**4-463 4.5.4 Habitat-Based Assessment of Other Fish and Wildlife Resources**

4-463 Summary of Conclusions

- Affected Environment

- Evaluation of the alternatives by components of the affected environment

## 4.5.4 Habitat-Based Assessment of Other Fish and Wildlife Resources

### Summary of Conclusions

Alternative B generally provides additional amounts and quality of the most limiting habitats when compared to Alternative A. A distinct advantage offered by Alternative B, when compared to Alternative A, is the certainty it provides. Alternative C provides greater habitat quality and quantity than Alternative B and provides the same certainty. Many east-side habitats do not differ in treatment under the alternatives. For the OESF, Alternatives 2 and 3 provide greater certainty than Alternative 1. In general, Alternatives 2 and 3 also provide greater amounts and quality of limiting habitats.

## Matrix 4.5.4a: Management Strategies for HCP (excluding OESF)

| | Alternative A<br>No Action | Alternative B<br>Proposed HCP | Alternative C |
|---|---|---|---|
| **Uncommon Habitats** | | | |
| West-side units | No specific provisions for uncommon habitats. Wildlife habitat objectives developed as required under FRP Policy No.22 | Same as Alternative A with additional mitigation provided for:<br>(1) talus fields larger than 1 acre: no harvest, 100-foot buffer with 60% canopy coverage; Forested talus; maximum harvest of 1/3 (vol.), yarding generally cannot physically disrupt talus, includes provision for mining of talus and road construction,<br>(2) caves important to wildlife: 250-foot no-harvest buffer around entrance, 100-foot no-harvest buffer around passages that may be disturbed by surface activities, new caves explored and mapped prior to management;<br>(3) cliffs: mining of rock from cliffs for road construction avoided when materials can otherwise be reasonably acquired, site-specific prescriptions developed;<br>(4) oak woodlands: retention of large dominant oaks, maintenance of 25-50% canopy cover, encroaching conifers removed, dead and dying oaks retained, prescribed burns where appropriate; and,<br><br>(continued) | Same as Alternative B. |

| | Alternative A<br>No Action | Alternative B<br>Proposed HCP | Alternative C |
|---|---|---|---|
| **Uncommon Habitats (continued)** | | | |
| West-side units (continued) | | (5) very large, old trees: large trees will be specified for retention with preference given to wildlife trees; applicable safety standards will be followed; attempt will be made to retain at least 2 live trees per acre harvested and at least 1/2 of the trees retained from the largest diameter class available; three snags per acre and three other green recruitment trees per acre; leave trees may be clumped. | |

## Matrix 4.5.4b: Management strategies for alternatives related to the OESF Planning Unit

| | Alternative 1<br>No Action | Alternative 2<br>Unzoned Forest<br>Proposed OESF | Alternative 3<br>Zoned Forest |
|---|---|---|---|
| **Uncommon Habitats** | | | |
| Uncommon Habitats | No specific provisions for uncommon habitats, development of wildlife habitat objectives required under FRP Policy No. 22. | Same as HCP Alternative B treatment of cliffs, caves, talus fields, and very large, old trees, except greater latitude for experimentation related to integrating conservation and production.<br><br>Attention to protecting known nesting, denning and/or roosting sites, but no special surveys unless unique circumstances.<br><br>Combined riparian, marbled murrelet, and spotted owl strategies will increase the presence of large, old trees. | Same as Alternative 2. |

## Affected Environment

### Introduction

Specific strategies to protect spotted owls, marbled murrelets, and salmonids have been presented in Chapter 2 and, under all alternatives, actions taken with regard to these species and riparian areas in general have been delineated. Numerous other wildlife species have been addressed individually to ascertain the impacts of the alternatives, and some of these species have specific protective actions proposed under one or more of the alternatives. In addition, protective measures are provided under the alternatives for special habitats such as cliffs, caves, talus slopes, and oak woodlands in the five west-side planning units and the OESF.

DNR anticipates that the proposed HCP will provide regulatory certainty with regard to all species (e.g., invertebrates, vertebrates, as well as yet undiscovered species) which may occur in habitats on DNR-managed lands in the five west-side planning units and the OESF. These species may number substantially over 200. NEPA requires an assessment of the likely impacts to all wildlife resources, including the area on the east side of the Cascades where DNR is currently seeking ESA protection only in relation to the spotted owl, and some other listed species. It is impracticable to analyze each of these species separately regarding their individual habitat and life-history needs relative to the considered actions under the alternatives. Rather, the HCP and this document propose a habitat-based approach to conservation and assessment of impacts. The primary assumption with regard to impacts to these other species is that if adequate amounts of habitat of sufficient quality are provided and other factors do not preclude the use of that habitat, then these species will persist. The question is whether the combination of the described protective measures, natural diversity within the habitats on DNR-managed lands, and the diversity of treatments to be implemented under each of the alternatives would provide a sufficient amount of habitat. This section discusses the impacts upon habitat quality and quantity that may result from each of the alternatives. Example species are sometimes used to display concepts and to accentuate the diversity of species being discussed through the use of this habitat-based approach.

### Habitat categories

Habitat categories addressed by this section include a variety of forest stands, physiographic features, and even individual trees. It is impossible to anticipate every habitat that could be used by every species. However, an attempt has been made to address the meaningful and identifiable categories. Some species require or depend upon more than one habitat category. Some species may be much more restrictive in their use of habitats and may depend upon only specific types of habitats within the coarse categories discussed in this section. For instance, some species are not only reliant on wetlands, but on those wetlands classified as bogs. As much as possible, forested habitats were divided according to forest structure and composition in a way that should be meaningful to forest-dwelling wildlife. Age classes of forested habitats were used as a surrogate for structure and composition in making estimates for this assessment. Conifer-dominated forests were classified as structurally complex forest (including fully functional forest and interior forest); closed-canopy forest; dense pole forest; regeneration

forest; open forest; and, on the east side, open, multi-aged forest. Other categories are wildlife trees, wetlands, riparian areas, aquatic habitats, caves, cliffs, talus rock, oak woodlands, prairies, subalpine and alpine habitats, and other habitats.

### Sources of data

Preliminary estimates of age classes for conifer-dominated forest stands were provided by DNR for the OESF and the remainder of the west-side planning units. These projections were made using several very coarse assumptions and are therefore not very precise. However, these projections do include the effects of the owl and murrelet strategies, as well as riparian and unstable-slope strategies. As much as possible, the projections factored in the likely silvicultural treatments to occur as a result of the strategies. Theoretical 40-, 60-, and 80-year rotations were projected in managed upland stands for comparison purposes only.

### Assumptions necessary to facilitate comparisons

Several assumptions were necessary to fill gaps in available data and the lack of details in some prescriptions. Actions under the alternatives are variable. This is particularly true under the No Action alternative because there is no guarantee that those actions will be conducted.

1. Although there is considerable uncertainty associated with the No Action alternative, some aspects were relatively more certain. It is assumed, for instance, that DNR would continue to honor the Hoh Agreement (Hoh Tribe and DNR 1993) regarding protection of riparian areas within portions of the OESF. In all alternatives, protection of unstable slopes was assumed to result in older forest. However, many of these areas might not be capable of supporting trees long enough to develop old-forest conditions and some unstable slopes might be harvested once appropriate techniques or knowledge are available. Further, some harvest may actually reduce the risk of failure on some slopes.

### Organization of this section

For the remainder of this section, each habitat category, or subset thereof, (1) will be described or defined; (2) the current situation, in terms of amount and quality of habitat, will be discussed; (3) impacts by alternatives will be discussed; and, (4) a comparison will be made between the alternatives. Impacts of each alternative will be described in the following order: west-side planning units (exclusive of OESF), east-side planning units, and then OESF. Where possible, subsections and alternatives were combined to reduce repetition.

## Evaluation of The Alternatives by Components of The Affected Environment

### Structurally Complex Forests

#### AFFECTED ENVIRONMENT

Structurally complex forests are those which are stocked with large trees. A variety of tree diameters and heights are evident. Mortality within the stand (or residual trees,

snags, and logs) provides cavities in standing snags, downed logs, deformities in standing live trees, large horizontal branches, and a complex canopy with conifer establishment occurring under openings in the canopy. For the purposes of this discussion, conifer stands greater than 70 years of age were considered to be structurally complex forest. Species using this habitat category range from the Johnson's hairstreak butterfly to the northern goshawk.

**West-Side Planning Units**

Currently, NRF management areas as proposed in Alternative B are 44 percent complex forest, proposed Dispersal management areas are 18 percent complex forest, and the remainder of the units are 26 percent complex forest. As a whole, these areas are 27 percent complex forest.

**East-Side Planning Units**

East-side forest habitats are not described in terms of age classes. Uneven-aged stands comprise the majority of east-side stands and conditions are described in more qualitative terms. Currently, 29 percent of DNR-managed lands on the east side are considered to be owl habitat (DEIS Table 4.3.5). Many 70-year-old stands may begin to approximate owl habitat on the east side of the Cascades where stands tend to be more diverse with regard to species and age composition.

**OESF Planning Unit**

According to preliminary estimates, about 20-30 percent of the OESF is composed of stands over 70 years of age.

#### ALTERNATIVES A AND 1

**West-Side Planning Units**

Complex forest will likely be provided as a result of spotted owl conservation, marbled murrelet protection, and other actions such as unstable-slope protection. The owl conservation strategy will only occur within owl circles under the No Action alternative; however, there is no guarantee regarding the amount of these complex forests that will exist. The level of protection may decrease as owls perish or relocate, and surveys document such change. However, habitat modeling efforts assumed no such decline in sites or relaxations in regulatory environment. The quality of habitat may be reduced where the 40 percent threshold is met and younger (i.e., Type C) habitat develops allowing harvest of older habitat (i.e., Type A or B).

Areas protected for murrelets will yield patches of uncertain size, shape, amount, and distribution but would likely be of high quality. It is expected that murrelet sites will occur more frequently near marine waters and at low elevations. Landscapes with significant patches of older forest may contain proportionally more murrelet sites as well.

Riparian buffers may contribute to complex forests, but a review of recent applications of DNR policies indicates such treatments are not guaranteed. Unstable slopes may be deferred from harvest until more is learned about how these slopes can be managed without increasing the risk of mass wasting and erosion. It is possible that in the short

term, and even in the long term to some degree, that unstable slopes will contribute somewhat to complex forests.

Based on DNR estimates, 30 percent of DNR-managed lands on the west side (exclusive of the OESF) would be in this habitat category at year 2096. This estimate includes riparian areas, unstable slopes, and murrelet sites, as well as habitat provided for owls. Based on average rotations of 60 years (40-80 years), it could be expected that those stands which fall outside such areas would provide 0 percent (0-12 percent) complex forests. As mentioned earlier (DEIS Table 4.2.1.5), most owl sites occur in proximity to federal lands. Thus, it is expected that under the No Action alternative the distribution of complex forests may be determined largely by the distribution of owl sites.

**East-Side Planning Units**

East-side forest habitats are not described in terms of age classes. It is expected that uneven-aged management will prevail in most cases on the east side. A significant amount of even-aged management may occur in the short term in areas where forest health is an issue. Where habitat is encumbered by owl circles, little to no harvest would be likely. In other areas, it is expected that fairly aggressive selective harvests would be employed and two distinct age classes would exist in most stands. Stocking of very large trees would be light and retention of snags would be minimal. It is projected that at year 2096, 17 percent of the east-side lands would be in NRF habitat.

**OESF Planning Unit**

As described above, the No Action alternative would, to a lesser degree, contribute complex forest as a result of owl and murrelet conservation, riparian buffers, and unstable-slope protection. Distribution of the resulting forests would be determined by the distribution of owl and murrelet sites, stream types, and unstable slopes. The level of riparian protection that would occur under the No Action alternative in the OESF is somewhat more certain due to the Hoh Agreement and given the degree of concern about mass wasting, sedimentation, and salmon that exists in this region. It is therefore more likely that larger and more robust buffers would be utilized in the OESF than in the remainder of west-side planning units. Preliminary stand-age projections indicate that 40-50 percent of the OESF could be in stands over 70 years of age at year 2096.

**ALTERNATIVE B**

**West-Side Planning Units**

While there is no guarantee these complex forests will exist under the No Action alternative, there is a commitment that this habitat class will be provided under Alternative B. As in the No Action alternative, complex forest would be provided as a result of owl conservation, marbled murrelet protection, and other actions. The owl conservation strategy will only occur in designated landscapes under Alternative B. The goal for those designated landscapes is that 50 percent of the designated area (by WAU) be developed and maintained in foraging habitat. Like the No Action alternative, the murrelet strategy may provide some additional complex forest, but would be uncertain regarding the shape, size, amount, and distribution of such stands. For the most part, these stands will be largely determined by the occurrence of murrelets. Since important

components of the murrelet strategy under Alternative B would be determined in the future after an interim period of research, it is unknown how much complex forest this alternative will contribute. Analysis completed with regard to murrelet habitat amounts and potential occupancy rates found in Section 4.2.2 and Table 4.2.31 may provide a basis for this estimate.

Alternative B would provide more complex forest in riparian areas in most geographic areas compared with the No Action alternative. The riparian management zones would likely provide complex forests now or in the future. The wind buffer prescription may provide some complex forest, but it is difficult to estimate. Those factors which are necessary to avoid impacts to salmonid would be maintained. The protection afforded unstable slopes would be the same as presented under the No Action alternative.

Based on DNR estimates, 31 percent of DNR-managed lands in west-side planning units (excluding the OESF) would be in this habitat category at year 2096. This estimate includes riparian areas, unstable slopes, and murrelet sites, as well as habitat provided for owls. Based on average rotations of 60 years (40-80 years), it could be expected that those stands which fall outside such areas would provide 0 percent (0-12 percent) complex forests. However, the older forests produced and maintained in riparian areas, murrelet sites, and other such areas would benefit from the protection provided by surrounding stands if those stands are of sufficient development to buffer the effects of sun, wind, and predators. The distribution of complex forests will be determined largely by the location of proposed NRF management areas and Dispersal management areas. At year 2096, it is expected that 39 percent of the Dispersal management areas, 59 percent of the NRF management areas, and 25 percent of the remaining areas would be in complex forest.

**East-Side Planning Units**

The riparian strategy is identical under all alternatives on the east side of the Cascade mountains. Areas east of the Cascade mountains would not be managed for murrelets, and therefore no additional habitat would be provided. The sole difference between alternatives on the east side is related to the owl strategies. East-side forest habitats are not described in terms of age classes. It is expected that uneven-aged management will prevail in most cases on the east side. Within the NRF management areas, habitat goals (50 percent NRF) will be met by a combination of retaining habitat or growing habitat. Many stands in these NRF management areas will be harvested during the plan. It is expected that these areas would receive a selective harvest which would retain multiple (i.e., more than two) age classes and large numbers of snags. This would hasten the return or achievement of NRF characteristics thereby allowing harvest of other areas to continue in the dynamic scheme intended. Outside NRF management areas, it is expected that fairly aggressive selective harvests would be employed as described in the No Action alternative. It is expected that 9 percent of east-side, DNR-managed lands will provide NRF habitat at year 2096.

### ALTERNATIVE C

**West-Side Planning Units**

Alternative C would resemble Alternative B with some exceptions. The NRF management areas would have a goal of 60 percent NRF instead of 50 percent NRF. This aspect of Alternative C may not result in drastic short-term changes from Alternative B because many areas are habitat and habitat-growth limited. Eventually, there will be some increase observed in older forests. The main difference between Alternatives B and C would likely occur as a result of the additional 83,000 acres of west-side NRF management areas provided under Alternative C.

Alternative C would retain all marginal and suitable murrelet habitat prior to development of a long-term plan. It is not certain that the long-term plan would be any different than that developed under Alternative B, but a greater number of options would be retained in preparation for the long-term plan. This might result in more or better distributed complex forest in the long term.

The riparian strategy would only allow entry into riparian buffers for enhancement purposes. It is expected that this will result in complex forests being developed in the no-harvest and minimal-harvest areas as well as the low-harvest areas. Alternative C would provide 50-foot no-harvest areas around nonforested wetlands as well.

It is expected that Alternative C would provide greater amounts of complex forest than either Alternative A or B. Even if the 60 percent NRF goal resulted in no more complex forest, the approximately 83,000 acres of additional NRF management areas would likely result in more complex forest at year 2096. At year 2096, it is expected that 50 percent of DNR-managed lands in the west-side planning units (excluding the OESF) would be in this habitat category. It is also expected that 58 percent of the NRF management areas, 48 percent of the Dispersal management areas, and 49 percent of the remaining areas would be in complex forest.

**East-Side Planning Units**

The difference between Alternatives B and C would be the 60 percent NRF goal and the additional NRF management areas. This would result in greater amounts and better distribution of complex forest on the east side than Alternative B and greater assurances than under Alternative A.

### ALTERNATIVE 2

Under this alternative, the objective is that at least 40 percent of the OESF would be in forest stages similar to complex forest at year 2096. This would include sites protected for murrelets, riparian areas, and unstable slopes. Given the topographic nature of the OESF and the concern regarding unstable slopes, it is uncertain how much additional protection would be needed to meet the 40 percent target. Much of this habitat category may occur on steep and unstable slopes. However, because of the 11 landscape planning units and the need to meet this target for each such unit, it is expected that the complex forest will be well distributed. The number of murrelet sites is also expected to be higher than other HCP planning units but would not be any more certain regarding the characteristics of such sites. The level of management within riparian buffers is

somewhat vague and it is therefore uncertain how much complex forest would be provided in these areas. However, complex forest is also expected to be retained or developed within 50 feet of nonforested wetlands. Preliminary DNR estimates indicate that 60-70 percent of the OESF would be in stands over 70 years old at the year 2096.

#### ALTERNATIVE 3

Under this alternative, it is expected that the owl strategy will contribute 100 percent of 5,000 acres in forests which are greater than 100 years old, 50 percent of 78,000 acres as sub-mature forest, and another 40 percent of 74,000 acres of owl habitat. Assuming this would all be complex forest at year 2096, about 26 percent of the OESF would provide complex forests. However, many areas outside these designated owl zones would also contribute complex forests as a result of the riparian and unstable-slope strategies described above. The distribution of complex forest would appear to be more centralized around the owl zones in Alternative 3, but riparian areas and unstable slopes would likely result in the distribution of this habitat category throughout most landscapes. It is expected that at year 2096, 36 percent of DNR-managed lands in the OESF would be NRF habitat. DNR estimates that 60-70 percent of the OESF would be in stands exceeding 70 years of age at year 2096.

#### COMPARISON AMONG ALTERNATIVES AND REMARKS RELATIVE TO CUMULATIVE EFFECTS

### West-Side Planning Units

Alternative C is expected to provide the most complex forest (50 percent) followed by Alternative B (31 percent). Alternative A would provide complex forests (30 percent) in some areas where neither Alternative B or C would provide any (e.g., southwest Washington). Alternative C provides complex forest in some areas not provided for under Alternative B (e.g., the Straits Planning Unit). The largest difference between the alternatives is the lack of certainty provided by Alternative A and the greater amounts and distribution of complex forest provided by Alternative C.

### East-Side Planning Units

In east-side areas designated for NRF development or maintenance, it is expected that adequate quantity, quality, and juxtaposition of complex forests will be provided for most of the species with requirements for this habitat category. These areas tend to be adjacent to or near federal reserves and will support the ability of the federal lands to provide the needed habitat. In addition to the NRF management areas delineated in Alternative B, Alternative C would provide additional NRF management areas in the White Salmon area and several other portions of the state. This would help provide additional complex forests for other species in those areas. Under the No Action alternative, owl territories are particularly dense in these same areas and would be expected to provide complex forests in these same general areas but with far less certainty than the action alternatives. Both action alternatives would likely provide more complex forest than the No Action alternative.

### OESF Planning Unit

Alternatives 2 and 3 are expected to provide the most complex forest at year 2096 (60-70 percent) in comparison to the No Action alternative (40-50 percent). Complex forest

would be better distributed across all 11 landscape planning units under Alternative 2 when compared to Alternatives 1 and 3.

**Remarks Relative to Cumulative Effects**

The need for contributions of late seral forest by nonfederal lands will be highest in those areas where little federal land exists such as southwest Washington, the Puget trough, low-elevation portions of the Olympic Peninsula, and areas in the White Salmon/Klickitat region. Nonfederal lands at low elevations are needed to conserve late-successional-dependent species (FEMAT 1993; Thomas et. al. 1993). In the No Action alternative, there are few spotted owl territories remaining in southwest Washington (the South Coast Planning Unit and the extreme western portion of the Columbia Planning Unit) and the prospect for these territories persisting is not good without the contributions from nonfederal landowners. Under the action alternatives, very little to no provision is made for owls in southwest Washington. Under Alternative C, 43,000 acres of experimental areas may prolong, but would not guarantee, long-term persistence of owls or complex forest. The No Action alternative may provide more complex forest in southwest Washington than the action alternatives, depending on site persistence, site movements over time, and other factors. As described above, the action alternatives may favor some landscapes at the expense of other landscapes, more so than the No Action alternative. Both the action and no-action scenarios may cause or perpetuate gaps (large areas with no late seral forest) in certain landscapes due to existing ownership patterns.

The impacts upon species requiring complex forest in southwest Washington will be particularly severe given the lack of contribution by federal lands. Species whose range may be disrupted by these alternatives may include, for example, the Keen's myotis, Pacific fisher, and late seral herbaceous plants and fungi. Some species may rely on these landscapes in greater proportion than others, and may be more affected by actions in this landscape. For instance, species which depend on late seral/complex forests in the low-elevation, Sitka spruce zone may be most affected. Currently, relatively small amounts of complex forest persist in southwest Washington placing a higher ecological value on those remaining stands. Without the buffering effect of more conservatively-managed federal lands, actions to harvest these habitats will have impacts which will be higher in proportion to the impacts resulting from harvest of similar habitats in other areas. Some actions will also limit the potential for this forest category to develop in the future.

## Fully Functional Older Forest (Subset of Structurally Complex Forest)

### AFFECTED ENVIRONMENT

For the purposes of this analysis, this subset of the mature, structurally complex forest was examined separately. The richness and species diversity of these habitats may provide for the needs of species beyond what is provided by stands which are merely structurally complex. It was assumed that forests older than 150 years in age would begin to satisfy these needs. In the OESF, the amount of habitat that is either older than 100 years or older than 200 years will be discussed.

**West-Side Planning Units**
Currently, NRF management areas as proposed under Alternative B are 15 percent older forest, Dispersal management areas are 3 percent older forest, and the remainder of the planning units are 2 percent older forest. As a whole, these areas are 4 percent older forest.

**East-Side Planning Units**
East-side forest habitats are not described in terms of age classes. Uneven-aged stands comprise the majority of east-side stands and conditions are described in more qualitative terms. Also, given the nature of east-side stands in lower elevations, there may be less distinct differences between a complex forest and an older forest than there are on the west side.

**OESF Planning Unit**
Within the OESF, preliminary estimates indicate that about 15-20 percent of the forest stands are older than 100 years and less than 2 percent are over 200 years old.

#### ALTERNATIVES A AND 1

**West-Side Planning Units**
There are no guarantees that older forests will be retained or developed. Although current guidelines may remain in place, where circles are near 40 percent habitat, substitution of younger Type C owl habitat may occur. Owls may also perish or relocate, allowing harvest of additional habitat. Murrelet sites will contribute to older forest because little management will occur within these sites. Little older forest is likely to occur in riparian areas. Some older forest may be found in conjunction with unstable slopes until more is learned about harvesting these slopes without placing them at greater risk for erosion and mass wasting.

Based on DNR estimates, 16 percent of DNR-managed lands on the west side (exclusive of the OESF) would be in this habitat category at year 2096. This estimate includes riparian areas, unstable slopes, and murrelet sites, as well as habitat provided for owls. Based on average rotations of 60 years (40-80 years), it could be expected that none of those stands which fall outside such areas would provide older forests. As mentioned earlier, most owl sites occur in proximity to federal lands. Because a major portion of the older forest provided in the No Action alternative will occur as a result of the protection afforded regulatory owl circles, it is expected that under the No Action alternative the distribution of older forests may be determined largely by the distribution of owl sites.

**East-Side Planning Units**
Because east-side stands are not assigned to age classes, it is very difficult to assess this habitat category in terms of age. With the exception of short-term restraints on harvest that would be expected within owl circles, nothing in this alternative designates no-harvest zones; and frequent entries in stands may remove many of the structures required to achieve all functions in an older forest.

### OESF Planning Unit

At year 2096, it is expected that all of the complex forest (40-50 percent of the OESF) would be in stands over 100 years old and about 10-15 percent of the OESF would be in stands over 200 years of age. About 20 percent of the stands over 100 years and almost all stands over 200 years would likely be previously unharvested stands (unharvested since date of stand initiation).

#### ALTERNATIVE B

### West-Side Planning Units

Under this alternative, some older forest is expected to occur in the 300-acre nest patches provided in the owl strategy during the research and transition phases of managing these sites. Most murrelet sites would be expected to eventually become older forest as would the 25-foot no-harvest riparian buffer and possibly even the 25- to 100-foot minimal-harvest zone.

Based on DNR estimates, 12 percent of DNR-managed lands on the west side (excluding the OESF) would be in this habitat category at year 2096. This estimate includes riparian areas, unstable slopes, and murrelet sites, as well as nesting habitat provided for owls. The distribution of older forests will be determined largely by the location of the 20,400 acres of owl nesting patches. At year 2096, it is expected that 12 percent of the Dispersal management areas, 32 percent of the NRF management areas, and 9 percent of the remaining areas would be in older forest.

### East-Side Planning Units

Because east-side stands are not assigned to age classes, it is very difficult to assess this habitat category. Nothing in this alternative designates sizable no-harvest zones, and frequent entries in stands may remove many of the structures required to achieve all functions in an older forest.

#### ALTERNATIVE C

### West-Side Planning Units

Under this alternative, older forest is expected to occur in the entire area provided in the owl strategy because this alternative does not provide for degradation of older forests. Most murrelet sites would also be expected to eventually become older forest, as would the 100-foot minimal harvest riparian buffer and portions of the low-harvest riparian buffer. The 50-foot no-harvest buffer of nonforested wetlands would also provide older forest in time. In Alternative C, it would be expected that 25 percent of DNR-managed land in the west-side planning units (excluding the OESF) would be in this habitat category at year 2096. It is also expected that 31 percent of the NRF management areas, 24 percent of the Dispersal management areas, and 23 percent of the remaining areas would be in complex forest.

### East-Side Planning Units

As in Alternative B, nothing in this alternative designates sizable no-harvest zones. However, the owl strategy would prohibit degradation of old-forest habitat which is counted toward the NRF objectives.

#### ALTERNATIVE 2

This alternative contains an objective of 20 percent forest with structure equivalent to that normally found in forest at least 100 years in age, and it is likely that large portions of that 20 percent would be in this habitat category during the first 40-60 years. As mentioned above, most murrelet sites would eventually provide older forest as would the 50-foot zone around nonforested wetlands. The OESF riparian strategy may also provide some older forest. According to preliminary estimates, it is expected that 50-60 percent older forest would be provided at year 2096 and that 10-15 percent forest over 200 years old would be present as well. About 5 percent of the forest stands over 100 years old and about 90 percent of the stands over 200 years old would have been previously unharvested.

#### ALTERNATIVE 3

This alternative may provide some older forest within owl zones, most likely within the central areas known as nest groves, where 100 percent of 5,000 acres will be forest of about 100 years or more in age. As in Alternative 2, murrelet sites, riparian areas, and wetland buffers may provide some older forest. According to preliminary estimates, it is expected that 60-70 percent of the OESF stands will be over 100 years of age and about 15 percent will be over 200 years of age. About 10 percent of stands over 100 years and about 95 percent of those over 200 years would be previously unharvested stands.

#### COMPARISON AMONG ALTERNATIVES AND REMARKS RELATIVE TO CUMULATIVE EFFECTS

### West-Side Planning Units

It is estimated that Alternative A would provide more older forest (16 percent) than Alternative B (12 percent) or C (25 percent), but this would not be guaranteed. It is likely that Alternative C would provide more than Alternative B based primarily on the 60 percent NRF target, the additional NRF management areas, and the higher habitat-quality standards.

### East-Side Planning Units

Although it is difficult to assess each alternative quantitatively regarding stand structures relative to age classes on the east side, it is possible to perform a relative assessment between the alternatives. A portion of owl habitat may be considered fully functional older forest. In the No Action alternative, these habitats are expected to be distributed, but often of short duration as owls are expected to move or expire in marginal habitats. In Alternative B, these habitats would be less distributed but more certain in the long term. Under Alternative C these habitats are more certain, well-distributed, and likely to be of a greater amount.

### OESF Planning Unit

The amounts of forest older than 100 years of age for the OESF would be 43 percent for Alternative 1, 64 percent for Alternative 2, and 67 percent for Alternative 3. For stands older than 200 years of age these amounts are expected to be 14 percent for Alterative 1, 12 percent for Alternative 2, and 16 percent for Alternative 3. Older forest in Alternative 1 would be distributed according to current owl circles but would not have any commitments associated with it. Older forest in Alternative 2 would be distributed across

all 11 landscape planning units. Older forest in Alternative 3 would be concentrated around strategic locations regarding owls (owl zones).

**Remarks Relative to Cumulative Effects**
As described earlier for complex forests, some landscapes may be deficient in complex forest. These same areas are also the most likely to be deficient in older forest. In the absence of federal lands or contributions by federal lands, the conditions for a number of species dependent on these forests may thus be impacted, or at least would not improve.

## Interior Forest (Subset of Structurally Complex Forest)

### Affected Environment
For the purposes of this discussion, interior forests are those structurally complex forest (greater than 70 years) which are of a sufficient distance (100-300 feet) from the edge of younger stands or nonforested areas to maintain conditions which are characteristic of nonfragmented forests. Murrelets and a number of other forest-nesting birds are subject to high predation rates when exposed to forest patches with high edge-to-area ratios. A number of species dependent on moist, stable conditions are negatively effected by changes in microclimate which occur in the vicinity of edges.

### Alternatives A and 1
**West-Side Planning Units**
With regard to the contribution made by owl sites, the amount would depend to a large degree on the existing situations present in current owl circles. The contribution received from murrelet sites would depend on whether murrelet sites were of sufficient size and shape to provide interior forest conditions. Riparian buffers may contribute complex forest, but may be too narrow to provide interior forest unless they are adjacent to mature stands. However, many species will benefit by widely-distributed complex forest components within buffers. Other species require interior forest with complex structure and would derive benefit only when buffers are adjacent to other complex forest. Unstable slopes may be deferred from harvest until more is learned about how these slopes can be managed without increasing the risk of mass wasting and erosion. It is possible that in the short term, and the long term to some degree, unstable slopes will make some contribution to interior forests. However, many such slopes are incapable of growing or supporting older forests. The stage of forest development on these unstable slopes varies across the landscape. One common factor is that they are located adjacent to or nearby streams or seeps. Although we do not know the size or shape of these patches, adjacency to the riparian corridor system should compliment the forests found within those corridors.

**East-Side Planning Units**
Although it is difficult to assess each alternative quantitatively regarding stand structures relative to age classes on the east side, it is possible to perform a relative assessment between the alternatives. The No Action alternative would provide habitat in regulatory circles where habitat already existed and patterns of retention would not necessarily favor larger patch size.

### OESF Planning Unit

The amount of interior habitat provided through the riparian and murrelet strategies may be minimal. Where these areas occur in proximity to one another or in proximity to unstable slopes, areas may coalesce into patches of habitat sufficient to provide some interior forest. Owl circles by themselves are also unlikely to provide large amounts of interior forest, but in conjunction with the above strategies may make a contribution.

#### ALTERNATIVE B

### West-Side Planning Units

Interior forest is likely to occur within the NRF management areas as the 50 percent goal is achieved. The 500-acre patches are likely to contain a considerable amount of interior forest. The contribution received from murrelet sites would depend on whether murrelet sites were of sufficient size and shape to provide interior forest conditions. The situation with regard to riparian and unstable-slope areas is the same as discussed under the No Action alternative.

### East-Side Planning Units

This alternative, which would eventually supply 50 percent of significant landscape areas in owl habitat, would logically be expected to produce significant amounts of interior forest in those areas.

#### ALTERNATIVE C

### West-Side Planning Units

Interior forest provided under Alternative C would be similar to Alternative B, but would be slightly greater in amount due to the 60 percent goal and the additional NRF management areas. In addition, all older forest in these areas that contributes to owl habitat would not be subject to actions which might degrade its value as is the case in Alternative B.

### East-Side Planning Units

This alternative, which would eventually supply 60 percent of significant landscape areas in owl habitat or better, would logically be expected to produce significant amounts of interior forest in those areas.

#### ALTERNATIVE 2

Interior forest is likely to occur to some extent within the OESF as the 40 percent goal is achieved. The contribution received from murrelet sites would depend on whether murrelet sites were of sufficient size and shape to provide interior forest conditions. The situation with regard to riparian and unstable-slope areas is essentially the same as discussed under the No Action alternative.

#### ALTERNATIVE 3

The amount of interior forest would be determined in part by the relationship of nest groves and owl zones. Murrelet sites, riparian buffers, and unstable slopes are identical to Alternative 2.

### West- and East-Side Planning Units

Alternatives B and C would provide larger amounts of interior forest than is estimated under Alternative A. The distribution of such interior forest is likely skewed toward the NRF management areas. Other areas may be dependent upon riparian areas, unstable slopes, and murrelet sites for interior forest. This may likely leave insufficient amounts of interior forest, for some species, across large landscapes under any of the alternatives.

### OESF Planning Unit

Alternative 2 would likely produce the greatest amounts of interior forest when compared to Alternative 3 and Alternative 1. Patch size and adjacency is likely to increase as the amount of complex forest increases beyond 40 or 50 percent.

## Closed-Canopy Forest

#### AFFECTED ENVIRONMENT

Closed-canopy forest (closed forest) is defined as those coniferous forests between 40 and 70 years of age. They are old enough so that they have undergone some stem exclusion and competition mortality and the trees in these stands have developed diameter; have achieved some lift to the lower portion of the canopy as self-pruning occurs; and have well-developed, deep canopies. However, these stands are young enough that they have not developed the complex structures characteristic of the previous habitat category. Most species relying on closed forests (e.g., tanagers) are likely able to substitute older, more complex stands when those are available. Where sufficient understory exists, species such as deer and elk may derive benefits from these closed-canopy stands when phenology is delayed so that a greater quality of forage is available late in the growing season, when thermal cover is provided in the summer and winter, and when hiding cover is provided by boles and undergrowth; but, older forests may provide even greater benefits.

### West-Side Planning Units

Currently, NRF-management areas are 30 percent closed forest, Dispersal management areas are 47 percent closed forest, and the remainder of the units are 41 percent closed forest. As a whole, these areas are 40 percent closed forest.

### East-Side Planning Units

Due to the lack of age-specific data on east-side stands, it is difficult to assess the amount of this habitat category which would likely be present. Many of the stands are expected to be managed on an uneven-aged basis. Where sufficient numbers of overstory trees are left, the stand may be considered as a closed forest. In other situations, the removal of most overstory trees or the naturally sparse nature of overstory trees might result in the more open uneven-aged stage discussed later. It is expected that, in either event, the needs of many species would be met. Species relying on forests which provide thermal cover, hiding cover, and other needs which are based more upon a more-or-less continuous canopy, and less so on characteristics such as found in older types, would

likely find sufficient habitats in even and multi-aged stands where one or a number of species predominate in the overstory and sufficient canopy cover remains.

**OESF Planning Unit**
Within the OESF, preliminary estimates indicate that about 5-10 percent of stands are currently in the closed-canopy forest stage.

#### ALTERNATIVES A AND 1

**West-Side Planning Units**
Due to the existing age distribution of forested stands on DNR-managed lands, it is expected that there will be a ready supply of mid-seral forests for many decades, regardless of which alternatives are implemented. Silvicultural options in mid-seral forests can increase or decrease the amount of time stands will remain in this stage before obtaining late-successional characteristics. These silvicultural options exist to a similar degree under all alternatives.

Based on DNR estimates, 29 percent of DNR-managed lands on the west side (exclusive of the OESF) would be in this habitat category at year 2096. This estimate includes riparian areas, unstable slopes, and murrelet sites, as well as habitat provided for owls. Based on average rotations of 60 years (40-80 years), it could be expected that those stands which fall outside such areas would provide 33 percent (0-38 percent) closed forests. It is reasonable to assume that between owl circles, riparian buffers, wetland buffers, unstable slopes, and general silviculture, closed forest would likely be provided in fair amounts across all landscapes. Under the No Action alternative, there is no guarantee for any rotation age or habitats. A change from a rotation which averages 60 years to one which averages 40 years may significantly alter this assessment.

**East-Side Planning Units**
Under all alternatives, it is expected that uneven-aged management would retain and grow stands with significant amounts of overstory trees. Even-aged management is also likely to continue on the east side especially considering the need for action relative to the forest health issue. Rotations are also expected to be sufficiently long to provide closed-canopy forest although there are no guarantees of this under the No Action alternative. However, it is also likely that these even-aged stands would then be converted to uneven-aged management as time progresses.

**OESF Planning Unit**
Based on preliminary estimates, it is expected that 30-35 percent of the OESF would be in closed forest at the year 2096.

#### ALTERNATIVE B

**West-Side Planning Units**
In the long term, there is greater certainty that mid-seral stands will be provided under the action alternatives because they are an intermediate stage necessary to obtaining late seral characteristics. Under this alternative, DNR would be managing in a manner to provide late seral habitats in some landscapes that would include harvests of some late seral habitat while developing other late seral habitat. This would ensure a continuing but

dynamic amount of mid-seral forests that would be guaranteed under this alternative. Substantial areas will also be managed as spotted owl dispersal habitat which will provide mid-seral forests in those areas.

Based on DNR estimates, 31 percent of DNR-managed lands on the west side (excluding the OESF) would be in this habitat category at year 2096. This estimate includes riparian areas, unstable slopes, and murrelet sites, as well as habitat provided for owls. The distribution of closed forests would be influenced little by the location of NRF management areas and Dispersal management areas. At year 2096, it is expected that 30 percent of the Dispersal management areas, 22 percent of the NRF management areas, and 33 percent of the remaining areas would be in closed forest.

**East-Side Planning Units**

Under all alternatives, it is expected that uneven-aged management would retain and grow stands with significant amounts of overstory trees. Even-aged management is also likely to continue on the east side especially considering the need for action relative to the forest health issue. Rotations are also expected to be sufficiently long to provide closed-canopy forest although there are no guarantees of this under the No Action alternative. However, it is also likely that these even-aged stands would then be converted to uneven-aged management as time progresses.

#### ALTERNATIVE C

**West-Side Planning Units**

At year 2096, it is expected that 22 percent of DNR-managed lands in the west-side planning units (excluding the OESF) would be in this habitat category. It is also expected that 21 percent of the NRF management areas, 29 percent of the Dispersal management areas, and 21 percent of the remaining areas would be in closed canopy forest. More areas would be managed for NRF, and fewer would be managed as dispersal habitat.

**East-Side Planning Units**

Under all alternatives, it is expected that uneven-aged management would retain and grow stands with significant amounts of overstory trees. Even-aged management is also likely to continue on the east side especially considering the need for action relative to the forest health issue. Rotations are also expected to be sufficiently long to provide closed-canopy forest although there are no guarantees of this under the No Action alternative. However, it is also likely that these even-aged stands would then be converted to uneven-aged management as time progresses.

#### ALTERNATIVE 2

This alternative includes an objective that would maintain at least 40 percent of each landscape planning area as young forest marginal or higher quality habitat. Under this alternative, the harvest of stands younger than 100 years of age is distributed through time to strike a balance with regrowth. It is estimated that at year 2096, 5-10 percent of the OESF would be in closed forest.

**ALTERNATIVE 3**
This alternative includes an objective that would retain 40 percent of 40,000 acres as young-forest marginal habitat (51-70 years). It is estimated that at year 2096, about 5 percent of the OESF would be in closed forest.

## Comparison Among Alternatives and Remarks Relative to Cumulative Effects

### West-Side Planning Units

Little difference exists between alternatives. The No Action alternative might produce 29 percent closed-canopy forest at year 2096, but results under this alternative are highly variable. It is estimated that Alternative B will contribute about 31 percent closed forest and that Alternative C will contribute about 22 percent.

When examining the amount of closed-canopy forest or older, more advanced habitat categories which may exist at year 2096 in comparison to the current amount (67 percent), the No Action alternative would contribute 59 percent and Alternative B would contribute 62 percent. Distribution under Alternative B would likely be 81 percent in the NRF management areas, 69 percent in the Dispersal management areas, and 58 percent in the remaining areas. In comparison, Alternative C would provide about 72 percent, with 78 percent of NRF management areas, 77 percent of Dispersal management areas, and 70 percent of the remaining areas.

Silvicultural techniques which are designed to produce late seral characteristics would be applied in NRF management areas under Alternatives B and C and in riparian areas under Alternative C.

### East-Side Planning Units

The amounts of this habitat category are not likely to differ significantly by alternative. For all alternatives, it is difficult to assess the amount which would be present, but it is also likely that closed-canopy forest and older categories will constitute a major portion of the forested habitat categories.

### OESF Planning Unit

The amount of closed forest differs significantly between alternatives. Alternative 1 would provide 30-35 percent closed forest in comparison to the action alternatives (5-10 percent). However, there is very little difference when considering that more advanced forests can substitute for closed forest for many species. All alternatives provide about 70-75 percent closed and older forests.

### Remarks Relative to Cumulative Effects

Species which rely on closed-canopy forest or older categories for security and thermal cover, such as black-tailed deer and elk, may be impacted. Fragmentation of remaining forest patches by roads and intervening harvests may have synergistic effects which could increase vulnerability of these game species, and may alter adult male to female ratios, thereby impacting recreational and economic opportunities as well (Montana Department

of Fish, Wildlife, and Parks 1985; Basile and Lonner 1979; Lyon 1979). It is expected that these effects would be greatest in the areas where DNR-managed lands are interspersed with numerous smaller and privately-owned tracts, and less so where DNR-managed lands are in contiguous blocks or adjacent to federal lands. Closed forest may not provide the structures and benefits needed by many species which depend on structurally complex, interior forest, but closed forest may provide a sufficient buffer to these older stands so that microclimate variability is reduced and those older stands function more thoroughly as interior forest.

Reduction in the amount and patch size of closed forests and older categories in certain landscapes (e.g., southwest Washington and the eastern portions of the Klickitat Planning Unit) may impact species utilizing contiguous forests such as the northern goshawk, and fragmentation and isolation may impact a number of low-mobility species.

## Open Multi-Aged Stands

#### AFFECTED ENVIRONMENT

This habitat category is not a likely forest stage on the west side. Douglas-fir is considered the most desirable species in areas where it can be grown and is relatively shade-intolerant. Even-aged harvests with the intent of planting Douglas-fir following harvest will retain too few overstory trees to produce this habitat category on the west side outside of the hemlock zone and sitka spruce zones. Partial harvests done for wildlife and resource objectives will leave too many trees to be considered in this habitat category. Partial harvests like thinnings will mainly be aimed at improving health and vigor of the dominant age class (exceptions to this may include experimental management in the OESF). On the west side, opening of stands will bring a quick response from understory plants, natural regeneration may occur by some shade-tolerant species, but they would not likely progress far before they were suppressed. However, where such stands might occur on the west side, they are discussed by age of dominant trees for the purposes of this assessment.

On the east side, uneven-aged management is highly likely (although some heavier removals are also possible, especially where forest health concerns exist). Natural fire regimes may also result in this stand type. These stands are most likely located where there is a species or a number of species, such as ponderosa pine, which are compatible with this management and natural fire regimes. Habitats included herein would be east-side stands with multispecies or ponderosa pine that would be relatively open, and would contain overstory trees with a canopy which has been elevated above the ground by self-pruning or fire, and would contain younger trees at various ages of development.

#### ALL ALTERNATIVES

These stands would be most likely located where species composition is compatible with this management. Overstory trees in these stands would be opened enough so that significant natural or artificial underplanting would occur. Management would be directed at both the older trees and the younger trees as future crop trees. Two age classes would be most common, three age classes would be less common, and a true

multi-aged stand would be uncommon. True multi-aged stands would be more likely to be unmanaged or lightly managed and would closely resemble the fully functional older forest discussed earlier. Three-age stands would tend to resemble the structurally complex forest habitat. Basically, these stands will be relatively common under all alternatives on the east side. They will be most common outside owl circles (No Action alternative) or outside NRF management areas (action alternatives).

## Dense Pole Forest

#### AFFECTED ENVIRONMENT

The dense-pole stage of forest development occurs during the early stages of stem exclusion, usually between 20 and 40 years old. Stems are closely spaced and numerous and little understory exists. The lower limit of the canopy begins to raise as self-pruning of branches occurs. Generally, there is insufficient canopy lift to allow larger birds, such as spotted owls, to penetrate. Other birds such as warblers and, in some of the older pole forest, waxwings and grosbeaks, would make use of this habitat category. Snowshoe hare may make use of this stage for hiding cover.

### West-Side Planning Units

Currently, proposed NRF management areas are 14 percent dense pole, Dispersal management areas are 22 percent dense pole, and the remainder of the units are 15 percent dense pole. As a whole, these areas are 16 percent dense pole forest.

### East-Side Planning Units

The amount of this habitat is difficult to assess without age-class information, but it is likely fairly low. There are stands in the transition zone between the pine and fir zones where dense regrowth of Douglas-fir and grand fir has occurred under an overstory of very open pine and Douglas-fir, which are larger and fire-resistant trees. It is extremely difficult to assess the amount of this habitat category.

### OESF Planning Unit

Within the OESF, preliminary estimates indicate that about a quarter of the land base is currently in this habitat category.

#### ALL ALTERNATIVES

### West-Side Planning Units

Based on DNR estimates, 15-20 percent of DNR-managed lands on the west side (exclusive of the OESF) would be in this habitat category at year 2096. This estimate includes riparian areas, unstable slopes, and murrelet sites, as well as habitat provided for owls. Based on average rotations of 60 years (40-80 years), it could be expected that those stands which fall outside such areas would provide 33 percent (25-50 percent) dense pole forests. It is expected that there would be little difference between areas. For instance, at year 2096 under Alternative B, it is expected that dense pole forests would encompass 13 percent of NRF management areas, 16 percent of Dispersal management areas, and 23 percent of the remaining areas. At year 2096 under Alternative C, it is

expected that dense pole forests would encompass 13 percent of NRF management areas, 10 percent of Dispersal management areas, and 18 percent of the remaining areas.

**East-Side Planning Units**
This habitat category is expected to be common under all alternatives given the concern about forest health and the likely occurrence of clearcuts for the purpose of changing species composition and reinitiating the successional stages. It is expected that planting of species appropriate to those sites will occur followed by management directed at achievement of natural forest conditions (e.g., relatively open, multi-aged, multispecies stands or stands dominated by older, fire-resistant ponderosa pine and Douglas-fir). It is also expected that, on smaller scales, fires would continue to reinitiate forest development of many stands which would eventually result in dense pole forest patches.

**OESF Planning Unit**
The amount of this habitat type decreases under all alternatives. Alternative 1 would retain the most (about 20 percent) in comparison with Alternatives 2 and 3 (5-10 percent).

#### Remarks Relative to Cumulative Effects

Most managed timberlands will continue to provide regular supplies of pole timber. It is highly unlikely that timber managers will manage on rotations much shorter than 40 years. In areas adjacent to federal reserves, the amount of pole timber available in the future may be greatly influenced by natural and stochastic events. Stochastic events such as fire, flood, disease, and windthrow will continue to create early seral openings that will eventually become pole forests.

## Regeneration Forest

#### Affected Environment

These forests are defined as those forests which are 10 to 20 years old and are composed of shrubs and saplings. They are old enough that their branches are beginning to intertwine and outcompete many of the shrubs. Canopies are very dense from the ground upward. Sparrows, thrushes, and porcupines are expected to use this habitat category.

**West-Side Planning Units**
Currently, proposed NRF management areas are 10 percent regeneration forest, Dispersal management areas are 10 percent regeneration forest, and the remainder of the units are 13 percent regeneration forest. As a whole, these areas are 12 percent regeneration forest.

**East-Side Planning Units**
Even-aged management is less common than uneven-aged management; however, there is a significant portion of the harvest which removes enough of the overstory to produce open stands and then regeneration stands through regrowth. It is difficult to assess the quantity of these habitats in the absence of age-class data. In the short term, even-aged management will occur frequently in areas of forest-health concern.

**OESF Planning Unit**
Within the OESF, about a quarter of the stands are currently at this stage.

#### ALL ALTERNATIVES

**West-Side Planning Units**
Based on DNR estimates, 10-11 percent of DNR-managed lands on the west side (exclusive of the OESF) would be in regeneration forest at year 2096. This estimate includes riparian areas, unstable slopes, and murrelet sites, as well as habitat provided for owls. Based on average rotations of 60 years (40-80 years), it could be expected that those stands which fall outside such areas would provide 17 percent (12-25 percent) regeneration stands. It is expected that there would be little difference between areas. For instance, at year 2096 under Alternative B, it is expected that regeneration forests would encompass 5 percent of NRF management areas, 8 percent of Dispersal management areas, and 12 percent of the remaining areas. At year 2096 under Alternative C, it is expected that regeneration forests would encompass 7 percent of NRF management areas, 7 percent of Dispersal management areas, and 8 percent of the remaining areas for an overall average of 8 percent. It is expected that species such as the snowshoe hare will find sufficient amounts of foraging habitat throughout the planning period.

**East-Side Planning Units**
Even-aged management will continue to be less common than uneven-aged management. However, there will likely be a significant portion of the harvest which will remove enough of the overstory to produce open stands that will eventually grow to become regeneration stands. It is difficult to assess the quantity of these habitats in the absence of age-class data. In the short term, actions to address forest health issues will likely continue to produce abundant amounts of this forest habitat category.

**OESF Planning Unit**
It is estimated that at year 2096, the No Action alternative would provide less of this habitat (about 5 percent or less) than the action alternatives (about 10 percent).

#### REMARKS RELATIVE TO CUMULATIVE EFFECTS

As mentioned above under the dense pole forest, managed timberlands will continue to provide regular supplies of regeneration stage timber. Under the action alternatives, NRF management areas may contain less early seral forest where harvesting is restricted by the strategy employed and existing dearth of late seral forest (i.e., NRF goals are not met), and where there are unusually large amounts of land in the mid-aged forest which are not ready for harvest. In areas adjacent to federal reserves, the amount of regeneration stage available in the future may be greatly influenced by natural and stochastic events. Stochastic events such as fire, flood, disease, and windthrow will continue to create early seral openings that will eventually become regeneration forests. These processes may be particularly important in riparian areas where some species, such as Nashville, orange-crowned, and Wilson's warblers depend on thickets or shrubs.

## Open forest stage

#### AFFECTED ENVIRONMENT

This habitat category is defined as the earliest of the seral stages, from 0-10 years of age. The overstory has been removed and herbs and low shrubs dominate the vegetation. Young conifer and deciduous trees are also present.

### West-Side Planning Units

Currently, NRF management areas are 3 percent open forest, Dispersal management areas are 3 percent open forest, and the remainder of the units are 5 percent open forest. As a whole, these areas are 5 percent open forest.

### East-Side Planning Units

Even-aged management is less common than uneven-aged management. However, there is a significant portion of the harvest which removes enough of the overstory to produce open stands. It is difficult to assess the quantity of these habitats in the absence of age-class data.

### OESF Planning Unit

Within the OESF, preliminary estimates indicate about 20 percent of stands are currently in the open forest stage.

#### ALL ALTERNATIVES

### West-Side Planning Units

Based on DNR estimates, 4-6 percent of DNR-managed lands on the west side (exclusive of the OESF) would be in this habitat category at year 2096. This estimate includes riparian areas, unstable slopes, and murrelet sites, as well as habitat provided for owls. Based on average rotations of 60 years (40-80 years), it could be expected that those stands which fall outside such areas would provide 17 percent (12-25 percent) open forests. It is expected that there would be some difference between areas. For instance, at year 2096 under Alternative B, it is expected that open forests would encompass 2 percent of NRF management areas, 6 percent of Dispersal management areas, and 7 percent of the remaining areas. At year 2096, under Alternative C, it is expected that open forests would encompass 3 percent of NRF management areas, 6 percent of Dispersal management areas, and 4 percent of the remaining areas.

### East-Side Planning Units

Fires will continue to provide large and small areas of this habitat category. In the short term, even-aged harvests to address forest health issues will continue to provide abundant amounts of this category. In the long term, it is expected that even-aged management will continue to form a portion of the actions occurring on the east side although it may become relatively less common in comparison to the uneven-aged harvests.

### OESF Planning Unit

Based on some very preliminary estimates, the No Action alternative would provide less open forest stage (less than 5 percent) than either Alternative 2 or 3 (10-15 percent).

**REMARKS RELATIVE TO CUMULATIVE EFFECTS**

Conversion to nonforestry would be one of the few likely threats to the availability of this stage. Conversion to agriculture often provides many species with similar habitat or forage needs. Under the action alternatives, NRF management areas may contain less early seral forest where harvesting is restricted by the strategy employed and existing dearth of late seral forest (i.e., NRF goals are not met), and where there are unusually large amounts of land in the mid-aged forest which are not ready for harvest. In areas adjacent to federal reserves, the amount of open forest stage available in the future may be greatly influenced by natural and stochastic events. Stochastic events such as fire, flood, disease, and windthrow will continue to create early seral openings (open forests). These processes may be particularly important in riparian areas where harvest will no longer be used to create openings. This is especially true for species such as the little willow flycatcher which may rely on areas of shrubs and deciduous trees in and adjacent to riparian areas.

Management in the recent past has created abundant amounts of such habitat, but has also decreased the quality of this open-forest habitat through active management to control vegetation competing with targeted regeneration species. Many species, such as band-tailed pigeons, depend upon the seeds and berries produced by broad-leaved plants in this forest stage.

As in the above age class, availability of open early seral stages will usually be the converse of late seral availability. Some local areas may experience short-term reductions in the amount of this ephemeral stage. Under all alternatives, there will be adequate amounts of early seral openings for all wildlife species native to this region. However, the usefulness of this habitat may vary somewhat by alternative. The character of these stands often changes rapidly during the 10-year period. Amounts of forage and berries produced begin to decrease as newly planted trees grow taller and begin to shade and suppress the herbaceous and shrub layers. Treatments to enhance the growth of trees and reduce competition with other vegetation often diminish the usefulness of these earlier stages to wildlife. In addition, when these units are either too large, too distant from older forests, or lack residual structure, they may not be used by all species. Western bluebirds forage in open areas, but require cavities for nesting. In addition to older mature stages, olive-sided flycatchers will utilize this forest stage in areas of abundant snags. Canopy openings and edges provide ideal foraging environments. Elk also forage in open areas but require nearby security and thermal cover. Road management (in terms of the amount of open road or sighting of roads in specific locations) is not likely to differ significantly by alternative but will greatly affect species which use open areas and are subject to human-induced disturbance or mortality.

Under the action alternatives, it is likely that a steady, albeit possibly lower, supply of this stage would be provided over time. Due to considerations of residual trees and other harvest practices, the quality of this habitat may be improved under the action alternatives. In many areas, some species such as Columbian black-tailed deer may experience slight short-term and localized reductions from current population levels, regardless of which alternative is implemented, due to age-class distribution of forests across all the ownerships. In some areas, early seral stages are overabundant and are not

sustainable. Local distribution of open units in the future may depend on harvest scheduling and the availability of harvest-aged timber.

## Wildlife Trees

#### AFFECTED ENVIRONMENT

Snags, large wildlife trees, cavities, and downed logs are important forest-habitat structures that provide many functions important to wildlife species. Vaux's swift depend upon large, hollow snags for nesting and roosting sites. These structures are usually common in unmanaged stands as well as stands managed for wildlife objectives. However, these structures may be of limited supply in managed stands where there are no specific wildlife objectives or as a result of past natural events and past management activity.

#### ALTERNATIVES A AND 1

The No Action alternatives would meet the minimums established by state regulations (WAC 222-30-20(11)). These are the only alternatives affecting management of east-side stands.

#### ALTERNATIVES B AND 2

Alternatives B and 2would employ a leave tree strategy which would focus on leaving at least two large trees per acre in harvested areas. This strategy would leave three snags per acre as well as three additional green recruitment trees per acre harvested. Large trees left in harvested units would be selected for characteristics important to wildlife and will provide habitat for many species which utilize openings. For example, bluebirds, violet-green swallows, kestrels, and Lewis' woodpeckers utilize snags and trees with cavities when they occur within and adjacent to open areas. Rufous hummingbirds utilize trees for nesting in very early stages of forest succession and rely on dense stems and foliage for nesting sites. Other species, such as sapsuckers, nuthatches, and flying squirrels would use snags once surrounded by forests of sufficient development. Greater experimentation regarding wildlife leave trees would be expected within the OESF. These alternatives should provide a much greater quality of leave trees and snags than the No Action alternative.

#### Alternatives C and 3

Alternatives C and 3 would employ a leave tree strategy which would focus on leaving at least two large trees per acre in harvested areas. Large trees left in harvested units would be selected for characteristics important to wildlife and will provide habitat for many species which utilize openings. For example, bluebirds, violet-green swallows, kestrels, and Lewis' woodpeckers utilize snags and trees with cavities when they occur within and adjacent to open areas. Rufous hummingbirds utilize trees for nesting in very early stages of forest succession and rely on dense stems and foliage for nesting sites. Greater experimentation regarding wildlife leave trees would be expected within the OESF. These alternatives should provide a much greater quality of leave trees than the No Action alternative, but would not provide any additional snags.

#### COMPARISON AMONG ALTERNATIVES AND REMARKS RELATIVE TO CUMULATIVE EFFECTS

The minimum leave trees under the No Action alternative might not provide sufficient habitat for these species because there is no particular focus on the value of large trees for wildlife. As the stands mature, the legacy trees provide habitat for different guilds of species at different times. Trees left under all alternatives should provide sufficient legacy trees once the stands become mature, but large, higher-quality wildlife trees would be of greater number under the action alternatives. Snags would not be guaranteed in the short term (early seral stands) under any of the alternatives.

None of the other alternatives guarantee the provision of snags above current state regulations. Estimates of snags needed for wildlife purposes are usually expressed as a number per acre harvested. Often, snags and green leave trees are clumped as a result of harvest-unit logistics. Many harvest operations are made logistically more simple by clumping all leave trees in one or two clumps at the edge of the harvest unit. Clumping leave trees in this manner benefits some species, while distributing leave trees benefits others. Those species which depend upon undisturbed sites would benefit from clumping, which may include many ground-dwelling animals such as amphibians. Clumping may provide a refugia from which some species can later disperse into the surrounding unit as it matures. Northern saw-whet owls and flycatchers may utilize clumps of leave trees and snags adjacent to open areas. Some species would benefit more from a distributed pattern of leave trees rather than leaving single clumps. Many species, such as the northern flying squirrel, are territorial during at least part of the year. Flying squirrels have home ranges on the order of 1-10 acres and are believed to defend a territory during the breeding season (Madden 1974). Single clumps would reduce the number of flying squirrel territories that a stand would be able to support. However, a strategy which would provide clumps of leave trees and snags every 5 acres, such as proposed in Alternatives B and 2, would likely serve the needs of flying squirrels and other such species quite well. Flying squirrels are important prey species for several forest carnivores, including spotted owls. Important considerations with regard to wildlife are the amount, quality, and distribution of leave trees and snags. Vaux's swift, fisher, and marten require hollow snags which are often in short supply. Some species of trees, which rot more rapidly in the core leaving a structurally-sound shell surrounding a softer or hollow core, provide superior cavity-nesting opportunities for many species. Alternatives B and 2 will provide emphasis on the retention of these structures.

## Wetlands

#### AFFECTED ENVIRONMENT

Wetlands are often varied and are important for a number of species. Young fish mature in wetlands. Many species of amphibians, such as the Cascades frog, are associated with wetlands. Some species utilize wetlands during portions of their life cycle or to fulfill certain requirements. Great blue herons feed in wetlands. Sphagnum bogs support a unique set of species such as Beller's ground beetle and Hatch's click beetle.

#### ALTERNATIVES A AND 1

The No Action alternatives will adhere to state regulatory minimums and policy standards under DNR's Forest Resource Plan, so long as these policies are retained. State

regulations would only buffer wetlands which are greater than 0.5 acre; the No action alternative might buffer wetlands as small as 0.25 acre. Also, if current policy is continued, wetlands would be treated as described in Matrices 1a and 1b, Chapter 2. Wetlands between 0.25 and 1 acre in size would receive a 100-foot buffer, while larger wetlands may receive a buffer of up to a site potential tree height. This is the only alternative affecting management of east-side wetlands and adjacent stands.

Buffers and forested wetlands activities would maintain 120 square feet of basal area with emphasis on windfirmness. Also, ground-based equipment would generally be precluded, natural surface and subsurface drainage conditions would be maintained or restored, and no roading would occur without on-site mitigation.

#### ALTERNATIVE B

Alternative B, like the No Action alternatives, will adhere to state regulatory minimums and to higher policy standards under DNR's Forest Resource Plan. If these policies and regulations were to be discontinued in the future, Alternative B would continue to provide the indicated level of protection for wetlands. Alternative B would buffer wetlands as small as 0.25 acre. Wetlands would be treated as described in Matrix 1a, Chapter 2. Wetlands between 0.25 and 1 acre in size would receive a 100-foot buffer, while larger wetlands would receive a buffer of up to a site potential tree height.

Buffers and forested wetlands activities would maintain 120 square feet of basal area with emphasis on windfirmness. Ground-based equipment would generally be precluded, natural surface and subsurface drainage conditions would be maintained or restored, and no roading would occur without on-site mitigation.

#### ALTERNATIVE C

In addition to the prescription contained in Alternative B, Alternative C would include a number of additional provisions. Bogs would be buffered even if they were only 0.1 acre in size, as would small interconnected wetlands or those connected to a typed water. Wetlands within 200 feet of unstable hillslopes would have the buffer increased by 50 percent on the half of the wetland closest to the unstable slope.

Buffers and forested wetlands would still maintain 120 square feet of basal area, but the trees would be representative dominants and co-dominants and would be windfirm. No ground-based equipment would be allowed within 50 feet of the wetland's edge or 100 feet of bogs. In addition, there would be no harvest allowed within 50 feet of nonforested wetlands.

#### ALTERNATIVES 2 AND 3

Buffers are expected to be based on tree height and should average over 100 feet on wetlands from 0.25 to 1 acre, and 150 feet on wetlands greater than 1 acre. Buffers and forested wetlands would still maintain 120 square feet of basal area, but the trees would be representative dominants and co-dominants. In addition, there would be no harvest allowed within 50 feet of nonforested wetlands. In addition, this conservation strategy would be integrated with a research and monitoring program.

#### COMPARISON AMONG ALTERNATIVES AND REMARKS RELATIVE TO CUMULATIVE EFFECTS

The action alternatives (Alternatives B, C, 2, and 3) buffer wetlands greater than 0.25 acre. The No Action alternatives (A and 1) may do this if current policy is maintained. Alternative B would ensure that the Forest Resource Plan policies were continued as a minimum. Alternatives C, 2, and 3 also provide buffers on smaller bogs and additional protection for all bogs. The leave tree strategy in wetland buffers should be more robust under the action alternatives because buffers will be guaranteed to be at least 100 feet wide on the average, as opposed to 25-50 feet under current state regulations. In addition, state regulations only require that a small number of larger trees be retained. However, the action alternatives would retain at least 120 square feet of basal area while the No Action alternatives might only retain 75 trees per acre which could be as small as 6 inches in diameter in western Washington or 4 inches in eastern Washington.

Therefore, it is expected that snag and cavity-dependent species which live adjacent to forested and nonforested wetlands would fare better under the action alternatives than under the No Action alternatives. Greater amounts of large woody debris (important loafing sites for turtles and ducks) would be provided in the action alternatives. Greater protection for the microclimate would also be protected by the action alternatives. Smaller forested and nonforested wetlands, which may contribute significantly to the total acreage of protected wetlands, would be protected more thoroughly under the action alternatives than under the No Action alternatives.

The treatment of nonforested wetlands in open areas (e.g., within prairie areas) does not differ among any of the alternatives. These habitats are particularly sensitive in areas of remnant prairies. Many sensitive plant species in the state are associated with ponds or wetlands located in remnant prairies such as those found in the Puget lowlands. Spotted frogs have become extremely rare in western Washington and once depended upon low-elevation wetlands with nonwoody vegetation. Impacts to these species would not vary by alternatives. Road construction and development likely pose the greatest threats for these species, rather than timber harvesting.

## Riparian Corridors

#### AFFECTED ENVIRONMENT

Riparian areas include the areas described in Sections 4.2.3, 4.3.2, and 4.4.2, which include forested areas adjacent to streams and wetlands which influence those aquatic and wetland habitats and are in turn influenced by those habitats as well. Many species dependent on moist environments or dependent on aquatic environments for a portion of their life history requirements are often dependent on riparian habitats.

#### ALTERNATIVES A AND 1

The No Action alternatives presume that the policies under the Forest Resource Plan would continue. These actions were described earlier in terms of buffer size and actions within those buffers. However, these treatments may or may not continue in the future. OESF actions would be more likely to continue due to the Hoh Agreement regarding riparian actions in portions of the OESF (Hoh Tribe and DNR 1993). Regulations established for riparian protection through promulgation of state regulations, or de facto

state regulations which result from completion of watershed analysis would be expected to continue and that DNR would adhere to those regulations. The buffers provided by the No Action alternative are likely sufficient for use as travel corridors; however, there is no guarantee that they will continue to be as wide as provided in the recent past. This represents the only alternative affecting management of east-side riparian corridors.

#### ALTERNATIVE B

Alternative B provides specific protection for many habitat components of riparian ecosystems. Buffer widths are established with consideration to stream type and size and site potential tree height. Possible treatments expected for riparian buffers are described in Chapter 2. Additional buffers may be prescribed for retention in wind-prone areas, but it is not possible to predict how often or under which situations these will occur. Alternative B provides wind buffers of a prescribed width on the windward side only of fishbearing streams where necessary because there is potential for windthrow. The occurrence of wind buffers would be more likely to occur in exposed stands along coastal areas.

Activities which may occur within the buffer will be addressed through adaptive management. The management decisions for the no-harvest area (0-25 feet), the minimal harvest area (25-100 feet), and the low harvest area (100 feet to the buffer's edge) will be developed to achieve the desired biological and economic conditions described earlier in this document. Alternative B would permit actions so long as there were no negative impacts to salmonid habitat, or current conditions are maintained. This would mean that water quality, sedimentation, temperature, and large woody debris would all be considered and management activity would be decided by DNR on a site-specific basis.

In addition to providing large woody debris, shade, and other characteristics desired for aquatic species, the goals of the riparian areas include providing snags, downed logs, cavities, and characteristics important to riparian wildlife. Riparian areas are important sources of cavities for certain species, such as cavity-nesting ducks (e.g., wood ducks, Barrow's golden-eye, hooded mergansers, and buffleheads).

#### ALTERNATIVE C

Alternative C would place wind buffers on both sides of all fishbearing streams. Alternative C would only allow management actions conducted for restoration and enhancement. Alternative C is most likely to maintain more sensitive species and would likely involve fewer areas in management actions.

#### ALTERNATIVES 2 AND 3

The OESF action alternatives would provide wind buffers along both sides of all streams but the widths may vary, so the most wind-prone areas would receive the most protection.

#### COMPARISON AMONG ALTERNATIVES AND REMARKS RELATIVE TO CUMULATIVE EFFECTS

The action alternatives would provide substantially more riparian habitat protection than the No Action alternatives. The action alternatives may lack detail in the description of potential actions to fully assess the impacts to all aquatic and terrestrial species at this time, but Alternative B establishes a process to ensure the necessary characteristics are achieved. None of the action alternatives specify the density and size of trees to remain.

Frequent entries for timber harvest could, in some situations, decrease the production of large trees, snags, and eventually large woody debris. However, most riparian sites would only be entered when adjacent units are harvested. Some uniquely large trees may be removed in the interims. Large trees, snags, and downed logs would likely exist in greater amounts than on adjacent upland sites.

Alternatives B and C might result in greater and more rapid re-establishment of conifers in riparian areas where conifers originally existed, compared with Alternative A. Although short-term impacts from actions such as alder removal and conversion to conifers may impact immediate large woody debris levels and shading, as well as other parameters of the riparian buffer, these restoration actions are protected to have positive benefits for many species in the long term.

The action alternatives appear to provide adequate buffers for use by many wildlife species as travel corridors and they would be guaranteed. However, for some of the species more sensitive to disturbance such as grizzly bears, they may not be adequate, especially in areas near roads where the need for cover may be greatest.

**Remarks Relative to Cumulative Effects**
It is expected that many species requiring moist conditions or older forests may eventually use riparian areas for specific life-history requirements or as travel/dispersal corridors. The benefit of these corridors will be proportional to their adjacency to other needed habitats. For example, riparian corridors will provide raptor dispersal or nesting habitat if adjacent stands are in advanced seral stages. As another example, links for amphibians to nearby wetlands or other off-channel habitat may prove important to the use of those habitats. It is expected that the action alternatives will provide wider and better buffers than the No Action alternative, and that the action alternative buffers would result in better connectivity to other habitats.

**East-Side Planning Units**
There are no differences among the alternatives regarding the east-side riparian strategy. The only difference between the alternatives on the east side is for owls and other listed species. As described earlier, composition of upland forests may vary between these alternatives and in turn further impact or benefit riparian habitats accordingly. Greater amounts of older forest along riparian areas would help maintain the riparian microclimate, reduce effects of edge on predation rates, provide additional habitats for moist-forest-dependent species, and would contribute to the riparian ecosystem in a number of additional ways. The riparian strategy for the east side is to follow the No Action alternative (state regulations and current policy). As mentioned earlier, there are no guarantees regarding buffer widths and treatments, and application of these standards may not be consistent between areas.

## Aquatic Habitats

### AFFECTED ENVIRONMENT

A description of aquatic habitats was provided in Sections 4.2.3, 4.3.2, and 4.4.2. These habitats include all standing water and running water at the surface-to-air interface and

beneath the surface of the water. Species dependent on the aquatic to habitat category include life-long residents such as sculpins and other resident fish, and part-time residents such as amphibians. Some of these species, such as tailed frogs and bull trout, have more stringent requirements than others.

#### ALL ALTERNATIVES

A complete description of impacts was given in earlier in this document and addressed by individual components of the aquatic system. Further analysis was also provided under salmon and bull trout in Section 4.5.2. One assumption made in this analysis is that bull trout and salmonids, being temperature and water-quality sensitive and having requirements for undisturbed substrates and free passage, represent species which can serve as indicators for other aquatic species.

#### COMPARISON AMONG ALTERNATIVES AND REMARKS RELATIVE TO CUMULATIVE EFFECTS

Organisms dependent on aquatic systems would likely fare better under the action alternatives. Combinations of more robust wetland protection, riparian corridors, and the treatments of stable and unstable uplands should all contribute to improved water quality which would include temperature, sediment, and seasonal flow regimes which more closely emulate those found naturally. Shading and microclimate protection should help keep water temperatures at normal levels. Salmonids, especially bull trout, may be the species which are most likely to be influenced by water-quality and passage issues in the forested environments. It is assumed that provisions to address these salmonids will provide the needed habitat quality and quantity for other fish and aquatic species. Irregular stream flows may be the most limiting factor to some aquatic species, such as mollusks. Wetlands can help to moderate stream flows through attenuation of flood-peaks during storm events, and by discharging ground water during low-flow periods. Alternatives C, 2, and 3 are more protective of factors that influence wetland hydrology and may therefore benefit stream flows more than Alternative A, 1, or B. The proposed HCP would not cover (and this analysis does not include) actions which may be taken regarding water diversion or direct manipulation of stream flows. It is expected that the riparian prescriptions in most areas should adequately address stream flows, large woody debris, bank stability, sedimentation, pool-riffle ratios, and channel morphology. Under all alternatives, the protection for aquatic habitats is expected to be enhanced by protection of unstable slopes. Protection of aquatic habitats would be greater under the action alternatives than under the No Action alternatives.

## Caves

#### AFFECTED ENVIRONMENT

Caves are important habitats for many species, and may be important for as yet undiscovered species. Some species are adapted specifically for life in caves and some of these only occur in one or a few caves (e.g., the campodeid dipluran *Haplocampa* spp., the stygobiont copapod *Stygonitocrella* spp.; WDW 1994). Cave dwellers often depend on the relatively stable conditions found in caves. The locations of some caves on DNR-managed lands are likely unknown.

#### ALTERNATIVES A AND 1

No specific provisions would be provided for this habitat category. This is the only alternative affecting management with regard to east-side caves.

#### ALTERNATIVES B, C, 2, AND 3

Buffers around cave passages (100 feet) and cave entrances (250 feet) as well as equipment-restricted areas were described in Chapter 2. Caves would be mapped prior to management activities and locations would be kept confidential.

#### COMPARISON AMONG ALTERNATIVES AND REMARKS RELATIVE TO CUMULATIVE EFFECTS

Buffers at cave entrances are particularly important to maintaining constant environmental conditions in terms of temperature and relative humidity. Bats often locate their hibernation roosts according to temperature gradients. Townsend's bats are very dependent on caves for hibernation. Drastic fluctuations in winter cave temperatures would be devastating for hibernating bats. Moisture fluctuations would impact amphibians, invertebrates, and fungi. The No Action alternative would offer no specific protection to caves whereas the action alternatives would provide 250-foot buffers at entrances and 100-foot buffers on each side of cave passages. In addition, there would be an effort to locate roads away from entrances and passages under the action alternatives, which would help maintain the integrity of the cave. The action alternatives provide a much greater level of protection to cave habitats and their resident and temporary residents.

### Cliffs

#### AFFECTED ENVIRONMENT

Cliffs are defined as a steep, vertical, or overhanging rock face. No estimate of the number and locations of cliffs was available for this assessment.

#### ALTERNATIVES A AND 1

No specific provisions would be provided for this habitat category. Alternative A is the only alternative affecting the management of cliffs on the east side.

#### ALTERNATIVES B AND 2

These alternatives state that mining of rock from cliffs for road construction would be avoided when practicable, that an evaluation will be conducted to identify important wildlife features which may exist, and that site-specific prescriptions would be developed where appropriate.

#### ALTERNATIVES C AND 3

These alternatives state that mining of rock from cliffs for road construction would be avoided when materials can otherwise be reasonably acquired and that site-specific prescriptions may be developed.

#### COMPARISON AMONG ALTERNATIVES AND REMARKS RELATIVE TO CUMULATIVE EFFECTS

Alternatives B and 2 provide for an assessment of wildlife values and establishing a site-specific plan when necessary to protect those values. The other action alternatives offer

little additional protection over the No Action alternative. Unless species are present that would require additional actions (i.e., peregrine falcons), it is assumed that little protection would be provided unless it came at no economic cost. The action alternatives may contribute to maintaining most cliff areas intact. However, only Alternatives B and 2 address the maintenance of vegetation within and adjacent to cliff areas for the use of nesting birds or for the maintenance of shelter from the elements. All alternatives could result in some level of impact to cliff-dependent species.

## Talus

#### AFFECTED ENVIRONMENT

Talus fields are homogeneous areas of rock rubble, usually coarse and angular, ranging in average size from 1 inch to 6.5 feet, derived from and lying at the base of a cliff or very steep, rocky slope. Talus field inventories were not available for this analysis, but talus is not an uncommon feature in portions of the Cascades and Olympic mountains.

#### ALTERNATIVES A AND 1

The No Action alternative offers no specific protection for talus fields. This is the only alternative for protection of talus on the east side.

#### ALTERNATIVES B AND 2

Alternatives B and 2 would provide a 100-foot buffer around talus fields over 1 acre in size (1/4 acre in some key areas). Talus fields would not incur any harvest; however, within the buffer, harvest might occur so long as it maintained 60 percent canopy coverage. In forested talus areas outside those buffers, harvest can occur so long as no more than 1/3 of the volume is removed during each rotation. Within talus fields and associated buffers, road building will be avoided, provided that the routing of roads around such areas can be accomplished in a practical manner that is consistent with other objectives of a comprehensive landscape-based road network plan. These buffers should help maintain the integrity and microclimate of the talus fields, as well as provide a supply of coarse woody debris.

#### ALTERNATIVES C AND 3

These alternatives would provide a 100-foot buffer around talus fields over 1 acre in size. Talus fields would not incur any harvest; however, within the buffer, a harvest of up to a third of the volume might occur during each rotation. The talus field itself would not be harvested and, if it were capable of supporting large trees, it might provide shade and a supply of downed logs. Yarding would generally not disrupt talus under the action alternatives, yet there is no guarantee of how often or to what extent disruption might occur.

#### COMPARISON AMONG ALTERNATIVES AND REMARKS RELATIVE TO CUMULATIVE EFFECTS

It appears that talus-dependent species would be better off under the action alternatives than under the No Action alternative because the talus field itself would not be subject to timber harvest and yarding would often avoid talus fields. Alternatives B and 2 provide a forested buffer around talus fields as well as protection of forested talus. Disruption will

be much less frequent under these alternatives. However, under Alternatives C and 3, it is unclear to what extent the nature of those habitats would be maintained for the long-term survival of species given the lack of certainty regarding disruption of the talus fields and the treatment of the immediately surrounding timber.

## Oak Woodlands

#### Affected Environment

A description of oak woodlands was provided earlier in this document. Oaks occur in the Puget trough area, the Columbia Gorge area, and scattered areas on the west side, but mostly on the east side.

#### Alternatives A and 1

Under the No Action alternative, oak woodlands are not currently harvested; however, there is no specific prescription for management of these woodlands and no guarantee they would not be harvested sometime in the future. The majority of oak woodlands occur on the east side and would thus be afforded little to no protection.

#### Alternatives B, C, 2, and 3

The action alternatives address oak woodlands in several meaningful ways. Dominant (open-form) oaks would be retained, as would standing dead and dying oaks, oaks with cavities, and downed logs. Underburns may be used when appropriate and encroaching conifers would be selectively removed. Removal of conifers would be especially beneficial on the west side of the Cascade Range. Approximately 25 to 50 percent of the canopy coverage would be retained.

#### Comparison Among Alternatives and Remarks Relative to Cumulative Effects

It is likely that these actions would result in retention and restoration of existing oak woodlands which support species such as the western gray squirrel, Lewis' and acorn woodpeckers, white-breasted nuthatches, and many cavity nesters, whereas the No Action alternative would not.

## Prairies

#### Affected Environment

Prairies and other grasslands as described herein are those lands where the climax vegetation under natural regimes of fire, drought, and other naturally occurring events would be maintained as vegetation mainly composed of grasses and forbs.

#### All Alternatives

The project boundary does not include grasslands in central and eastern Washington. Activities covered under this project do not include grazing or grassland management. Therefore, the alternatives do not vary significantly regarding prairies. Remnant prairies are a concern in the Puget Lowlands; however, it is expected that under all the alternatives, DNR's primary actions in these areas would be restoration or no action. Several species of gopher, butterflies, and sensitive plants may benefit or be impacted

depending on the actions taken. DNR does manage a number of prairie areas, such as Mima Mounds, within the range of the proposed HCP. They are not part of the HCP, but would continue to be managed separately as NRCAs or NAPs. NRCAs and NAPs would not be covered by the proposed HCP. Their retention and management for perpetuation of natural processes would likely count as mitigation so long as the conservation and management of these areas continue.

#### Remarks Relative to Cumulative Effects

West-side prairies have been devastated by development and fire suppression. Fire suppression has resulted in conifer encroachment and loss of prairies. This has probably impacted a number of species more severely in the state of Washington than forest management.

### Subalpine meadows and shrub fields

#### Affected Environment

These habitat classes include many of the nonforested areas at high elevations which support vegetation. Blueberry fields and avalanche chutes, as well as wet meadows, are all examples of these habitats. Very few DNR-managed lands are at elevations that would include these habitat classes. Most of these areas are likely under federal ownership.

#### All Alternatives

DNR manages several areas with subalpine meadows, such as portions of Mount Si, as NRCAs or NAPs. NRCAs and NAPs are not part of the HCP, but would continue to be managed separately as NRCAs or NAPs. NRCAs and NAPs would not be covered by the proposed HCP, but their retention and management for perpetuation of natural processes would likely count as mitigation so long as the conservation and management of these areas continue.

Subalpine meadows and shrub fields are, by definition, not timbered, but may be surrounded by high-elevation timber types which do not regenerate or grow very quickly or reliably. These habitat classes support several species which can be impacted by disturbance. Grizzlies utilize these habitats for foraging but require nearby escape cover to help minimize human-bear interactions. Mountain goats forage in these areas when escape cover (cliffs) are nearby. Mountain goats also need older forests nearby for use during critical periods. The largest threats to these habitat classes include human disturbance. Humans, by their presence, disrupt normal behavior and energy balances of this habitat's residents and trample and manipulate its vegetation.

### Alpine tundra, krumholtz, and glaciers

#### Affected Environment

Even more so than the previous habitat class, this is a very rare habitat class for DNR-managed lands (if present at all). Most of these habitats are under federal ownership.

**ALL ALTERNATIVES**

No timber harvest actions are planned for these areas and there is not any significant difference among the alternatives. Access to these areas is probably the sole factor under DNR's control. Under the action alternatives, it is expected that there will be fewer open roads adjacent to federal reserves, especially within and immediately adjacent to the grizzly bear recovery zone in the Cascades.

## General Cumulative Effects

In the foreseeable future the cumulative impacts to species may increase with the promulgation of the proposed 4(d) special rule for the northern spotted owl. Loss of habitat in certain landscapes, such as southwest Washington, would likely impact many species dependent on late seral habitats. Continued development along Puget Sound and throughout the Puget trough will impact species whose ranges include or are concentrated within these areas regardless of the habitat types. Those species dependent on extremely young stands of mixed conifer/hardwood would probably be impacted the least.

Availability of habitat to those species normally utilizing those habitat categories can be influenced by several factors, including patch size and connectivity to other habitats. Many species are poor dispersers. Low-mobility species may not be able to pioneer all patches of habitat as they develop. Riparian corridors will form the basis for connectedness under all alternatives. Roads may also form barriers to some low-mobility species. Roads can create physical barriers for elk, particularly when associated with large accumulations of slash on steep slopes. Elk usually are able to find ways around such barriers within a short distance.

Roads and their associated disturbances can reduce the availability of surrounding habitats. It is estimated that habitat effectiveness for elk is reduced to one-half when there are about 2 miles of road per section[1]. Lyon (1979) found that 3 miles of road per section removed virtually all effective habitat for elk in Montana. Other researchers have documented year-round avoidance of areas near roads. These effects, however, are very much interrelated with the effects of local and landscape levels of cover. Some species are affected to a greater degree by road densities. Excessive road densities (greater than 1 mile per section) may also preclude use of those areas by grizzly bears. Direct mortality of many species also increases in proximity to open roads. Other species may be impacted in other ways. Dust accumulation near roads may inhibit necessary functions for some smaller animals. The use of herbicides, pesticides, and fertilizers may have impacts upon the usability of habitats for may species and may contribute to direct mortality as well. This will be particularly true for many invertebrates or for species dependant on sensitive broad-leaved plants. Additional impacts and exclusion from habitats may occur from activities which are unrelated to this plan. However, the expected impacts to reducing habitat availability are relatively similar under all alternatives.

[1] A section is a subdivision of a Township in the U.S. Public Land Survey system, representing a piece of land normally 1 square mile in area (containing 640 acres as nearly as possible).

## 4.6 Soil

Soil can be defined as the material at the earth's surface which is capable of supporting plants. It is the ecosystem element located at the interface of the climatic, geologic, water, and biologic ecosystem elements. It is a dynamic, natural, three-dimensional body composed of weathered mineral and organic material that provides plants with air, water, root anchorage, and nutrients.

Issues raised during scoping that relate to soils include mass-wasting potential and sedimentation related to water quality and fish habitat issues. Information related to these issues, including road-building and maintenance activities, can be found in the west-side and OESF riparian discussions (Sections 4.2.3 and 4.4.2) and water quality (Section 4.8). Section 8.3.1 of DNR's environmental impact statement for the Forest Resource Plan (DNR 1992a) addresses geology, soils, and erosion issues in relation to current policy and activities. In addition, questions about soil productivity were raised during scoping for the HCP. This section's assessment of impacts on soil focuses on the maintenance of long-term soil productivity. Information about the underlying geology and vegetative zones of each planning unit, which relates to all three issues, can be found in Appendix B - Geology/ Soils/Vegetation.

Forest management relies on soil productivity to support a healthy forest ecosystem and produce desired forest products. Soil productivity is a soil's capacity to support vegetation, and long-term productivity is a soil's capacity to sustain the natural growth potential of plants over time (USDA and USDI 1994a).

Forest management can adversely affect long-term soil productivity through erosion (surface erosion and mass wasting), displacement and compaction, and alteration of chemical composition and of soil communities. The extent to which long-term productivity is affected by forest management is unknown, but it is generally recognized that poor management has the potential to reduce natural soil productivity (USDA and USDI 1994a). Potential adverse affects to soils are controlled by the Washington Forest Practices Rules which require a SEPA environmental checklist for timber harvest where the potential for mass wasting exists (WAC 222-16-050) and require that timber harvest leave land in a condition conducive to future timber production (WAC 222-30-020). In addition, the Forest Resource Plan (DNR 1992b) directs the department to provide, where appropriate, extra protection for soils to ensure the long-term productivity of trust assets.

Adverse impacts to long-term soil productivity are directly related to the frequency and intensity of forest management activities. Sites with the least management-induced disturbance have the highest likelihood of maintaining long-term soil productivity. Sites with more frequent or more intensive management-induced disturbance have a lower likelihood of maintaining soil productivity, but adherence to forest practices rules and Board of Natural Resources policies should prevent an unacceptable degradation of soils.

## 4.6.1 Alternative A

### Five West-Side Planning Units

Under Alternative A, DNR management in the five west-side planning units will be consistent with Board policies and compliant with the Washington Forest Practices Rules (Title 222 WAC). DNR would manage wetlands for no overall net loss of naturally occurring wetland acreage and function (Policy No. 21; DNR 1992b). Riparian management zones would be established on all Type 1, 2, 3, and 4 Waters and when necessary along Type 5 Waters (Policy No. 20; DNR 1992b). Based on current practices in DNR-managed riparian areas, soils in riparian management zones would be subject to a minimal level of management-induced disturbance, but if management objectives change, so could the level of disturbance. No harvest would occur on hillslopes identified in the field as having a high potential for mass wasting.

At present, most timber in suitable marbled murrelet habitat is deferred from harvest, but as much as one-third of DNR-managed suitable murrelet habitat might be harvested under the No Action alternative. Forest land from which marbled murrelet habitat is harvested would subsequently be managed on an even-aged system. Typically, even-aged management is based on either an economic rotation or a maximum volume rotation. Currently, the most widely used harvest age is based on an economic rotation, which is approximately 50-60 years in west-side forests. Maximum volume rotations are approximately 80-100 years, the age at which stand mean annual increment culminates. Typically, over a single harvest cycle, entries into a forest stand are made for precommercial thinning, commercial thinning, and final harvest. Damage to soil productivity can occur during commercial thinning and final harvest. The conversion of old forest to even-aged management subjects virgin soils to a regime of management-induced disturbance.

Old forest that is outside of spotted owl circles, not on unstable hillslopes, or in riparian management zones, and not marbled murrelet habitat, could be harvested. Management for spotted owls would continue on a circle-by-circle basis. No old forest would be allowed to develop in circles that are below the 40 percent minimum, and any old forest lost to natural or human-caused disturbance would not be replaced. The geographical shift of an owl activity center also alters the location of its owl circle, and this may release old forest for harvest. In the west-side planning units, forest land from which old forest is harvested would subsequently be managed on an even-aged system.

### Three East-Side Planning Units

DNR management in the east-side planning units will be consistent with the same policies. However, forest land from which old forest is harvested would generally be managed on an uneven-aged system. In addition, these units are out of the known range of the marbled murrelet and are therefore not affected by marbled murrelet policies.

The predominant form of harvest in east-side DNR-managed forests is partial cutting where 30-35 percent of stand volume is removed on a 20-year cutting cycle. The conversion of old forest to intensive uneven-aged management results in more frequent

management-induced disturbance. However, it is anticipated that adherence to Board of Natural Resources policies should prevent an unacceptable degradation of soils.

## 4.6.2 Alternative B

### Five West-Side Planning Units

Under Alternative B, DNR would continue to manage in a manner consistent with Board policies and in compliance with the Washington Forest Practices Rules (Title 222 WAC). DNR would manage wetlands for no overall net loss of naturally occurring wetland acreage and function. The riparian conservation strategy of Alternative B establishes riparian management zones which consist of a riparian buffer and a wind buffer. Along most streams, the riparian buffer is wider than the riparian management zones of Alternative A. Based on the primary management objective of riparian buffers -- to maintain or restore salmonid habitat -- soils in riparian management zones would be subject to a minimal level of management-induced disturbance. This level of disturbance is expected to be less than or equal to that of Alternative A. Wind buffers will protect the riparian buffers of Type 1, 2, and 3 Waters in areas of high windthrow potential. Windthrow along the edges of clearcuts can cause significant disturbance to soils. No harvest would occur on hillslopes identified in the field as having a high potential for mass wasting.

The short-term marbled murrelet conservation strategy allows the harvest of marginal habitat and unoccupied higher quality habitat. Forest land from which marbled murrelet habitat is harvested would subsequently be managed on an even-aged system. The amount of murrelet habitat converted to even-aged management should be less than under Alternative A. All old forest that is outside of NRF management areas and riparian management zones, not on unstable hillslopes, and not marbled murrelet habitat could be harvested. Forest land from which old forest is harvested would subsequently be managed on an even-aged system. In NRF management areas, at least 50 percent of the DNR-managed land designated for NRF management would be NRF habitat at any one time. The 50 percent habitat prescription would be applied to watershed administrative units (WAUs). This WAU prescription requires that forests be managed on a longer harvest rotation. In effect, the frequency of management-induced disturbance would be reduced in areas managed for NRF habitat. Overall, more owl habitat would be converted to short-rotation (50 to 60 years) even-aged management than under Alternative A.

Compared to Alternative A, riparian areas would be subject to less frequent and less intensive management-induced disturbance, but in upland areas there could be an increase in the land area subject to management-induced disturbance. However, it is anticipated that adherence to Board of Natural Resources policies should prevent an unacceptable degradation of soils. Relative to Alternative A, there should be a reduction in adverse impacts to soils.

### Three East-Side Planning Units

In the east-side planning units, management in riparian areas and wetlands is the same as under Alternative A, rather than having additional riparian strategies applied as on the west side. In NRF management areas, at least 50 percent of the DNR-managed land designated for NRF management would be NRF habitat at any one time. The 50 percent habitat prescription would be applied to WAUs. This WAU prescription requires that forests be managed on a longer harvest rotation. In effect, the frequency of management-induced disturbance will be reduced in areas managed for NRF habitat. Overall, more owl habitat would be converted to uneven-aged management than under the No Action alternative.

Compared to Alternative A, riparian areas would be subject to the same level of management-induced disturbance, but in upland areas there would be an increase in the land area subject to management-induced disturbance. However, it is anticipated that adherence to Board of Natural Resources policies should prevent an unacceptable degradation of soils. Relative to Alternative A, there should be no significant difference in adverse impacts to soils.

## 4.6.3 Alternative C

### Five West-Side Planning Units

DNR management of the five west-side planning units under Alternative C is similar in approach to Alternative B, but provides greater retention of older forests. Alternative C establishes wider riparian buffers and added protection from windthrow than Alternative B. The marbled murrelet conservation strategy does not allow the harvest of marginal habitat or unoccupied higher quality habitat and, over the long term, the amount of murrelet habitat converted to even-aged management should be less than under Alternative B. In NRF management areas, at least 60, rather than 50, percent of the DNR-managed land designated for NRF management would be NRF habitat at any one time. Overall, less owl habitat would be converted to short-rotation even-aged management than under Alternatives A or B and the frequency of management-induced disturbance in riparian, murrelet and owl NRF habitat would be less.

In areas where forest management is conducted through short-rotation even-aged management, it is anticipated that adherence to Board of Natural Resources policies should prevent an unacceptable degradation of soils. Relative to Alternative A, there should be a reduction in adverse impacts to soils.

### Three East-Side Planning Units

Compared to Alternatives A and B, riparian areas on the east side would be subject to the same level of management-induced disturbance. In NRF management areas, as in the west-side units, at least 60 percent of the DNR-managed land designated for NRF management would be NRF habitat at any one time, requiring that forests be managed on a longer harvest rotation than Alternative B. The area of uplands subject to management-induced disturbance is the same as Alternative B, but the frequency of disturbance is less.

Overall, less owl habitat on the east side would be converted to uneven-aged management than under Alternative A or B.

In areas where forest management is conducted through intensive uneven-aged management it is anticipated that adherence to Board of Natural Resources policies should prevent an unacceptable degradation of soils. Relative to the Alternative A, there should be a no significant difference in adverse impacts to soils.

## 4.6.4 OESF Alternative 1

As with Alternative A for the west-side and east-side planning units, DNR would manage forests in a manner consistent with Board policies and compliant with the Washington Forest Practices Rules (Title 222 WAC). Based on current practices in DNR-managed riparian areas, soils in riparian management zones would be subject to a minimal level of management-induced disturbance, but if management objectives change, then so could the level of disturbance. Potential soil productivity impacts related to marbled murrelet and spotted owl management are the same as for Alternative A for the west-side planning units. It is anticipated that adherence to Board of Natural Resources policies should prevent an unacceptable degradation of soils.

## 4.6.5 OESF Alternative 2

The riparian conservation strategy of this alternative establishes an inner-core buffer similar to the riparian management zones of Alternative 1. In addition, these mass-wasting buffers are protected by a wind buffer. Based on the primary management objective of riparian areas -- maintain and aid restoration of the composition, structure, and function of aquatic and riparian ecosystems -- soils in the inner-core buffer would be subject to a minimal level of management-induced disturbance. No harvest would occur on hillslopes identified in the field as having a high potential for mass wasting. DNR would manage wetlands for no overall net loss of naturally occurring wetland acreage and function.

The short-term marbled murrelet conservation strategy allows the harvest of marginal habitat and unoccupied higher quality habitat (as does Alternative B in the west-side planning units). Forest land from which marbled murrelet habitat is harvested would be subject to more frequent management-induced disturbance. The amount of murrelet habitat harvested should be less than under Alternative 1.

The mission of the OESF is to integrate the production of forest commodities with the conservation of ecological values. Consequently, DNR-managed lands in the OESF will be managed under a variety of stand prescriptions. Some stands may be managed under even-aged short rotations. Other stands may be managed under an uneven-aged system that retains the composition, structure, and function of late-successional forests. The entire OESF would be managed so that each landscape planning unit contained at least 40 percent spotted owl habitat, 20 percent of which would be old forest habitat. This will require longer harvest rotations than Alternative 1. Special stand prescriptions to accelerate or maintain owl habitat may be developed. What these prescriptions might be is unknown, but it is reasonable to assume that they will be less detrimental to soil productivity than short-rotation even-aged management.

Compared to Alternative 1, riparian areas would be subject to less frequent and less intensive management-induced disturbance. In upland areas subject to intensive management it is anticipated that adherence to Board of Natural Resources policies should prevent an unacceptable degradation of soils. Given the mission of the OESF, it is anticipated that soil productivity will be an important area of research. Compared to Alternative 1, this should reduce adverse impacts to soils.

## 4.6.6 OESF Alternative 3

Under Alternative 3, DNR would continue to manage in a manner consistent with Board policies and compliant with the Washington Forest Practices Rules (Title 222 WAC). The riparian conservation strategy is the same as Alternative 2.

The mission of the OESF is to integrate the production of forest commodities with the conservation of ecological values. Consequently, DNR-managed lands in the OESF will be managed under a variety of stand prescriptions. Some stands may be managed under even-aged short rotations. Other stands may be managed under an uneven-aged system that retains the composition, structure, and function of late-successional forests.

The short-term marbled murrelet conservation strategy does not allow the harvest of marginal habitat and unoccupied higher quality habitat (as does Alternative C in the west-side planning units). Over the long term, the amount of murrelet habitat harvested should be less than under Alternative 2. All old forest that is outside spotted owl zones and riparian areas, not on unstable hillslopes, and not marbled murrelet habitat could be harvested. In owl zones, the habitat specifications for the nest grove, core, and range areas would determine the intensity and frequency of forest management within these areas. The requirement that the core and range areas contain 50 and 40 percent owl habitat, respectively, will require longer harvest rotations than Alternative 1. Special stand prescriptions to accelerate or maintain owl habitat may be developed. What these prescriptions might be is unknown, but it is reasonable to assume that they will be less detrimental to soil productivity than short-rotation even-aged management.

Compared to Alternative 1, riparian areas would be subject to less frequent and less intensive management-induced disturbance, but in upland areas there could be an increase in the land area subject to management-induced disturbance. It is anticipated that adherence to Board of Natural Resources policies should prevent an unacceptable degradation of soils. Given the mission of the OESF, it is anticipated that soil productivity will be an important area of research. Compared to Alternative 1, this should reduce adverse impacts to soils.

# 4.7 Air Quality

## 4.7.1 Affected Environment

An issue raised during scoping was the impact on air quality by the proposal. While the HCP proposal would not affect this resource, the agencies opted to briefly discuss the issue. The topography and climate west of the Cascade mountains create a combination of natural conditions that periodically accumulate air pollutants. These conditions include peculiar local and regional wind patterns, abundance of moisture, fog, and stable atmospheric conditions with accompanying low-level inversions. Topography especially influences wind patterns in Puget Sound, the Columbia River Gorge, and other areas such as the Spokane and Lewiston-Clarkston valleys. Lowlands tend to accumulate contaminants when pollutant sources are present. Winter and spring air turbulence and precipitation in western Washington help dissipate air pollution. During the summer, hydrocarbons and nitrogen oxides react under the influence of sunlight to cause smog, odor, and poor visibility. In eastern Washington, the most significant feature affecting accumulation of air pollutants is the occurrence of stable atmospheric conditions. These conditions persist for extended periods in populated valleys (DNR 1992a).

Sources of air contaminants are motor vehicle fumes, industrial processing losses, industrial fuel use, home heating, and refuse disposal. The contaminants are primarily sulfur oxides, particulates, carbon monoxide, nitrogen oxides, fluorides, and hydrocarbons. Dust and smoke from agricultural and forestry practices contaminate the air on a localized, short-term basis.

Air quality data show the greatest concentrations of air pollution are in King, Pierce, Snohomish, and Spokane Counties. Most air pollutants in the Puget Sound region are released along the eastern shore of Puget Sound between Everett and Tacoma. During periods of stable air, contaminants are concentrated in a relatively small area near the point of emission. During moderate or strong winds, contaminants move great distances but are rapidly diluted or dispersed to small concentrations (DNR 1992a).

## 4.7.2 Forest management

The principle ways in which forest management practices adversely affect air quality are smoke from prescribed burning and air-borne dust from logging roads.

### Prescribed burning

The U.S. Clean Air Act (42 U.S.C. § 7401 et seq.) is designed to reduce air pollution, protect human health, and preserve the nation's air resources. To regulate air quality, the Clean Air Act sets a number of standards (referred to as National Ambient Air Quality Standards (NAAQS)) addressing particulates from wildfire and prescribed burning. Washington State's implementation of the Clean Air Act is guided by existing laws, regulations, and DNR's Smoke Management Plan (DNR 1993). DNR's Smoke Management Plan is designed to meet the requirements of the Clean Air Acts of the United States and of Washington State (RCW 70.94), the forest fire protection laws of Washington State (RCW 76.04), and the Washington Forest Practices Act (RCW 76.09.905).

Preparing a site for reforestation and reducing the risk of wildfire are the typical reasons for prescribed burns. The use of prescribed burns for site preparation has become less common as concerns for air quality have increased. Prescribed burns are regulated by the Washington State Smoke Management Plan (DNR 1993). The plan requires a 50 percent reduction in statewide prescribed burn emissions by the year 2000. This level of reduction has already been achieved on state and private land. DNR may burn between 500 and 1,000 acres per decade for site preparation. RCW 76.04.660 specifies that landowners responsible for the existence of extreme fire hazard are "required to abate, isolate and reduce the hazard." In addition, Policy No. 10 of the Forest Resource Plan (DNR 1992b) directs the department to take preventive measures beyond what is required by law. The negative impacts of prescribed burns on air quality likely have a net positive impact -- particulate emissions from wildfires are, on average, three to four times that from prescribed underburning. DNR may burn between 300 and 1,000 acres per year for wildfire risk reduction.

DNR's 1995 annual report (DNR 1995a) states that, by the end of 1993, public and private land managers achieved more than a 50 percent reduction in particulate emissions from forest debris fires. This far exceeds the 20 percent reduction required under the state Clean Air Act.

## Air-borne dust from logging roads

Air-borne dust is regulated through the road maintenance standards of the Washington Forest Practices Board (WAC 222-24) and the safety standards of the Department of Labor and Industries (WAC 296-54). The amount of air-borne dust is a function of road quantity, quality, and use. Department policy has limited the size of harvest areas to a maximum of 100 acres (DNR 1992b). As the size of harvest units has shrunk, the miles of logging road have necessarily grown. It is reasonable to expect that between 800 and 1,000 miles of new road will be constructed in the HCP planning area over the next decade. The quality of roads on DNR-managed land meets or exceeds the standards of the Washington Forest Practices Board (WAC 222-24). The state legislature has directed DNR to utilize the "multiple use concept" in the management of state-owned lands under its jurisdiction (RCW 79.68). The general public is allowed free access to many DNR-managed roads, and this increases the level of road usage. In general, the adverse impacts of air-borne dust are localized and short term.

## Forest land and air quality

One of the essential ecological benefits of forested lands is the enhancement of air quality. Plants enhance air quality through the process of photosynthesis, in which plants consume carbon dioxide and produce oxygen. In addition, through photosynthesis, trees serve as reservoirs for the long-term terrestrial storage of carbon dioxide, the gas most closely associated with global warming. Trees also retard the spread of wind-carried particulates by either trapping the material on their leaves' surfaces or slowing wind speed to the point that particulates cannot remain suspended. Harvesting timber temporarily removes the air quality benefits provided by forests.

## 4.7.3 Alternatives

The impacts to air quality are approximately the same for all alternatives, but the HCP alternatives may result in some improvement of air quality. The amount of site preparation involving prescribed burns should not be altered by the alternatives. The amount of prescribed burns for wildfire risk reduction could increase slightly under the HCP alternatives, particularly in the east-side planning units. The eastern Cascades are prone to large wildfires, and spotted owl nesting habitat possesses the ideal structural characteristics for stand-replacing fires -- a multi-layered canopy and plentiful down woody debris. Underburning owl habitat in an owl circle to reduce extreme fire hazard could be construed as incidental take. The HCP alternatives may provide more flexibility to conduct prescribed burns. The reduced risk of wildfire may yield a net positive impact to air quality.

Air-borne dust should be reduced under the HCP action alternatives. DNR has already begun a shift toward more intensive road management, and the incorporation of road network management into the HCP alternatives demonstrates a commitment to the continual improvement of the road network. Public access to and use of DNR-managed roads is expected to remain at a high level, but the level of use is the same for all alternatives.

The forested land base remains the same for all alternatives. Therefore, the forest processes which enhance air quality -- photosynthesis, carbon dioxide storage, particulate interception, and air flow moderation -- should be approximately the same for all alternatives.

# 4.8 Water Quality

Water resources include both surface water and ground water. Although the evaluation of potential impacts on water quality is addressed in various riparian sections, the agencies opted to discuss the general subject here. This section briefly describes the issues of water quality and quantity, and the current water quality status of DNR-managed lands within the HCP planning area. It closes with cross-references to other sections that evaluate the potential water-related environmental consequences of the alternatives.

## 4.8.1 Affected Environment

The principal influence on surface water movement is the hydrologic regime, which refers to the combined effects on water of climate, soils, geology, topography, and vegetation.

The quantity of surface water is determined by: (1) the amount of precipitation, and, (2) the extent of losses to the atmosphere or to deep percolation into the ground. Precipitation is controlled by climate and is not significantly influenced by forests or their management. Loss to the atmosphere by evaporation and transpiration of plants is a function of climate interacting with vegetation and soils. These functions are influenced by the forest condition. Whether water that has moved through the soil will become surface flow or go into ground water aquifers depends largely on the region's geology. Water movement in natural streams is a function of water volume, channel geometry and channel slope or gradient. In unmanaged forest areas, the most common disturbance is trees and other vegetation entering streams. In places where this debris is temporarily stabilized, flows may back up and increase in depth.

In general, the forests in Washington contain waters of high quality. Sedimentation as a result of natural or man-made forces is the most common cause of degraded water quality. An estimated 80 percent of water quality deterioration is associated with this process. Forest vegetation acts a stabilizing influence that minimizes the effect of sedimentation on water quality.

Sedimentation includes the processes of erosion, sediment transport, and deposition. Deposition is the temporary or permanent stoppage of sediment movement. Surface water quality is not affected if sediment is deposited before reaching a water body. Once sediment reaches streams, deposition can occur several times over. As flow velocities and volumes increase, sediment is moved downstream. If flow volume or velocities decrease, deposition can occur. The amount of sediment suspended or moved along the streambed therefore depends on surface water movement.

Sediment affects water quality in several ways. It creates a turbid (muddy) condition that restricts light in the stream environment. Nutrients combined with, or attached to, the sediment particles are added to surface water. Oxygen-demanding materials associated with sediment can reduce dissolved oxygen content. Sedimentation may also introduce harmful minerals into surface water.

The high absorption capability of forest soils, combined with the uptake of vegetation, does not allow many dissolved solids to be leached and enter surface water. As a result,

surface waters usually have low concentrations of dissolved solids. In the mature forest, the nutrient cycle generally approaches a steady state; only small amounts of nutrients are discharged in the drainage water. Volumes of dissolved solids are therefore usually small in stream flow from forested areas and primarily reflect the area's geology.

Streamside vegetation can also temporarily degrade surface water quality. Water quality in a small stream is often related to the amount of autumn leaves that fall into the stream channel: dissolved oxygen and pH, decrease but water color, specific conductance, iron, magnesium, and bicarbonate ions all increase as more leaves enter the water. Deciduous litter, which is primarily deposited in autumn, decomposes faster than coniferous litter. Water quality is therefore affected to a greater extent by deciduous than coniferous litter.

The temperature of surface water is another quality modified by a forest. Streamside vegetation prevents extreme daily fluctuation in temperature during low flows and high energy input by providing shade and absorbing energy. With lower temperatures, dissolved oxygen concentrations are higher. Temperature is critical for the survival of various fish species, and it can also affect water quality. Algae, for example, bloom in warm water and can interfere with fish habitat and recreation. Changes in water temperature as a result of timber harvesting are typically noted in small rivers and streams.

Ground water means all water below the ground surface. It includes two types of water storage and movement: aquifers and subsurface flow.

Aquifers contain water that has percolated through the soil mantle or channel bottoms; they are geologic formations capable of storing water and allowing its lateral movement. In general, water movement through aquifers is slow and little affected by immediate precipitation. The presence of aquifers is determined by the geology of a region. In western Washington, most of the area underlain by aquifers is in the glaciated Western Washington Lowlands Province and near the coast of the Olympic Peninsula Province. In the forested areas of eastern Washington, aquifers are mostly limited to the vicinity of the channels of major drainages. Most aquifers consist of sedimentary materials; others include basalt formations. They are usually deep below the surface, up to several thousand feet.

Subsurface waters, on the other hand, typically enter the soil and are stopped by an impervious layer of bedrock or consolidated materials. If the land surface is on an incline, lateral movement occurs within or just below the soil. Movement is often rapid and sensitive to immediate precipitation. Subsurface flow is the most common in Washington's forested areas, especially in mountainous areas. Movement of subsurface flow is determined by the topography and characteristics of soil and subsoil. Subsurface flow is also strongly influenced by the forest condition and management activities.

The quantity of ground water at any time is determined by the amount of water percolating through the soil, the amount in storage below the soil surface and in aquifers, and the amount either removed for domestic purposes or entering stream channels and other surface water bodies. Trees and plants remove water from soil by the process of

transpiration. This loss of water in soil creates a moisture content that is less than the maximum amount the soil can hold. When precipitation or snowmelt are absorbed, water is held in the soil until the maximum level of moisture content is reached.

Ground water quality is not as sensitive as that of surface water to forest conditions and management. In general, the quality of ground water in aquifers depends more on aquifer and local geology than on forest influences. Subsurface flows are more sensitive to forest influences. Forest soils serve as excellent filters through which water percolates. Dissolved and suspended solids and organic compounds are filtered or absorbed by forest soil. As a result of this natural filter, ground water recharged from forest land is generally of good quality.

Forested watersheds in Washington are an important source of public water supplies, mostly as surface water. The quality of surface water from state-managed forest land is generally good, making forests a valuable source of drinking water that typically requires little treatment. Activities in forest watersheds can affect public water supplies in two related ways; quantity and quality, which in turn can affect the usable quantity of water. The department manages state forest land in several major watersheds used for public water supplies, including the Sultan, Tolt, and Green River basins in western Washington and Buck Creek watershed in eastern Washington. Whether the department's activities significantly affect public water supplies depends on the proportion of watershed areas managed by the department and the type and timing of activities.

## Planning Unit Overview

The following tables (4.8.1-4.8.9) summarize water resources and related influences on water for the nine planning units in HCP area.

## Table 4.8.1: Summary of water resources and related influences on DNR-managed lands in the North Puget Planning Unit

(Source: Data compiled from DNR's GIS. Data for unstable hillslopes based on Shaw and Johnson (in press) slope morphology model)

| | Length on HCP lands (miles) | Percent of each stream type in the stream network (based on length) | Density on HCP lands (miles per square mile) | Area on HCP lands (acres) | Percent of HCP lands |
|---|---|---|---|---|---|
| Streams | | | | | |
| Type 1 | 90.4 | 4 | .15 | | |
| Type 2 | 16.5 | 1 | .03 | | |
| Type 3 | 177.1 | 8 | .29 | | |
| Type 4 | 426.4 | 20 | .69 | | |
| Type 5[1] | 1,474.9 | 67 | 2.38 | | |
| Open Water | | | | 1,830 | |
| Land in rain-on-snow zone | | | | 151,280 | |
| Roads | | | 1.55 | | |
| Unstable Hillslopes | | | | 48,426 | 12 |

[1] Untyped streams are treated as Type 5 for the purpose of this analysis.

## Table 4.8.2: Summary of water resources and related influences on DNR-managed lands in the South Puget Planning Unit

(Source: Data compiled from DNR's GIS. Data for unstable hillslopes based on Shaw and Johnson (in press) slope morphology model)

| | Length on HCP lands (miles) | Percent of each stream type in the stream network (based on length) | Density on HCP lands (miles per square mile) | Area on HCP lands (acres) | Percent of HCP lands |
|---|---|---|---|---|---|
| Streams | | | | | |
| Type 1 | 35.1 | 3 | .15 | | |
| Type 2 | 6.3 | 1 | .03 | | |
| Type 3 | 75.6 | 7 | .33 | | |
| Type 4 | 146.4 | 13 | .64 | | |
| Type 5[1] | 825.4 | 76 | 4.83 | | |
| Open Water | | | | 1,016 | |
| Land in rain-on-snow zone | | | | 64,664 | |
| Roads | | | 2.81 | | |
| Unstable Hillslopes | | | | 12,567 | 9 |

[1] Untyped streams are treated as Type 5 for the purpose of analysis.

## Table 4.8.3: Summary of water resources and related influences on DNR-managed lands in the Columbia Planning Unit

(Source: Data compiled from DNR's GIS. Data for unstable hillslopes based on Shaw and Johnson (in press) slope morphology model)

| | Length on HCP lands (miles) | Percent of each stream type in the stream network (based on length) | Density on HCP lands (miles per square mile) | Area on HCP lands (acres) | Percent of HCP lands |
|---|---|---|---|---|---|
| Streams | | | | | |
| Type 1 | 78.1 | 2 | .17 | | |
| Type 2 | 5.5 | <1 | .01 | | |
| Type 3 | 179.2 | 6 | .40 | | |
| Type 4 | 488.7 | 15 | 1.08 | | |
| Type 5[1] | 2,524.0 | 77 | 5.58 | | |
| Open Water | | | | 187 | |
| Land in rain-on-snow zone | | | | 119,176 | |
| Roads | | | 2.66 | | |
| Unstable Hillslopes | | | | 32,326 | 11 |

[1] Untyped streams are treated as Type 5 for the purpose of analysis.

## Table 4.8.4: Summary of water resources and related influences on DNR-managed lands in the Straits Planning Unit

(Source: Data compiled from DNR's GIS. Data for unstable hillslopes based on Shaw and Johnson (in press) slope morphology model)

| | Length on HCP lands (miles) | Percent of each stream type in the stream network (based on length) | Density on HCP lands (miles per square mile) | Area on HCP lands (acres) | Percent of HCP lands |
|---|---|---|---|---|---|
| Streams | | | | | |
| Type 1 | 18.4 | 3 | .11 | | |
| Type 2 | 15.8 | 3 | .09 | | |
| Type 3 | 60.3 | 10 | .35 | | |
| Type 4 | 85.2 | 15 | .49 | | |
| Type 5[1] | 397.2 | 69 | 2.28 | | |
| Open Water | | | | 1,144 | |
| Land in rain-on-snow zone | | | | 18,848 | |
| Roads | | | 2.58 | | |
| Unstable Hillslopes | | | | 10,336 | 9 |

[1] Untyped streams are treated as Type 5 for the purpose of analysis.

## Table 4.8.5: Summary of water resources and related influences on DNR-managed lands in the South Coast Planning Unit

(Source: Data compiled from DNR's GIS. Data for unstable hillslopes based on Shaw and Johnson (in press) slope morphology model)

| | Length on HCP lands (miles) | Percent of each stream type in the stream network (based on length) | Density on HCP lands (miles per square mile) | Area on HCP lands (acres) | Percent of HCP lands |
|---|---|---|---|---|---|
| Streams | | | | | |
| Type 1 | 59.7 | 2 | .16 | | |
| Type 2 | 16.1 | 1 | .04 | | |
| Type 3 | 164.2 | 6 | .44 | | |
| Type 4 | 328.2 | 12 | .88 | | |
| Type 5[1] | 2,153.0 | 79 | 5.77 | | |
| Open Water | | | | 412 | |
| Land in rain-on-snow zone | | | | 16,807 | |
| Roads | | | 2.85 | | |
| Unstable Hillslopes | | | | 15,370 | 6 |

[1] Untyped streams are treated as Type 5 for the purpose of analysis.

## Table 4.8.6: Summary of water resources and related influences on DNR-managed lands in the Chelan Planning Unit

(Source: Data compiled from DNR's GIS. Data for unstable hillslopes based on Shaw and Johnson (in press) slope morphology model)

| | Length on HCP lands (miles) | Percent of each stream type in the stream network (based on length) | Density on HCP lands (miles per square mile) | Area on HCP lands (acres) | Percent of HCP lands |
|---|---|---|---|---|---|
| Streams | | | | | |
| Type 1 | 1.3 | 1 | .05 | | |
| Type 2 | 0 | 0 | .00 | | |
| Type 3 | 1.3 | 1 | .05 | | |
| Type 4 | 6.6 | 3 | .27 | | |
| Type 5[1] | 202.8 | 95 | 8.28 | | |
| Open Water | | | | 5 | |
| Land in rain-on-snow zone | | | | 11,550 | |
| Roads | | | 2.70 | | |
| Unstable slopes[2] | | | | | |

[1] Untyped streams are treated as Type 5 for the purpose of analysis.
[2] Unstable hillslope calculations were done for the west-side and OESF planning units only.

## Table 4.8.7: Summary of water resources and related influences on DNR-managed lands in the Yakima Planning Unit

(Source: Data compiled from DNR's GIS. Data for unstable hillslopes based on Shaw and Johnson (in press) slope morphology model)

| | Length on HCP lands (miles) | Percent of each stream type in the stream network (based on length) | Density on HCP lands (miles per square mile) | Area on HCP lands (acres) | Percent of HCP lands |
|---|---|---|---|---|---|
| Streams | | | | | |
| Type 1 | 10.1 | 2 | .08 | | |
| Type 2 | 1.7 | 0 | .01 | | |
| Type 3 | 22.4 | 5 | .18 | | |
| Type 4 | 67.0 | 15 | .53 | | |
| Type 5[1] | 362.6 | 78 | 2.87 | | |
| Open Water | | | | 41 | |
| Land in rain-on-snow zone | | | | 69,779 | |
| Roads | | | 2.38 | | |
| Unstable slopes [2] | | | | | |

[1] Untyped streams are treated as Type 5 for the purpose of analysis.
[2] Unstable hillslope calculations were done for the west-side and OESF planning units only.

## Table 4.8.8: Summary of water resources and related influences on DNR-managed lands in the Klickitat Planning Unit

(Source: Data compiled from DNR's GIS. Data for unstable hillslopes based on Shaw and Johnson (in press) slope morphology model)

| | Length on HCP lands (miles) | Percent of each stream type in the stream network (based on length) | Density on HCP lands (miles per square mile) | Area on HCP lands (acres) | Percent of HCP lands |
|---|---|---|---|---|---|
| Streams | | | | | |
| Type 1 | 8.3 | 1 | .04 | | |
| Type 2 | 6.6 | 1 | .03 | | |
| Type 3 | 38.7 | 5 | .19 | | |
| Type 4 | 111.9 | 16 | .54 | | |
| Type 5[1] | 552.0 | 77 | 2.67 | | |
| Open Water | | | | 126 | |
| Land in rain-on-snow zone | | | | 97,043 | |
| Roads | | | 2.64 | | |
| Unstable slope[2] | | | | | |

[1] Untyped streams are treated as Type 5 for the purpose of analysis.
[2] Unstable hillslope calculations were done for the west-side and OESF planning units only.

## Table 4.8.9: Summary of water resources and related influences on DNR-managed lands in the OESF Planning Unit

(Source: Data compiled from DNR's GIS. Data for unstable hillslopes based on Shaw and Johnson (in press) slope morphology model)

| | Length on HCP lands (miles) | Percent of each stream type in the stream network (based on length) | Density on HCP lands (miles per square mile) | Area on HCP lands (acres) | Percent of HCP lands |
|---|---|---|---|---|---|
| Streams | | | | | |
| Type 1 | 87.3 | 4 | .21 | | |
| Type 2 | 44.7 | 2 | .11 | | |
| Type 3 | 285.7 | 11 | .68 | | |
| Type 4 | 261.5 | 10 | .63 | | |
| Type 5[1] | 1,852.6 | 73 | 4.44 | | |
| Open Water | | | | 500 | |
| Land in rain-on-snow zone | | | | 50,375 | |
| Roads | | | 3.21 | | |
| Unstable Hillslopes | | | | 37,991 | 14 |

[1] Untyped streams are treated as Type 5 for the purpose of analysis.

## Current Water Quality Status

The Washington Department of Ecology is authorized by the U.S. Environmental Protection Agency (EPA) to regulate water quality in the state; this includes enforcing compliance by landowners in minimizing nonpoint sources of water pollution (e.g., sediment from mass-wasting events) and avoiding exceedance of mean daily water temperatures. The Washington Department of Ecology compiles a list of water-quality-limited streams as required by Section 303(d) of the federal Clean Water Act, and the list is approved by EPA. Tables 4.8.10, 4.8.11, and 4.8.12 provide information on the water quality impairments for each of the planning units within the three major planning subareas. This information is derived from the GIS database for waters classified by the Washington Department of Ecology (1994) as water-quality-impaired.

### Table 4.8.10: Water quality-limited streams within (5) West-Side Planning Units

(Source - Washington Department of Ecology, 1994. List of water quality limited streams in Washington State)

| | North Puget | South Puget | Columbia | South Coast | Straits |
|---|---|---|---|---|---|
| Number of impaired stream segments | 19 | 7 | 4 | 12 | 6 |
| Total miles impaired | 43.53 | 9.89 | 4.82 | 11.66 | 5.54 |
| Miles of streams impaired for: Temperature | 24.35 | 0 | 3.19 | 0 | 1.19 |
| Sediment | 1.66 | 0 | 0 | 0 | |
| Fecal coliform | 7.99 | 9.89 | 1.13 | 5.74 | 4.35 |
| Dissolved oxygen | 0 | 0 | 0 | .74 | 0 |
| Temperature and sediments | 88.60 | 0 | 0 | 0 | 0 |
| Combination of any 3 of 4: (temperature, sediment, fecal coliform, and dissolved oxygen) | .93 | 0 | .50 | 5.18 | 0 |

## Table 4.8.11: Water quality-limited streams within (3) East-Side Planning Units

(Source - Washington Department of Ecology, 1994. List of water quality limited streams in Washington State.)

| | Klickitat | Yakima | Chelan |
|---|---|---|---|
| Number of impaired stream segments | 6 | 8 | 1 |
| Total miles of impaired streams | 6.62 | 16.71 | 0.08 |
| Miles of streams impaired for: Temperature | 1.41 | 14.81 | 0 |
| Sediment | 0 | 0 | 0 |
| Fecal coliform | 1.65 | 1.65 | 0 |
| Dissolved oxygen | 0 | 0 | 0 |
| Temperature and sediment | 3.56 | 0.25 | 0.08 |
| Combination of any 3 of 4: (temperature, sediment, fecal coliform, and dissolved oxygen) | 0 | 0 | 0 |

## Table 4.8.12: Water quality- limited streams within the Olympic Experimental State Forest

(Source - Washington Department of Ecology, 1994. List of water quality limited streams in Washington State.)

| | |
|---|---|
| Number of impaired stream segments | 26 |
| Total miles of impaired streams | 58.46 |
| Miles of streams impaired for: Temperature | 57.97 |
| Sediment | 0 |
| Fecal Coliform | 0 |
| Dissolved oxygen | 0 |
| Temperature and sediment | 0.49 |
| Combination of any 3 of 4 (temperature, sediment, fecal coliform, and dissolved oxygen) | 0 |

The Department of Ecology is directed, through the Clean Water Act, to establish total maximum daily loads (TMDL) for all waters on the list. The total maximum daily load is defined as the sum of all pollutant loads allocated to point and nonpoint sources within a watershed. The TMDL is set such that the loading capacity of an identified water segment is not exceeded.[1] Ecology prioritizes waters for TMDL development by assessing "vulnerability to degradation, extent of beneficial use impairment, availability to technical support, amenability to control the problem through TMDLs, and the degree of public interest" (Washington Department of Ecology 1994). Watersheds are managed on a 5-year cycle, during which time the intent is to meet water-quality standards through monitoring, inspections, TMDL development, permitting, and other pollution-control activities.

## 4.8.2 Evaluation of Alternatives

Water temperature and sedimentation are the two nonpoint sources of impairment most closely related to forest land management. Soil disturbance, road runoff, reduced shade, and other factors affect water quality. The designation of riparian zones and related management strategies within these zones mitigate adverse affects because riparian vegetation traps sediments, stabilizes banks, and provides shade. Water quantity, or stream flow, and overall hydrology within drainage basins can also be affected by forest land management. These water quality and quantity issues are discussed in the riparian habitat sections (Sections 4.2.3, 4.3.2, and 4. 4.2) of this draft EIS. Additional information related to the No Action alternative is available in the FEIS for DNR's Forest Resource Plan (1992a). In addition to wetlands, watershed analysis, roads, and riparian management zone policies, DNR adopted a landscape planning policy that incorporates this broader watershed perspective into forest land management.

[1] DNR and the Washington Department of Ecology currently are pursuing the possibility of satisfying TMDL requirements with the Washington Forest Practices Act watershed analysis methods (WFPB 1995b), in order to delist water-quality-limited streams (J. Schuett-Hames, Washington Department of Ecology, Southwest Regional Office, Olympia, personal commun., 1995; S. Bernath, DNR, Forest Practices Division, Olympia, pers. commun., 1995). This cooperative agreement is contingent on the inclusion of water quality and monitoring modules in the Forest Practices watershed analysis manual, as well as a more comprehensive treatment of Type 4 and Type 5 drainages as nonpoint sources for stream sediment loading and water temperature impacts. DNR's Forest Practices Division is taking the necessary steps toward accomplishing these tasks.

# 4.9 Cultural Resources

## 4.9.1 Affected Environment

Many people in Washington State, including Native Americans, value the archeological and historical sites associated with their history and culture. Many Native Americans continue to use local traditional resources and highly value traditional cultural sites.

Native Americans have occupied the Washington landscape for more than 12,000 years. The original inhabitants were descendants of Asian peoples who entered North America via the land bridge that once connected Alaska to Kamchatka and Siberia (Washington Office of Archaeology and Historic Preservation 1989). Archaeological sites have been found from the Pacific coast to the Columbia plateau. Evidence of Washington's prehistory includes ancient tools, remnants of habitation sites, burial grounds, and petroglyphs that provide clues to the lives of these people.

Because of the barrier created by the Cascade mountains, the cultures of Native Americans west of the Cascades differed greatly from those on the east side of the mountains. The tribes west of the Cascades were grouped by anthropologists as "Coast Indians," whereas tribes east of the Cascades were referred to as "Plateau Indians" (Avery 1965). The life of the Coast Indians, including the Salish and Nootka cultural groups, was centered around water. Salmon was not only a major source of food, but also the focus of many ceremonies. The tribes celebrated their spiritual ties to the salmon and paid tribute to them as the foundation of their food supply. The coast peoples ate other kinds of fish, including herring, trout, cod, and shellfish, as well as roots, berries, and nuts. The region provided ample wood for constructing canoes and houses. Coastal tribes used cedar bark to weave clothing and made rain hats and baskets from spruce root and grass fibers.

The coast people fished and hunted along the coast in spring, summer, and fall, living in small temporary encampments. In the winter they gathered together in more permanent villages. The coastal environment, with its plentiful resources, allowed these Native Americans to accumulate a great wealth of clothing, baskets, and food. Often the wealthiest man in the village was chief. The chief usually inherited his wealth in the form of fishing rights at a particularly good spot in the river or the right to pick berries where they were most abundant. A unique feature of some Coast Indian cultures was the potlatch, a grand feast given by a wealthy family at which they gave away their possessions to guests. It took years for the hosts to collect enough food and gifts, such as blankets, jewelry, and baskets, for hundreds of guests.

The lives of the Plateau tribes were somewhat different than the coast people. Because food was less plentiful for the Plateau tribes, they spent much more time securing provisions than the coast tribes. Salmon were also a major food source for these tribes. However, because other kinds of fish were not as plentiful, Plateau tribes supplemented their diet with rabbit, deer, and elk, as well as roots, berries, and nuts. Wood was scarce around the Plateau villages, so shelters were built from poles and animals skins or woven

mats, or pithouses were dug below ground. Caves and natural rock-shelters also provided protection from the elements.

The Plateau tribes did not have the plentiful resources to build up stores of wealth that the coastal tribes did. Chiefs of the Plateau villages were chosen for their wisdom rather than wealth. Sweathouses played an important part in Plateau culture. Most were built from a framework of bent limbs covered with branches, skins, or mats. Sweating in these huts was part of a purification ritual.

Table 4.9.1 shows the nine HCP planning units and the major tribes associated with those lands.

## Table 4.9.1: HCP planning units and major tribes associated with those lands

| PLANNING UNIT | MAJOR TRIBES |
|---|---|
| OESF | Makah/Ozette, Quileute, Hoh, Quinalt, Lower Elwha S'Klallam, Jamestown S'Klallam, Port Gamble S'Klallam |
| Straits | Makah, Lower Elwha S'Klallam, Jamestown S'Klallam, Port Gamble S'Klallam, Skokomish |
| South Coast | Quinalt, Shoalwater Bay, Chehalis |
| North Puget | Nooksack, Lummi, Swinomish, Sauk-Suiattle, Stillaguamish, Tulalip, Muckleshoot |
| South Puget | Suquamish, Muckleshoot, Puyallup, Nisqually, Squaxin Island, Skokomish |
| Columbia | Yakama, Chinook |
| Chelan | Yakama |
| Yakima | Yakama |
| Klickitat | Yakama |

Many archaeological and historic sites lie within the borders of DNR's nine habitat conservation planning units. Table 4.9.2 summarizes the types of sites in each planning unit that are located on or near DNR-managed lands.

### Table 4.9.2: Types of archaeological and historic sites within the borders of DNR's nine HCP planning units

(Source - DNR TRAX system )

| UNIT | NO. OF SITES | TYPES OF SITES |
|---|---|---|
| OESF | 11 | cemeteries, shipwrecks, homesteads |
| Straits | 13 | historic battle ground, lithic debris, mammoth bone[2] |
| South Coast | 33 | bridges, railroad and logging camps, ancient campsites and rock-shelters |
| North Puget | 33 | rock-shelters, petroglyphs, burial grounds, historic district[3] |
| South Puget | 7 | campsites, lithic matter, and railroad camps |
| Columbia | 15 | historic city district, ancient caves and petroglyphs |
| Chelan | 3 | campsite, burial ground, cairn |
| Yakima | 11 | ancient rock-shelters and lithic matter |
| Klickitat | 20 | homesteads, camp and village sites, and pictographs |

## 4.9.2. Alternatives

Native American graves and archaeological sites are protected from disturbance under chapters 27.44 and 27.53 RCW. Federal and state laws also protect historic and archaeological sites. The state Office of Archaeology and Historic Preservation maintains a register of these sites. DNR uses a computer-based filing and recording system that allows the department to inventory and retrieve information about sites in a particular area. DNR land managers use the department's Total Resource Application Cross-Reference (TRAX) system in evaluating specific project impacts to ensure that department activities do not damage these sites. The department works closely with tribes and other agencies to keep these records current.

[2]The Manis Mastodon Site, near Sequim, is listed on the National Register of Historic Places.

[3]Part of the Stevens Pass Historic District, which is listed on the National Register, lies within the North Puget Sound Unit.

The department's current procedure is to survey areas and obtain as much information as possible from tribes and other interested parties before a timber sale is executed. The department intends to continue to work closely with tribes to identify historical and archaeological sites. The goal is to prevent timber harvesting and related activities from inadvertently damaging cultural resources.

The department's policy, stated in the Forest Resource Plan, is that the department will establish a program to identify and inventory historic and archaeological sites and protect them at a level which, at a minimum, meets regulatory requirements. This policy reduces the possibility that timber harvest or other department activities will destroy or damage historical or archaeological sites.

DNR's policy ensures that resources are identified within the project area and that the department will analyze the project's effect on the resources and take appropriate measures to ensure that no damage occurs. Mitigating measures may include the modification of practices, physical protection of the resource, data recovery, or similar measures. Where appropriate, additional professional assistance will be obtained. The proposed HCP for DNR's trust lands will not alter this policy or its implementation.

# 4.10 Economic Analysis of DNR's Habitat Conservation Plan

This section provides an analysis of the economic impact of the proposed HCP alternatives on Washington's economy. This section focuses on changes in employment in the economy as a whole. When analyzing the impacts of changing policies in forest land management, some previous NEPA documents, such as the FSEIS for the President's Forest Plan (USDA and USDI 1994a), have examined the role of nontimber uses such as special forest products, tourism, and recreation. While these issues were raised during the scoping process and considered by DNR in developing the range or alternatives, DNR and the Services do not believe that activities involving use of these resources would differ in the presence or absence of an Incidental Take Permit. As a result, this section does not examine these issues.

Typically, changes in forest management affect many aspects of the regional and national economy. The proposed changes are small relative to the national timber harvest, so changes in prices for timber products and other adjustments in the national economy are not anticipated. Different regions throughout the state that rely on timber from state-managed lands may experience both positive and negative impacts from changes in management of the state's resources. This analysis focuses on timber-related employment and employment income as policy-relevant indicators of the HCP alternatives and their impacts on the region's economy.

## Economic Background

Forest products are an important component of Washington's economy. The lumber, wood products, and paper industries provided more than 52,000 of the 336,000 manufacturing jobs in the state in 1993. In comparison, the aircraft manufacturing sector provided 95,000 jobs (Washington State Employment Security 1995). Although manufacturing accounted for only 12 percent of total employment in 1993 (U.S. Department of Commerce 1995), manufacturing activity generates work in other sectors of the economy as companies and workers demand supplies and services. As manufactured products are exported from the region they generate important new income for the state economy.

Some regions of the state are more dependent on forest industries than others. The economy of the Olympic Peninsula is heavily dependent on lumber and wood products. Lumber and paper products are a significant component of the economy of the region west of the Cascades. Regions near Seattle-Tacoma have denser populations and more diverse economies. The economies of regions east of the Cascades are more agriculturally oriented.

In 1990, the forest products industry supplied about half the logs it consumed from its own lands. State-managed lands supplied 16 percent of the logs used, 910 MMbf (DNR 1994c), but this decreased considerably after 1990. The small proportion from state-managed lands is misleading because some regions of the state rely on timber from state-managed lands for a much larger share of their supply. Clallam County sawmills, for example, obtained more than a fifth of their logs from state-managed lands (DNR 1994c).

In 1990, more than a quarter of the logs exported from the Olympic Peninsula were from state-managed lands (DNR 1994c). Mills east of the Cascades relied on state-supplied timber to a lesser extent. However, export of logs from state-managed lands is now prohibited.

The volume of timber sales from state-managed lands has not been very stable. Road building, policy shifts, litigation, and endangered species protection have affected the amount of timber cut. These changes lend perspective to changes anticipated under the HCP. The timber industry has absorbed much larger year-to-year changes in harvest amounts than are anticipated from the implementation of the HCP. The industry is now well adapted to changes in supply, particularly supply from state-managed lands. Implementation of the HCP eliminates a significant source of variation in harvests from state-managed lands.

The forest products industry is highly cyclical. Changes in the national demand for housing and paper products relate closely to the health of the national economy and interest rates. Additionally, timber supply from the Pacific Northwest is sensitive to international markets. Even before the recent controversies over endangered species, the Northwest forest industries were changing. Competition from southern forests and imports, technological changes, and exhaustion of old-growth forests confronted the industry with new challenges (Schamberger et al. 1992). In the past, log production for export provided some "slack" in the production system. Raw log exports would increase or decrease in response to relative price shifts brought on by changes in domestic demand. Timber harvest was somewhat insulated from domestic economic downturns because it had an alternative outlet for its product. Recent legal changes have curtailed exports. As a result, business-cycle effects are felt more quickly at the forest level. A stable but flexible supply of logs from state-managed lands may be able to mitigate these impacts.

## Methods

The U.S. Forest Service has developed a series of multipliers based on the number of jobs created and income generated by the harvest of 1 million board feet of timber. Any increase in harvest volume has a direct effect in the timber industry. More people are employed to cut and process logs. The increase also has an indirect effect as mills buy more supplies from other industries and mill employees spend their income in the community. The U.S. Forest Service multipliers show both the direct impact of a change in harvest volume and the indirect change generated by the additional employment in the timber industry. Multiplying the change in harvest volume by the multiplier yields the expected change in employment. Any impacts are linearly related to the change in harvest volume.

Although they are simple to apply, the multipliers embody a number of assumptions about the timber industry and the regional economy. The multiplier must reflect the different uses of the logs to gauge the employment impact accurately. Logs harvested for export generate employment in the forest and shipping docks but not in sawmills or furniture factories. Less processing implies fewer new jobs will be added. In addition,

some regional economies can provide many services and supplies needed by timber mills and workers. In these integrated economies the increased wages may recirculate several times, generating additional income and employment. Contrast the impact of a dollar spent in a grocery store in a remote part of Alaska with one spent in a supermarket in Tacoma. Each probably goes largely to a food wholesaler in Seattle. The Alaskan dollar has left the regional economy after only one transaction. The Tacoma dollar will pay salaries to the wholesaler's employees who will then recirculate it in the regional economy. The Tacoma dollar will generate more income in the region because the economy is more complete. For these reasons, the U.S. Forest Service develops a unique multiplier for each timber harvest region reflecting the use of its timber and the regional economy. In this analysis, the multiplier for the nearest region was applied in each planning unit.

Any multiplier analysis also reflects the technology used during the period in which the multiplier is calculated. The technology in the timber industry has been changing rapidly in recent years. Improved productivity has significantly reduced the number of jobs per board foot produced (Mead et al. 1991, quoted in Schamberger et al. 1992). These changes are likely to continue for the near future. Adjusting the multiplier for technological change is conceptually possible but any adjustment would be speculative at best.

Multipliers are designed to evaluate the short-term changes in harvest volumes associated with 5- and 10-year forest plans. They do not encompass longer term adjustments such as the migration of people or industries. Nor can they capture the impact of new products and price structures. Within the planning horizon of the proposed plans it is easy to imagine the possibility of large shifts of capital and people. Substitution of recycled plastics for logs, and computer monitors for paper, is already changing the dynamics of the lumber and paper industries. When one considers that 200 years ago parchment and the quill pen were advanced communications technology, defending an assumption of no changes in technology or economic structure through the forecast period is difficult. Any economic forecast beyond 40 years should be viewed with the deepest skepticism.

Data provided by DNR are based on 10-year forecast periods. Sustainable harvest calculations suggest the volume of harvest by age class of trees. Annual harvest quantities are required for the multiplier analysis, so 10-year harvest totals were divided by 10. Actual annual harvests will vary because of weather, market conditions, and other events. Employment and income impacts are shown as a range of probable changes to demonstrate the degree of uncertainty about actual harvests.

## Results

Tables 4.10.1 and 4.10.2 show the annual harvest levels and associated employment and unemployment income impacts for each alternative analyzed. Estimated harvest levels for the alternatives are divided into two categories: expected and low. The expected harvest levels represent average annual harvest levels based on the projection of DNR-managed land harvest levels for the first decade (see Appendix 5 for a discussion of the assumptions used for the harvest analysis projections). Low harvest levels represent the

possibility of annual negative fluctuations of up to 35 percent for the No Action alternative and 25 percent for Alternative B. It is recognized that future conditions and circumstances may result in higher harvest levels than specified in the expected or low harvest levels used here. However, given the uncertainty typically associated with making such projections, a more conservative approach to the harvest level estimates is probably warranted.

Table 4.10.1 shows that total regional expected annual harvest levels under Alternative B would be 7.1 percent greater than under the No Action alternative. Implementation of Alternative C would result in a decrease of 16.3 percent in annual harvest levels compared with the No Action alternative. Under low harvest levels, Alternative B would result in a 23.5 percent harvest increase over the No Action alternative. Alternative C would result in a decrease of 3.4 percent.

## Table 4.10.1: Aggregate harvest levels and timber-related jobs, by alternative

Source: Washington Department of Natural Resources 1996.

| | Timber Harvest[1] | | | | |
|---|---|---|---|---|---|
| | **Alts. A, 1** | **Alts. B, 2** | **Percent Change in Harvest Levels[2]** | **Alts. C, 3** | **Percent Change in Harvest Levels[2]** |
| Expected | 724.7 | 776.0 | + 7.1% | 606.9 | -16.3% |
| Low | 471.0 | 582 | + 23.5% | 455.2 | -3.4% |

[1] In millions of board feet

[2] HCP Alternatives compared with Alts. A, 1.

For expected harvest levels, the table shows that job impacts, based on percentage increases, would be concentrated in the east-side and OESF planning units. For the east-side planning units, timber-related employment and income would increase by over 32 percent Alternative B compared with the No Action alternative. For the OESF Planning Unit, employment and income under Alternative B would increase by 42.9 percent. For the west-side planning units, harvest levels and employment would be similar under both alternatives A and B.

## Table 4.10.2: Timber-related Job and Income Impacts, by Planning Unit and Alternative

Source: Total timber-related jobs and income are based on response coefficients (jobs and income per million board feet of timber harvest) developed for National Forest timber harvest levels in Washington State. Contact Regional Economist, U.S. Forest Service, Strategic Planning, Region 6 Office, Portland Oregon.

| | Total Timber-related jobs[1] | | | | | Total Timber-related job income[2] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No Action | HCP Option B | | HCP Option C | | No Action | HCP Option B | | HCP Option C | |
| Unit | Jobs | Jobs | Percent change[3] | Jobs | Percent change[3] | ,000 Dollars | ,000 Dollars | Percent change[3] | ,000 Dollars | Percent change[3] |
| **West Side[4]:** | | | | | | | | | | |
| **expected** | 13,671 | 13,693 | +0.2% | 10,777 | -21.2% | 378,683 | 377,945 | -0.2% | 294,805 | -22.2% |
| **low** | 8,886 | 10,270 | +15.6% | 8,082 | -9.0% | 246,144 | 283,459 | +15.2% | 221,104 | -10.2% |
| **East Side[5]:** | | | | | | | | | | |
| **expected** | 313 | 415 | +32.6% | 286 | -8.7% | 7,084 | 9,380 | +32.4% | 6,468 | -8.7% |
| **low** | 204 | 311 | +52.5% | 215 | +5.4% | 4,605 | 7,035 | +52.8% | 4,851 | +5.4% |
| **OESF:** | | | | | | | | | | |
| **expected** | 938 | 1,340 | +42.9% | 579 | -38.3% | 24,990 | 35,700 | +42.9% | 15,427 | -38.3% |
| **low** | 610 | 1,005 | +64.8% | 434 | -28.8% | 16,244 | 26,775 | +64.8% | 11,571 | -28.8% |
| **Total:** | | | | | | | | | | |
| **expected** | 14,922 | 15,448 | 3.5% | 11,642 | -22.0% | 410,757 | 423,025 | 3.0% | 316,700 | -22.9% |
| **low** | 9,700 | 11,586 | 19.4% | 8,731 | -10.0% | 266,993 | 317,269 | 18.8% | 237,526 | -11.0% |

[1] Includes direct, indirect and induced employment from associated harvest levels.

[2] Includes direct, indirect, and induced employment income from associated harvest level.

[3] Specified Alternative compared with No Action alternative.

[4] Columbia, Straits, North Puget, South Puget and South Coast planning units.

[5] Chelan, Yakima, and Klickitat planning units.

For low harvest levels, the OESF Planning Unit would have the highest percentage increase for harvest and employment levels under Alternative 2 compared with the No Action alternative. The east-side planning units would have the next highest percentage increase, and the west-side planning units have the smallest increase.

Under the expected harvest projections, Alternative C would result in a decrease in timber-related employment and income for all three areas compared with the No Action Alternative. The west-side would experience a 21 percent decline in employment and income; the east-side about a 9 percent decline and the OESF a 38 percent decline. Under low harvest projections, the east-side would show a 5.4 increase in employment and income compared with the No Action Alternative; the west-side, a 9 to 10 percent decline in employment and income; and the OESF, about a 29 percent decline.

Overall, under expected harvest projections, Alternative B would result in a 3.4 and 3.0 percent increase in timber-related employment and associated income, respectively over the No Action alternative; Alternative C would result in a 22 percent decrease for both employment and income.

Under low harvest projections, Alternative B would result in an increase of 19 percent over the No Action alternative for both employment and income. Alternative C would decrease employment and income around 10 percent.

# 4.11 Cumulative Effects

## 4.11.1 Introduction

The cumulative effects analysis addresses the effects of each alternative and their interactions with other reasonably foreseeable actions at the regional level. Cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions, regardless of the originator of those actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Each resource assessment section in this DEIS includes at least some discussion of cumulative effects potential related to DNR's No Action and action alternatives as these apply to the five west-side, three east-side and OESF planning units in conjunction with expected actions on federal and private lands and regional recovery plans for threatened and endangered species. This is especially true for the action alternatives because the management strategies were developed with potential cumulative effects as one consideration in determining the potential effectiveness of the strategy for that resource. In addition, a habitat-based assessment is provided in Section 4.5.4. In many ways, that section provides a cumulative effects assessment in respect to overall forest and riparian habitat. Rather than repeat cumulative effects discussions contained in other parts of this document, Section 4.11 will give a brief overview of the cumulative effects contribution anticipated from DNR's No Action and action alternatives.

The discussion in this section, as well as earlier sections, does not address harvest of specific units, construction of specific roads, or other specific management activities that would be undertaken by DNR during normal forest practices. Specific actions like these that are not directly addressed under an alternative would be consistent with DNR's Forest Resource Plan (DNR 1992b), the Washington Forest Practices Act, and other state and federal laws.

## 4.11.2 Assumptions

DNR's planning area for the proposed HCP coincides with the range of the northern spotted owl. The total area of trust lands covered by the proposed HCP is approximately 1.6 million acres. Actions proposed by DNR would be applied only to DNR-managed lands. However, many other individuals and entities own and manage forest land within this same area, including the federal government (8,826,000 acres), state government (non-DNR) (151,000 acres), city and county government (101,000 acres), tribes (1,015,000 acres), and private individuals and organizations (9,488,000 acres). Potential actions by these other landowners, which would affect the overall quantity, quality, and pattern of forest land and forest habitat within western Washington, are many and highly variable. It is impossible to predict what that aggregate set of actions will be during the next 100 years. Therefore, in an effort to provide a meaningful summary of potential cumulative effects for DNR's actions, one must make some assumptions. These assumptions, based on potential trends rather than specific actions by specific landowners or government entitites, are listed below:

(1) Washington State's population will continue to grow, increasing the already abundant demands for forest lands in this state to do all and be all: providing timber and forest products, jobs, forest refuges for spiritual quests, suitable development land for expansion of society's infrastructure, habitat for all animal, plant and fish species native to Washington, unique settings for a broad range of recreation and outdoor sports, and more.

(2) In light of these demands and the changing winds of law and legislation, landowners and land managers will continue to seek creative ways to increase regulatory certainty.

(3) Large forest landowners and managers, in search of ways to resolve conflict among the many growing demands, will look increasingly toward processes that define a niche for their lands and will create specific, objectives-based plans to achieve them.

(4) Although minor adjustments may be made over time, the President's Forest Plan will provide the general level of long-term protection envisioned at the time of its adoption. As a result, national forests and parks will provide the backbone of forest habitat conservation in Washington State. Other landowners who develop specific conservation strategies will seek to define their niche in relationship to the federal lands in their area, providing themselves the greatest flexibility while also making an effective contribution to overall conservation within the state.

(5) The current shift toward habitat-based conservation, rather than species-by-species conservation, will continue as a result of composite efforts to achieve both regulatory and conservation certainty into the future.

(6) While they will be potentially more dynamic through time than the President's Forest Plan, the cumulative set of habitat conservation plans initiated by private, tribal, municipal, and state landowners and managers will create an increasingly effective, reliable, and integrated network of forest habitat in Washington.

(7) DNR will continue to manage the majority of its forest trust lands as commercial forest, being guided in that management by its responsibilities to each of the trusts. Although some forest land may become designated as transition lands during the Asset Stewardship planning process recently initiated, no significant changes in overall emphasis are expected.

## 4.11.3 Alternative A and Alternative 1

Conservation under the No Action alternatives (A and 1) is currently achieved on DNR-managed lands on a site-by-site, species-by-species basis under the guidance of the Forest Resource Plan (DNR 1992b) and the Washington Forest Practices Act. Coordination with adjacent landowners' efforts is also site-by-site, rather than at the landscape level. However, policies adopted by the Board of Natural Resources in the Forest Resource Plan (DNR 1992b) are shifting DNR toward a broader approach to forest management through landscape planning, watershed analysis, and other policies. Implementation of these policies is currently in progress.

While this shift will increase the amount of attention given to how DNR-managed lands fit into a landscape context and to potential cumulative effects of individual activities, there is no inherent strategy for achieving clearly defined conservation goals at this broader scale. More specifically, without a defined strategy for managing the nature and pattern of forest and riparian vegetation at a broad regional scale, it is difficult to ensure that positive cumulative outcomes can be accomplished for habitat within the context of commercial forest production and other forest demands. This becomes clear as the various resource assessments contained in Chapter 4 are read. Repeatedly, the No Action alternatives are described as having the potential to provide for various conservation needs, but that this can not be counted upon because: (1) no specific provisions are defined for certain needs; and/or, (2) the quantity, quality, and distribution of resulting habitats are unplanned (e.g., unpredictable movement of owls circles under today's owl circle approach rather than controlled location of habitat based on potential effectiveness and contribution need.)

If habitat were abundant, the cumulative effects might be of less concern. But when some habitats are dwindling and specific characteristics of certain habitat needs are still unknown, the inability to predict whether the cumulative effect will be positive or negative on a landscape level causes concern. There is relatively low certainty as to whether the No Action alternatives will provide positive cumulative effects on the quantity, quality, and distribution of forest habitat in Washington over the next 100 years. The individual resource evaluations suggest, at the least, there will be some gaps in availability of some habitats for some life cycle needs of some species.

## 4.11.4 Alternative B

### West-Side Planning Units

Alternative B provides a landscape-level, habitat-based strategy for providing conservation in western Washington for a broad range of species and habitat types. The primary emphasis is on spotted owls, marbled murrelets, and riparian habitat; however, it is expected that the resulting quantity, quality, and patterns of upland and riparian forests will be effective habitat for many other native species.

The owl strategy, in particular, builds on anticipated federal forest patterns. By identifying the type of effective support DNR-managed lands can contribute, Alternative B has the potential to gain high conservation benefits while maintaining the greatest operational flexibility. It also makes no demands on other nonfederal landowners, since their actions are not essential to ensuring the DNR contribution, but they have the opportunity to identify a niche for themselves in relation to this and the federal strategy that enhances everyone's contribution, thus gaining the same certainty with high flexibility. This should provide greater likelihood of positive cumulative effects for northern spotted owl conservation. This is particularly true if the trend toward habitat-based conservation plans continues as assumed.

The riparian strategy seeks to ensure overall riparian ecosystem function from headwaters to the mouth of all rivers to the extent feasible for a single land manager among many

others within each watershed. This should provide greater certainty of positive cumulative effects for the high number of species that rely on riparian, wetland, and aquatic areas than the No Action alternatives. Although the long-term contribution of marbled murrelet habitat is uncertain, there will be at least some added assurance of older forests across a larger percentage of DNR-managed lands. In addition, due to the multiple-species perspective, Alternative B provides greater certainty that the range of forest successional stages on DNR-managed lands will include older forests, with important unique features and habitats maintained, and be located where they are more strategically effective from a biological perspective.

### East-side Planning Units

Because there are so many differences between west-side and east-side ecology, DNR decided to leave most habitat issues in the east-side planning units for future planning efforts. Only the northern spotted owl strategy and other listed species potentially utilizing the east-side planning units' habitat are applied to the east-side planning units. Potential cumulative effects on eastside units related to the spotted owl strategy are described at the end of Section 4.3.1.

## 4.11.5 Alternative C

Alternative C is similar to Alternative B. Like B, it takes a strategic approach to locating certain habitats and protecting certain unique features and habitat elements. However, it provides greater certainty than either A or B that there will be adequate amounts of older forest, more certain range of desired habitats, and higher protection of riparian forests on DNR-managed lands. At the same time, it also reduces management flexibility. The potential long-term implications of this reduced flexibility in DNR's ability to respond to actions taken by other landowners within the planning area are unclear related to cumulative effects on habitat conservation.

## 4.11.6 Alternative 2

Like Alternative B for the other planning units, Alternative 2 provides a landscape-level, habitat-based strategy in the OESF for contributing to conservation in western Washington for a broad range of species. The primary emphasis is on spotted owl, marbled murrelet, and riparian ecosystems; however, it is expected that the resulting quantity, quality, and patterns of upland and riparian forests will be effective habitat for many other native species.

While Alternative 1 emphasizes protecting existing habitat for individual species, Alternative 2 is an experimental approach for enhancing the natural growth potential of today's commercial forest and for building habitat into the future. It begins with a habitat-recovery phase, then stabilizes around a habitat-maintenance approach. The nature of riparian, murrelet, and owl habitat targets should ensure a broad distribution of quality, quantity, and types of habitat landscape-by-landscape. While Alternative 2 is less closely tied to support of federal owl sites through fixed zones than Alternative 3, it also allows the greatest flexibility to locate habitat in the most strategic location through time, adjusting more easily to an unpredictable, changing environment.

Alternative 2 includes a research program that will emphasize cooperative efforts with other landowners and land managers. This has the potential to make two strong contributions toward ensuring positive long-term cumulative effects: (1) valuable new knowledge that can be used to improve the effectiveness of the conservation strategies; and, (2) the common ground gained in forest management through partnerships and shared knowledge, rather than independent actions taken without attention to adjacent lands and approaches. At the same time, because Alternative 2 is an experimental approach to achieving habitat-based conservation in a commercial forest, there is greater potential risk. This makes the cumulative outcome less certain than Alternative 3, but still more certain than Alternative 1.

## 4.11.7 Alternative 3

On the broad scale, Alternative 3 in the OESF is similar to Alternatives B and C for the west-side planning units in that it provides a landscape-level, habitat-based strategy for providing conservation on the Olympic Peninsula and is based on a more traditional zoned approach. It builds on habitat zones designed to provide specific functions for spotted owls in relation to federal lands. The primary emphasis on spotted owl, marbled murrelet, and riparian ecosystems is expected to result in forest and riparian vegetation patterns that provide effective habitat for many other species beyond just these three. Likewise, due to the multiple species emphasis and the careful placement of owl zones, this alternative provides greater certainty that the range of forest successional stages on DNR-managed lands will include older forests and be located where they are most strategically effective. There is greater certainty of positive cumulative effects under Alternative 3 than under Alternative 1.

Unlike Alternative 1, however, Alternative 3 incorporates an aggressive approach to research and gaining new knowledge and to coordinate efforts with other landowners, closer to like Alternative 2. This has the potential to make two strong contributions toward ensuring positive long-term cumulative effects: (1) valuable new knowledge that can be used to improve the effectiveness of the conservation strategies, and (2) the common ground gained in forest management through partnerships and shared knowledge, rather than independent actions taken without attention to adjacent lands and approaches. This also means there is greater potential risk than with Alternative 1 regarding the actual cumulative effects outcome; this risk is lower than with Alternative 2 because Alternative 3 is somewhat less experimental in the approach to achieving habitat through time.

## 4.11.8 Closing

In 100 years, as a traveler exploring western Washington, would a person be able to tell which alternative had been implemented? It might be difficult to tell the difference at the stand level. What isn't seen may be more significant than what is seen. For example, not seeing overly narrow riparian management areas would be significant. In general, under all the alternatives, the full range of silvicultural activities will still be applied. Under all the alternatives, all the assortment of forest stands seen today will be out there on the landscape. There will be no way to tell whether the stand you're walking through or

looking down upon is the result of any particular alternative. The difference will be pronounced at the landscape level, showing a mosaic of stand treatments that are interwoven, providing lang-term economic and ecological viability. The point is that the differences will be subtle. In fact, the effectiveness of each alternative lies precisely in the cumulative effects of the many small actions that make up that alternative. Alternatives B, C, 2, and 3 offer specific strategies to guide the cumulative effects toward positive outcomes; Alternatives A and 1, because they continue stand-level management in an atmosphere of regulatory uncertainty, permit effects to fall where they may. Alternative C is more conservative than Alternative B in providing for greater certainty of conservation benefits. Alternative 3 is more conservative than Alternative 2 in applying an experimental approach to achieving a habitat-based strategy for integrating production and conservation.

# 5. List of Preparers

# 5. List of Preparers

## Members of the Interdisciplinary Team (IDT)

| Name | Contribution | Degree(s) |
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| Jeff Cederholm, DNR | Natural Resource Scientist | B.S., M.S., Fisheries Biology |

## Specialists

(those with expertise utilized in the development of the EIS)

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Dorothy Duncan, *Commissioner, Clallam County*
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Mary Leitka, *Hoh Tribe, 10/95 to present*
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Grant Munro, *industrial forestry*
Bert Paul, *Forks, Washington*
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Jim Closner, Field Foresters
Mark Johnsen, Ozette District Manager

# 6. Distribution List

# 6. Distribution List

## Federal

***Environmental Protection Agency***[1]
***National Marine Fisheries Service***
***National Park Service, Pacific Northwest Region***
***US Fish and Wildlife Service***
***US Forest Service, Portland***
***Olympic National Park***

### U.S. Senate

The Honorable Slade Gorton
The Honorable Patty Murray

### U. S. House of Representatives

The Honorable Norm Dicks
The Honorable Richard Hasting
The Honorable Jack Metcalf
The Honorable Linda Smith
The Honorable Rick White
The Honorable Jennifer Dunn
The Honorable Jim McDermott
The Honorable George Nethercutt
The Honorable Randy Tate

## State

***California Department of Forestry***
Central Washington University Board of Trustees
Eastern Washington University Board of Trustees
The Evergreen State College Board of Trustees
***Governor's Timber Team (Washington)***
***Maryland Forest Service***
***Oregon Department of Forestry***
University of Washington Board of Regents
Washington State Board of Education
***Washington State Department of Ecology***
***Washington State Department of Fish and Wildlife***
***Washington State Office of Archaeology and Historic Preservation***
***Washington State Parks and Recreation Commission***
Washington State University Board of Regents
Western Washington University Board of Trustees

[1] Names shown in bold and italics will receive a complete set of the HCP and EIS. All others will receive Executive Summaries.

## State Legislators

***Senator Ann Anderson, Natural Resources Committee***
***Senator Kathleen Drew, Natural Resources Committee***
***Senator Jim Hargrove, Natural Resources Committee***
***Senator Mary Margaret Haugen, Natural Resources Committee***
Senator Valoria Loveland, Democratic Caucus Chair
Senator Dan McDonald, Republican Caucus Leader
***Senator Bob Morton, Natural Resources Committee***
Senator Irv Newhouse, Republican Caucus Floor Leader
Senator George Sellar, Republican Caucus Chair
Senator Sid Snyder, Democratic Caucus Leader
***Senator Harriet Spanel, Natural Resources Committee***
***Vic Moon, Research Analyst, Senate Natural Resources Committee***
***Cathy Baker, Fiscal Analyst, Senate Natural Resources Committee***
Representative Marlin Appelwick, Minority Leader
Representative Clyde Ballard, Speaker of the House
***Representative Bob Basich, Natural Resources Committee***
***Representative Barney Beeksma, Natural Resources Committee***
***Representative Jim Buck, Natural Resources Committee***
***Representative Ian Elliot, Natural Resources Committee***
Representative Dale Foreman, Majority Leader
***Representative Steve Fuhrman, Natural Resources Committee***
Representative Bill Grant, Minority Caucus Chair
***Representative Brian Hatfield, Natural Resources Committee***
***Representative Ken Jacobsen, Natural Resources Committee***
Representative Lynn Kessler, Minority Whip
Representative Barbara Lisk, Majority Caucus Chair
***Representative John Pennington, Natural Resources Committee***
***Representative Debbie Regala, Natural Resources Committee***
***Representative Tim Sheldon, Natural Resources Committee***
***Representative Val Stevens, Natural Resources Committee***
***Representative Brian Thomas, Natural Resources Committee***
***Representative Les Thomas, Natural Resources Committee***
***Representative Bill Thompson, Natural Resources Committee***
***Karl Herzog, Fiscal Analyst, House Capital Budget Committee***
***Linda Byers, Research Analyst, House Natural Resources Committee***
***Nancy Stevenson, Fiscal Analyst, House Appropriations Committee***
***Bob Longman, Coordinator, House Finance Committee***

## County

Adams County Commissioners
Adams County Planning Department
Asotin County Commissioners
Asotin County Planning Department
Benton County Commissioners
Benton County Planning Department
Chelan County Commissioners
***Chelan County Planning Department***
Clallam County Commissioners
Clallam County Conservation District
***Clallam County Planning Department***
Clark County Commissioners
***Clark County Planning Department***
Columbia County Commissioners
***Columbia County Planning Department***
Cowlitz County Commissioners
Cowlitz County Planning Department
Douglas County Commissioners
Douglas County Planning Department
Ferry County Commissioners

## County (cont.)

Ferry County Planning Department
Franklin County Commissioners
Franklin County Planning Department
Garfield County Commissioners
Garfield County Planning Department
Grant County Commissioners
Grant County Planning Department
Grays Harbor County Commissioners
***Grays Harbor County Planning Department***
Island County Commissioners
***Island County Planning Department***
Jefferson County Commissioners
***Jefferson County Planning Department***
King County Council
King County Council, Surface Water Mgmt. Division
***King County Planning Department***
Kitsap County Commissioners
***Kitsap County Planning Department***
Kittitas County Commissioners
***Kittitas County Planning Department***
Klickitat County Commissioners
Klickitat County Planning Department
Lewis County Commissioners
***Lewis County Planning Department***
Lincoln County Commissioners
Lincoln County Planning Department
Mason County Commissioners
***Mason County Planning Department***
Okanogan County Commissioners
Okanogan County Planning Department
Pacific County Commissioners
***Pacific County Planning Department***
Pend Oreille County Commissioners
Pend Oreille County Planning Department
Pierce County Council
***Pierce County Planning Department***
San Juan County Commissioners
***San Juan County Planning Department***
Skagit County Commissioners
***Skagit County Planning Department***
Skamania County Commissioners
***Skamania County Planning Department***
Snohomish County Commissioners
***Snohomish County Planning Dept***
Spokane County Commissioners
Spokane County Planning Department
Stevens County Commissioners
Stevens County Planning Department
Thurston County Commissioners
***Thurston County Planning Department***
Wahkiakum County Commissioners
***Wahkiakum County Planning Dept***
Walla Walla County Commissioners
Walla Walla County Planning Department
Whatcom County Council
***Whatcom County Planning Department***
Whitman County Commissioners
Whitman County Planning Department
Yakima County Commissioners
Yakima County Planning Department

## Local

***Seattle Water Department***
***City of Aberdeen, Department of Planning and Economic Development***
***City of Everett, Public Works Department***
***City of Forks, Economic Development Steering Committee***
***Port of Port Angeles***

## Tribal

***Chehalis Tribe***
***Chinook Tribe***
***Cowlitz Tribe***
***Hoh Tribe***
***Jamestown S'Klallam Tribe***
***Lower Elwha S'Klallam Tribe***

## Tribal (cont.)

*Lummi Nation*
*Makah Tribal Council*
*Marietta Band of Nooksack Indians*
*Muckleshoot Tribal Council*
*Nisqually Tribe*
*Nooksack Tribe*
*Northwest Indian Fisheries Commission*
*Point No Point Treaty Council*
*Port Gamble S'Klallam Tribe*
*Puyallup Tribe*
*Quileute Tribe*
*Quinault Nation*
*Samish Tribe*
*Sauk-Suiattle Tribe*
*Shoalwater Bay Tribal Council*
*Skagit Tribe*
*Skokomish Tribe*
*Snohomish Tribe*
*Stillaguamish Tribe*
*Swinomish Tribe*
*Suquamish Tribe*
*Squaxin Island Tribe*
*Tulalip Tribe*
*Upper Skagit Tribe*
*Yakama Tribe*

## Libraries

Aberdeen Timberland Library
Antioch University of Seattle Library
Battelle Seattle Research Center Library
Bellevue Community College Library
Bellingham Public Library
Brewster Public Library
Burlington Public Library
Camas Public Library
Cathlamet City Library
***Central Washington University Library***
Central Washington University, Horticulture/Forestry Library
Centralia Timberland Library
Chehalis Timberland Library
Chehalis Tribe Library
Chelan Public Library
Cheney Public Library
Chewelah Public Library
City University, Bellevue Library
Clark College Library
Clark County Law Library
Cle Elum Public Library
Columbia Basin College Library
Colville Confederated Tribes Library
Colville Public Library
Davenport Public Library
Dayton Public Library
***Eastern Washington University Library***
Edmonds Community College Library
Ellensburg Public Library
Elwha S'Klallam Tribe Library
Enumclaw Public Library
Ephrata Public Library
Everett Community College Library
***Everett Public Library***
Evergreen State College Library
Fairwood Library
Forks Memorial Library
Fort Vancouver Regional Library
Fort Vancouver Regional Library, White Salmon Branch
Fort Vancouver Regional Library, Battle Ground Branch
Fort Vancouver Regional Library, Stevenson Branch
Foster Wheeler Environmental Library
***Gonzaga University, Crosby Library***
Georgia Pacific, Bellingham Division Library
Goldendale Public Library
Government Research Assistance Library
Grand Coulee Public Library
Grandview Community Library
Grays Harbor College, John Spellman Library
Green River Community College, Holman Library
Harrington Public Library
Heritage College Library
Highline Community College Library
Hoh Tribe Library
Hoquiam Timberland Library
Issaquah Library
ITT Rayonier Research Center Library
James River Corporation, Camas Technical Center Library
Jamestown S'Klallam Tribal Library

## Libraries (cont.)

Jefferson County Rural Library
John A. Brown Library
Kalispel Tribe Library
Kelso Public Library
Kettle Falls Public Library
***King County Library***
King County Library, North Bend Branch
Kitsap Regional Library
Kittitas Public Library
Lacey Timberland Library
Longview Public Library
Lower Columbia College, Alan Thompson Library
Lummi Reservation Library
Makah Tribe Library
Mid Columbia Library
Mid Columbia Library, West Richland Branch
***Mt. Vernon Public Library***
Muckleshoot Library
Montesano Timberland Library
Natural Resources Building Library
Neill Public Library
Nisqually Tribe Library
North Central Regional Library
North Central Regional Library, Republic Branch
North Central Regional Library, Waterville Branch
Nooksack Tribe Library
North Seattle Community College Library
Northwest Indian Fisheries Commission
North Olympic Library, Forks Branch
North Olympic Library, Port Angeles Branch
Okanogan Public Library
Olympia Timberland Library
Olympic College Library
Omak Public Library
Othello Public Library
Pasco Public Library
Pend Oreille County Library
Peninsula College, John D. Glenn Library
Pierce College, Fort Steilacoom Library
Pierce County Library
Pomeroy Library
Port Gamble S'Klallam Tribe Library
Port Townsend Public Library
Prosser Public Library
Pullman Public Library
Puyallup Public Library
Puyallup Tribe Library
Raymond Timberland Library
Quileute Tribe Library
Quinault Indian Nation Library
Reardan Memorial Library
Renton Public Library
Richland Public Library
Ritzville Public Library
Roslyn Public Library
St. Martins College Library
San Juan Island Library
Sauk-Suiattle Tribe Library
Seattle Central College Library
Seattle Community College Library
Seattle Pacific University Library
***Seattle Public Library***
Seattle University Library
Sedro Woolley Public Library
Shoalwater Bay Community Library
Shoreline Community College, Ray W. Howard Library
Skagit Valley College Library
Skokomish Tribe Library
Sno Isle Regional Library
Sno Isle Regional Library, Coupeville Branch
Sno Isle Regional Library, Langley Branch
Sno Isle Regional Library, Stanwood Branch
South Bend Timberland Library
South Puget Sound Community College Library
South Seattle Community College Library
Spokane Community College Library
Spokane County Library
Spokane Falls Community College Library
Spokane Public Library
Spokane Tribe Library
Sprague Public Library
Squaxin Island Tribal Library
Stillaguamish Tribe Library
Suquamish Tribe Library
Swinomish Tribe Library
Tacoma Community College Library
***Tacoma Public Library***
Tri Cities University Library
Tulalip Tribe Library

## Libraries (cont.)

Tumwater Timberland Library
University of Puget Sound, Collins Memorial Library
University of Washington, Allen Library
University of Washington, College of Forest Resources Library
***University of Washington Library, Government Publications***
University of Washington, School of Fisheries Library
Upper Skagit Tribe Library
U.S. Environmental Protection Agency, Region 10 Library
Waitsburg Weller Public Library
Walla Walla Community College Library
Walla Walla County Library
***Washington State Library***
Washington State University, Environmental Science Library
Washington State University, Department of Forestry Library
***Washington State University, Government Documents***
Wenatchee Public Library
Wenatchee Valley College Library
Western Washington University, Huxley College Library
***Western Washington University, Mabel Zoe Wilson Library***
Weyerhaeuser Corporate Library
Weyerhaeuser Forestry Library
Weyerhaeuser Technical Center Library
Whatcom Community College Library
Whatcom County Library
Whitman College, Penrose Library
Whitman County Library
Whitworth College Library
Wilbur Public Library
William G. Reed Timberland Library
Winthrop Public Library
Yakama Indian Nation Cultural Center Library
Yakima Valley Community College Library
Yakima Valley Regional Library

## Organizations

Audubon Society (state)
American Rivers
Beak Consultants
Black Hills Audubon Society
Boise Cascade
Bullitt Foundation
Buse Timber and Sales
Champion International
Columbia Gorge Audubon
Council of Presidents
Forest Land Management Commission
Foster Wheeler Environmental
Greater Ecosystem Alliance
Island Foresters
ITT Rayonier
Longview Fibre
Mantech Environmental
The Mountaineers
Murray Pacific
The Nature Conservancy
Northwest Forestry Association
Olympic Peninsula Foundation
Parametrix, Inc.
Pacific Lumber and Shipping
People for Puget Sound
Plum Creek
Pope & Talbot
Puget Sound Society for Conservation Biology
Resources Northwest, Inc.
Save Our Wild Salmon
Seattle Audubon
Sierra Club
Simpson Timber
Trout Unlimited
Washington Association of School Administrators
Washington Commercial Forest Action Committee
Washington Environmental Council
Washington Forest Protection Association
Washington Hardwoods Commission
***Washington State Association of Counties***

## Organizations (cont.)

*Washington State School Directors' Association*
*Washington Trout*
*Washington Wildlife Federation*
*Washington Wilderness Coalition*
*Western Ancient Forest Campaign*
*Western Forest Industries Association*
*Wild Salmon Center*
*The Wilderness Society*
*World Wildlife Fund*
*Wind River Logging Co.*

## Individuals

*Katherine Baril*
*Bruce Barnum*
*Bob Benton*
*Colleen Berg*
*Alice Blandin*
*Cedar Blomberg*
*Jody Brower*
*Elsa Bruton*
*Lanny Carpenter*
*Tina Chan*
*Ellen Chu*
*John Clevenger, Jr.*
*Clifton Collins*
*Michael Collins*
*Lisa Dabek*
*Helen Daly*
*Jack Davis*
*Carolyn Dobbs*
*Harm Dotinga*
*Gene Dziedzic*
*Ronald Figlar Barnes*
*Jerry Franklin*
*Julie Garrison*
*Margaret Gaspari*
*Marcy Golde*
*Warren Groves*
*Tom Hamer*
*Janet Hardin*
*Kathleen Hedtke*
*Becky Herbig*
*Clayton Hobart*
*Richard Holthausen*
*James Karr*
*Jim Klinck*
*Joel Kuperberg*
*Kirk Lakey*
*Jeff Langlow*
*Darrell Linton*
*Mike Mackelwich*
*Jill Mackie*
*Larry Maechler*
*Joe Mennish*
*Charley Moyer*
*Grant Munro*
*Nancy Naslund*
*Dan Norkowski*
*Bill Null*
*Randall Payne*
*Bert Paul*
*Olemara Peters*
*Karen Peters Waldron*
*Charles Peterson*
*Alicia Pool*
*Martin Raphael*
*Ivan Redmund*
*Melanie Rowland*
*Robert Sager*
*Jim Schafer*
*Randy Scott*
*Jean Stam*
*Dave Stokes*
*Dan Stroh*
*Steve Tharinger*
*Ed Thiele*
*Sonjia Thompson*
*Linda Thomson*
*Neil and Milicent Turnberg*
*Brian Urbain*
*Aaron Viles*
*Paul Wagner*
*Roy Wagner*
*Jim Walton*
*Jeff White*
*Larry Williams*
*Shawna Wittman*
*Vim Wright*
*E Zahn*
*F R Zimmerman*

# Appendix A

## DNR's Forest Management

### Federal Grant Lands

On November 11, 1889, President Benjamin Harrison signed the proclamation that made Washington the 42nd state. As part of the preparation for statehood, the Omnibus Enabling Act of 1889, passed by Congress a few months earlier, set aside 2 square miles of every 36 to produce financial support for the common schools. In addition, the act granted additional lands to other public institutions. These lands are known as federal grant lands and consist of eight specific trusts:

1. Common school lands, which support the construction of public schools.
2. Agricultural school lands, which support Washington State University in Pullman.
3. Charitable, educational, penal and reformatory institutions lands, which support those public institutions.
4. University original lands, which were used to support the University of Washington in Seattle. Only a small amount of that acreage remains.
5. University transfer lands, which were originally part of the charitable trust but were transferred by the state legislature to provide additional support to the University of Washington.
6. Normal school lands, which currently support three universities (Western Washington University in Bellingham, Central Washington University in Ellensburg and Eastern Washington University in Cheney).
7. Scientific school lands, which support Washington State University.
8. Capitol building lands, which support the construction of state office buildings on the capitol campus in Olympia.

### Forest Board Lands

The Forest Board was established in 1923 to manage logged and abandoned properties formerly owned by individuals and corporations. The land reverted to the counties when the original owners failed to pay property taxes. These properties were subsequently transferred to the state, and the Forest Board was established to regenerate trees on the lands, which are now managed for timber production in perpetuity. Revenues produced from Forest Board Transfer lands support the county and junior taxing districts (such as schools, road, and cemetery districts) in which they are located. The department manages these properties as trustee. Forest Board Purchase lands were acquired by gift or

purchase. Revenues go to the county and junior taxing districts in which they are located and the state general fund for the benefit of public schools.

## Community College Forest Reserve Lands

In addition to federal grant and Forest Board lands, the department also manages a small amount of forest lands for community colleges. The Community College Forest Reserve was established by the state legislature in 1990; monies for the department to purchase the properties were appropriated that year. Additional land will be purchased if funds are allocated. These lands, located near urban areas, form a buffer between working forests and suburban uses. The properties are managed for sustainable timber production, but special consideration is given to aesthetics, watershed protection, and wildlife habitat. Revenues go in a special fund for building and capital improvements on community college campuses.

## Natural Area Preserves and Natural Resource Conservation Areas

In recognition of the need for the state to own special lands, the legislature created programs to identify and purchase Natural Area Preserves (NAP) and Natural Resource Conservation Areas (NRCA). For each NAP and NRCA, DNR is preparing a management plan that outlines protection, enhancement, restoration, and allowable uses. These vary widely with the current condition and conservation objectives of each site. NAPs provide the highest level of protection for the excellent examples of unique or typical natural features of Washington State. NAPs are valued particularly by land managers and scientists because they provide (1) a genetic resource for native plants and animals, especially endangered, threatened, or rare species; (2) environmental reference points; and, (3) outdoor laboratories for scientific research and education.

NRCAs are established to protect outstanding examples of native ecosystems, habitat for endangered, threatened and sensitive plants and animals, and scenic landscapes. Some NRCAs provide opportunities for outdoor environmental education as well as opportunities for low-impact public use consistent with resource protection.

## Summary of Forest Resource Plan Policies

### General Management Policies

#### Federal Grant Land Base

The department will maintain a diversified base of federal grant lands, including nonforest properties. In deciding whether to sell, exchange, or acquire lands, the department will balance current economic returns and trust benefits with future economic returns and trust benefits.

#### Forest Board Land Base

The department will perpetuate a productive forest base of Forest Board lands. In deciding whether to exchange lands, the department will assess whether timber harvesting

is impractical on these properties and, if so, will attempt to replace them with productive forest lands.

### Land Classifications

The department intends to designate those lands and timber resources that are unavailable for harvest as "off-base." All deferrals will be included in this category.

## Harvest Regulation Policies

### Sustainable, Even-Flow Timber Harvest

The department will manage state forest lands to produce a sustainable, even-flow harvest of timber, subject to economic, environmental, and regulatory considerations.

### Harvest Levels Based on Volume

The department's harvest calculations will be based on volume rather than acreage or other considerations.

### Western Washington Ownership Groups

The department will establish a sustained, even-flow harvest level within specified ownership groups in western Washington, as follows:

1. Forest Board Transfer lands, where the harvest will be calculated by individual counties.
2. Federal grant lands and Forest Board Purchase lands, where the harvest will be calculated by department administrative regions.
3. The Capitol State Forest, which will be considered a separate ownership group.
4. The Olympic Experimental State Forest, which will also be considered a separate ownership group.

## Eastern Washington Ownership Groups

The department will establish sustained, even-flow harvest levels within specified ownership groups in eastern Washington, as follows:

1. Yakima River.
2. Klickitat.
3. Highlands and South Okanogan.
4. Arcadia.
5. North Columbia.

### Special Forest Products

The department will encourage and promote the sale of special forest products where appropriate and will market them in a manner consistent with the overall policies of this plan.

### Forest Health Trust Asset Protection Policies

The department will incorporate forest health practices into the management of state forest land to bring about a net benefit through the reduction or prevention of significant forest resource losses from insects, diseases, animals, and other similar threats to trust assets.

### Fire Protection

The department will supplement the state's fire protection program to bring about a net benefit through the reduction of significant resource losses from wildfire on department-managed land.

## Financial Policies

### Managing "On-Base" Lands

The department will manage "on-base" forest lands at different levels of intensity depending on biological productivity and economic potential. Investment decisions will be made according to expected returns.

### Annual Review of Financial Assumptions

The department will review and adjust annually its financial assumptions used in management decisions.

## Special Lands Policies

### Special Ecological Features

The department will identify state forest lands with special ecological features that fill critical gaps in ecosystem diversity, and it will seek legislation and funding to remove these lands from trust ownership.

### Old Growth Research Area Deferrals

During this planning period, the department will continue to defer from harvest certain old growth research stands in western Washington to maintain the ability to acquire information on ecological relationships which may affect intensive timber management.

### The Genetic Resource

The department will protect and enhance a diverse gene pool of native trees on state forest lands to ensure well-adapted, future, commercial forests.

## Landscape Planning Policies

### Landscape Planning

The department will develop plans by setting management objectives for specified landscapes consistent with the Forest Resource Plan.

### Soliciting Information

The department will solicit comments from interested parties, including local neighborhoods, tribes, and government agencies when preparing landscape-level objectives.

## SEPA Policy

### SEPA Review

The department will conduct a SEPA review when subsequent plans and activities constitute a non-exempt agency action under the act.

## Aquatic Systems Policies

### Watershed Analysis

The department will analyze by watershed the effects of past, present, and reasonably foreseeable future activities on water quality and quantity, and it will modify operations to control risks to public resources and trust interests.

### Riparian Management Zones

The department will establish riparian management zones along Type 1-4 Waters and when necessary along Type 5 Waters. The department will focus its efforts on protecting key nontimber resources, such as water quality, fish, wildlife habitat, and sensitive plant species.

### Wetlands

The department will allow no overall net loss of naturally occurring wetland acreage and function.

## Wildlife Policy

### Wildlife Habitat

The department will provide wildlife habitat conditions which have the capacity to sustain native wildlife populations or communities. The department will develop wildlife habitat objectives based upon habitat availability and function, species status and vulnerability, and trust obligations. When there are apparent conflicts between meeting the wildlife habitat and trust management objectives, the department will seek balanced solutions and policies.

## Endangered, Threatened, and Sensitive Species Policy

### Endangered Species

The department will meet the requirements of federal and state laws and other legal requirements that protect endangered, threatened, and sensitive species and their habitats. The department will actively participate in efforts to recover and restore endangered and threatened species to the extent that such participation is consistent with trust obligations.

## Historic and Archaeological Sites Policy

### Identifying Historic Sites

The department will establish a program to identify and inventory historic and archaeological sites and protect them at a level which, at a minimum, meets regulatory requirements.

## Public Access and Rights-of-Way Policies

### Providing Public Access

The department will provide public access for multiple uses on state forest lands. In certain circumstances the department will control vehicular or other access, but only where necessary to accomplish specific management objectives. Public access may be closed, restricted, or limited to protect public safety; to prevent theft, vandalism, and garbage dumping; to protect soils, water quality, plants, and animals; or to meet other objectives identified in the plan.

### Granting Public Rights-of-Way

The department will grant rights-of-way to private individuals or entities when there is an opportunity for enhancing trust assets and when any detriments are offset.

### Acquiring Rights-of-Way

The department will acquire right-of-way across private or other public lands to department-managed forest land when this access is needed to increase the value of trust assets or for management purposes. The department will acquire these rights-of-ways by gift, purchase, exchange, condemnation, or road use agreement. Permanent, public access rights are preferred.

### Developing and Maintaining Roads

The department will develop and maintain a road system which integrates management needs and controls effects on the forest environment.

## Forest Recreation Policy

### Recreation on State Forest Lands

The department will allow recreation on state forest land when compatible with the objectives of the Forest Resource Plan. As part of its efforts, the department will continue to comply with the Statewide Comprehensive Outdoor Recreation Plan.

## Silviculture Policies

### Silviculture Activities

The department will plan and implement silvicultural activities to meet trust responsibilities. In cases warranting special attention, the department will accept a reduction in current income or return on investment when the department determines that it is necessary to provide extra protection for soil, water, wildlife, fish habitat, and other public resources.

### Harvest and Reforestation Methods

The department will select the harvest method which produces the best mix of current and long-term income, achieves reforestation objectives, and integrates nontimber resource objectives identified in the Forest Resource Plan. Reforestation objectives must ensure adequate restocking, produce acceptable benefits to the trusts, and protect public resources.

### Green-up of Harvest Units

The department will reduce the impacts of clearcutting and certain even-aged silvicultural systems by generally limiting the size of harvest areas to a maximum of 100 acres, requiring "green-up" of adjacent areas before harvesting timber, and employing other techniques to blend harvested areas into the landscape.

### Control of Competing Vegetation

To prevent domination of crop trees by other vegetation, the department will select from the following methods for controlling competing vegetation:

1. No treatment.
2. Nonherbicide.
3. Ground-applied herbicide.
4. Aerial-applied herbicide.

The department will consider the no treatment method first and then move sequentially down the list. The department will select the first method on the list which is both effective and produces an acceptable return on investment. A method lower on the list may be used only if it substantially outperforms other methods.

### Fertilizing, Thinning, and Pruning

The department will use fertilization, thinning, and pruning on stands which will respond and produce an acceptable rate of return on investment.

# Appendix B

## Geology/Soils/Vegetation

## Geology

### Five West-Side Units

Puget Sound is a partially submerged glaciated area with moderate relief (change in elevation). The coastal section, including the Willapa Hills, is made of unconsolidated deposits of alluvial, glacial, and volcanic materials. Glaciers have carved deep, steep-sided valleys along the western slopes of the Cascade Range. Tributary channels flow at high angles into rivers that, in turn, flow through broad valleys, such as the Skagit River valley. Steep slopes are subject to debris flows from the heads of stream channels (USDA and USDI 1994a p. 3&4-8).

### Olympic Peninsula

The Olympic Peninsula Province is made up of a central core of the rugged Olympic Mountains surrounded by almost level lowlands. The lowland strips are narrow on the east and north, but wider on the west and south sides of the peninsula. Most ridges in the Olympic Mountains are 4,000-5,000 feet in elevation with some higher peaks attaining elevations to 7,965 feet. Glaciation has strongly influenced landforms. All main river valleys are broad and U-shaped, and all major peaks are ringed with cirques, many containing active glaciers (Franklin and Dyrness 1973 p. 9).

Geologically, the mountainous portion of the Olympic Peninsula is made up of volcanic and sedimentary rocks. The sedimentary rocks make up the center and western part of the peninsula while the volcanic form the northern, eastern and southern fringe. Unconsolidated sediments from glacial outwash, till, and alluvium dominate the low elevation areas west of mountains (Henderson et al. 1989).

### Three East-Side Units

The three east-side planning units are referred to as the Klickitat, Yakima, and Chelan. The Klickitat unit ranges in topography from 12,276 at the peak of Mount Adams to about 72 feet on the Columbia River pool behind Bonneville Dam. The southern and southeastern part of the unit is underlain by Columbia River basalt cut by northwest-trending faults. Elevations rise toward the westernmost part of the unit, near Mount Adams. The bedrock in this part of the unit is an older (Miocene to Oligocene) sequence of tuffs and volcanic sandstones overlain by Quaternary andesite and basalt flows. Many cinder cones aligned on extensions of the older faults to the southeast are present on the Quaternary lava flows. Patchy deposits of alpine glacial drift are found above elevations

of about 1,800-2,000 feet. In the northeast part of the unit, Columbia River basalts are folded into anticlinal ridges separated by synclines that are filled with Pliocene through Recent alluvium.

The Yakima unit extends from the Cascade crest from Mount Adams to Snoqualmie Pass and eastward to the Columbia Basin. Accreted Mesozoic metamorphic and altered sedimentary rocks are found in the vicinity of White and Snoqualmie Passes. The rest of the area in the higher elevations is comprised of tertiary lava flows and volcaniclastic rocks patchily covered with alpine glacial drift. The lower elevations to the east consist of
anticlinal ridges of Columbia River basalt separated by synclinal basins filled with upper Miocene through recent alluvial sediments and distal alpine glacial outwash deposits.

The Chelan unit extends from Stevens Pass to the Canadian border along the Cascade crest on the west to the Columbia Basin on the southeast and the Okanogan Highlands on the east and northeast. The rugged, mountainous core along the western and central parts of the unit are underlain by the crystalline core of the North Cascades--thoroughly metamorphosed gneisses and granitic stocks and batholiths ranging in age from pre-Cambrian through Eocene. In the eastern and southern parts of the unit are two northwest-trending structural basins filled with Cretaceous and Eocene sedimentary and volcanic rocks respectively. All but the highest peaks in the area have been heavily glaciated and the valleys all have relatively flat bottoms and steep walls. Glacial scour has been extremely deep, gouging out basins reaching depths of nearly 2,000 feet in Lake Chelan.

## Soils

Soil can be defined as the material at the earth's surface which is capable of supporting plants. It is the ecosystem element located at the interface of the climatic, geologic, water, and biologic ecosystem elements. It is a dynamic, natural, three-dimensional body composed of weathered mineral and organic material that provides plants with air, water, root anchorage, and nutrients. Soil characteristics and soil behavior are a product of the interaction of five soil-forming factors: (1) parent material (the material from which the soil has formed); (2) climate; (3) organisms; (4) topography; and, (5) time. The soil characteristics and soil behavior which occur across HCP planning units will be discussed in terms of these soil forming factors. This discussion is based on soil maps and detailed information including soil characteristics, soil behavior, and forest soil management interpretations from the Soil Layer of DNR's Geographic Information System and soil survey reports published by the U.S. Soil Conservation Service (now the U.S. Natural Resources Conservation Service).

### West-Side Planning Units

#### North Puget Sound, South Puget Sound, and Straits Planning Units

Soil characteristics and soil behavior on most forested state trust lands in the North Puget Sound, South Puget Sound, and Straits planning units, as well as other glaciated terrain in Washington State, are strongly influenced by glacial activity during the Fraser Glaciation.

In the Fraser Glaciation, which occurred approximately 25,000 to 10,000 years B.P., alpine glacial activity in the Cascade and Olympic ranges and continental glacial activity on terrain covered by the Puget and Juan de Fuca glacial lobes shaped topography and deposited soil parent materials throughout this area.

The relatively short time period since deglaciation is a factor which has limited the degree of soil formation in the parent materials on this glaciated terrain. The glacial deposits and other surface parent materials remaining after deglaciation have not experienced the higher level of physical and chemical alteration and related soil horizon development generally found in unglaciated areas of Washington State. These glaciated terrain soils tend to have much lower levels of organic matter accumulation in their surface horizons and less horizon development in general than the older, more heavily weathered, better-developed soils in other parts of Washington State.

Parent material is a major factor influencing soil characteristics and soil behavior on this glaciated terrain. Major types of glacial parent materials, in order of their relative coverage, are glacial till, glacial outwash, and glacial lake sediments.

Glacial till is an unsorted, nonstratified mixture of clay, silt, sand, and rock fragments deposited directly by glacial ice. Glacial till soils are commonly found on broad, moderately sloping till plains, but can also be found capping the bedrock on steeper mountainous terrain. Glacial till soils are generally found with hard, impermeable lodgement till at an average depth of 24-36 inches, covered by loose, permeable ablation till. Restricted soil drainage caused by the impermeable lodgement till at shallow depths can be a management concern on glacial till soils. The deeper, better drained, more heavily weathered glacial till soils such as the Tokul Gravelly Loam found in the higher precipitation areas along the foothills of the Cascades tend to be among the most productive forest soils in the Puget Sound lowland.

Glacial outwash is the gravel, sand, and silt, usually stratified, deposited by glacial meltwater. Glacial outwash soils are commonly found on broad outwash plains or on the higher terraces in the larger valleys. Most soils on the lower terraces in these valleys have formed on recent stream alluvium and tend to have younger, less well-developed soil profiles.

Restricted drainage is rarely a problem on glacial outwash soils because they tend to be deep and relatively coarse textured. These coarse textured soils also tend to have lower compaction potentials than the finer textured glacial till or glacial lake sediment soils. The coarse textures of glacial outwash soils such as the Everett Very Gravelly Sandy Loam tends to limit their capacity to retain and supply nutrients and water and, therefore, limits their potential productivity. The soils formed on glacial outwash, as well as the soils formed on other glacial parent materials, tend to be less productive in the lower precipitation areas in the rain shadow of the Olympics.

Glacial lake sediments consist primarily of silt and clay materials which were deposited in lakes dammed by glacial ice. Most glacial lake sediments are bedded, interbedded or laminated. Glacial lake sediment soils are commonly found in mountain valleys which

were dammed by glacial ice. The drainage in glacial lake sediment soils tends to be restricted by their fine textures and their bedding or laminations, when present. Although they tend to have high potential productivity, soils, such as the Pastik Silt Loam, have a higher mass-wasting potential on steep topography than soils formed on glacial till or glacial outwash because they tend to have higher pore-water pressures and lower soil strengths. Glacial lake sediment soils also tend to have higher compaction potentials because of their finer textures and higher moisture contents, particularly during the wet season.

Soils formed from mixtures of colluvial bedrock materials, glacial drift deposits, and volcanic ash are often found at medium to high elevations in glaciated portions of the Cascade and Olympic ranges. These soils tend to be deeper, finer textured, better developed, and more productive on gentle slopes and on toeslopes or other terrain features where soil parent materials tend to accumulate and be retained. Soils in these areas, however, tend to be thinner, have less soil profile development, and are less productive on the steeper, less stable topography where high levels of surface erosion and mass-wasting activity tend to minimize soil retention. The potential for surface erosion and mass-wasting activity tends to be greater on soils in the rain-on-snow elevation zones in the Cascades and Olympics because the potential for surface flow is greater.

Volcanic ash has been deposited on most soil surfaces throughout the Cascades, the Puget Sound lowlands and the Olympics. Variations in volcanic ash content are influenced primarily by topography and geographic location. As indicated above, gentle topography has tended to favor thicker volcanic ash accumulations. Most volcanic ash from the Cascade volcanoes was deposited to the north and east of the Cascade crest and the soils of the Puget Sound lowlands and the Olympics tend to have less volcanic ash influence than soils in and along the Cascades. Increases in weathered volcanic ash content tend to increase the nutrient status, water-holding capacity and potential productivity of soils. Deep, heavily weathered volcanic ash soils such as the Cinebar Silt Loam are among the most productive soils at moderate elevations in the Cascades.

### South Coast and Columbia Planning Units

The South Coast and Columbia planning units, in comparison with the North Puget, South Puget, and Straits planning units described above, have had relatively small portions of their forested state trust lands influenced by glacial activity. Some soils on older, more heavily weathered glacial deposits from the Olympics are found in northern portions of the South Coast Planning Unit and some soils on younger, less heavily weathered glacial deposits are found in the Cascades in the Columbia Planning Unit.

The soils on forested state trust lands in the South Coast and Columbia planning units tend to be older, deeper, finer-textured, and have higher nutrient status than those on the more widely glaciated planning units to the north. Because of these soil characteristics and the generally favorable climatic conditions, the average potential productivity of the forested state trust lands in the South Coast and Columbia planning units tends to be higher than in other planning units.

Most forested state trust land soils on terrain features above the alluvial valley bottoms in the South Coast and Columbia planning units have formed on parent materials derived from the underlying bedrock. Topography has played a major role influencing the characteristics and behavior of these soils. Primarily because of the increased potential for surface erosion and mass wasting, the soils on the steeper terrain tend to be shallower, have higher gravel content and lower potential productivities than the soils formed on gentle terrain.

Major soils on basalt bedrock in the Willapa Hills, for example, include the moderately deep Katula Very Cobbly Loam on ridgetops and very steep sideslopes; the deep Bunker Silt Loam on moderate to steep sideslopes; and the very deep Boistfort Silt Loam on gentle to moderate sideslopes and toeslopes. Similar relationships between topography and soil characteristics and behavior are found on sedimentary bedrock types and other parent materials.

Parent materials play a major role in determining the mass-wasting potential of soils in the South Coast and Columbia planning units. The high mass-wasting potential of the St. Martin Gravelly Silty Clay Loam and similar soils in Skamania County is determined by the unstable character of the old landslide deposits on which they have formed. Soils formed over sedimentary bedrock or weathered or brecciated igneous bedrock tend to have higher mass-wasting potential than soils formed over unweathered or unbrecciated igneous bedrock.

## OESF

The range in soil characteristics and behavior on forested state trust lands in the Olympic Experimental State Forest is very large because of the wide range in each of the soil forming factors. As in other west-side planning units, those soils with the highest potential productivity and lowest mass-wasting potential tend to be found on gentle to moderate slopes and low to moderate elevations and those soils with the lowest productivity and highest mass-wasting potential tend to be found on the steepest terrain at the highest elevations.

The Ilwaco Silt Loam and the Klone Very Gravelly Loam soils are two of the most productive and easily managed soils on forested state trust lands in this planning unit. The Ilwaco soils are very deep, well-drained, and formed in highly weathered sandstone residuum on moderately sloping foothill topography. The Klone soils are very deep, well- drained, and formed on glacial outwash terrace deposits. Well-drained soil conditions favor high commercial forest productivity levels, but many areas, primarily on glacial drift plains and alluvial bottoms at lower elevations in the Olympic Experimental State Forest Planning Unit, have limited commercial forest productivity potential because of poor drainage conditions and high water tables.

Limited commercial forest productivity potential is also found on higher elevation soils in the Olympics due primarily to shallower soil depths in combination with shorter growing seasons. The Sollecks Very Gravelly Loam, Frigid, 60-90 percent Slopes is a major soil type on state trust lands at higher elevations in the Olympics. The Sollecks is formed

from colluvial sandstone and conglomerate parent materials on ridgetops and very steep sideslopes. The depth of this soil ranges from shallow to moderately deep, varying with percentage slope and slope position. This high elevation terrain where the Sollecks and similar soils are found has a high mass-wasting potential because it is very steep and because of the frequent heavy rainfall storms and rain-on-snow events.

## East-Side Planning Units

Climatic differences have resulted in significant differences between the soils in the west-side planning units described above and the east-side planning units. The east-side planning units occur in the rain shadow of the Cascade Range and their lower precipitation levels have tended to limit their potential forest productivity levels and soil profile development.

The forested state trust lands closer to the eastern edges of the east-side planning units are those which tend to have the lowest potential forest productivity and lowest levels of soil profile development because they have the lowest mean annual precipitation levels. The forested state trust lands closer to the western edges of the east-side planning units will tend to have higher potential forest productivity and more soil profile development because of their higher mean annual precipitation levels. Potential forest productivity, however, is restricted on the higher elevation areas with shorter growing seasons. Forested state trust lands in east-side planning units tend to have fewer problems with mass-wasting activity than those in west-side units because of their lower frequency of heavy rainfall storms and rain-on-snow events.

## Vegetation / Forest Zones

### Vegetative Zones

Vegetative zones are broad areas that have similar types of vegetation. The HCP area includes land in the zones described below. These brief descriptions are followed by Table 1 that lists selected plant species found in each zone. This table, compiled from "Natural Vegetation of Oregon and Washington" (Franklin and Dyrness 1973), is meant to illustrate the variety of tree, shrub, and other vegetation found in Washington, and is not intended to be a complete list.

### Sitka Spruce Zone

Along the Pacific coast and extending inland up river valleys is a narrow band of vegetation where Sitka spruce is considered climax. This is the Sitka spruce zone. In most places it is usually only a few miles wide and occurs where summer fog and drip precipitation are common. The climate in this zone is the mildest of any Washington forest zones. Winter rains are heavy and snow is infrequent. Trees are tall and stands are dense. Productivity and biomass are high, and there are relatively few hardwoods. Rain forests of the Olympic National Park are a special type within the Sitka spruce zone.

## Western Hemlock Zone

The western hemlock zone extends from sea level to 2,000 feet throughout most of Washington. The inland boundary of this zone coincides roughly with the western boundary of the national forests in the Cascade mountains. The climax trees are western hemlock, with western redcedar in moister areas and Douglas-fir in drier areas. The forest canopy is dense, tall conifers. This forest zone is the largest in the state and contains some of the most productive and most intensively managed forest lands. Most state forest land in western Washington is in this zone. However, because of its extent and accessibility, most of the western hemlock zone has been disturbed, logged, or burned at least once in the past 200 years. As a result, large portions are now dominated by Douglas-fir in seral stands or contain mixtures of hardwoods. Even before settlement by Europeans, there were extensive Douglas-fir stands, probably the result of old fires. Remnants of these original stands are commonly referred to as old growth. Red alder is a common pioneer species throughout the zone.

Climate of the western hemlock zone is mild, wet, and maritime. Snow is common but not persistent. The Puget Sound lowlands are considered a special type; forest composition is modified by the rain shadow of the Olympic Mountains and gravelly glacial soils.

A version of the western hemlock zone occurs east of the Cascade Range. Extensive stands of western hemlock and western redcedar occur in moist pockets and along streams and rivers throughout northeastern Washington, as well as farther east. The trees, understory vegetation, and high precipitation give these inland stands their distinct maritime flavor.

## Pacific Silver Fir Zone

The Pacific silver fir zone extends from about 2,000 to 4,000 feet in elevation in Washington. On the west side of the Cascades, it abuts the western hemlock zone at lower elevations and extends upward to subalpine forests in the Olympic and Cascade mountains. Pacific silver fir community types are also found east of the Cascades.

Throughout the zone the climate is cool and wet, with a short growing season. It is common in this zone for up to half of the annual precipitation to fall as snow and persist as winter snowpacks for 3-7 months. Dense forests consist of tall conifers and patches of shrubby undergrowth. Huckleberry species are common. Douglas-fir is also a major component of this zone.

## Subalpine Fir/Mountain Hemlock Zone

Subalpine fir/mountain hemlock forests make up the highest forest zone in the Olympics and on both sides of the Cascade mountains, extending from about 4,000 feet to the timberline. Mountain hemlock predominates at the lower elevations and is replaced with subalpine fir at higher elevations. The zone ends at the high altitudes mosaic of tree groups, glades, and meadows.

East of the Cascades and in the Okanogan Highlands, subalpine fir is found associated with Engelmann spruce.

Scattered pockets of Engelmann spruce are found on the east side of the Olympics and west of the Cascades in the Mt. Baker-Ross Lake area. This zone is Washington's coolest and wettest forest environment. Forests here are dense and contain short to medium-tall conifers, often with an understory mixture of shrub and herbaceous vegetation.

### Alpine Zone

Alpine meadows and high-altitude barrens are found in the Olympics and Cascades above timberlines. This zone lacks timber production potential. Vegetation consists of complex mixtures of forbs, grasses, sedges, and low shrubs. Several types of plant communities on Washington alpine lands are linked to local microclimatic variations of moisture, snowpack duration, and substrate. Winters are cold and long, and summers are brief. Growth, except for spectacular floral displays, is slow.

### Grand Fir Zone

An extensive grand fir zone occurs below the subalpine forest in eastern Washington. From a management point of view, the grand fir zone and Douglas-fir zone, with which it merges, are usually considered together. However, in an ecological sense, they should be considered separately. The zone is cooler and moister than the lower Douglas-fir zone, but warmer and with less snow accumulation than subalpine forests.

### Douglas-fir Zone

The Douglas-fir zone in eastern Washington is particularly prominent in the northern portion of the state. Douglas-fir in Washington is commonly bordered at lower and drier elevations by a band of ponderosa pine that separates it from shrub steppe and grass communities of the Columbia Basin.

Subtle limitations of temperature and moisture are probably important in separating the Douglas-fir zone from the moister grand fir zone and the drier ponderosa pine zone. Forests in both the grand fir and Douglas-fir zones consist of dense medium and tall conifers. Where overstory density permits, understory vegetation may be of extensive brush or grass, depending on soil moisture content.

### Ponderosa Pine Zone

The ponderosa pine zone, lowest of the forest zones in eastern Washington, occurs between 2,000 and 4,000 feet elevation. The ponderosa pine zone typically borders the shrub-grassland zone but in south-central Washington, a community of Oregon white oak is located between the two.

This zone is the driest of the Washington forest zones. Precipitation is low, especially in summer. Winter precipitation commonly falls as snow which accumulates as a result of low temperatures. Summer days are hot and summer nights cool. The effective growing season is short and probably moisture-limited. Soil moisture regulates the distribution of understory vegetation, which ranges from brush to grass. The forest consists of dense to open stands of tall trees.

## Table 1: Vegetative zones of area covered by the HCP

(Source - compiled from Franklin and Dyrness 1973)

| Vegetative Zone | Elevation range (feet) | Average precipitation (inches) | Major tree species | Common shrubs | Herbaceous plants |
|---|---|---|---|---|---|
| Sitka spruce | 0 - 500' | 80 - 120" | Sitka spruce, western hemlock, western redcedar, Douglas-fir, grand fir, Pacific silver fir, red alder | red huckleberry, devilsclub, salmonberry | sword fern, Oregon oxalis, false lily-of-the-valley, evergreen violet, wood violet, Smith's fairybells |
| western hemlock | 0 - 3,000' | 60 - 120" | Douglas-fir, western hemlock, western redcedar, red alder, bigleaf maple | vine maple, Pacific rhododendron, creambush oceanspray, California hazel, western yew, Pacific dogwood, red huckleberry, Oregongrape, salal, trailing blackberry | deerfoot vanillaleaf, evergreen violet, white trillium, sword fern, twinflower, Pacific peavine, common tarweed, white hawkweed, snow-queen, common beargrass, Oregon iris, western fescue, western coolwort, Hooker's fairybells, wild ginger, ladyfern, deerfern, Oregon oxalis |

| Vegetative Zone | Elevation range (feet) | Average precipitation (inches) | Major tree species | Common shrubs | Herbaceous plants |
|---|---|---|---|---|---|
| Pacific silver fir | 2,000 - 4,250' | 80 - 120" | Pacific silver fir, western hemlock, noble fir, Douglas-fir, western redcedar | vine maple, salal, Oregongrape, red huckleberry, big huckleberry, Alaska huckleberry, ovalleaf huckleberry, devilsclub | beargrass, twinflower, bunchberry dogwood, deerfoot vanillaleaf, queencup beadlily, dwarf blackberry, western coolwort, white trillium, ladyfern |
| mountain hemlock and subalpine fir | 4,000 - 6,000' | 65 - 110" | mountain hemlock, subalpine fir, lodgepole pine, Alaska-cedar | big huckleberry, ovalleaf huckleberry, Cascade azalea, blueleaf huckleberry, rustyleaf | beargrass, one-sided wintergreen, dwarf blackberry, Sitka valerian, evergreen violet, avalanche fawnlily |
| alpine | 4,000+ | 60-120 | | western cassiope, blueleaf huckleberry, red mountainheath, luetkea | Alaskan clubmoss, mountain hairgrass, American bistort, Sitka valerian, showy sedge, feathery mitrewort, American false hellebore, arctic lupine, fireweed, black alpine sedge, alpine willowweed, slender hawkweed, fanleaf cinquefoil, smallflower paintbrush, western pasqueflower |

| Vegetative Zone | Elevation range (feet) | Average precipitation (inches) | Major tree species | Common shrubs | Herbaceous plants |
|---|---|---|---|---|---|
| grand fir | 3,500 - 6,500' | 25 - 50" | grand fir, ponderosa pine, lodgepole pine, western larch, Douglas-fir | common snowberry, shinyleaf spirea, woods rose, Nootka rose, mallow ninebark, creambush oceanspray | pinegrass, northwestern sedge, elk sedge, broadleaf arnica, kinnikinnick |
| Douglas-fir | 2,000 - 4,500' | | Douglas-fir, ponderosa pine, lodgepole pine, western larch | baldhip rose, Oregon boxwood, prickly currant, big huckleberry | Columbia brome, sweetscented bedstraw, starry solomonplume, western meadow-rue, heartleaf arnica, sideflower mitrewort, bigleaf sandwort, white hawkweed, twinflower, trail plant, Piper anemone, Lyall anemone, wood violet, white trillium, queencup beadlily, wild ginger, broadleaf lupine, dwarf blackberry |

| Vegetative Zone | Elevation range (feet) | Average precipitation (inches) | Major tree species | Common shrubs | Herbaceous plants |
|---|---|---|---|---|---|
| ponderosa pine | 2,000 - 4,000' | 15 - 30" | ponderosa pine, western juniper, quaking aspen, Oregon white oak | Saskatoon serviceberry, chokecherry, black hawthorn, creambush oceanspray, common snowberry, woods rose, Nootka rose, mallow ninebark, shinyleaf spirea, creeping western barberry, Wyeth buckwheat, snow eriogonum, yellow leafless mistletoe | bluebunch wheatgrass, Idaho fescue, Sandberg's bluegrass, western yarrow, western gromwell, yellow salsify, large-flowered brodiaea, beauty cinquefoil, purple-eyed grass, spreading dogbane, arrowleaf balsamroot, sagebrush buttercup, low pussytoes, slender fringecup, littleflower collinsia, miner's lettuce, Japanese brome, cheatgrass brome, narrow-leaved montia, smallflower forgetmenot, vernal draba, autumn willowweed, Nuttall's fescue, little tarweed, pink annual phlox, shining chickweed |

## Current Resource Management Practices and Policies

### DNR Forest Management

In addition to following statutory regulations, management guidance is provided to the department through policies established by the Board of Natural Resources and the Commissioner of Public Lands. The Forest Resource Plan (DNR 1992b) is the major policy document providing direction for management of forested trust lands. The Forest Resource Plan was developed and written by the Department of Natural Resources to guide it in managing 2.1 million acres of state forest land through 2002. The plan does not identify management activities on specific tracts of land (for example, individual timber sales). Rather, it describes the department's general policies and priorities.

The Forest Resource Plan reaffirms the department's commitment to act as a prudent land manager. The department will continue to generate income from state forest land to support schools and other beneficiaries. The policies of the plan also require the department to analyze and, if necessary, modify the impact of its activities on watersheds, wildlife habitat, special ecological features, wetlands, and other natural resources. The plan focuses the department's attention on these resources so that it can make better decisions that accommodate the public's need for school revenue, wood, and healthy forests.

DNR divisions and regions are responsible for carrying out these policies. Many of the policies are translated into operational guidelines for implementation. Regions accomplish planning for, and on-the-ground management of, forest lands in a manner consistent with policy. See Appendix A, p. A2 for summary of Forest Resource Plan policies.

## Forest Habitat Characteristics of Three Seral Stages

### Seral Stages Defined

Ecological succession can be thought of as a series of progressive changes that a plant community goes through, that culminate in a relatively stable condition. Seral stages are the communities and environmental conditions that replace each other as succession progresses. A seral stage is characterized by a particular range of environmental attributes including plants, moisture, and nutrient regimes, soil conditions, physical structure, and habitat features.

Succession occurs in different ways on different sites. Variations in moisture, temperature and nutrients can result in profound differences in species, structure, and rates of change. In describing an individual seral stage, it's helpful to remember that ecological parameters exist on a continuum, so that a description of a particular seral stage is a generalized snapshot, not a model that will apply in all cases. The duration of each seral stage depends in large part on the longevity of the dominant species, which is able to maintain dominance until senescence (the end of the life cycle).

Different terminologies are used to describe successional change. The systems used by Oliver (1981) and Brown (1985) are roughly parallel to seral stages in that they are tree-growth related, but use artificial systems based on tree diameter as opposed to an ecologically based approach. The seral stages described by Spies and Franklin (1991) are based on major ecosystem processes (such as nutrient cycling, rate of growth, types of vegetation, and soil character) that change as a forest matures.

Table 2 describes a general progression of seral stages for forests in western Washington. Eastern Washington forests are more difficult to describe, due to a more complex history of human intervention including fire suppression, and such human-induced disturbances as grazing, slash burning, and partial cutting, which has had a powerful impact on succession. In addition, succession on the east slope of the Cascades is likely to proceed at a slower rate than that described in the Table 3, due to generally drier and colder growing conditions.

The first, early seral stage begins after a disturbance such as logging or fire.[1] The vegetation that initially invades a site is generally shade-intolerant, nutrient demanding and often relatively short-lived. The canopy structure generally consists of a single tree layer (which may include several species), and an understory of deciduous shrubs and herbs. After some time, the canopy will close to the extent that the light-demanding understory species are shaded out and excluded from the stand. This stage is also known as the "stem exclusion stage" because the stand density inhibits the establishment of new stems, and trees with a competitive advantage will suppress or kill off their less competitive neighbors. (Oliver and Larson 1990). The mid-seral (or understory reinitiation) stage begins when shade tolerant trees and understory species start to establish in the understory. This is the stage that silviculturists recognize as mature forest, where mean annual increment is culminated. The structure of such forests is likely to still consist of one major canopy layer through most of the stage, until gradually gaps form in the canopy and some of the trees in the understory begin to achieve some height. The late seral stage is characterized by multiple canopy layers, large diameter live trees, large snags, and down logs. Trees of all ages exist in the stand, and canopy gaps supply light for a variety of understory species. This stage encompasses most definitions of old growth. It is important to note that old-growth forests are not synonymous with climax forests; a climax forest is dominated by the most shade tolerant tree species that can reproduce on the site, while old-growth forests are defined by structure and are frequently dominated by late seral species.

The Old Growth Definition Task Group (1986) has a definition of old growth that applies to forests in western Washington, and includes the following minimum requirements:

> **Live trees:** Two or more species, with a wide range of age and size. More than eight Douglas-fir trees per acre, either greater than 32 inches dbh or greater than 200 years old.

[1] Brown et al. 1985 state that a temperate stand that has been clearcut and broadcast burned will remain in an "open sapling, pole" stage for 10 to 20 years, in a "closed sapling, pole" stage for 40 to 100 years, in a "large saw-timber" stage for 10 to 120 years, and an "old growth" stage for up to 700 years.

**Canopy:** Deep and multi-layered.
**Snags:** Greater than 4 conifer snags per acre, greater than 20 inches dbh and greater than 15 feet tall.
**Logs:** Greater than 15 tons of logs per acre, including 10 pieces per acre that are greater than 23 inches in diameter and greater than 49 feet long.

### Habitat Characteristics

Wildlife species depend on a variety of structural features in the forest for foraging, breeding, shelter, and resting. Some species require all the conditions described by a particular seral stage or stand condition[2] for some or all of their life cycle. Others require only one or two key habitat features (such as nest cavities or deciduous forage), without regard for the type of stand where such features occur. Each species also has its own degree of flexibility as to what type of stand conditions it can utilize; some species are obligate denizens of old-growth or early seral-stand conditions, and others may use several stand conditions throughout their lives.

It is the particular structural features of a stand that make it good or poor habitat for a given wildlife species. Table 3 outlines some of the key habitat features that are generally associated with different seral stages.

## Table 2: Comparison of classification systems

| Classification system | EARLY herb and shrub | EARLY seral | MID seral | LATE seral |
|---|---|---|---|---|
| Brown 1985 | Grass-forb, shrub, and open sapling-pole conditions | Closed sapling-pole, sawtimber condition | Large sawtimber condition | Old growth |
| Spies and Franklin 1991 | --- | Young | Mature | Old growth |
| Oliver 1981 | Stand initiation stage | Stand initiation stage, stem exclusion stage | Understory re-initiation stage | Old growth |

[2] Brown (1985) describes several stand conditions that are roughly equivalent to the seral stages described above; Early = open pole-sapling and closed pole-sapling conditions, Mid = large sawtimber condition, Late = old-growth condition.

## Table 3: Comparison of Seral Stage Structure and Vegetation

| Seral stage | EARLY herb and shrub stage | EARLY seral | MID seral | LATE seral |
|---|---|---|---|---|
| Age of dominant trees[3] | 0 to 30 years | 30 to 80 years | 80 to 195 years | > 195 years |
| Characteristic structure | Initially dominated by light and nutrient-demanding herb and shrub species and tree seedlings. Eventually an "open" pole stand condition evolves, with shade-intolerant tree species dominating. | Single-layer canopy, often of shade-intolerant species, usually including hardwoods as well as conifers, deciduous shrubs and forbs in understory. Eventually may develop closed canopy with little understory; some mortality in canopy. | Single-layer canopy with an understory of small shade-tolerant seedlings, saplings and evergreen shrubs. Snags and down logs mostly pre-date current stand. Where stand may appear multi-layered, understory trees are of one age, but achieve different sizes through competition. | Multi-layer canopy of mixed species and mixed ages, including some smaller diameter, shade-tolerant tree species. Understory may include shade-tolerant evergreen shrubs as well as deciduous shrubs and forbs in canopy gaps. Large live trees, large snags, large diameter down logs and canopy gaps are characteristic. |

[3] Spies and Franklin 1991

| Seral stage | EARLY herb and shrub stage | EARLY seral | MID seral | LATE seral |
|---|---|---|---|---|
| Habitat features[4] | A mix of coniferous trees and deciduous trees and shrubs provides songbird nesting and foraging areas, and browse for ungulate species.<br><br>Voles and shrews utilize understories of forbs and grasses for food and shelter.<br><br>Coyotes and raptors hunt burrowing rodents. | A mix of coniferous trees and deciduous trees and shrubs provide songbird nesting and foraging areas, and browse for ungulate species.<br><br>Voles and shrews utilize understories of forbs and grasses for food and shelter.<br><br>Rabbits, mountain beavers and grouse shelter and forage in the understory, and bobcats shelter and feed on rabbits. | Canopy provides thermal cover for many wildlife species, and nesting and foraging areas for some songbirds.<br><br>Trees provide cones and shelter for squirrels; raptors nest and feed on rodents.<br><br>Down wood provides habitat for rodents, amphibians, martens, and other species. | Large dead trees provide nesting and denning cavities, and food sources for woodpeckers.<br><br>Large live trees provide broad nesting platforms; closed portions of stand provide thermal cover; and canopy gaps provide deciduous forage.<br><br>Down logs provide habitat for amphibians, rodents and other animals, which in turn provide food for forest carnivores such as weasel, marten and fisher. |
| Plant species characteristic of moist forests[5] | red alder, Douglas-fir, salmonberry, trailing blackberry, fireweed, brackenfern | Douglas-fir, big leaf maple, red alder, salmonberry, brackenfern, trailing blackberry, thimbleberry | western hemlock, Sitka spruce, western redcedar, Douglas-fir, Pacific silver fir, salal, swordfern, Alaska huckleberry, western white anemone | western hemlock, pacific silver fir, Sitka spruce, Douglas-fir, pacific yew, vanilla leaf, three-leaved foamflower, Oregon oxalis, Smith's fairybells |

[4] Brown 1985

[5] Bigley and Hull in prep.; Lesher and Henderson, 1989; Franklin and Dyrness, 1973

| Seral stage | EARLY herb and shrub stage | EARLY seral | MID seral | LATE seral |
|---|---|---|---|---|
| Plant species characteristic of dry forests | California hazel, serviceberry, oceanspray, creeping snowberry, kinnickinnick, white hairy hawkweed, bigleaf sandwort, Scouler's hairbell, broadleaf starflower, common mullein, Idaho fescue | Douglas-fir, western hemlock, lodgepole pine, Pacific madrone, prickly currant, oceanspray, baldhip rose, creeping snowberry, trailplant, California hazel, vanillaleaf | Douglas-fir, western hemlock, lodgepole pine, Oregongrape, red huckleberry, salal, bigleaf sandwort | northern twinflower, thin-leaved huckleberry, prince's pine |

# C. Appendix C - Calculating Juvenile Survival Rates and the Finite Rate of Change of the Spotted Owl Population on the Olympic Peninsula

# Appendix C

## Calculating Juvenile Survival Rates and the Finite Rate of Change of the Spotted Owl Population on the Olympic Peninsula.

Burnham et al. (1994) reported "apparent" survival rates ($\phi$) as 0.245 (s.e. = 0.064) for juvenile spotted owls on the Olympic Peninsula, which made it possible to calculate the 95 percent confidence interval around $\phi$ as 0.116 to 0.374. This was calculated by first solving for the sample size (n) used in estimating $\phi$, assuming the standard error was calculated for a binomial population (in which individuals survive or die) as:

$$\text{s.e.} = \sqrt{\phi(1-\phi)/n}$$

to give n = 45, then using tables of t-values to calculate confidence intervals using 2-tailed values for p = 0.05, 44 DF. Burnham et al. (1994) also describe how to correct $\phi$ for emigration: the "true" survival probability ($S$) results from adjusting $\phi$ for the rate at which juveniles emigrate and survive 1 year ($E$), or

$$S = \phi / (1 - E).$$

They estimated $E$ = 0.3158, with a 95 percent confidence interval of 0.2113 to 0.4203, based on 76 juvenile owls that were monitored with radio telemetry and survived 1 year. From these data, then a range of estimates of $S$ can be derived. Substituting the point estimates, low and high values from the 95 percent confidence intervals for $\phi$ and $E$ into the equation above provides an estimate of $S$ = 0.3581, ranging from 0.1471 to 0.6451. That range can then be compared to the value needed to result in a stable Olympic Peninsula sub-population ($S$ = 0.413, Burnham et al. 1994 Table 9) for an empirical test of their hypothesis that the Olympic Peninsula sub-population is declining.

The finite rate of population change can be calculated by constructing Leslie matrices using adult and subadult survivorship and fecundities from Burnham et al. (1994) and the estimate and range of $S$ presented above, then solving each for its dominant eigenvalue (Caswell 1989).

# D. Appendix D - Methods for the Evaluation of Conservation Alternatives for Spotted Owl on the OESF

# Appendix D

## Methods for the Evaluation of Conservation Alternatives for Spotted Owl on the OESF

Three techniques were used to evaluate the alternatives: (1) a general evaluation of the habitat capability of the OESF area that will result, in the near- and long-term, from each alternative and how each can address the threats described in Section 4.2.3.3.1a; (2) computer simulations of spotted owl life histories in response to landscape conditions that are expected to result from each alternative; and, (3) the degree to which each alternative either avoids or allows incidental take (Frederick 1994) of currently known owl sites.

## Methods for a General Evaluation of Habitat Capability

Both stand- and landscape-level characteristics of forests are important to their capability as habitat for spotted owls (see Horton in press for a review). Forest stands with a particular structure and composition have been defined as either young- or old-forest spotted owl habitat in western Washington (Hanson et al. 1993). Stands with these characteristics have been otherwise variously classified as small sawtimber, large sawtimber, and old growth (Brown 1985) or young, mature, and old growth (Spies and Franklin 1991). An estimate of the current amount and distribution of forest stands of these types, in the OESF area, has been derived from analysis of Landsat Thematic Mapper satellite imagery (WDFW 1994b, see Map 26 and Table 4). Projections of future amounts and distributions of these stand-types under the alternatives can be based on: (1) the relationships among stand age, structure, and composition; and, (2) succession and harvest patterns under the alternatives, and other assumptions about land use. These estimates of current and likely future landscape conditions can then be used to evaluate the capability of current and likely future landscapes as habitat for spotted owls.

Spotted owls respond to landscape characteristics at the scale of home ranges of pairs, and expand the areas they traverse to encompass sufficient habitat to meet their resource needs (Carey et al. 1992). Holthausen et al. (1994) reported the median home range area from a study of 10 radio-tagged owl pairs on the western Olympic Peninsula as 14,721 acres, and that those ranges encompassed a median area of old-growth and mature forests of 4,579 acres (32 percent of the median range). To assess the capability of current and likely future landscape conditions around the OESF, the density of potential owl habitat (including young- and old-forest habitat, Hanson et al. 1994) at the scale of pair range-sized circles (2.7 miles radius) was calculated using a series of assumptions (described below) about the outcomes of current, proposed, and likely future policies and rules, action alternatives, and natural processes, as well as about the ages at which forest stands take on the characteristics of owl habitat. A threshold density of at least 40 percent

young- and old-forest habitat was used for these analyses because: (1) a broader range of young-forest types were classified as habitat (after Hanson et al. 1993) than have been reported in other studies (e.g., Bart and Forsman 1992; Holthausen et al. 1994) in which lower proportions of landscapes that supported owls were classified as habitat; and, (2) the U.S. Fish and Wildlife Service considers 40 percent habitat (including young-forest types) as the threshold below which incidental take occurs (Frederick 1994). The total area of all ownerships within the OESF that meet or exceed 40 percent potential habitat at the scale of 2.7-mile radius circles is assumed to reflect the capability of the OESF area to support owl pairs, a good basis for comparison among the alternatives.

In order to estimate habitat density, habitat was considered as a binary variable; that is, stands were either potential habitat or they were not. Stands that were classified as small sawtimber, large sawtimber, or old growth by WDFW (1994b) were assumed to be current potential habitat. Habitat capability was also projected 100 years into the future for each of the three alternatives. For projections of habitat capability, stands that were developed under OESF action alternatives (presumably with silvicultural techniques that promoted habitat development) and were older than 50 years were assumed to be habitat. Otherwise young stands were assumed to be managed such that they did not become habitat. It was assumed that landscape-wide habitat proportions for different categories of land ownership, 100 years in the future, would be: (1) 90 percent of the landscape of Olympic National Park and Olympic National Forest, Late-Successional Reserves (USDA and USDI 1994b); (2) 55 percent of the landscape in all (for Alternative 3) or parts (for Alternative 2) of DNR-managed lands in the OESF; (3) 55 percent of the landscape in Olympic National Forest, Adaptive Management Areas (USDA and USDI 1994b); (4) 25 percent of all (for the No Action alternative) or parts (for the Zoned Forest alternative) of DNR-managed lands in the OESF; and, (5) 10 percent of all other lands.

Simple, conservative assumptions were developed, based on the following reasoning, for the proportions of habitat for each distinct combination of land ownership and alternative:

(1) Physical and biotic factors prevent all land area from becoming potential habitat, thus 90 percent was assumed for Olympic National Park and Olympic National Forest Late-Successional Reserves.

(2) Several independent, spatially-explicit projections of potential management scenarios under the Zoned Forest and Unzoned Forest alternatives suggest that potential owl habitat will comprise greater than 55 percent of some (Alternative 2) or all (Alternative 3) DNR-managed landscapes in the OESF (Traub 1995; Martin 1995). Thus, the conservative assumption (less habitat than may actually result) of 55 percent is used.

(3) The mission of the OESF is to learn how to integrate commodity production and ecosystem support, similar to that of the Adaptive Management Areas (USDA and USDI 1994b), thus landscape conditions that are hypothesized to serve this mission in the OESF are assumed for the Olympic National Forest Adaptive Management Areas.

(4) Over the course of 100 years under Alternative 1 (the No Action alternative), potential habitat in current owl circles on DNR-managed lands is assumed to be lost due to natural

disturbances, harvest following shifting or "decertified" owl circles, and other events. It is assumed that management practices will permit no habitat development except as needed to follow current policy for protection of riparian ecosystems. Habitat in these areas is projected to comprise 25 percent of DNR-managed lands in 100 years (approximately the same as the current abundance of potential owl habitat on DNR-managed lands, see Table 4). Areas outside of owl zones under Alternative 2 are assumed to be similarly-managed, thus habitat is projected to comprise 25 percent of them as well.

(5) Owl habitat is projected to comprise 10 percent of other lands in 100 years, approximately the same as their current composition (Table 4).

Four digital maps describing current or projected conditions were constructed with a grid-based GIS (ESRI 1995). The maps of land ownership (DNR 1995d) or land cover (WDFW 1994b) were resampled to 10-acre pixel size (660 feet square). For simplicity, habitat proportions were assumed to be constant within combinations of ownership and alternative. Thus, all pixels within each of those combinations were assigned the habitat proportions described under numbers 1-5 above as their value. A GIS function that accumulated the values of neighboring cells was conducted over a radius of approximately 2.7-miles (22 cells) for each cell in the digital maps. Subsequent calculations assigned each cell a value that was the proportion of the 2.7-mile circle around that cell that was potential habitat. Areas of all ownerships within the OESF that had at least 40 percent potential habitat at the scale of 2.7-mile radius circles were then measured and mapped. This allowed the projected long-term outcomes of all alternatives to be directly compared both against current conditions and against each other.

## Methods for Conducting Computer Simulations of Spotted Owl Life Histories

### Introduction

Mathematical models and computer simulations have played a significant role in the conservation of the northern spotted owl (Thomas et al. 1990; USDI 1992b, Raphael et al. 1994). In general, the structure and complexity of models are determined by: (1) modeling objectives; (2) knowledge and understanding of the system; and (3) available technology. Over the past 5 years the complexity of spotted owl population models has increased with changes in each of these factors. The intent of early spotted owl population models (Marcot and Holthausen 1987; USDA 1988; Lande 1988; Noon and Biles 1990, Burnham et al. 1994) was to estimate $\lambda$, the finite rate of population change. Estimates of $\lambda$ provided better understanding of population dynamics, and were implicit predictions about the future state of the population. These models examined population dynamics in one dimension -- time. They did not consider other the effects of variables that are best described in spatial dimensions, namely landscape composition and pattern. Evolving conservation objectives, increased understanding, and improved technology have propelled the development of more complex spotted owl models that consider spatially-dependent variables.

Well-constructed models can be valuable tools for developing decisions on conservation plans. They allow knowledge, assumptions, and objectives to be organized and integrated in a logical framework such that their outcomes can be objectively evaluated. For example, a good spotted owl model would predict outcomes based on knowledge of owl ecology, population biology, forest succession, and land cover; assumed relationships between habitat quality and population biology; and assumed changes in landscape characteristics based on objectives for land use.

Alternatives for management of the OESF were analyzed with a recently developed computer model that incorporated both spatial and temporal effects on the spotted owl population. Comparisons among alternatives were based on model predictions of their long-term effects on the size, stability, and distribution of the spotted owl population on the Olympic Peninsula. The outcomes predicted under each alternative were quantified in two ways. Habitat analyses estimated the amount, quality, and distribution of potential habitat. These analyses indicated the relative differences among alternatives in their ability to provide habitat capable of supporting owl pairs, and the geographic distribution of that habitat. The model also predicted the abundance and distribution of paired and unpaired owls over time. These predictions allowed comparisons of the relative effects of each alternative on population size, trends, and distribution. However, it must be emphasized that the strengths of these predictions is in the relative differences among predicted outcomes rather than in the absolute numbers and locations of owls predicted by the model.

## Model Description

Schumaker (1995) provides a detailed description of the simulation model. It was written in the C programing language and runs on a SUN Microsystems Workstation™. The simulation model is designed to be used with raster GIS data that represent land cover, and consists of three separate modules that conduct habitat analysis, movement simulation, and demographic simulation. All modules are accessed through windows-style user interfaces and the movement and demographic modules have a fully animated graphical output. Viewing these processes while simulations are ongoing can be useful to the modeler. The habitat analysis module is used to generate a data file that specifies the locations and qualities of hexagon-shaped units of land cover. The resulting data are used in both the movement and demographic modules.

## Habitat Analysis Module

GIS data representing the spatial distribution of land cover may contain millions of pixels. Each pixel corresponds to a small patch of earth, and is assigned a category that represents the cover-type which predominates on that patch. To simplify the habitat model, a regular grid of hexagons is intersected with the raster GIS data to obtain a map of hexagonal "sites" that are classified as either suitable or unsuitable. A suitable site is one that has sufficient quality and quantity of habitat to support a resident single or breeding pair, and is also referred to as a "territory."

The construction of the hexagonal habitat map is controlled by the following parameters: the numeric habitat value of each GIS category, a hexagon size, an "expansion"

parameter, and the threshold for territories. The habitat module calculates a score for each site that equals the average habitat value of all pixels contained within it. Hexagons having scores above the threshold are classified as suitable sites. In addition, suitable sites can result when sub-threshold sites "expand" to use habitat from adjacent supra- or sub-threshold sites. However, each unit of habitat may be used by only one site. The expansion parameter may be assigned any real value from 0-6. At its lower limit, no habitat from adjacent sites is used, while at the upper limit a site may include all the habitat available within its six immediate neighbors. Hexagon boundaries and scores do not change as a result of expansion. Expansion simply allows sub-threshold sites with sufficient, nearby, available habitat to be classified as suitable.

## Movement Module

The movement module is individual-based, and simulates the dispersal of fledglings and the seasonal wandering of floaters. Movements across the landscape consist of a series of steps taken from one hexagon to one of six neighboring hexagons. The movements of juveniles, floaters, and unpaired territorial individuals are simulated once each year. All juveniles and floaters move from their present site, but unpaired territorial owls make a decision to move based on the habitat quality of their present site. In the simulator, males search for empty suitable sites and females search for single territorial males. Movement decisions are not affected by the presence of other individuals. Owls can move through an occupied territory or reside in an occupied territory as a floater. Owls stop moving when they (1) have found the object of their search; (2) have taken the maximum number of allowable steps; or (3) a decision to stop has been made. No mortality occurs during movement.

The length of a single step is the center-to-center distance between neighboring hexagons, and the path length is the sum of steps. The model is parameterized with a mean path length which is then converted to a stopping probability. Before each step the stopping probability is used to decide whether to stop or to take another step. In addition, the movement model requires specification of the minimum and maximum number of steps allowed. The minimum movement distance is adhered to by juveniles, but is ignored by floaters.

Direction of movement is controlled by interactions among two parameters, "Bias to Quality" and "Autocorrelation." The degree to which owl movements are guided by habitat quality is specified by the "Bias to Quality" parameter. This parameter determines the frequency with which owls move to the neighboring site with the highest habitat quality. If Bias to Quality equals 1, then owls always move to the neighboring site with the highest habitat score, but if this parameter equals zero, then owls never consider the habitat quality of neighboring sites when moving. If bias to quality equals 0.5, then, on average, owls consider the habitat quality of neighboring sites on half of their steps. If owls do not move to the neighboring hexagon with the highest habitat quality, then the "Autocorrelation" parameter determines the direction of the next step. This parameter determines the linearity of the movement path. When Autocorrelation equals 1, the next step will be in the same direction as the previous step, i.e., straight ahead. When Autocorrelation equals zero, there is an equal probability of moving to any of the neighboring six hexagons. When this parameter equals 0.5 the next step has a higher

probability of veering right or left than moving straight ahead. A true random walk can be obtained by setting both Bias to Quality and Autocorrelation to zero. Increasing Autocorrelation produces a directed random walk, and increasing Bias to Quality has the effect of concentrating the searching effort in areas of superior habitat quality.

Unpaired territorial owls make a decision to leave their present site based on the habitat quality of their present site. A nonlinear function describes the relationship between site fidelity, i.e., the probability of moving, and habitat quality (Figure 1a). Minimum site fidelity occurs on the poorest quality suitable site, and maximum site fidelity occurs on suitable sites that are above a high quality habitat threshold. The shape of this function implies that over some range of high quality habitat, spotted owls are insensitive to differences in habitat quality.

The edges of the habitat map may be made to function as absorbing, reflecting or wrapping boundaries. Individual sites can be made to function as reflecting boundaries in order to prevent movement across large bodies of water, mountain ranges, etc.

## Demographic Module

Population demographics were simulated using an individual-based, two-sex, three stage-class model. A key feature of the demography module is its ability to link certain life history parameters -- survivorship, fecundity, and site fidelity -- to habitat quality. An owl surrounded by high quality habitat is less likely to disperse, more likely to survive, and more likely to produce a large brood. The model uses an annual time step with each year broken up into four phases: the movement of floaters and territorial singles, reproduction, movement of juveniles, and survival (Figure 2). The module records a variety of demographic information including the number of owls in each stage class (adults, subadults, and juveniles), the number of pairs, single territorial birds, and floaters. In addition, the model generates an "occupancy map" that can be used to investigate the spatial distribution and frequency of occupancy of sites over time. A built-in time series function allows the model to read new territory maps on a yearly basis, and thus, to simulate landscape change through time.

The simulation model is initialized with only pairs of adult owls being present; other stage classes, floaters, and single territorial birds are generated during the simulation. The model allows the initial owl pairs to be located in a flexible manner. Pairs can be located randomly on suitable sites, on the best suitable sites, or can be placed manually on specific suitable sites. If the initialization is strictly random, then it becomes necessary to determine if these locations should remain fixed across model runs, or whether new initial locations should be picked at the start of each run.

The model is stochastic. Individual-based models are demographically stochastic since the fate of each individual is determined independently. To simplify the interpretation of results, environmental stochasticity of parameters was not incorporated into the simulations.

Survivorship was simulated as a stochastic variable and as a function of site habitat quality. The relationship between survivorship and habitat quality has a linear portion

with survivorship increasing with habitat quality up to a threshold value above which there was no change in survivorship (Figure 1b). For each stage-class, there are minimum and maximum survivorship parameters which, with the survivorship threshold parameter, define a function that relates survival probability to site score. The minimum survivorship occurs in the site with the lowest score. The maximum survivorship occurs in all sites with scores greater than the high quality habitat threshold.

Fecundity was also simulated as a stochastic variable and as a function of site habitat quality. For each stage-class, there are minimum and maximum values for the probability of failing to produce fledglings. These values were used to define a nonlinear function that indirectly relates fecundity to site score (Figure 1c). The maximum probability of a site failing to produce fledglings occurs on the suitable site with the lowest score. The minimum probability or nesting failure occurs on suitable sites that are above a high quality habitat threshold. This function and the observed frequency of brood sizes (Forsman et al. 1984) determine the probability of an owl pair producing zero, one, two, or three fledglings.

Three constants, $b_1$, $b_2$, $b_3$, are the frequency of broods with one, two, and three fledglings respectively, observed for reproductively successful spotted owl pairs. Let $P_{NF}(ss)$ be the nonlinear function that relates nesting failure to site score. Then, the probability of producing a brood of size zero equals $P_{NF}(ss)$, and the probability of producing a brood of size i, $P_i$, equals $[1-P_{NF}(ss)]\bullet b_i$, where i = 1, 2, or 3. The sum of $P_{NF}(ss)$, $P_1$, $P_2$, and $P_3$ equals one.

## Parameterizing the Model

Values for demographic parameters have been estimated for the Olympic Peninsula's spotted owl population (Burnham et al. 1994). The data used to calculate the values were collected across the entire peninsula over a wide range of spotted owl habitat quality, but those values are not expressed as functions of habitat quality. A major difficulty in implementing a model with habitat-dependent parameters is establishing the link between the demographic parameters and the habitat model.

The functions relating survival and fecundity to habitat quality were developed through "parameter tuning." Parameter tuning was also used to develop movement parameters. The population simulator accommodates this process by generating statistics on realized survival rates, fecundity and movement distances. To tune parameters, 100 replicate trials of 50 years using a territory map derived from the reclassified 1990 and 1991 GIS data (as discussed below) were run. This method of parameterization is an iterative process which may be summarized as: (1) select an initial value; (2) run the population simulator; (3) examine the statistics of interest; (4) adjust the parameter value; and (5) repeat the steps (1) through (4) until the desired realized value is obtained. Parameter values are summarized in Table 5.

## GIS Data

Habitat maps were constructed from GIS data. GIS data for the northwest portion of the Olympic Peninsula, which includes the entire OESF, were based on 1991 Landsat Thematic Mapper (LTM) imagery (WDFW 1994b). Pixel resolution was 30 meters (98

feet) resampled to 25 meters (82 feet). Supervised classification of the LTM imagery resulted in GIS data with nine categories: old growth, large saw, small saw, pole, sapling, open canopy/mixed conifer, open/nonforested, water, and cloud/cloud shadow (Table 6). GIS data for the remainder of the peninsula were based on 1990 LTM imagery (Green et al. 1993). This GIS data had a different classification scheme. Pixels were classified as late-successional, mid-successional, or early-successional forests, nonforested, water, or clouds. Using aerial photography and historical patterns of timber harvest, those data were reclassified to correspond with the nine categories of the 1991 LTM image. Some forest stands on the eastern and southern peninsula did not match the classification criteria for any of the other categories. For these, a new classification, "mid-seral," was created.

GIS data covering different portions of the peninsula were merged, and an elevation model based on the environmental zones described in Henderson et al. (1989) was used to develop a new category, high elevation forest. Forests above 3,000 feet in the western and southern Olympic Mountains, above 4,000 feet near the middle of the range, and above 4,500 feet in the northeastern portion of the mountain range were reclassified as such. In the model, this forest type has no value as nesting habitat, but can function as dispersal habitat. The complete reclassified GIS data appear in Map 30. The GIS data were assumed to represent the current land cover on the Olympic Peninsula.

## Habitat Parameters

The size of hexagons in the model corresponds to the minimum home range of an owl pair. The density of owl pairs in the low-elevation old-growth forests of Olympic National Park is estimated to be 0.32/1,000 acres (Seaman et al. 1994). This density is equivalent to an exclusive home range of 3,088 acres/pair. The Olympic National Park has the highest density of good owl habitat on the Olympic Peninsula. Spotted owl range sizes vary inversely with the density of high quality habitat (Carey et al. 1992). Thus, 3,088 acres/pair was considered to be the minimum home range. The resolution of pixels in the GIS grid restricts the set of hexagon sizes that can be generated by the model. Since the hexagon size closest to 3,088 acres was 3,134 acres, this was used in the model.

The expansion parameter is used to better model the response of owls to landscape composition and pattern. This parameter represents two aspects of owl behavior. As the density of good habitat decreases, owls expand the size of their home ranges and increase the degree of overlap with the ranges of their neighbors (Carey et al. 1992). The expansion parameter represents the maximum amount of neighboring hexagons that may be included in a home range. For 20 owl home ranges studied on the western Olympic Peninsula (Forsman in prep. cited by Holthausen et al. 1994) the median size of home ranges was 14,296 acres. The maximum home range size was 27,308 acres. With a hexagon size of 3,134, the maximum home range that can be modeled is 21,938 acres (a hexagon plus its six neighboring hexagons). In the habitat model, the maximum value was assigned to the expansion parameter value.

Spotted owls demonstrate a marked selection for old-growth stands but their habitat selection becomes increasingly general from nesting to roosting to foraging (reviewed by

Horton in press). Large and small sawtimber stands are sometimes selected and frequently used in proportion to their availability, but other stand types are generally avoided (reviewed by Horton in press). Thus, old growth, large saw, and small saw were assigned values as habitat for the model. In order to define weighted values for those stand types, a habitat utilization index (HUI) was calculated for each. HUI estimates the value of each stand type based on observed ratios of use of stand types, and is defined as:

$$HUI = \frac{\text{mean \% of radio telemetry relocations in habitat type X}}{\text{mean \% of home range in habitat type X}}$$

Using preliminary data from 20 radio-tagged owls from the western Olympic Peninsula (E. D. Forsman, USFS, Corvallis, OR, unpubl. data, 1990), HUI was highest for old growth, lower for small sawtimber, and intermediate for large sawtimber. The ratio of HUIs for two different stand types is a measure of the differential response of owls to those types, and reflects their comparative habitat quality. Those ratios were, $HUI_{OG}/HUI_{LS} = 1.50$ and $HUI_{OG}/ HUI_{SS} = 2.19$. For modeling, old growth was assigned the highest possible habitat value (9) to increase the level of discrimination among site quality (Table 7). Based on the ratios, habitat values of 6 and 4 were assigned to large and small sawtimber respectively (Table 7). No radio-telemetry data were available from owls in the mid-seral stand type from the eastern and southern Olympic Peninsula. It was assigned a weight of 1 (Table 7) based on its structure, composition, and the distribution and abundance of owls in those areas.

The habitat threshold for suitable sites was calculated with the following equation:

$$T = HV_{OG}\, A_{OG} + HV_{LS}\, A_{LS} + HV_{SS}\, A_{SS}$$

where A is the mean proportion of area covered by each stand type within home ranges (E. D. Forsman, USFS, Corvallis, OR, unpubl. data, 1990), and HV is the habitat value of each stand type. This equation uses the mean composition of home ranges and the relative
values of habitat quality for each stand type to derive a threshold habitat value for suitable sites. Using the values in Table 8, T was found to be 5.

## Dispersal Barriers

Owls on the Olympic Peninsula were modeled as a closed population. The ocean and inland waterways form natural barriers to the west, north, and east. Poor habitat acts as an effective barrier to the south. In reality, there may be some movement of owls to and from the peninsula, but it is believed to have an insignificant impact on population demographics (e.g., Holthausen et al. 1994). Barriers to dispersal were modeled as reflecting boundaries. Reflecting barriers were also placed in high elevation sites that were more than 75 percent nonforested.

## Movement Parameters

The mean number of movement steps was adjusted so that the model reported a mean net dispersal distance as close as possible to 24.2 km, the value observed by Eric Forsman for dispersing juvenile spotted owls on the Olympic Peninsula (E. D. Forsman, USFS, Corvallis, OR, pers. comm., 1995). Forsman's data also specifies minimum and maximum observed net dispersal distances of 8.7 and 58.2 km, respectively. Using $\beta$ to represent the value assigned to the mean number of dispersal steps, the model parameters specifying the minimum and maximum number of movement steps were set to $8.7/24.2 \bullet \beta$ and $58.2/24.2 \bullet \beta$, respectively. The Auto precorrelation and Bias to Quality parameters were adjusted to obtain the desired mean dispersal distance (24.2 km) (15 miles) while at the same time obtaining a ratio of total to net dispersal distances that fell within the range observed in the field. Forsman (E. D. Forsman, USFS, Corvallis, OR, pers. commun., 1995) suggests the ratio of total to net dispersal distance for the Olympic Peninsula population could be as high as 4. Data cited in Thomas et al. (1990 p. 305) give an estimate of total to net dispersal distance of 1.9. The final values for Autocorrelation and Bias to Quality gave a ratio of total to net dispersal distance of 2.4. Tuning resulted in Bias to Quality of 0.21 and Autocorrelation of 1.0. In effect, as owls move across the landscape they move into the best available habitat on 1 out of every 5 steps, and when not guided by habitat quality owls move in a straight line.

There are no published data from which to directly derive parameters to describe site fidelity. An assumption that related the probability of an unpaired owl dispersing and habitat quality was developed arbitrarily. The relationship has a linear portion over which dispersal probability decreases from 50 percent at the suitable site with the lowest quality habitat up to a threshold site quality value above which unpaired owls did not disperse (Figure 1a).

## Demographic Parameters

The parameters for minimum and maximum adult survivorship were chosen to yield a realized adult survivorship approximately equal to that of Burnham et al. (1994) for the Olympic Peninsula -- 0.862 (Table 5). The maximum value of adult survivorship was set to 0.92, the same maximum value used by Holthausen et al. (1994), and the minimum value was adjusted to yield the desired realized value. Subadult survivorship is thought to be lower than adult survivorship, but Burnham et al. (1994) did not detect a statistically significant difference between them. Thus, the minimum and maximum subadult survivorship were set equal to that of adults.

Selecting a value for juvenile survivorship was more problematic because current understanding of juvenile survival rates on the Olympic Peninsula is incomplete. For example, Burnham et al. (1994) estimated a survival rate, uncorrected for emigration, of 0.245 while Holthausen et al. (1994) estimated a 0.612 survival rate, corrected for emigration. But Holthausen et al. (1994) used values of 0.29 and 0.38 in their simulations of the Olympic Peninsula population. Given the range of uncertainty surrounding estimates of juvenile survivorship on the Olympic Peninsula, we chose to simplify this part of the model. Juvenile survivorship was implemented as a constant, i.e., this parameter was not a function of habitat quality, and simulations were run with a wide range of plausible values -- from 0.38 to 0.53.

We assumed a fledgling sex ratio of 50:50 (Noon and Biles 1990; Thomas et al. 1990). The parameters $b_1$, $b_2$, $b_3$ were estimated from the data in Forsman et al. (1984 p. 33-34) and set to 0.36, 0.56, and 0.08, respectively. Juveniles were assumed to be nonreproductive (fecundity = 0). The parameters for minimum and maximum probability of nesting failure, $P_{NF}(ss)$ (Table 5), were chosen to yield a realized fecundity approximately equal to that of Burnham et al. (1994). For the Olympic Peninsula these values were 0.760 and 0.412 fledglings/female for adults and subadults, respectively. The minimum value of adult $P_{NF}(ss)$ was set to 0.465, which is equivalent to a maximum fecundity of 0.92 fledglings per female, the same maximum value used by Holthausen et al. (1994). Again, there were no published estimates of fecundity in high quality habitat, but 0.92 was considered plausible as it represents a pair producing nearly two fledglings every other year. The maximum value of adult $P_{NF}(ss)$ was adjusted to yield the desired realized fecundity. The maximum for subadult $P_{NF}(ss)$ was chosen so that the ratio between the maximum adult and maximum subadult fecundities equaled the ratio between the Burnham et al. (1994) estimates for adult and subadult fecundities.

The nonlinear functions for site fidelity, survivorship, and fecundity (i.e., nesting failure) all reflect thresholds to habitat quality. Above these thresholds, site fidelity, survivorship, and fecundity are constant values. Similar functions were used in other spotted owl population analyses (Raphael et al. 1994; Holthausen et al. 1994). There are no published data which directly describe thresholds to habitat quality, so plausible values were derived for these parameters. The results of Bart and Forsman (1992) indicate that the threshold is greater than 60 percent older forest within 1,000 acres of the nest site, but how much greater is unknown. On the Olympic Peninsula, 2,000-acre circles around locations of paired spotted owls contained 61 percent suitable habitat (Lehmkuhl and Raphael 1993). This value is an average for 59 call-survey locations, and therefore, the "high quality" circles probably contained a proportion of suitable habitat much greater than 61 percent. With these results in mind, we set the high quality habitat threshold equal to 7. This value is equivalent to a site that is approximately three-quarters old-growth forest, or one-third old growth/two-thirds large saw, or any combination of old growth, large saw, and small saw that yields an average value equal to 7. This value may be too high, but choosing a high value was intentional because it provides a conservative estimate of the response of demographic parameters to habitat quality.

## Population Initial Conditions

The model allows the user to specify the initial number of breeding pairs and their spatial distribution. The current number of nesting pairs on the Olympic Peninsula is estimated to be between 280 and 320 (Holthausen et al. 1994). The locations of many owl nest sites are known exactly, and reasonable estimates for the spatial distribution of other owl nest sites could be derived, but the complexity of this task was beyond the scope of this analysis. Nesting pairs could have been distributed on randomly selected suitable sites across the peninsula, or assigned to the best 300 suitable sites, but these initial conditions seemed unrealistic.

No reliable estimates for the number of resident single and floater owls are currently available. The inability to specify the initial conditions for these stages presents two problems. First, model results are not useful until the simulated population approaches a

stable distribution of all stages. This stable distribution may not be approached for several decades, and therefore no valid results would be available with which to evaluate conditions in the near future. Second, the model is sensitive to initial conditions, particularly the initial density of individuals. The presence of resident single owls increases the likelihood that a dispersing bird will find a mate, and this affects the population's average fecundity. Also, a population without a pool of adult floaters to replace dead breeders will decline more rapidly than one with such a pool. Under this unrealistic scenario, the simulated population is more likely to become extinct.

To overcome the problems associated with specifying locations of nesting pairs and the initial abundances and distribution of unpaired adults, the initial conditions were established as follows. First, at the beginning of each replicate trial, the Olympic Peninsula was saturated with nesting pairs. That is, an owl pair was assigned to every suitable site (435 sites for the 1994 hexagonal habitat map). Second, 50 replicate trials were run with the parameters in Table 5 and with the hexagonal habitat map held constant. Third, the average trajectory of owl pair abundance was examined to determine the time step, or year, at which the number of pairs was closest to 300. This time step was defined to be 1994. This process was repeated for each value of juvenile survivorship used in the analysis. For example, when juvenile survivorship equaled 0.44, the number of owl pairs declined from 435-300 in 11 years. Year 11 was set to 1994, and all other time dependent parameters or simulator functions (e.g., simulation duration, the landscape time series) were modified accordingly. Using this method to set the initial conditions for unpaired owls in 1994, the average number of floaters ranged from 50-60 and the average number of resident single owls ranged from 25-30.

## Analysis of Alternatives

Alternatives 1, 2, and 3 were analyzed. Each alternative was represented by a series of six GIS images of the Olympic Peninsula: the present, and then 20, 40, 60, 80, and 100 years hence. A fourth scenario, a static landscape, in which current land cover remained constant for 100 years was also analyzed for purposes of comparison.

There are four major land ownership groups on the Olympic Peninsula: tribal, private, federal, and DNR. It was assumed that tribal and private lands would continue to be intensively managed for timber production and would remain, on average, in the same condition as present. Thus, for the sake of simplicity, habitat conditions those lands were held constant for analysis of all alternatives. Federal lands consist of three different management designations: Olympic National Park, and the Late-Successional Reserves and Adaptive Management Areas of the Olympic National Forest. Again, for simplicity's sake, the park and Adaptive Management Areas were assumed to remain constant over time for each alternative. It was assumed that the Late-Successional Reserves would develop toward old-growth forest. Changes in the Late-Successional Reserves were projected using a simple model of forest succession (Table 9), and were used for analysis of each alternative.

It was recognized that changes to the distribution, but probably not the abundance of potential habitat would occur over time on DNR-managed lands under the No Action

alternative. However, for the sake of simplicity, habitat conditions on DNR-managed lands were held constant over time for analysis of the No Action alternative.

Schedules of potential forest succession and harvest were developed as the basis for representing each of the OESF action alternatives (Traub 1995). Desired future landscape conditions, representing the constraints or thresholds of each OESF action alternative, were entered into SNAP (Scheduling and Network Analysis Program) (Sessions and Sessions 1994). SNAP applies a heuristic algorithm to identify efficient plans to attain timber harvest targets while heeding all constraints and landscape-level thresholds (Sessions 1994). Two basic pathways were modeled: one employed two commercial thinnings followed by a regeneration harvest at 100 years, this was the basic prescription for upland areas; the other employed 50 percent-volume harvests at 100-year intervals, this prescription was applied in sensitive areas that allowed some harvest (Traub 1995). These pathways were chosen to represent simplistic, modal management regimes envisioned for the OESF and are similar both in concept and intended objectives to the "biodiversity pathway" regimes developed and analyzed by the Washington Landscape Management Project (Carey et al. in press).

SNAP projected changes in forest stand conditions as harvest and succession proceeded over 100-year simulations. Those changes were reported as areas within 10-year interval age classes and within each of the owl management zones or landscape planning units for the Zoned and Unzoned Forest alternative, respectively. Age classes were then converted to land cover categories (Table 9) for modeling owl populations. For all alternatives, stand conditions were modeled separately for the interior-core and exterior riparian buffers, such that it was assumed that the interior-core developed into old-growth and the exterior buffer developed into large sawtimber.

The changes on DNR-managed lands were modeled for each of the approximately 11,000 forest stands identified in DNR's GIS database. For simplicity's sake, those changes were modeled stochastically rather than deterministically. That is, harvests were assigned to stands at random rather than following an actual, predetermined schedule for each stand. Stands were assigned a random integer between 1 and 1,000. Then using the random numbers, stands were assigned cover-types according to the proportion of the total OESF occupied by that type. For example, if SNAP projected that outside of riparian buffers 16.7 percent of the OESF would be small sawtimber, and 20.2 percent would be large sawtimber, then stands with random numbers between 1 and 167 were reclassified as small saw, and stands with random numbers between 168 and 369 were reclassifed as large saw.

## Methods for Estimating Incidental Take of Spotted Owls

It is anticipated that during the life of the HCP, some spotted owls may be displaced, and habitat conditions for some individual owls or owl pairs may be degraded by DNR activities in the OESF such that their ranges are temporarily incapable of supporting them. These activities will constitute incidental take of spotted owls as defined by the ESA. The degree to which each alternative either avoids or allows incidental take is another method for comparing those alternatives. The evaluation criteria of the U.S. Fish

and Wildlife Service to estimate the risk of incidental take (Frederick 1994) were used for these analyses. Their criteria are based on maintaining a threshold proportion of habitat in home range-sized circles around known owl sites as defined by WDFW.

Sites where spotted owls have been observed are assigned a status by WDFW staff based on the nature of the observations recorded: pair - observations of two owls behaving as a pair; two birds - observations of two birds not behaving as a pair; single - repeated observations of a single owl suggesting territorial status; unknown - isolated observations that do not suggest territorial status. These sites are the basis for estimates of the potential of the conservation strategy for the OESF to result in incidental take of spotted owls. The simplest estimate is based on the advice of the U.S. Fish and Wildlife Service regarding incidental take (Frederick 1994), i.e., harvest of potential owl habitat within 2.7- mile radius circles around owl site centers in which habitat comprises 40 percent or less land cover. There are two types of situations where this could occur: DNR harvests within 2.7-miles of sites with less than 40 percent habitat, or DNR harvests that reduce sites from 40 percent or more to less than 40 percent habitat.

However, simple estimates of take as described above are likely to overestimate impacts to the persistence and productivity of owls at known sites in and near the OESF because habitat conditions at several of these sites make it unlikely that owls will reside there. Additional data that can be used to refine the simple estimate of take are the habitat conditions around sites and the recent history of observations at sites. These data allow inferences about the likelihood that sites can actually support resident owls and the recent occupancy of sites, and thus, refined estimates of the risk of actually taking owls. Sites that are surrounded by less than 20 percent habitat are significantly less likely to support occupancy than those surrounded by more habitat (Bart and Forsman 1992). Based on the quality and results of owl surveys, additional inferences about occupancy at such sites can be made to arrive at a refined estimate of the number of sites that appear to have the potential to support resident owls, and/or may currently support resident owls, and that should be considered to be at risk for take under the several alternatives. However, after sites have been screened based on these additional data, take would occur as described above.

The locations and status of owl sites are from the WDFW Interagency spotted owl database (July 1995). Additional information on survey locations, timing, and results are from DNR surveys in the OESF between 1987 and 1995 (DNR, Olympic Region, Forks, WA, unpubl. data) and personal communications with biologists from federal agencies (E. D. Forsman, USFS, Corvallis, OR, pers. commun., 1987-1995; D.E. Seaman, National Biological Survey, Olympic National Park, pers. commun, 1987-1995) and private industry (D. Varland, Rayonier, Hoquiam, WA, pers. commun, 1987-1995; W. Buck, Beak Consultants, Kirkland, WA, pers. commun., 1987-1995). An estimate of habitat and land ownership around owl sites was developed using satellite imagery (WDFW 1994b) and digital maps of public land ownership (DNR 1995d). This information was used to classify owl sites for simple and refined estimates of the potential for incidental take under the action alternatives for the OESF.

## Table 4: Estimates of forest cover on lands of different ownership in the Olympic Experimental Forest area, July 1991[1]

| Landowner | Cover-type | Total Area (ac) | Percent of Area[7] | Percent of Cover-type[8] |
|---|---|---|---|---|
| Olympic National Park | late seral[2] | 216,137 | 16.5 | 59.1 |
| | other[4] | 16,298 | 1.2 | 18.7 |
| | mid-seral[3] | 143,857 | 11.0 | 16.8 |
| Olympic National Forest | late-seral | 66,325 | 5.0 | 18.1 |
| | mid-seral | 15,434 | 1.2 | 17.7 |
| | other | 93,294 | 7.1 | 10.9 |
| DNR-managed, OESF[5] | late-seral | 52,150 | 4.0 | 14.3 |
| | mid-seral | 20,990 | 1.6 | 24.1 |
| | other | 197,974 | 15.1 | 23.1 |
| Other[6] | late-seral | 30,983 | 2.4 | 8.4 |
| | mid-seral | 34,293 | 2.6 | 39.4 |
| | other | 421,558 | 32.1 | 49.2 |
| **Total** | | 1,312,758 | 100 | |

[1] Land cover estimated by supervised classification of Landsat Thematic Mapper scenes taken July 1991, (WDFW 1994b). Land ownership estimated from DNR's digital public lands map (DNR 1995d).

[2] Late seral forests = old growth and large-saw cover

[3] Mid-seral forests = small-saw cover

[4] other land cover = pole, sapling, open-canopy/mixed conifer, open areas (clearcuts, high-elevation barrens, towns, etc.), water, cloud/shadow cover

[5] DNR-managed lands proposed as the Olympic Experimental State Forest (OESF)

[6] Other lands include all private ownerships, tribal lands, DNR-managed lands outside the OESF

[7] The area within the cover-type within the ownership class, divided by the total area described

[8] The area within the cover-type within the ownership class, divided by the total area within the cover-type

## Table 5: Complete list of model parameters and control variables used in spotted owl simulations

| | |
|---|---|
| **Movement Parameters:** | |
| Minimum Steps | 11 |
| Mean Steps | 31 |
| Maximum Steps | 75 |
| Autocorrelation | 1.0 |
| Bias To Site Quality | 0.21 |
| Site Fidelity Probability: Min. and Max. | 50 100 |
| **Demographic Parameters:** | |
| Sex Ratio | 50:50 |
| Maximum Brood Size | 3 fledglings |
| Probabilities of Each Brood Size | 1=0.36; 2=0.56; 3=0.08 |
| Juvenile Survivorship | 0.38, 0.41, 0.44, 0.47, 0.50, 0.53 |
| Subadult Survivorship: Min. and Max. | 0.700 0.920 |
| Adult Survivorship: Min. and Max. | 0.700 0.920 |
| Juvenile Probability of Nesting Failure: Max. and Min. | 1.00 1.00 |
| Subadult Probability of Nesting Failure: Max. and Min. | 0.858 0.710 |
| Adult Probability of Nesting Failure: Max. and Min. | 0.840 0.465 |
| High Quality Habitat Threshold | 7.0 |
| Fit To Site Quality (Linear / Logistic) | Linear |
| **Program Control Variables:** | |
| Number of Runs | 50 |
| Number of Years in a Run | variable |
| Initial Number of Pairs | 435 |
| Year to Begin Tracking Occupancy | year 20 |
| Display (On / Off) | Off |
| Sampling Function (On / Off) | Off |
| Initialization Method (Random / Weighted / Custom) | Weighted |
| Initialization Protocol if Random (Re-Randomize / Fixed) | N/A |
| Boundary Condition (Absorbing / Reflecting / Wrapping) | Reflecting |

## Table 6: Forest classifications used in GIS data (WDFW 1994b)

**Old growth**: dominant dbh 30" or greater; usually more than 8 dominant trees/acre; three or more canopy layers with less than complete canopy closure; several snags/acre 20" dbh or greater; several down logs /acre 24" dbh or greater

**Large saw**: dominant dbh 20-30"; more than 10 dominant trees/acre of this size; codominant trees are 14" dbh or greater; two or three canopy layers more closed than old growth; small snags present with sparse or no large snags; few large down logs

**Small saw**: dominant dbh 14-20"; one or two canopy layers; small snags or none present; small down dead wood or none present

**Pole**: dominant dbh 10-14"; one canopy layer; little or no down dead woody debris

**Sapling**: approximately 2-5" dbh

**Open canopy/ mixed conifer**: canopy closure less than 60%, any mixture of at least 90% conifers

**Open/ nonforested**: clearcuts, open sapling stands, pasture, human settlement

## Table 7: Landscape parameters and values

| Parameter | Value |
|---|---|
| min. home range size | 1,269 ha[1] |
| home range expansion | 6.0 |
| suitable habitat threshold | 5.0 |
| Habitat Values: | |
| old growth | 9 |
| large saw | 6 |
| small saw | 4 |
| mid-seral | 1 |
| all other types | 0 |

[1] 3,134 acres

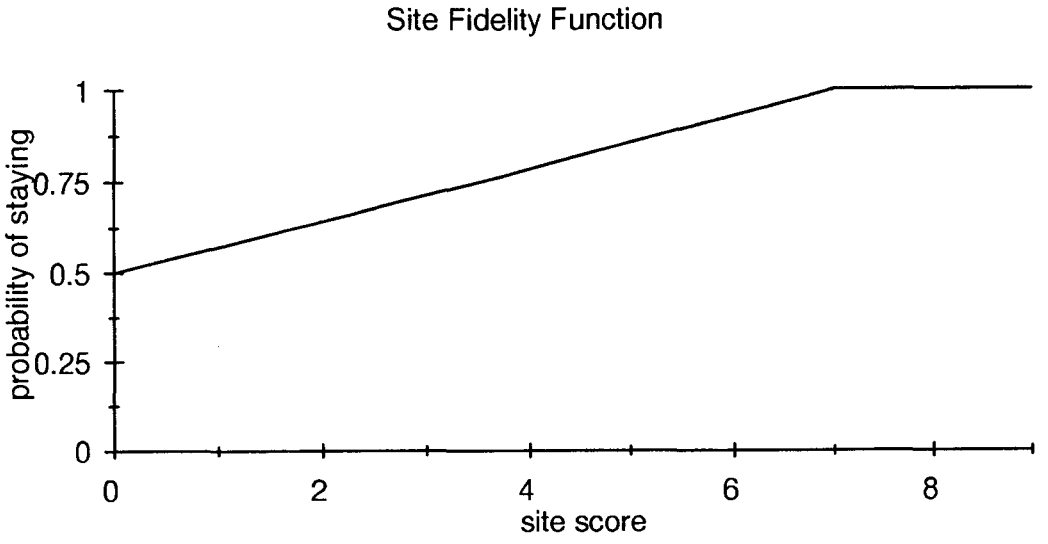
**Table 8: Values used in calculation of suitable spotted owl habitat threshold: Habitat Utilization Indices (HUI) rounded to the nearest integer, and the mean proportion of each stand type in Olympic Peninsula home ranges (E. D. Forsman, USFS, Corvallis, OR, unpubl. data, 1990).**

| Stand Type | Proportion of HUI | Home Range |
|---|---|---|
| old growth | 9 | 0.47 |
| large saw | 6 | 0.4 |
| small saw | 4 | 0.13 |
| all others | 0 | 0.36 |

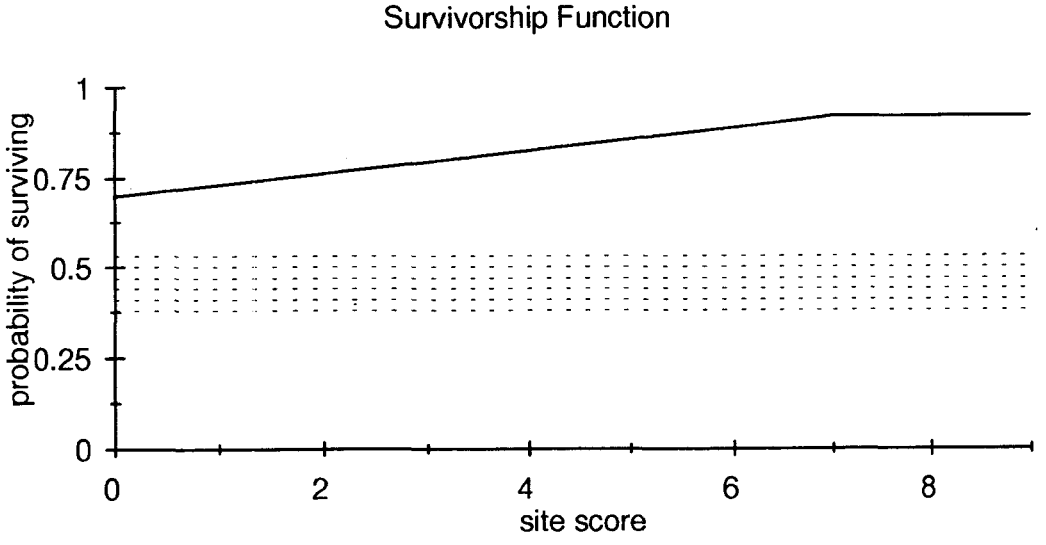
**Table 9: Forest growth model used for projecting changes in National Forest Late-Successional Reserves. OG=old growth, LS=large saw, SS=small saw, PO=pole, SP=sapling, CC= clearcut (nonforested).**

| Stand Age in 1994 | Forest Growth Through Time | | | | | |
|---|---|---|---|---|---|---|
| | 1994 | 2014 | 2034 | 2054 | 2074 | 2094 |
| ≥200 | OG | OG | OG | OG | OG | OG |
| 100-199 | LS | LS | LS | OG | OG | OG |
| 50-99 | SS | SS | LS | LS | LS | LS |
| 25-49 | PO | SS | SS | SS | LS | LS |
| 13-24 | SP | PO | SS | SS | SS | LS |
| ≤12 | CC | PO | PO | SS | SS | LS |

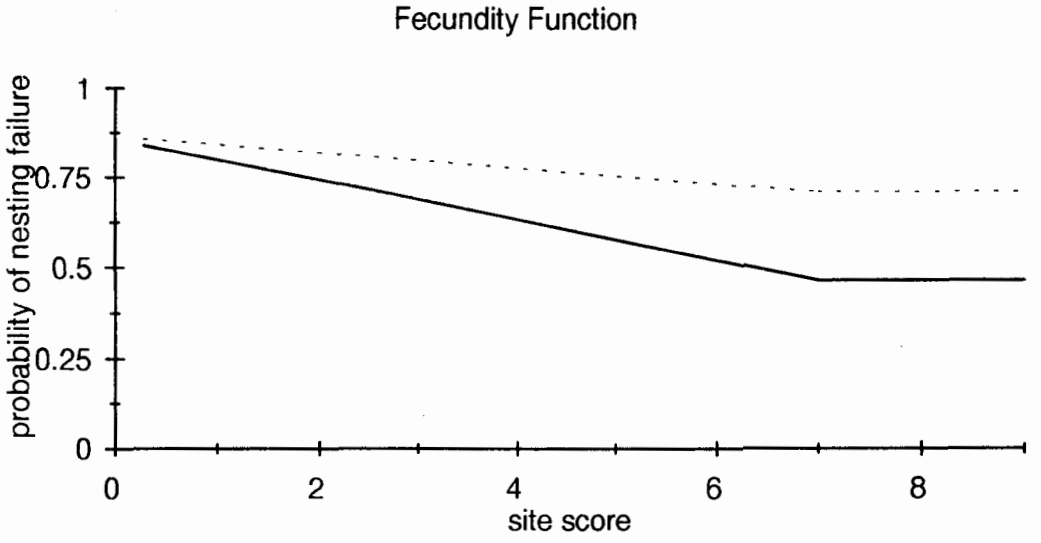
**Figures 1a-c:** **Nonlinear functions describing the relationship between spotted owl site score (habitat quality) and certain parameters. The breakpoint in the function corresponds to the high quality habitat threshold. For this analysis, a value of 7 was assigned to the high quality habitat threshold.**




**1a. Site Fidelity -- expressed as the probability of leaving a suitable site.**

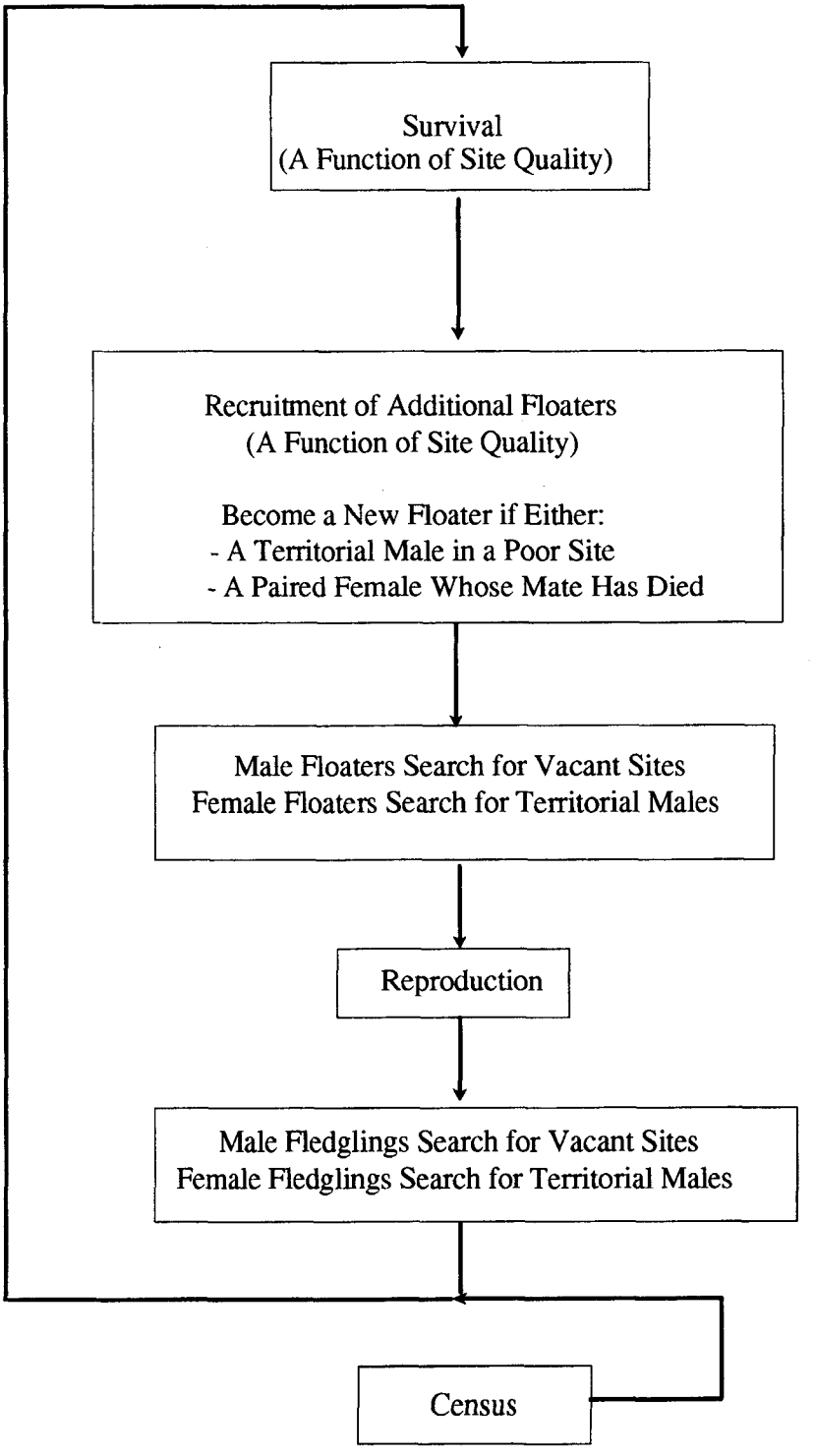



**1b. Survivorship -- nonlinear function was the same for adults and subadults. Horizontal dashed lines represent the different values of juvenile survivorship used in the analysis.**

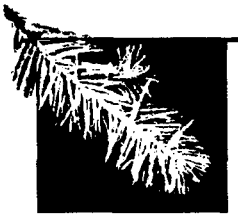



**1c. Fecundity -- expressed as probability of nesting failure. solid line = adult function; dashed line = subadult function. Juvenile fecundity was set to zero, i.e., probability of nesting failure equals one.**

**Figure 2:** **Flow chart showing one yearly cycle through the spotted owl population simulator. Survival, reproduction, and census blocks are parts of the demographic module. Reproduction is also a function of site habitat quality. Other blocks are parts of the movement module.**



# Glossary



# Glossary

Selected Greek and Roman characters (E, $E_D$, $E_O$, $I_D$, $I_O$, $\lambda$, $\lambda_D$, $\lambda_F$, n, P, r, $\phi$, S) used in statistical/mathematical analyses are interfiled in the glossary. ($\lambda$ = Lambda; $\phi$ = Phi)

**Active channel** - Defined by DNR as the stream area occupied by typical flood events (i.e., comparable to the two-year recurring flood). The active channel generally coincides with the ordinary high-water mark, but may encompass side channels and adjacent flood-plain areas. (See draft HCP p. IV.97-98 for more discussion of active channel versus high-water mark.)

**Activity center** - The closest 70 acres of suitable habitat around the nest tree or primary roost of territorial spotted owls.

**Adaptive Management Area** - As proposed by FEMAT, federal areas where timber harvest can occur which are designated to encourage the development and testing of technical and social approaches to achieving desired ecological, economic, and social objectives.

**Administratively Withdrawn Areas** - Federal areas removed from the harvestable timber base through agency direction and land management plans.

**Age class** - An interval, commonly 10 years, into which the age range of forest stands is divided for classification.

**Alluvial** - Describes soil and similar materials that were transported and deposited by running water.

**Anadromous fish** - Those species of fish that mature in the ocean and migrate to freshwater rivers and streams to spawn; an example is salmon.

**Angular canopy density (ACD)** - A measure of solar radiation reaching a stream; the projection of canopy closure measured at the angle at which solar radiation directly passes through the canopy to the stream.

**ARC/INFO** - Computer program for geographic information systems.

**Biological diversity** - The relative degree of abundance of wildlife species, plant species, communities, habitats or habitat features per unit of area.

**Blowdown** - Trees felled by high winds.

**Board foot** - The amount of wood equivalent to a piece of wood one foot by one foot by one inch thick.

**Board of Natural Resources** - A Washington State board that establishes policies for the Department of Natural Resources to ensure that the acquisition, management, and disposition of lands and resources within the department's jurisdiction are based on sound principles. The board is composed of six members: The commissioner of public lands, the Governor, the superintendent of public instruction, the dean of the College of Agriculture at Washington State University, the dean of the College of Forest Resources at the University of Washington, and an elected representative from a county that contains Forest Board land.

**Bog** - A hydrologically isolated, low nutrient wetland that receives its water from precipitation only. Bogs typically have no inflow and rarely have outflows. Bogs have peat soils 16 or more inches in depth (except where over bedrock), and specifically adapted vegetation such as sphagnum moss, Labrador tea, bog laurel, sundews, and some sedges. Bogs may have an overstory of spruce, hemlock, cedar, or other tree species, and may be associated with open water.

**Buffer** - A forested strip left during timber harvest to conserve sensitive ecosystems or wildlife habitat. Management activities may be allowed as long as they are consistent with the conservation objectives for the buffer.

**Candidate species** - A federal and state designation. Federal candidate species, category 1, are species for which there is substantial information to support listing the species as threatened or endangered; listing proposals are either being prepared or are delayed by work on higher priority species. Federal candidate species, category 2, are species for which information indicates that listing may be appropriate, but conclusive data are not available; additional information is being collected. State candidate species are those that WDFW will review for possible listing as endangered, threatened, or sensitive. Federal candidate species are examined individually to determine their status in Washington and whether inclusion as a priority species is appropriate or warranted.

**Canopy** - The continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth. See also "Understory canopy" and "Overstory canopy."

**Canopy closure** - The degree to which the canopy (forest layers above one's head) blocks sunlight or obscures the sky. See also "Relative density."

**Capable habitat, spotted owls** - An area that is capable of supporting a spotted owl pair because of the abundance and distribution of forest stands that are suitable as habitat for spotted owls. Based on radio-telemetry studies, the minimum conditions for capable habitat on the Olympic Peninsula are 5,700 acres of owl habitat within a 2.7-mile radius circle. See also "Suitable habitat, spotted owls."

**Class A, AA water** - See "Water quality classifications."

**Class 1 observation** - A wildlife species observation confirmed by a biologist. The observation may be visual or vocal, and/or include a carcass, tracks, hair, dig or food cache.

**Class IV-Special** - A Washington forest practices class; forest practices which require an environmental checklist in compliance with SEPA, as they have been determined to have potential for a substantial impact on the environment.

**Clearcut** - A harvest method in which all or almost all of the trees are removed in one cutting; an even-aged silvicultural system. Clearcutting establishes a stand without protection from an overstory canopy.

**Climax** - The culminating, highly stable stage in plant succession for a given environment; an ecosystem will stay at the climax stage until disturbance affects the ecosystem and the stages of ecological succession begin again.

**Closed-canopy forest** - Coniferous forests between 40 and 70 years of age. Also called closed forest; a forest habitat description for DNR-managed forest lands (used in DEIS Section 4.5.4).

**Cluster** - An area that contains habitat capable of supporting three or more breeding pairs of spotted owls with overlapping or nearly overlapping home ranges.

**Coarse woody debris** - See "Large woody debris."

**Code of Federal Regulations (C.F.R.)** - A codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government.

**Commercial thinning** - The removal of generally merchantable trees from an even-aged stand, so that the remaining trees can develop faster and with less competition.

**Congressionally Reserved Areas** - Areas that require congressional enactment for their establishment, such as national parks, wild and scenic rivers, national recreation areas, national monuments, and wilderness. They are also referred to as Congressional Reserves (USDA and USDI 1994a) and Congressionally Withdrawn Areas (FEMAT 1993).

**Conservation zones** - See "Marbled murrelet conservation zones."

**Contiguous forested area, marbled murrelets** - A method DNR has proposed to determine which adjoining acres would be included in a suitable habitat block.

**Contiguous habitat block, marbled murrelets** - An area of forest containing structures forming a suitable habitat block for the murrelet, which might consist of all or parts of several stands. See "Suitable habitat block, marbled murrelets."

**Critical habitat, federal** - Areas designated under the federal Endangered Species Act that have the physical and biological features necessary for the conservation of a listed species, or which require special management considerations or protection.

**Critical habitat, state** - Habitats of threatened or endangered species as designated by the Washington Forest Practices Board.

**Debris avalanches** - The very rapid and usually sudden sliding and flowage of incoherent, unsorted mixtures of soil and weathered bedrock.

**Debris flow** - A moving mass of rock fragments, soil, and mud, more than half the particles being larger than sand size; can travel many miles down steep confined mountain channels; a form of debris torrent.

**Debris torrent** - Debris flow or dam-break flood. Rapid movement of a large quantity of materials, including wood and sediment, down a stream channel. Usually occurs in smaller streams during storms or floods, and scours the stream bed.

**Demographic support** - The reproductive contributions of individuals which enhance population viability.

**Dense pole forest** - A forest in the early stages of stem exclusion. The lower limit of the canopy begins to raise as self-pruning of branches occurs. Little understory exists. Stems are closely spaced and numerous. A forest habitat description for DNR-managed forest lands (used in DEIS Section 4.5.4).

**Designated Conservation Area (DCA)** - A contiguous area of habitat to be managed and conserved for spotted owls under the federal Final Draft Recovery Plan for the Northern Spotted Owl.

**Detection** - The unit of measure for marbled murrelet surveys; the sighting or hearing of one or more birds acting in a similar manner.

**Diameter at breast height (dbh)** - The diameter of a tree, measured 4.5 feet above the ground on the uphill side of the tree.

**Direct influence zone** - The area in uplands, bordering the riparian zone, that has a direct influence on aquatic ecosystems. Direct influences include shading, sedimentation, input of organic nutrients, and recruitment of large woody debris.

**Dispersal** - The movement of juvenile, subadult, and adult animals from one sub-population to another. For juvenile spotted owls, dispersal is the process of leaving the natal territory to establish a new territory.

**Dispersal habitat, spotted owls (east-side planning units)** - In the HCP, dispersal habitat has the following characteristics: (1) canopy closure of at least 50 percent; (2) overstory tree density of at least 40 trees per acre that are at least 11 inches dbh; (3) top

height of at least 60 feet; (4) retention of four green trees per acre from the largest size class present for recruitment of snags and cavity trees; and (5) at least 50 percent of DNR-managed lands designated for dispersal function on a quarter township basis will be maintained in these stand conditions.

**Dispersal habitat, spotted owls (west-side planning units)** - Habitat used by juvenile owls or by owls of any age to disperse or move from one area of nesting-roosting-foraging habitat to another. In the HCP, dispersal habitat will be maintained on 50 percent of lands selected for a dispersal habitat role. The 50 percent will be measured on a WAU basis. In the HCP, dispersal habitat has the following minimum characteristics: (1) canopy cover of at least 70 percent; (2) the largest trees in a stand should have a quadratic mean dbh of 11 inches; (3) a top canopy height of at least 85 feet (top height is the average height of the 40 largest diameter trees per acre); and (4) green tree retention of at least four trees from the largest size class per acre. Type A, Type B, and sub-mature habitat can be counted as dispersal habitat.

**Dispersal management areas** - Lands identified in the HCP that will be managed to provide dispersal habitat for the spotted owl. In the discussion of the owl strategies, also referred to as designated dispersal areas and dispersal habitat areas.

**Distance bands, marbled murrelets** - Bands used in surveys as part of DNR's marbled murrelet forest habitat relationship studies. The bands are divided into Near, Mid, and Far. Band width is based on the distribution of DNR-managed lands from marine waters; each band contains one-third of the land within the planning unit. See also "Habitat classes, marbled murrelets."

**Distance from marine waters** - As used in the HCP to determine suitable habitat blocks for the marbled murrelet, distance from marine waters is measured from the Pacific coast, from Puget Sound, or from Rice Island (located in the Columbia River upstream from the Astoria bridge), whichever is closest.

**Diversity** - See "Biological diversity."

**Down woody debris** - See "Large woody debris."

**Draft environmental impact statement (DEIS)** - A public document prepared pursuant to the State or National Environmental Policy Acts (SEPA or NEPA).

**E** - Juvenile emigration of spotted owls. Used to correct estimates of juvenile survival probabilities (survivorship). Estimates for this parameter are taken from Burnham et al. (1994).

$\mathbf{E_D}$ - The rate of emigration from DNR-managed lands to federal reserves. This parameter is used in the qualitative evaluation of demographic support.

$E_o$ - The rate of emigration from "other" lands to federal reserves. This parameter appears in the conceptual model used for the qualitative evaluation of demographic support.

**Early herb and shrub stage** - See "Herb and shrub stage."

**Early seral stage** - Forest development classification that corresponds with: (1) closed sapling-pole, small sawtimber condition (Brown 1985); (2) young forest (Spies and Franklin 1991); and (3) stand initiation stage, stem exclusion stage (Oliver 1981).

**Earthflow** - A mass-movement landform and process characterized by downslope translation of soil and weathered rock over a discrete basal shear surface (landslide) within well-defined lateral boundaries.

**Ecosystem** - See "Forest ecosystem."

**Edge** - An abrupt change between adjacent plant communities, successional stages, or vegetative conditions.

**Edge effects** - The modified environmental conditions along the margins, or "edges," of forest patches.

**Effectiveness monitoring** - Monitoring done to determine whether the HCP conservation strategies result in the anticipated habitat conditions.

**Enabling Act** - The Congressional Enabling Act of 1889, which authorized statehood for Washington. The act provided the state with federal grant lands to be held in trust for the support of the state's public institutions and placed limits on the sale, lease, and management of these lands.

**Endangered species** - A federal and state designation. A species determined to be in danger of extinction throughout all or a significant portion of its range.

**Endangered Species Act (ESA)** - The federal Endangered Species Act of 1973, as amended, sets up processes by which plant or animal species can be designated as threatened or endangered. Two federal agencies, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, administer the act. Once species are listed, the act also provides that these agencies develop recovery plans for these species, including conserving the ecosystems on which listed species depend.

**Environmental impact statement (EIS)** - A document prepared under the National or State Environmental Policy Acts to assess the effects that a particular action will have on the environment.

**Environmental uncertainty** - Unpredictable changes in environmental conditions. Such events include changes in weather conditions, food supply, populations of predators or competitors, and habitat distribution.

**Evapotranspiration** - The conversion of water, whether open or as soil moisture (both by evaporation) or within plants (by transpiration), into water vapor that is released to the atmosphere.

**Even-aged** - A system of forest management in which stands are produced or maintained with relatively minor differences in age; generally, less than a 10-year difference in age.

**Evolutionarily Significant Units (ESU)** - A population that is substantially reproductively isolated from other population units of the same species, and represents an important component in the evolutionary legacy of the species.

**Exterior riparian buffer** - A buffer whose purpose is to protect the integrity of the interior-core buffer; part of the OESF riparian strategy. See also "Buffer."

**Extirpation** - The elimination of a species from a particular area.

**Federally listed** - Species formally listed as a threatened or endangered species under the federal Endangered Species Act; designations are made by the U.S. Fish and Wildlife Service or National Marine Fisheries Service.

**Federal Reanalysis Team** - A group of six federal scientists assembled to review existing data and develop a population model to estimate the importance of contributions of varying amounts of habitat from nonfederal lands to the long-term existence of a spotted owl population on the Olympic Peninsula. Cited in this document as (Holthausen et al. 1994).

**Federal reserves** - Federal lands that have been, or are proposed to be, withdrawn from acreage used for timber yields. These include Congressionally Reserved Areas such as national parks, wild and scenic rivers, national recreation areas, national monuments, and wilderness; Late-Successional Reserves, Riparian Reserves, Administratively Withdrawn Areas, Research Natural Areas, Special Recreation Management Areas, etc.

**50-11-40 guideline** - The Interagency Scientific Committee's (Thomas et al. 1990) recommendation that forested federal lands between designated Habitat Conservation Areas be managed such that 50 percent of every quarter township have forest stands in which trees have an average dbh of 11 inches and at least a 40 percent canopy closure.

**Foraging habitat** - Environment or plant community for which a species exhibits a preference for foraging. For spotted owls, foraging habitat is associated with healthy prey populations of small forest floor mammals and northern flying squirrels.

**Forest ecosystem** - The interrelationships between the various trees and other organisms (both plants and animals) that form a community; and the interrelationships between these organisms and the physical environment in which they exist.

**Forest Ecosystem Management Assessment Team (FEMAT)** - A team organized by the federal government in 1993 to develop a management plan for federal lands within the range of the northern spotted owl.

**Forest Practices Act** - A Washington State statute establishing minimum standards for forest practices and providing for necessary administrative procedures, rules, and regulations applicable to activities conducted on or pertaining to forests on both state-managed and private lands.

**Forest Practices Board** - A Washington State board created to write forest practices regulations which are administered and enforced by the Washington Department of Natural Resources.

**Forest Practices RMZs** - See "Riparian Management Zones (RMZs)."

**Forest Resource Plan (FRP)** - DNR's Forest Land Management Division's 1992 final policy plan, containing the current policies of the Board of Natural Resources.

**Forest stand** - See "Stand."

**(4)d special rule** - See "Proposed (4)d special rule."

**Fragmentation** - The spatial arrangement of successional stages across the landscape as the result of disturbance; often used to refer specifically to the process of reducing the size and connectivity of late-successional or old-growth forests.

**Fully functional forest** - Fully functional, older forest is forest older than 150 years; a subset of structurally complex forest. A forest habitat designation for DNR-managed forest lands (used in DEIS Section 4.5.4).

**Geographic information system (GIS)** - A computer system that stores and manipulates spatial data, and can produce a variety of maps and analyses. DNR's GIS is able to: (1) assign information and attributes to polygons and lines, which represent relationships on the ground; and (2) update and retrieve inventory, mapping, and statistical information. DNR uses its GIS as one of several tools for setting landscape-level planning objectives.

**Geomorphic processes** - Landscape-modifying processes such as surface erosion, mass wasting, and stream flow.

**Green tree retention** - A stand management practice in which live trees are left within harvest units to provide habitat components.

**Habitat classes, marbled murrelets** - Designations in DNR's marbled murrelet forest habitat relationship studies. Distance bands are further subdivided into three habitat classes: (1) old forest habitat (more than 120 years old) with an average density of at least two suitable nesting platforms per acre; (2) young forest habitat (sub-mature, less

than 120 years old) with an average density of at least two suitable nesting platforms per acre; and (3) young forest habitat (sub-mature, less than 120 years old) with at least one suitable nesting platform per acre. See also "Distance bands, marbled murrelets."

**Habitat complexity** - As defined in the HCP OESF riparian conservation strategy, habitat complexity includes: (1) variations in stream flow velocity and depth by structural obstructions to channel flow; (2) physical and biological interactions between a channel and its flood plain; (3) aquatic and riparian structures that provide cover from predators; (4) a variety of stream substrates that include gravel for fish spawning and macroinvertebrate habitat; (5) sufficient storage area within channels and flood plains for sediment and organic matter; and (6) diversity of riparian vegetation that provides adequate sources of woody debris and nutrients to channels, and that moderates water and air temperatures within the riparian corridor.

**Habitat Conservation Area** - As proposed by the federal Interagency Scientific Committee (Thomas et al. 1990), a contiguous block of habitat to be managed and conserved for breeding pairs, connectivity, and distribution of owls. Application may vary throughout its range according to local conditions.

**Habitat conservation plan (HCP)** - An implementable program for the long-term protection and benefit of a species in a defined area; required as part of a section 10 incidental take permit application under the federal Endangered Species Act.

**Habitat diversity** - See "Biological diversity."

**Habitat preference** - The choice of habitat(s) that an animal would make if all habitat types were available to it.

**Habitat selection** - The choice of habitat(s) directly available to an animal.

**Habitat types, spotted owls** - See "Spotted owl habitat types."

**Harass** - A form of take under the federal ESA; defined in federal regulations as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 C.F.R. § 17.3 (1994)).

**Harm** - A form of take under the federal ESA; defined in federal regulations as an act which actually kills or injures wildlife. Such acts may include significant habitat modification or degradation where it actually kills wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 C.F.R. § 17.3 (1994)).

**Herb and shrub stage** - Forest development classification that corresponds with: (1) grass-forb, shrub, and open sapling-pole conditions (Brown 1985); and, (2) stand initiation stage (Oliver 1981).

**High quality nesting habitat, spotted owls (east-side planning units)** - An interim definition developed in the HCP, to be applied as an average condition over a 300-acre nesting habitat patch. High quality nesting habitat consists of sub-mature, mature, and old-growth forest types. Sub-mature habitat is the minimum standard for nesting habitat. This corresponds with spotted owl Type A habitat (east of Cascade crest). See "Spotted owl habitat types."

**High quality nesting habitat, spotted owls (west-side planning units)** - An interim definition developed in the HCP, to be applied as an average condition over a 300-acre nesting habitat patch. High quality nesting habitat consists of: (1) at least 31 trees per acre greater than or equal to 21 inches dbh per acre; (2) at least three trees from the above group of 31 trees have broken tops; (3) at least 12 snags per acre greater than 21 inches dbh; (4) a minimum of 70 percent canopy closure; and (5) a minimum of 5 percent ground cover of large down woody debris.

**Home range** - The area used by a species and to which it exhibits fidelity. There is much geographic variation in spotted owl home range size. The median home range (determined by USFWS radio-telemetry data) is a circle 1.8 miles in radius east of the I-5 corridor, or a circle 2.7 miles in radius west of the I-5 corridor. The median home range radius (determined by Hanson et al. 1993) is 2.0 miles in the western Washington Cascades and 2.7 miles in the western Washington lowlands and Olympic Peninsula. (See Chapter III of the HCP for more discussion.)

**Hydrologic analysis unit (HAU)** - Subdivisions of the watershed administrative unit (WAU) used in the hydrology module of the Washington Forest Practices Board's watershed analysis manual.

**Hydrologic maturity** - The degree to which hydrologic processes (e.g., interception, evapotranspiration, snow accumulation, snowmelt, infiltration, runoff) and outputs (e.g., water yield and peak discharge) in a particular forest stand approach those expected in a late seral stand under the same climatic and site conditions. In DNR's HCP, a "hydrologically mature forest," with respect to rain-on-snow runoff, is a well-stocked conifer stand at age 25 years or older.

$I_D$ - The rate of immigration to DNR-managed lands from federal reserves. This parameter is used in the qualitative evaluation of demographic support.

$I_O$ - The rate of immigration to "other" lands from federal reserves. This parameter appears in the conceptual model used for the qualitative evaluation of demographic support.

**Identifiable channel** - A channel with well-defined and measurable banks where vegetative ground cover has been disturbed and sediment is exposed.

**Implementation Agreement (IA)** - A part of the application for an incidental take permit, which specifies the terms and conditions, resources, schedule of activities, and expectations to the parties of the agreement.

**Implementation monitoring** - Monitoring done to determine whether the HCP conservation strategies are implemented as written.

**Incidental take** - The taking of a federally listed wildlife species, if the taking is incidental to, and not the purpose of, carrying out otherwise lawful activities. See also "Take."

**Incidental take permit** - Permit issued by the U.S. Fish and Wildlife Service to a nonfederal entity (state, tribe, private landowner), that allows incidental take of a threatened or endangered species; permit also requires permittee to carry out specified actions that minimize and mitigate the incidental take.

**Interagency Scientific Committee** - The U.S. Interagency Scientific Committee to address the conservation of the Northern Spotted Owl; cited in this document as (Thomas et al. 1990).

**Interception** - In hydrology, the rainfall and snowfall caught in the forest canopy.

**Interim conservation areas** - In DNR's proposed OESF Zoned Forest alternative, areas designated as high priority areas, approximated by current owl circles, for interim conservation of habitat until threshold populations are attained in the owl zones. Interim conservation areas and owl zones are integral concepts in the Zoned Forest alternative.

**Interior-core riparian buffer** - Streamside buffer in the HCP OESF riparian strategy; minimizes disturbance of unstable channel banks and adjacent hillslopes, and protects and aids natural restoration of riparian processes and functions. See also "Buffer."

**Interior forest** - Structurally complex forest greater than 70 years old, which is a sufficient distance (100-300 feet) from the edge of younger stands or nonforested areas so as to maintain conditions which are characteristic of nonfragmented forests. A subset of structurally complex forest; a forest habitat description for DNR-managed forest lands (used in DEIS Section 4.5.4).

**Lambda ($\lambda$)** - The finite rate of population change, or annual population growth rate. Defined mathematically as population size at year n divided by population size at year n minus one.

$\lambda_D$ - The finite range of population change for the owls on DNR-managed lands. Assumed to be less than one. This parameter is used in the qualitative evaluation of demographic support.

$\lambda_F$ - The finite rate of population change for the owls on federal reserves. Assumed to be greater than one. This parameter is used in the qualitative evaluation of demographic support.

**Landsat Thematic Mapper** - A satellite-borne sensor capable of recording reflected and emitted energy from the surface of the earth in seven "bands" or divisions of the visible and infrared spectrum.

**Landscape** - Large regional units of lands that are viewed as a mosaic of communities, or a unit of land with separate plant communities or ecosystems forming ecological units with distinguishable structure, function, geomorphology, and disturbance regimes. In the HCP, a landscape is defined as a large area comprised of various interacting patterns of stand structure and function going through alterations over time.

**Landscape assessment** - In DNR's proposed HCP, any method used to field verify the amount of habitat in WAUs on DNR-managed lands.

**Landscape-level planning** - The process of planning across a larger area than stand-by-stand.

**Landscape planning** - The process of planning for a specified landscape by setting specific objectives for a given area, such as protection of wildlife and timber production.

**Landscape planning unit (LPU)** - Landscape-level planning units used by DNR's Olympic Region to identify 11 watershed-based units within the Olympic Experimental State Forest.

**Landslide** - Any mass movement process characterized by downslope transport of soil and rock, under gravitational stress, by sliding over a discrete failure surface; or the resultant landform. In forested watersheds, landsliding typically occurs when local changes in the soil pore water pressure increase to a degree that the friction between soil particles is inadequate to bind them together.

**Large organic debris (LOD)** - See "Large woody debris."

**Large saw** - Large sawtimber. The OESF GIS forest classification for large saw is: dominant dbh 20-30 inches; more than 10 dominant trees/acre of this size; co-dominant trees are 14 inches dbh or greater; two or three canopy layers more closed than old growth; small snags present with sparse or no large snags; few large down logs.

**Large woody debris** - Large pieces of wood in stream channels or on the ground–includes logs, pieces of logs, and large chunks of wood; provides streambed stability and/or habitat complexity. Also called coarse woody debris or down woody debris. Large organic debris is large woody debris, but may contain additional nonwoody debris, such as animal carcasses.

**Late seral stage** - See "Late-successional forest."

**Late-successional forest** - A mature and/or old-growth forest stand. Also called late seral-stage forest. Typical characteristics are moderate to high canopy closure, a multi-layered, multispecies canopy dominated by large overstory trees, numerous large snags,

and abundant large woody debris (such as fallen trees) on the ground. Typically, stands 80-120 years old are entering this stage.

**Late-Successional Reserve (LSR)** - A type of reserve on federal lands proposed by FEMAT, encompassing old forest stands.

**Layered** - A transitional forest structure, when second-growth is being manipulated to create old-growth features; there is greater structural diversity than understory and somewhat less than with classic old growth.

**Leeward** - In this document, the side of a stream opposite that from which the wind blows.

**Listed wildlife species** - Species formally listed as endangered, threatened, or sensitive by a federal (USFWS or NMFS) or state (WDFW) agency.

**Lithosol** - A type of soil characterized by shallow depth to bedrock and imperfect weathering; usually develops on steep slopes in mountainous areas.

**Low-harvest area** - As defined for the HCP's west-side planning units, the outermost portion of the riparian buffer, more than 100 feet from the active channel margin.

**Low order streams** - Small streams with very few tributaries; often are headwaters. Type 4 and 5 Waters are low order streams.

**Maintenance and enhancement phase** - In the HCP OESF strategy, the remainder of the permit period following the restoration of threshold amounts of total spotted owl habitat (40 percent) in all landscape planning units. This phase follows the restoration phase.

**Maintenance of species distribution** - Supporting the continued presence of a species' population in as much of its historic range as possible.

**Marbled murrelet** - A Pacific seabird that nests in mature or old-growth forests within 50 miles of marine environments; listed as a threatened species by the U.S. Fish and Wildlife Service and Washington State.

**Marbled murrelet conservation zones** - Murrelet distribution zones described in the Marbled Murrelet Recovery Team (1995) draft recovery plan: there are six zones identified throughout a three state area; Zone 1 is the Puget Sound Zone and Zone 2 is the Western Washington Coast Range Zone.

**Marbled murrelet habitat** - For marbled murrelets, potential habitat is coniferous forests within 50 miles of the coast; old growth regardless of stand size; mature forests (80-200 year old stands) with or without an old-growth component; young stands with remnant old growth or mature trees greater than 32 inches in diameter; young (70-80 years) coniferous forests that have deformities that result in structures suitable for nesting.

Marbled murrelet habitat requires structural features such as large residual trees, large limbs, and nesting platforms. See "Occupied Stand Approach" for the Washington Forest Practices Board's definition.

**Marbled murrelet nesting habitat, Alternative A** - See "Occupied Stand Approach."

**Marbled murrelet nesting habitat, Alternative B** - An interim definition from HCP Alternative B. Suitable habitat blocks are contiguous forested areas that are: (1) at least 5 acres in size; (2) contain an average of at least two potential nesting platforms per acre; and (3) are within 50 miles of marine waters.

**Marbled murrelet zone 1** - A 10-40 mile wide zone adjacent to marine areas in which the majority of marbled murrelet detections and nests are located; defined in the FEMAT report.

**Marbled murrelet zone 2** - An inland zone that abuts marbled murrelet zone 1. Numbers of murrelet detections in zone 2 indicate that it is used by only a small fraction of the breeding population; defined in the FEMAT report.

**Mass wasting** - Dislodgment and downslope transport of soil and rock under the direct application of gravitational stress.

**Matrix** - As proposed by FEMAT, the matrix is the area of federal lands where most timber harvest will occur, in the areas outside of the Late-Successional Reserves and Riparian Reserves.

**Mature stand** - The period of life in a forest stand from culmination of mean annual increment to an old-growth stage or to 200 years. This is a time of gradually increasing stand diversity. Hiding cover, thermal cover, and some forage may be present. See also "Mid-seral stage."

**Metapopulation** - Several sub-populations linked together by immigration and emigration. Metapopulation dynamics are influenced by the relationships between source and sink habitats and source and sink sub-populations.

**Mid-seral stage** - Forest development classification that corresponds with: (1) large sawtimber condition (Brown 1985); (2) mature forest (Spies and Franklin 1991); and (3) understory reinitiation stage (Oliver 1981). Age of dominant trees is 80-195 years (Spies and Franklin 1991); due to stand density, brush, grass, or herbs decrease in the stand. Hiding cover may be present.

**Minimal-harvest area** - As defined for the HCP's west-side planning units, the part of the riparian buffer outside of the no-harvest area; the next 75 feet from the active channel, and inside the low-harvest area (25-100 feet from the stream).

**Mitigation** - Methods of reducing adverse impacts of a project, by: (1) limiting the degree or magnitude of the action and its implementation; (2) rectifying the impact by

repairing, rehabilitating, or restoring the affected environment; (3) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or (4) compensating for the impact by replacing or providing substitute resources or environments.

**Monitor species** - A state designation. Wildlife species native to the state of Washington that: (1) were at one time classified as endangered, threatened, or sensitive; (2) require habitat that has limited availability during some portion of its life cycle; (3) are indicators of environmental quality; (4) require further field investigations to determine population status; (5) have unresolved taxonomy which may bear upon their status classification; (6) may be competing with and impacting other species of concern; or (7) have significant popular appeal.

**n** - The sample size; the number of observations or individuals in a scientific study.

**National Environmental Policy Act (NEPA)** - This law is the basic national charter for protection of the environment. NEPA requires all federal agencies to consider and analyze all significant environmental impacts of any action proposed by those agencies; to inform and involve the public in the agency's decision-making process; and to consider the environmental impacts in the agency's decision-making process.

**National Marine Fisheries Service (NMFS)** - The federal agency that is the listing authority for marine mammals and anadromous fish under the federal Endangered Species Act.

**Natural Area Preserve (NAP)** - In Washington State, a natural area which has been so dedicated under the provisions of state law, or formally committed to protection by a cooperative agreement between a government landholder and the Department of Natural Resources.

**Natural catastrophes** - Extreme forms of environmental destruction that usually occur on a large scale, have widespread impacts, but are short in duration.

**Natural Heritage Program** - A DNR program that identifies, selects and nominates outstanding natural areas in Washington; also, oversees state listing of plants.

**Natural Resources Conservation Area (NRCA)** - Washington State lands designated by the legislature to protect special scenic and/or ecological values.

**Nest patches** - Patches of old forest with a high degree of structural complexity (i.e., forest types known to support nesting spotted owls) that will be retained in an unmanaged state during the research phase of the HCP; part of the west-side NRF management strategy.

**Nesting platform, marbled murrelets** - Any large limb or other structure at least 50 feet above ground and at least 7 inches in diameter. In the HCP, platforms are counted in conifer trees only, and only if located within the live crown.

**Nesting, roosting, and foraging habitat (NRF)** - Habitat with the forest structure, sufficient area, and adequate food source to meet the needs of a nesting pair of spotted owls. The forest structure is stands at least 70 years old with a three-layer canopy, that include very large diameter (200+ years) trees from the previous stand, large diameter (70+ years) trees, and small understory trees, along with snags and large down woody debris.

**No-harvest area** - As defined for the HCP's west-side planning units, the 25 feet of the riparian buffer closest to the stream.

**Northern spotted owl** - A medium-size dark brown owl that has round to elliptical white spots on the head, white mottling on the body and abdomen, and white bars on the tail; native to the Pacific coastal region. Federally listed as a threatened species, and listed as endangered by Washington State.

**NRF management areas** - Lands identified in the HCP that will be managed to provide demographic support and contribute to maintaining species distribution for the spotted owl. In the discussions of the owl strategies in the DEIS, also referred to as NRF areas, designated NRF areas, and DNR NRF areas.

**Occupancy, marbled murrelets** - A portion of a survey area where at least one of the following occurs, indicating potential occupying of the site by marbled murrelets: (1) discovery of an active nest or a recent nest site as evidenced by a fecal ring or eggshell fragments; (2) discovery of a chick or eggshell fragments on the forest floor; (3) birds flying below, through, into, or out of the forest canopy within or adjacent to a stand; (4) birds perching, landing, or attempting to land on branches; (5) birds calling from a stationary location within the stands; or (6) birds flying in small or large radius circles above the forest canopy.

**Occupied Stand Approach** - The definition used in the HCP No Action alternative. The Washington Forest Practices Board's definition of suitable marbled murrelet habitat as defined by the marbled murrelet emergency rule alternative (WAC 222-16-010). Suitable marbled murrelet habitat is a contiguous forested area: (1) within 40 miles of marine waters; (2) containing at least eight trees per acre greater than or equal to 32 inches dbh; (3) at least 40 percent of the trees greater than or equal to 32 inches dbh are Douglas-fir, western hemlock, western redcedar, or Sitka spruce (low-elevation tree species); and (4) containing at least two nesting platforms per acre. Nesting platforms shall include any horizontal limb, tree structure, or deformity greater than or equal to 7 inches in diameter and 50 feet or more in height above the ground.

**Off-base** - A DNR classification for lands and timber resources that are unavailable for harvest.

**Old forest habitat, marbled murrelets** - See "Habitat classes, marbled murrelets."

**Old forest habitat, spotted owls** - In the HCP, for the east-side planning units, this

corresponds with Type A habitat; for the west-side planning units, this corresponds with Types A and B habitat (defined under "Spotted owl habitat types.")

**Old-growth forest** - A successional stage after maturity that may or may not include climax old-growth species; the final seral stage. Typically, it contains trees greater than 200 years old. Stands containing Douglas-fir older than 160 years which are past full maturity and starting to deteriorate may be classified as old growth. The OESF GIS forest classification for old growth is: a dominant dbh of 30 inches or greater; usually more than eight dominant trees/acre; three or more canopy layers with less than complete canopy closure; several snags/acre with a 20 inch dbh or greater; and, several down logs/acre with a 24 inch dbh or greater.

**Older forest** - See "Fully functional forest."

**Olympic Experimental State Forest (OESF, the Experimental Forest)** - A DNR planning unit on the Olympic Peninsula, which has unique potential for research and experiments involving forestry, wildlife, and related disciplines; an integral part of DNR's proposed HCP.

**Open forest stage** - The earliest of the seral stages, or forest age 0-10 years. The overstory has been removed and herbs and low shrubs dominate the vegetation. A forest habitat description for DNR-managed forest lands (used in DEIS Section 4.5.4).

**Open multi-aged stands** - East-side forest stands with multispecies or ponderosa pine that are relatively open and contain overstory trees with a canopy which has been elevated by self-pruning and contains younger trees at various ages of development; often a result of uneven-aged management. A forest habitat description for DNR-managed forest lands (used in DEIS Section 4.5.4).

**Orographic** - Pertaining to mountains, especially in regard to their location, distribution, and accompanying phenomenon; also, said of the precipitation that results when moisture-laden air encounters a high barrier and is forced to rise over it, such as the precipitation on the windward slopes of a mountain range facing a steady wind from a warm ocean.

**Overstory canopy** - The uppermost forest canopy layer. See also "Canopy" and "Understory canopy."

**Owl circle** - A radius that approximates the median spotted owl home range size. See also "Home range."

**Owl site** - Any site where there has been a recent or historic observation of a single spotted owl or a pair of owls.

**Owl zones** - In the HCP OESF Zoned Forest alternative, owl zones are areas that have been delineated for the retention and restoration of owl habitat until threshold proportions are attained (predicted to be in 40-60 years). See also "Interim conservation areas."

**P** - Probability value.

**Partial cutting** - Removal of selected trees from a forest stand, leaving an uneven-aged stand of well-distributed residual, healthy trees. Also called uneven-aged management.

**Patch** - See "Nest patches."

**Phenology** - Annual schedule or timing at which various stages of development are achieved such as changes with the seasons.

**Phi ($\phi$)** - The "apparent" probability that juvenile female owls would survive one-year, based on re-observation of marked birds.

**Physiographic province** - A region of which all parts are similar in geologic structure and climate and which consequently had a unified geomorphic history; a region whose pattern of relief features or landforms differs significantly from that of adjacent regions.

**Planning unit** - DNR-identified land units that include both DNR-managed lands and lands of other landowners/managers. Planning units are grouped into three areas for the purpose of implementing the HCP: the Olympic Experimental State Forest, five west-side planning units, and three east-side planning units. The nine planning units in the HCP area are: Olympic Experimental State Forest, South Coast, North Coast, Columbia, Straits, South Puget, Chelan, Yakima, and Klickitat.

**Pole** - A pole tree is any considerable length of round timber before saw log size, ready for use without further conversion. The OESF GIS classification for a pole stand is: dominant dbh 10-14 inches; one canopy layer; and little or no down dead woody debris.

**Population dynamics** - How populations and the environment interact to cause changes in a population over time.

**Population viability analysis** - Using population dynamics to analyze how large a population needs to be and how its habitat needs to be distributed across landscapes to persist over time. See also "Viable population."

**Precommercial thinning** - Cutting trees at an immature age to allow for better growth of the remaining trees; may include removal of excess and/or diseased trees in the 10-35 year class.

**President's Forest Plan** - In April 1993, President Clinton convened a conference in Portland, Oregon, in order to resolve conflicts over management of late-successional forest ecosystems on federal lands within the range of the northern spotted owl. As a result of the conference, the Forest Ecosystem Management Assessment Team (FEMAT) was convened to develop a set of options for managing federal forests within the range of the owl in Washington, Oregon, and northern California. These options were analyzed in a NEPA environmental impact statement process, and a final plan was adopted by the U.S. departments of Agriculture and Interior in April 1994. This final plan is referred to

as the President's Northwest Forest Plan, the Northwest Forest Plan, and the President's Forest Plan.

**Priority habitat** - As defined by the Washington Department of Fish and Wildlife, priority habitat is a habitat type with unique or significant value to many species. It must have one or more of the following attributes: (1) comparatively high fish and wildlife density; (2) comparatively high fish and wildlife species diversity; (3) important fish and wildlife breeding habitat; (4) important fish and wildlife seasonal ranges; (5) important fish and wildlife movement corridors; (6) limited availability; (7) high vulnerability to habitat alteration, and/or (8) unique or dependent species. A priority habitat may be described by a unique vegetation type (e.g., oak woodlands) or by a dominant plant species that is of primary importance to fish and wildlife. A priority habitat may also be described by a successional stage (e.g., old-growth and mature forests). Alternatively, a priority habitat may consist of a specific habitat element (e.g., talus slopes, caves, snags) that is of key value to fish and wildlife. A priority habitat may contain priority and/or non-priority fish and wildlife species.

**Priority species** - As defined by the Washington Department of Fish and Wildlife, priority species are fish and wildlife species requiring protective measures and/or management guidelines to ensure their perpetuation.

**Proposed (4)d special rule** - Refers to section (4)d of the federal Endangered Species Act. Pursuant to section (4)d, special rules may be promulgated with respect to a particular federally listed species. Such special rules may permit incidental take so long as they meet the conservation needs of the listed species.

**Proposed threatened or endangered species** - Species proposed by the USFWS or NMFS for listing as threatened or endangered under the federal Endangered Species Act; not a final designation.

**Protected species** - A state designation. Protected wildlife includes all birds not classified as game birds, predatory birds, or endangered species designated by the Washington Fish and Wildlife Commission, that shall not be hunted or fished. Protected species are listed in WAC 232-12-011.

**R** - Linear regression coefficient.

**Rain-on-snow zone** - Area, generally defined as an elevation zone, where it is common for snowpacks to be partially or completely melted during rainstorms.

**Recovery plan** - A plan developed by a government agency, that if implemented will result in the recovery of a threatened or endangered species to the extent that the species can be delisted from threatened or endangered status.

**Regeneration forest** - Forests which are 10-20 years old and are composed of shrubs and saplings. A forest habitat description for DNR-managed forest lands (used in DEIS Section 4.5.4).

**Regulatory circles** - See "Spotted owl regulatory circles."

**Relative density (RD)** - The basal area of a stand divided by the square root of the quadratic mean dbh of the stand. In the HCP, when canopy closure is used in a habitat definition, RD will be used as a measurement if and when DNR has established a correlation between RD and canopy closure in spotted owl habitats for its trust lands.

**Reserves** - See "Federal reserves."

**Resident single** - An unpaired spotted owl that has an established home range; a resident single may be part of a pair whose mate was not detected during surveys. Also called a territorial single.

**Restoration phase** - In the HCP OESF strategy, the 40-60 year period during which existing young stands are developing the characteristics of young-forest marginal and sub-mature habitat.

**Revised Code of Washington (RCW)** - A revised, consolidated, and codified form and arrangement all the laws of the state of a general and permanent nature.

**Riparian area** - Areas of land directly influenced by water or that influence water. Riparian areas usually have visible vegetative or physical characteristics reflecting the influence of water. Riversides and lake borders are typical riparian areas.

**Riparian buffer** - As defined for the HCP's west-side planning units, the inner buffer of the riparian management zone that serves to protect salmonid habitat. See also "Riparian management zone."

**Riparian ecosystem** - In DNR's proposed HCP, the area of direct interaction between terrestrial and aquatic environments.

**Riparian management zone** - As defined in DNR's Forest Resource Plan (1992) Policy No. 20, and in the HCP, an area consisting of an inner riparian buffer and an outer wind buffer. The riparian buffer serves to protect salmonid habitat; the wind buffer protects the riparian buffer. This policy expands the level of protection required under the current Washington Forest Practices Act. It authorizes DNR to establish riparian management zones along Type 1 through 4 Waters and, when necessary, along Type 5 Waters. DNR may remove timber from riparian management zones only when adequate protection can be provided to fish and other nontimber resources. These riparian management zones apply to the west-side planning units within the HCP area.

**Riparian management zone** - DNR's Forest Resource Plan (1992) Policy No. 20 authorizes DNR to establish riparian management zones along Type 1 through 4 Waters and, when necessary, along Type 5 Waters. This expands the level of protection required under the current Washington Forest Practices Act. The HCP proposes a zone consisting of an inner riparian buffer and an outer wind buffer. The riparian buffer functions to protect salmonid habitat; the wind buffer protects the riparian buffer. Harvest can occur

within the buffers as long as management activities support these functions and are consistent with the conservation objectives. The riparian management zones as described in the HCP apply to the west-side planning units.

**Riparian Reserves** - A type of federal reserve proposed by FEMAT, consisting of protected forest zones along rivers, streams, lakes, and wetlands; the Riparian Reserve would act as a buffer between water resources and timber harvest.

**Riparian zone** - A narrow band of moist soils and distinctive vegetation along the banks of lakes, rivers, and streams; in the HCP, the portion of the riparian ecosystem between the aquatic zone and the direct influence zone (uplands).

**River mile** - A statute mile as measured along the center line of a river. River miles are measured from the mouth of the river, or are discrete measures of distance (i.e., a distance of 2-4 river miles).

**Roosting habitat** - For spotted owls, roosting habitat is associated with the presence of potential perches at various vertical positions throughout the forest canopy.

**S** - The "true" probability that juvenile female owls would survive one-year, based on re-observation of marked birds and accounting for the rate at which juvenile female owls emigrate from the study area or to areas within the study area that are inaccessible to normal re-observation techniques.

**Salmonids** - Fish species belonging to the family Salmonidae, including trout, salmon, char, and whitefish species.

**Salvage timber sale program (Salvage rider)** - Forests slated for protection under the President's Forest Plan that have been authorized for harvest under an emergency two-year salvage timber sale program (Pub. L. No. 104-19, 109 Stat. 240 (1995)).

**Sapling** - A young tree no longer a seedling but not yet a pole. The OESF GIS classification for sapling is: approximately 2-5 inches dbh.

**Sap-pole** - See "Sapling" and "Pole."

**Sawtimber** - Trees big enough to yield saw logs. See also "Small saw" and "Large saw."

**Scoping** - Determining the range of proposed actions, alternatives, and impacts to be discussed in an EIS (WAC 197-11-793).

**se** - See "Standard error."

**Seed tree harvest** - A harvest method in which all mature timber from an area is harvested in one entry except for a small number of trees left as a seed source for the harvested area.

**Selective harvest** - A general term for partial cutting or salvage cutting in which individual trees are removed.

**Sensitive species** - A state designation. State sensitive species are species native to the state of Washington that are vulnerable or declining and are likely to become endangered or threatened in a significant portion of their ranges within the state without cooperative management or the removal of threats.

**Seral stages** - Developmental stages that succeed each other as an ecosystem changes over time; specifically, the stages of ecological succession as a forest develops. There are various subdivisions for seral stages, which include:

(1) early seral stage; mid-seral stage; and late seral stage;
(2) young forest; mature forest; and old-growth forest;
(3) grass-forb; shrub; open sapling-pole; closed sapling-pole-sawtimber; large sawtimber; and old growth; and
(4) stand initiation; stem exclusion; understory reinitiation; and old growth.

**Shelterwood cut** - A harvest method in which a portion of a mature forest stand is removed in two or more cuttings; a portion of the stand is retained as a source of seed and/or protection during the period of regeneration.

**Siltation** - The deposition or accumulation of silt that is suspended throughout a body of standing water or in some considerable portion of it; especially the choking, filling, or covering with stream-deposited silt behind a place of retarded flow.

**Silt** - Sedimentary materials composed of fine particles, such as soil or sand, suspended in or deposited by water; mud or fine earth in suspension.

**Silviculture** - The theory and practice of controlling the establishment, composition, growth, and quality of forest stands in order to achieve management objectives.

**Sink area** - The area in which local mortality rate exceeds local reproductive rate. Because mortality rates exceed reproduction, these populations would go extinct without immigration from source areas.

**Site center** - The actual nest tree or the primary roost of territorial owls.

**Site index** - A measure of forest productivity expressed as the height of the dominant trees in a stand at an index age.

**Site index curves** - Nonlinear regressions of tree height versus breast height age for different site productivities; used as a means to predict future growth.

**Site potential tree height** - The height a dominant tree may attain given the site conditions where it occurs.

**Slump** - A landslide characterized by a shearing and rotary movement of a generally independent mass of rock or earth along a curved slip surface (concave upward) and about an axis parallel to the slope from which it descends, and by backward tilting of the mass with respect to that slope so that the slump surface often exhibits a reversed slope facing uphill.

**Small saw** - Small sawtimber. The OESF GIS forest classification for small saw is: dominant dbh 14-20 inches; one or two canopy layers; small snags or none present; and, small down dead wood or none present.

**Snag** - Dead tree that is still standing.

**Source area** - The area in which local reproductive success is greater than local mortality (lambda is greater than one at the scale of an owl cluster). Populations in source areas produce an excess of individuals that must emigrate from their natal area to establish new territories.

**Special Emphasis Areas (SEAs)** - Proposed federally designated areas in Washington, as outlined in the proposed 4(d) special rule under the federal Endangered Species Act.

**Spotted owl** - See "Northern spotted owl."

**Spotted owl habitat types** - Defined by DNR's "Owl memo no. 3" (Stearns 1991), the habitat types are:

Type A habitat (east of the Cascade crest) - Stands within the Pacific silver fir, grand fir, Douglas-fir, and ponderosa pine forest zones that have not been logged. Stands are typically old-growth and mature forests with the following characteristics: (1) A multi-layered, multispecies canopy dominated by large (20 inches and larger dbh) overstory trees (typically 70-100 stems/acre, although tree densities as low as 35 stems/acre are possible where large diameter trees are present); (2) moderate to high (60-85 percent) canopy closure; (3) some large trees with various deformities (e.g., large cavities, broken tops, dwarf mistletoe infections); (4) large (20 inches and larger dbh) snags present (typically three or more stems/acre); and (5) accumulation of large (20 inches or larger dbh) fallen trees and other woody debris on the ground.

Type A habitat (west of the Cascade crest) - Optimal, old-growth forest habitat that has the following characteristics: (1) a multi-layered, multispecies canopy dominated by large (30 inches or larger dbh) overstory trees (typically 15-75 stems/acre; (2) moderate to high (60-80 percent) canopy closure; (3) a high incidence of large trees with various deformities (e.g., large cavities, broken tops, dwarf mistletoe infections); (4) numerous large (30 inches or larger dbh) snags (typically two or more stems/acre); and (5) large accumulations of fallen trees and other woody debris on the ground.

Type B habitat (east of the Cascade crest) - Stands within the grand fir, Douglas-fir, and ponderosa pine forest zones. Stands are typically mature forest habitat that has naturally regenerated following fire or windthrow and has the following characteristics: (1) a multi-layered, multispecies canopy dominated by overstory trees approximately 12 inches or larger dbh. Stands must contain at least 20 percent fir and/or hemlock in the overstory; (2) approximately 50 percent canopy closure; (3) dominant live trees with

various deformities (e.g., large cavities, broken tops, dwarf mistletoe infections); and (4) snags and down logs, at least some of which are of similar dbh to dominant live trees.

Type B habitat (west of the Cascade crest) - Mature forest habitat that has the following characteristics: (1) few canopy layers, multispecies canopy dominated by large (20 inches or larger dbh) overstory trees (typically 75-100 stems/acre, although densities as low as 35 stems/acre are possible where large diameter trees are present); (2) moderate to high (60-80 percent) canopy closure; (3) some large trees with various deformities (e.g., large cavities, broken tops, dwarf mistletoe infections); (4) large (20 inches and larger dbh) snags present; and (5) accumulations of fallen trees and other woody debris on the ground.

Type C habitat (east of the Cascade crest) - Type C habitat is defined on the basis of use by spotted owls. Younger stands occurring at low to mid-elevations where some old-growth/mature components and/or structural characteristics are present. This habitat often appears as a mosaic of relatively small, older stands scattered among and within younger stands. Type C habitat also includes areas of historic high-grade logging and partial entry. Type C includes: (1) historically selectively harvested stands that have had less than 40 percent volume removed and still contain the structural components important to spotted owls, some large trees, snags, down woody debris, and evidence of deformities; (2) stands that have most of the characteristics of Types A or B habitat but grow on rocky or poor soils resulting in highly variable canopy closure. This habitat appears as clumps or pockets of stands with high canopy closure in a patchwork distribution; (3) multi-layered stands that have most of the characteristics of Types A and B habitat but are dominated by ponderosa pine, with as little as 10 percent of the overstory comprised of Douglas-fir; and (4) Types A and B habitat at elevations greater than 5,000 feet comprised of Douglas-fir, Pacific silver fir, western hemlock, or a combination of these species.

Type C habitat (west of the Cascade crest) - Marginal habitat, usually younger stands with some old-growth/mature components and/or structural characteristics. Type C habitat is defined on the basis of use by spotted owls. Such habitat generally results from fire or windthrow. It may include partially harvested stands that have had less than 40 percent volume removed and still contain structural components important to spotted owls.

**Spotted owl regulatory circles** - Circles of 1.8-mile radius in the western Washington Cascades, and 2.7 miles in the western Washington lowlands and the Olympic Peninsula; based on observed size of pair ranges.

**Spotted owl site status** - See "Status 1 through 5, spotted owl site centers."

**Stand** - A group of trees which possess sufficient uniformity in composition, structure, age, spatial arrangement, or condition to distinguish them from adjacent groups.

**Stand conversion** - The conversion of stands from low-commercial value species to more valuable conifer species; also called stand rehabilitation.

**Stand initiation** - The first stage of forest growth; an open condition and new regeneration. The other three stages are stem exclusion, understory reinitiation, and old growth. (Classification system from Oliver 1981.)

**Standard error (se)** - A statistical measure of variability. A larger standard error indicates greater variability.

**State Environmental Policy Act (SEPA)** - This law is the basic state charter for protection of the environment. SEPA requires all state agencies to consider and analyze all significant environmental impacts of any action proposed by those agencies; to inform and involve the public in the agency's decision-making process; and to consider the environmental impacts in the agency's decision-making process.

**Status 1 through 5, spotted owl site centers** - Status assigned to spotted owl site centers by the Washington Department of Fish and Wildlife (WAC 222-16-080). The five categories are: status 1- Pair or reproductive; status 2- Two birds, pair status unknown; status 3- Resident territorial single; status 4- Status unknown; and status 5- Historic status (formerly occupied).

**Stem exclusion** - The second stage of forest growth, with tree competition and mortality. The other three stages are stand initiation, understory reinitiation, and old growth. (Classification system from Oliver 1981.)

**Stream classifications** - See "Water typing system."

**Structurally complex forest** - Conifer-dominated forests greater than 70 years of age, densely stocked with large trees; includes fully functional forest and interior forest. Also referred to as complex forest. A forest habitat description for DNR-managed forest lands (used in DEIS Section 4.5.4).

**Subalpine** - The area above the upper limit of contiguous closed forest and beneath the upper limit of growth; typically, a mosaic of tree patches and meadows.

**Sub-mature forest** - DNR defines this as a younger forest category that includes mid-seral forest (non-late-successional or old growth) that has the structural characteristics necessary to provide roosting and foraging functions. This corresponds with spotted owl habitat Type C (defined under "Spotted owl habitat types.").

**Sub-mature habitat (east-side planning units)** - In the HCP, sub-mature habitat has the following characteristics: (1) forest community composed of at least 40 percent Douglas-fir or grand fir component; (2) canopy closure of at least 70 percent; (3) tree density of between 110-260 trees per acre; (4) tree height or vertical density with either (a) dominant and co-dominant trees at least 90 feet tall, and/or (b) two or more canopy layers, numerous intermediate trees, numerous low perches; (5) snags/cavity trees or mistletoe infection with either (a) three or more snags or cavity trees per acre that are greater than or equal to 20 inches dbh, and/or (b) a moderate to high infection of mistletoe; and (6) 5 percent ground cover of dead and down wood averaged over a stand.

**Sub-mature habitat (west-side planning units)** - In the HCP, sub-mature habitat has the following characteristics: (1) forest community dominated by conifers, or in mixed conifer/hardwood forest, the community is composed of at least 30 percent conifers (measured as stems per acre dominant, co-dominant, and intermediate trees); (2) at least 70 percent canopy closure; (3) tree density of between 115-280 trees per acre (all greater than 4 inches dbh); (4) height of dominant and co-dominant trees at least 85 feet tall; (5) at least three snags or cavity trees per acre that are at least 20 inches dbh; and (6) a minimum of 5 percent ground cover of large down woody debris.

**Sub-population** - A well-defined set of interacting individuals that comprise a proportion of a larger, interbreeding population.

**Succession** - A series of changes by which one group of organisms succeeds another group; a series of developmental stages in a plant community.

**Suitable habitat block, marbled murrelets** - In the HCP, a suitable habitat block is a contiguous forested area that is at least five acres in size, contains an average of at least two potential nesting platforms per acre, and is within 50 miles of marine waters.

**Suitable habitat, spotted owls** - Any forest type that meets some or all of the life needs of the spotted owl including nesting (breeding), roosting (resting), and foraging (feeding). See also "Spotted owl habitat types."

**Suitable site, spotted owls** - As defined in the HCP OESF owl habitat model, a site in which the quality and quantity of habitat within it, or within it and its adjacent sites, is adequate to support a nesting pair of spotted owls; also called a territory.

**Take** - A prohibited action under federal law, except where authorized. To harass, harm, pursue, hunt, wound, kill, trap, capture, or collect a federally listed threatened or endangered species, or to attempt to do so. Take may include disturbance of the listed species, nest, or habitat, when disturbance is extensive enough to disrupt normal behavioral patterns for the species, although the affected individuals may not actually die. See also "Harm" and "Incidental take."

**Talus** - A homogeneous area of rock rubble, ranging in average size from 1 inch to 6.5 feet, derived from and lying at the base of a cliff or very steep, rocky slope.

**Target conditions** - Achieving ecological recovery and population restoration of a listed species; target conditions are often defined in federally-mandated recovery plans for a given species.

**Taxon** - A category in the biological system of arranging plants and animals in related groups, such as class, family, or phylum.

**Territorial single** - See "Resident single."

**Territorial spotted owl site centers** - Sites classified as either status 1, status 2, or status 3 by the Washington Department of Fish and Wildlife. See "Status 1 through 5, spotted owl site centers."

**Territory, spotted owls** - See "Suitable site, spotted owls."

**Threatened species** - A federal and state designation. Species likely to become an endangered species throughout all or a significant portion of their range within the foreseeable future.

**Threatened and endangered species** - Formal classifications of species. Federal designations are made by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. State of Washington designations are made by the Washington Fish and Wildlife Commission (RCW 77.08.010). See also "Candidate species," "Endangered species," "Proposed threatened or endangered species," "Sensitive species," and "Threatened species."

**Trust** - In law, a fiduciary relationship in which one person (the trustee) holds the title to property or manages it for the benefit of another (the beneficiary).

**Trust lands** - Those lands held in trust and managed by the Washington Department of Natural Resources for the benefit of the trust beneficiaries.

**Turbidity** - The relative clarity of water, which may be affected by material in suspension in the water.

**Type A and B Wetlands** - See "Wetland typing system."

**Type 1 through 5 Waters** - See "Water typing system."

**Type 9 Water** - Untyped water; classification used in DNR's GIS database. In some analyses within this DEIS, untyped waters are treated as Type 5 Waters.

**Types A, B, and C habitat types** - See "Spotted owl habitat types."

**Uncommon habitats** - A category of forested and nonforested habitats including cliffs, caves, talus slopes, oak woodlands, and very large, old trees. A habitat description for DNR-managed lands (used in DEIS Section 4.5.4).

**Underburning** - Prescribed burning of the forest floor or understory for botanical or wildlife habitat objectives, hazard reduction, or silvicultural objectives.

**Understory canopy** - Forest undergrowth; the lowest canopy layer of trees and woody species. See also "Canopy" and "Overstory canopy."

**Understory reinitiation** - The third stage of forest growth, with undergrowth development and some tree regeneration. The other three stages are stand initiation, stem exclusion, and old growth. (Classification system from Oliver 1981.)

**Uneven-aged** - Forests composed of trees that differ markedly in age; may be a result of partial cutting practices.

**U.S. Fish and Wildlife Service (USFWS)** - The federal agency that is the listing authority for species other than marine mammals and anadromous fish under the federal Endangered Species Act.

**Unlisted species agreement** - A request by DNR to USFWS and NMFS that species other than the northern spotted owl and marbled murrelet be included in the incidental take permit; part of DNR's HCP application. These include: (1) other upland species listed by the federal government as endangered or threatened within the range of the northern spotted owl; and (2) other species of concern, such as certain salmonids and candidate species. The purpose is to provide assurances to DNR that no additional land restrictions or financial compensation will be required from DNR for species adequately covered by an HCP in light of unforseen or extraordinary circumstances.

**Unzoned forest** - A forest without areas deferred from timber management.

**Validation monitoring** - Monitoring done to evaluate the cause-and-effect relationships between habitat conditions resulting from the HCP conservation strategies and the animal populations these strategies are intended to benefit.

**Vegetative zones** - Broad areas that have similar types of vegetation. Zones within the HCP area include the Sitka spruce zone, the western hemlock zone, the Pacific silver fir zone, the subalpine fir/mountain hemlock zone, the alpine zone, the grand fir zone, the Douglas-fir zone, and the ponderosa pine zone (based on Franklin and Dyrness 1973).

**Viability analysis** - See "Population viability analysis."

**Viable population** - A population that is of sufficient size and distribution to be able to persist for a long period of time in the face of demographic variations, random events that influence the genetic composition of the population, and fluctuations in environmental conditions, including catastrophic events.

**Washington Administrative Code (WAC)** - All current, permanent rules of each state agency, adopted pursuant to chapter 34.05 RCW.

**Washington Board of Natural Resources** - See "Board of Natural Resources."

**Washington Forest Practices Act** - See "Forest Practices Act."

**Washington Forest Practices Board** - See "Forest Practices Board."

**Washington Fish and Wildlife Commission** - The state commission with statutory authority to list threatened, endangered, and sensitive wildlife species.

**Water quality classifications** - Washington State Department of Ecology water quality criteria standards; specifications are given in WAC 173-201-045. Class AA water is "extraordinary," Class A water is "excellent," Class B water is "good," and so on.

**Water resource inventory area (WRIA)** - Watershed-based planning unit, defined by the Washington State Department of Ecology. WRIAs are determined by drainages to common water bodies.

**Water typing system** - A simplified explanation of Washington's classifications of water types appears here. For the complete classification system, see WAC 222-16-030.

Type 1: All waters, within their ordinary high-water mark, as inventoried as "shorelines of the state."

Type 2: Segments of natural waters which are not Type 1 and have a high use and are important from a water quality standpoint for domestic water supplies; public recreation; fish spawning, rearing, or migration or wildlife use; are highly significant to protect water quality.

Type 3: Segments of natural waters which are not Type 1 or 2 and are moderately important from a water quality standpoint for: domestic use; public recreation; fish spawning, rearing, or migration or wildlife uses; or have moderate value to protect water quality.

Type 4: Segments of natural waters which are not Type 1, 2, or 3, and for the purpose of protecting water quality downstream are classified as Type 4 Water upstream until the channel width becomes less than two feet in width between the ordinary high-water marks. These may be perennial or intermittent.

Type 5: Natural waters which are not Type 1, 2, 3, or 4; including streams with or without well-defined channels, areas of perennial or intermittent seepage, ponds, natural sinks and drainage ways having short periods of spring or storm runoff.

**Watershed** - The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake.

**Watershed administrative unit (WAU)** - In Washington State, the basic hydrologic unit used for watershed analysis. See WAC 222-22-020 for more information.

**Watershed Administrative Unit (MM-WAU) Approach** - One of two proposed marbled murrelet rule alternatives under consideration by the Washington Forest Practices Board. The other alternative is the Occupied Stand Approach.

**Watershed analysis** - A systematic procedure for characterizing watershed and ecological processes to meet specific management objectives; provides a basis for resource management planning. In Washington, the assessment of a watershed administrative unit completed under Washington State law.

**Wetland** - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, such as swamps, bogs, fens, and similar areas.

**Wetland management zone (WMZ)** - Zones within in Type A and Type B Wetlands, measured horizontally from the wetland edge or the point where the nonforested wetland becomes a forested wetland; WMZs have variable widths based on the size of the wetland and wetland type. WMZ widths are specified in WAC 222-30-020.

**Wetland typing system** - A simplified explanation of Washington's classifications of wetland types appears here. For the complete classification system, see WAC 222-16-035.

Nonforested wetland - Any wetland or portion thereof that has, or if the trees were mature would have, a crown closure of less than 30 percent. There are two types of nonforested wetlands: Type A and Type B. A Type A Wetland is: (1) greater than 0.5 acre in size; (2) associated with at least 0.5 acre of ponded or standing open water; or (3) are bogs and fens greater than 0.25 acre. A Type B Wetland classification is all other nonforested wetlands greater than 0.25 acre.

Forested wetland - Any wetland or portion thereof that has, or if the trees were mature would have, a crown closure of 30 percent or more.

**Wildlife Code of Washington** - Title 77 RCW (Revised Code of Washington).

**Wildlife trees** - Wildlife trees include large live trees, snags, cavities, and down logs that provide forest-habitat structures for wildlife.

**Wind buffer** - As defined for the HCP's west-side planning units, the outer buffer of the riparian management zone that maintains the ecological integrity of the riparian buffer by reducing windthrow.

**Windthrow** - Trees blown down by wind; also called blowdown.

**Yarding** - Transporting logs from the point of felling to a collecting point or landing.

**Young forest** - A forest that is 40-80 years old.

**Young forest habitat, marbled murrelets** - See "Habitat classes, marbled murrelets."

**Young-forest marginal habitat** - As defined by the Washington Forest Practices Board Spotted Owl Advisory Group, younger forest that provides some of the characteristics spotted owls need for roosting, foraging, and dispersal. This habitat type corresponds to the low to mid-range of the former Type C designation (see "Spotted owl habitat types.").

**Zoned forest** - A forest with special management areas, or zones, set aside for habitat protection.

**Zones** - See "Marbled murrelet conservation zones," "Marbled murrelet zone 1," "Marbled murrelet zone 2," and "Owl zones."

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# References

**ACRONYMS USED IN TEXT:**
DNR = Washington Department of Natural Resources
FEMAT = Forest Ecosystem Management Assessment Team
USDA = U.S. Department of Agriculture
USDI = U.S. Department of the Interior
WDF = Washington Department of Fisheries
WDFW = Washington Department of Fish and Wildlife
WDW = Washington Department of Wildlife
WFPB = Washington Forest Practices Board


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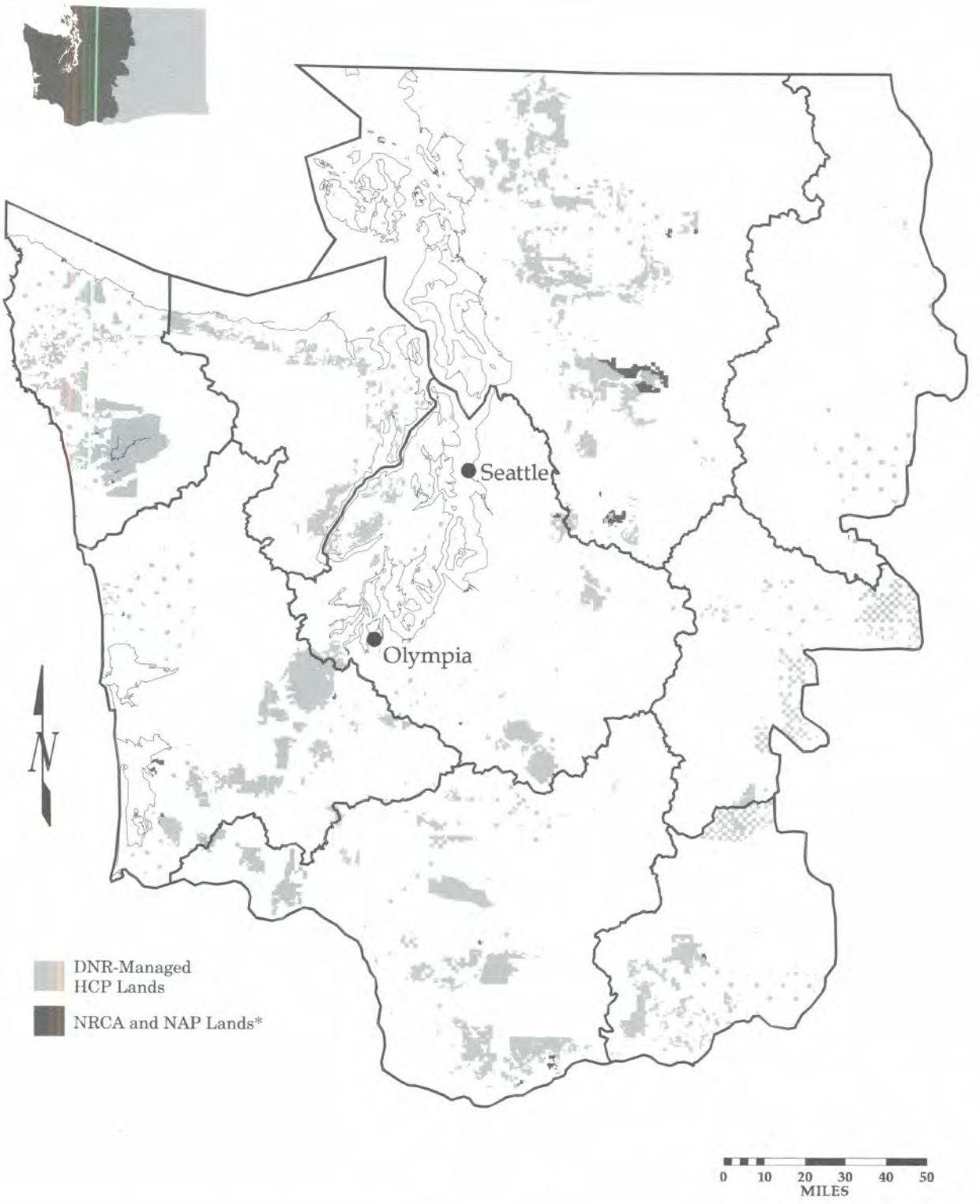
# Maps

# Map 1: HCP Planning Area with Unit Boundaries

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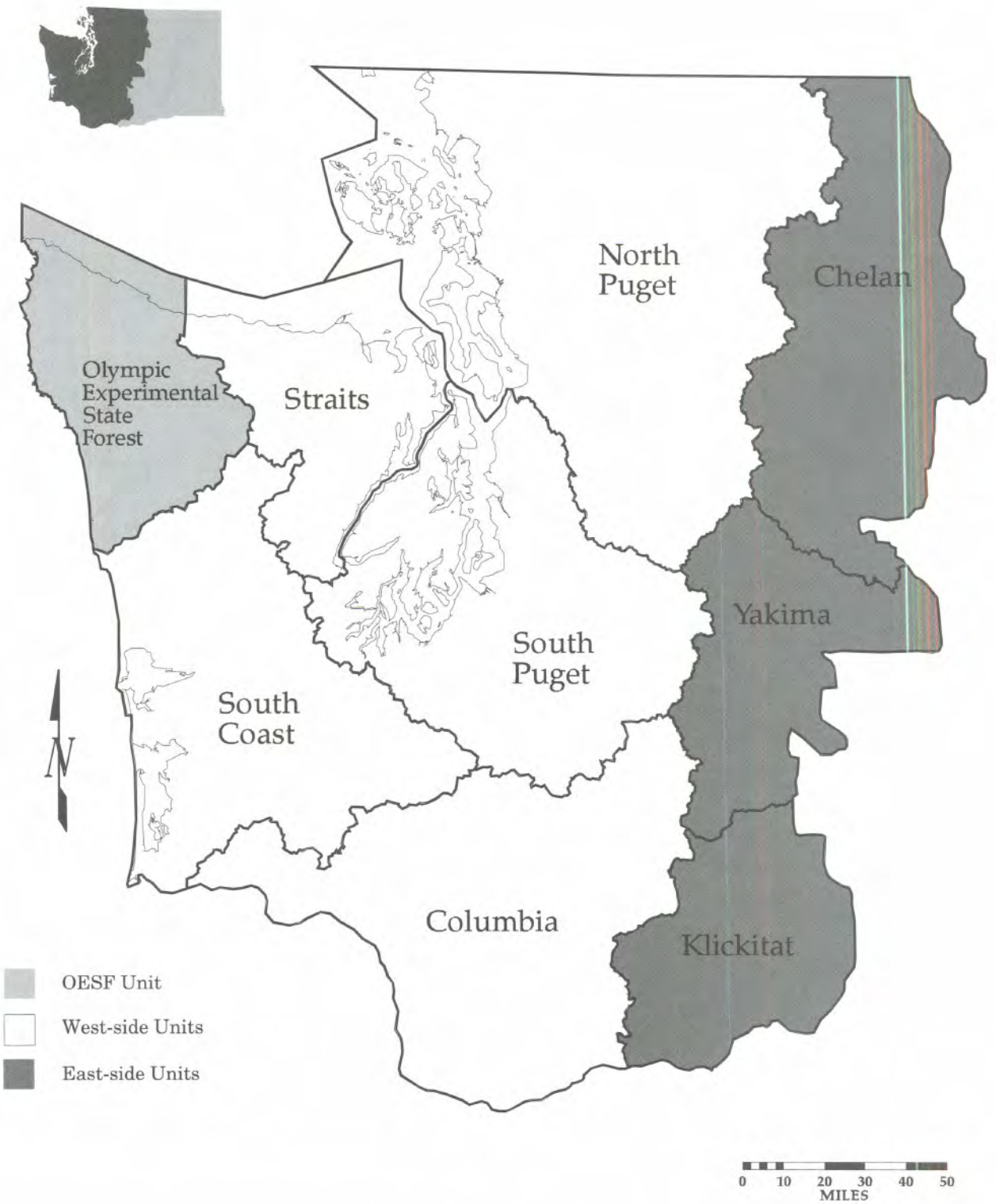
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves

## Map 2: HCP Planning Units

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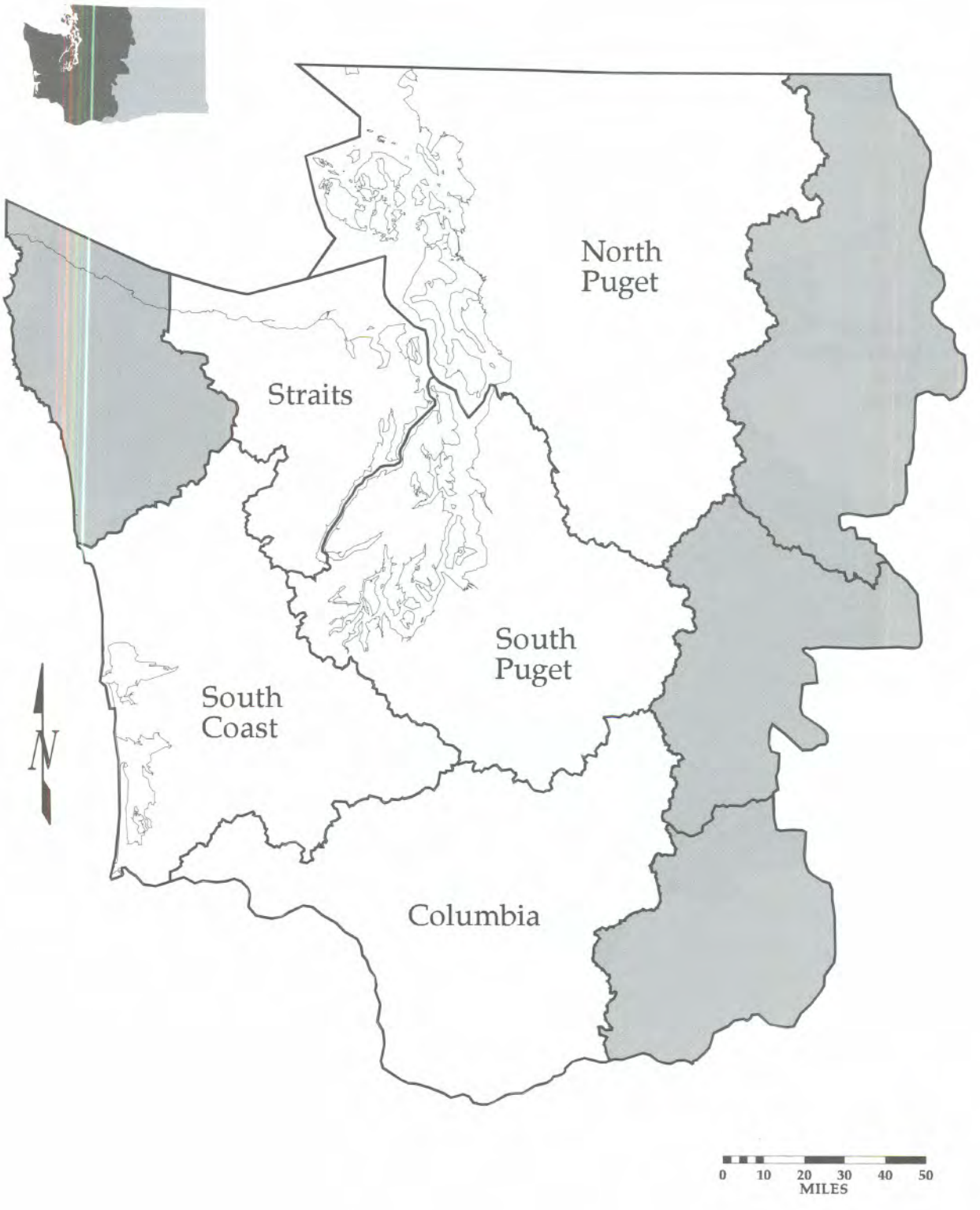
## Map 3: Five West-Side Planning Units

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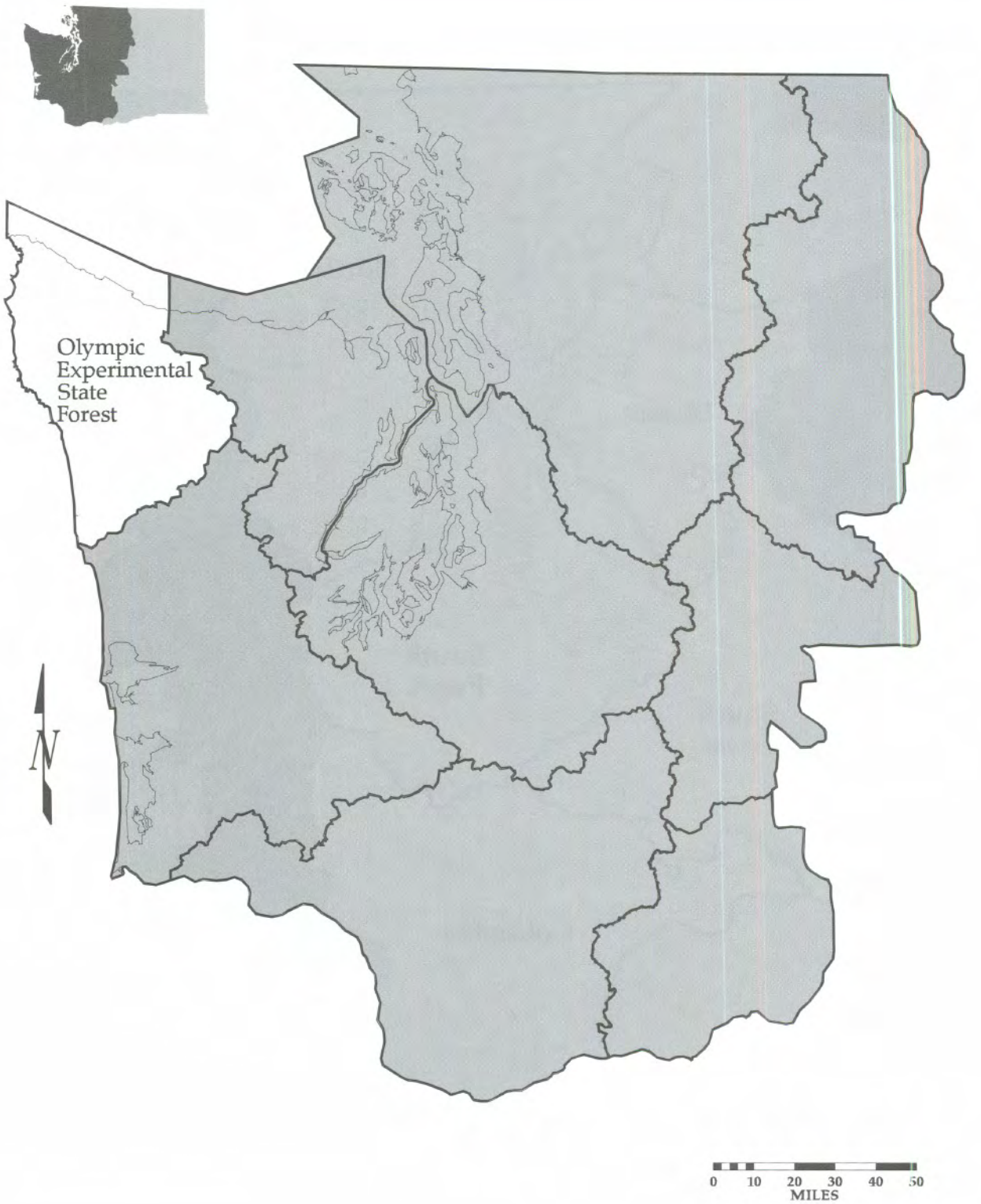
# Map 4: Olympic Experimental State Forest Planning Unit

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## Map 5: Three East - Side Planning Units


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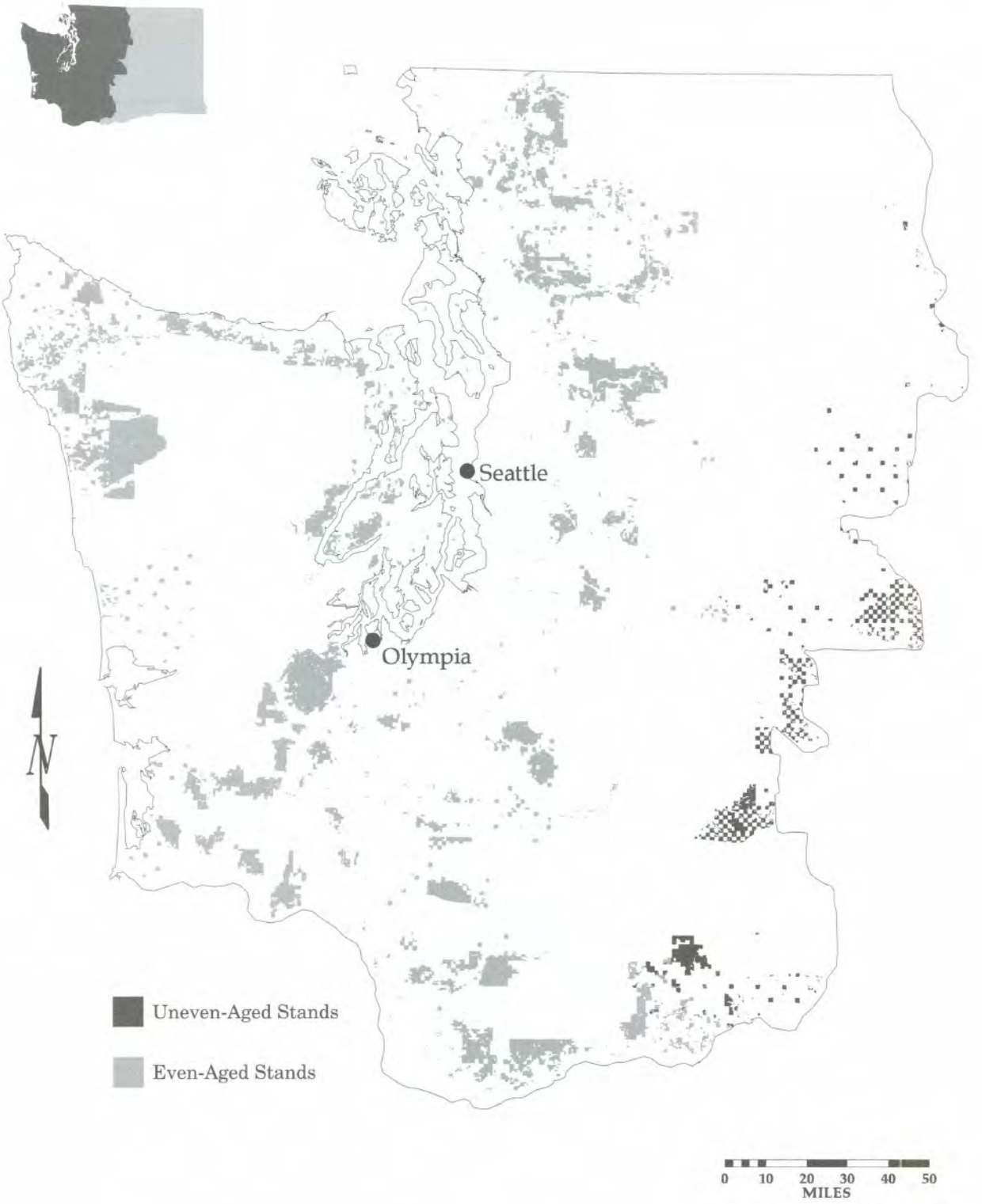
# Map 6: Location of Uneven-Aged and Even-Aged Stands on DNR-Managed Lands Covered by the HCP

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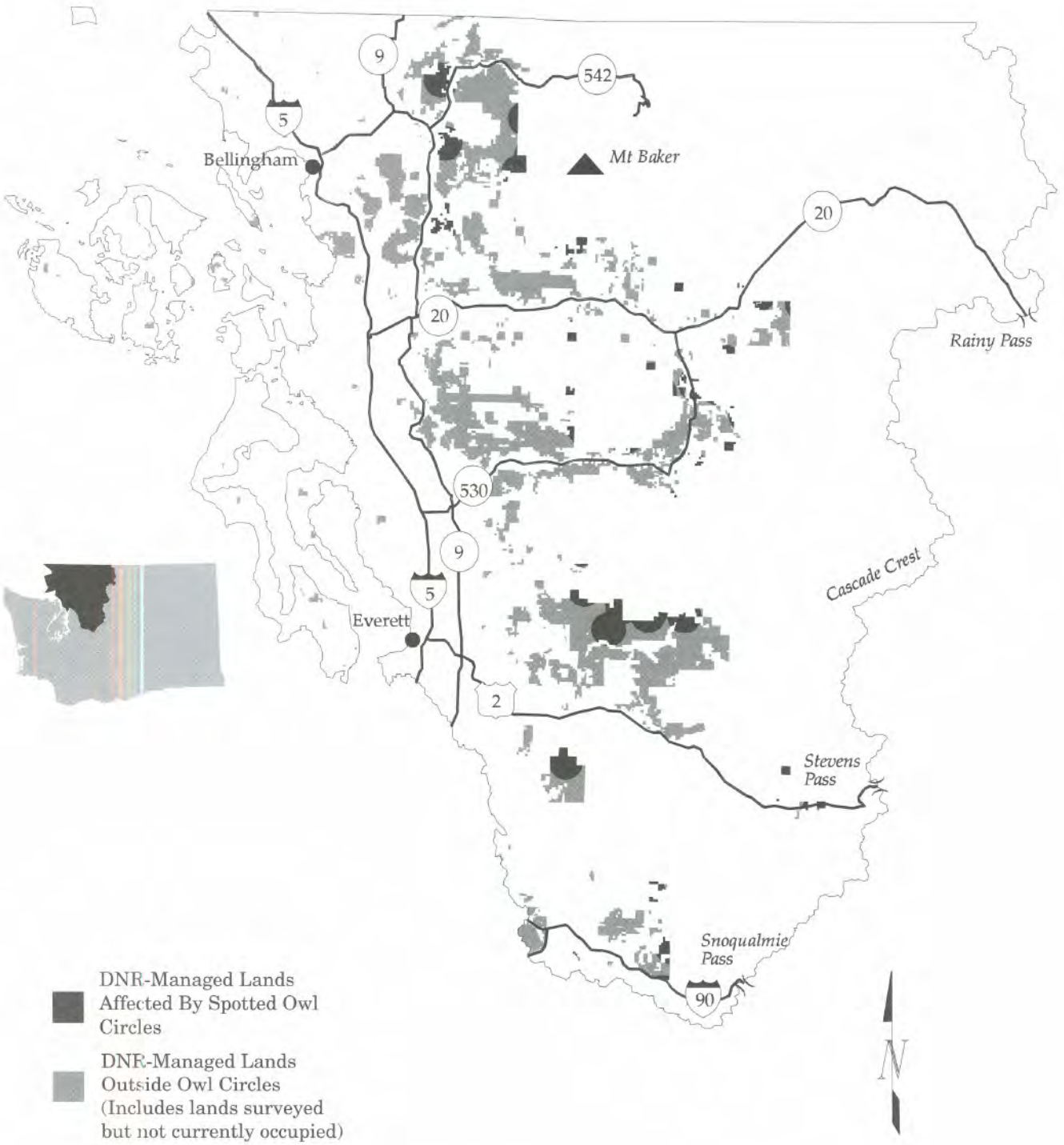
# Map 7: Spotted Owl Conservation under Alternative A within the North Puget Planning Unit

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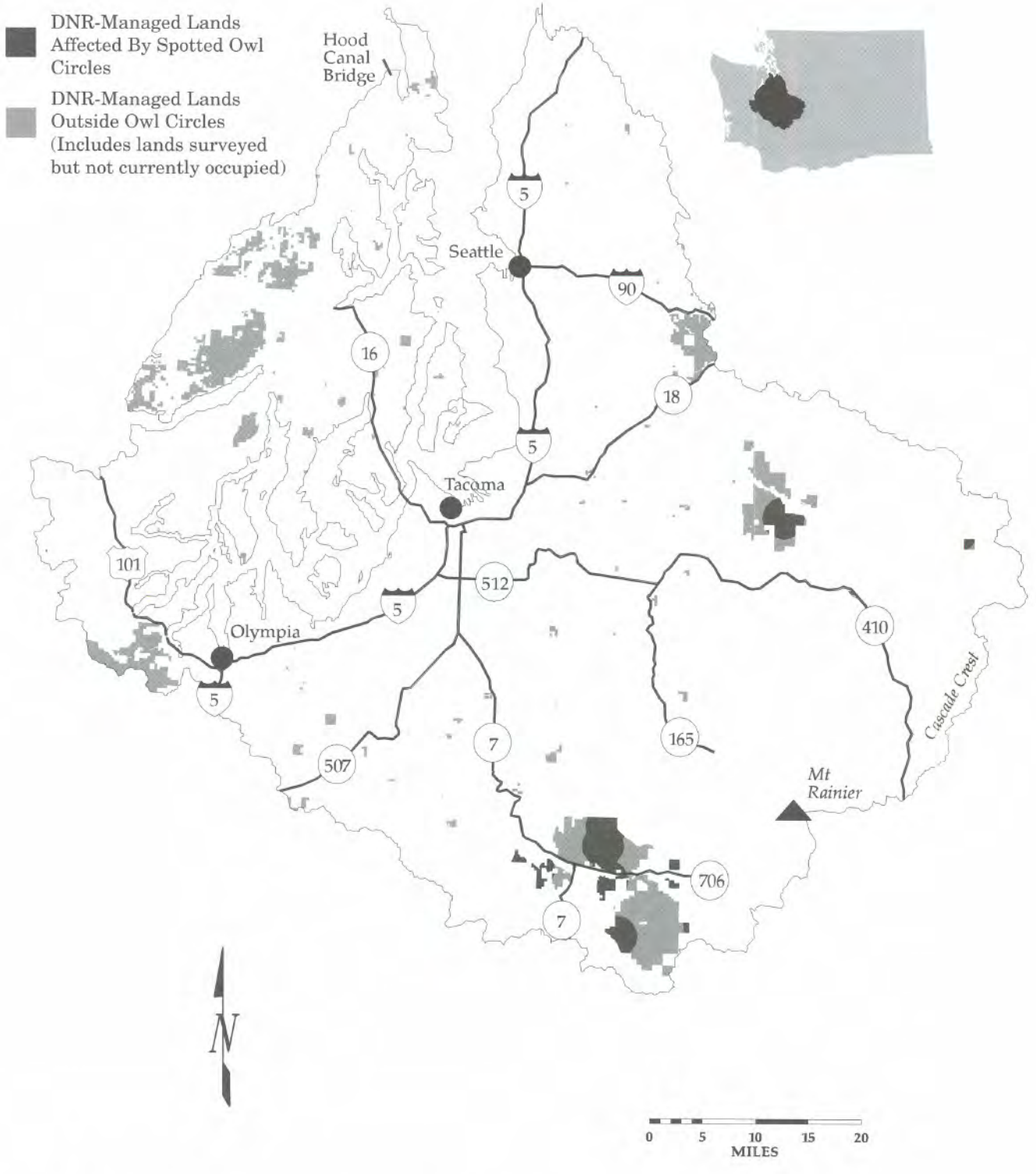
# Map 8: Spotted Owl Conservation under Alternative A within the South Puget Planning Unit

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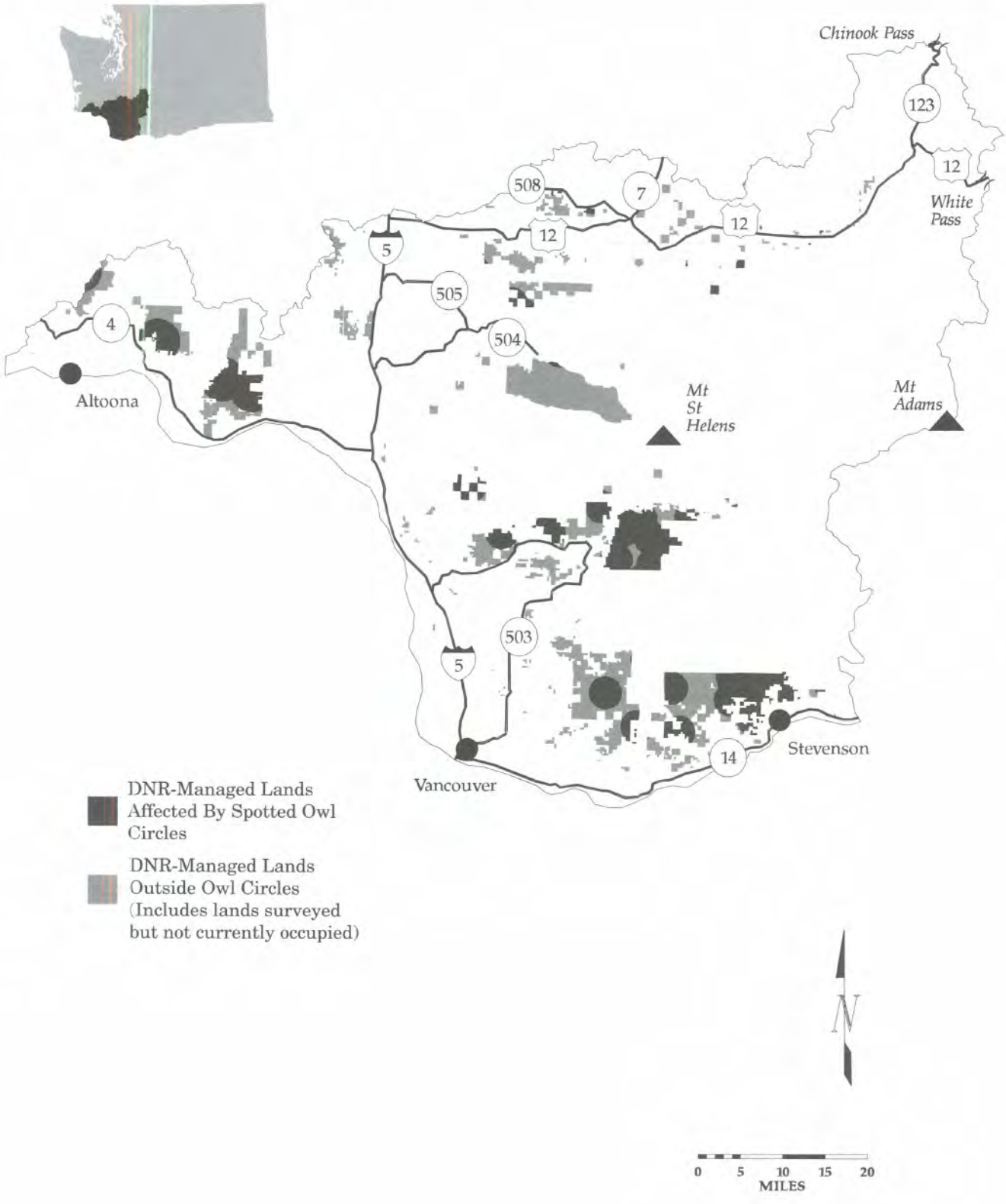
# Map 9: Spotted Owl Conservation under Alternative A within the Columbia Planning Unit

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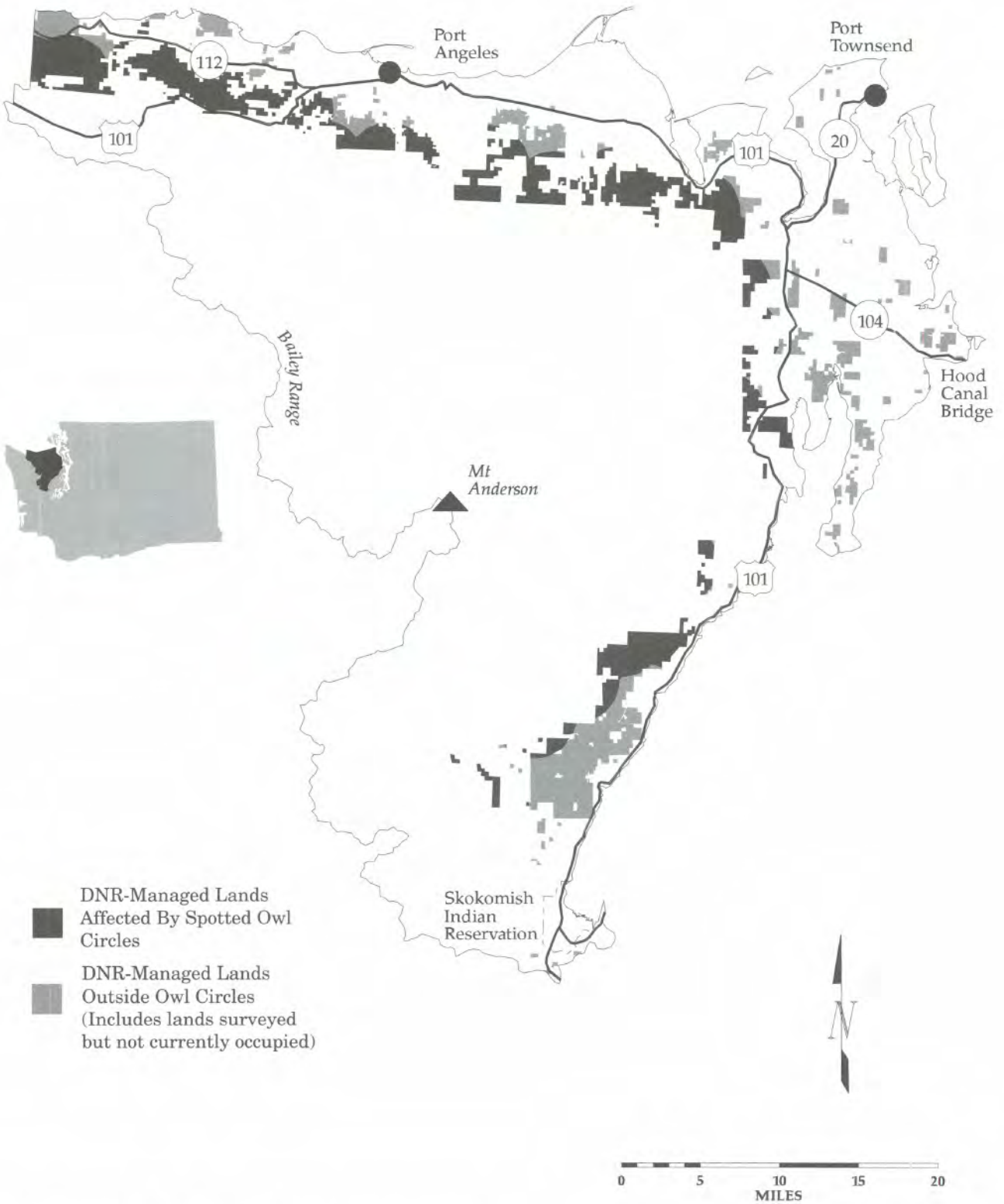
# Map 10: Spotted Owl Conservation under Alternative A within the Straits Planning Unit

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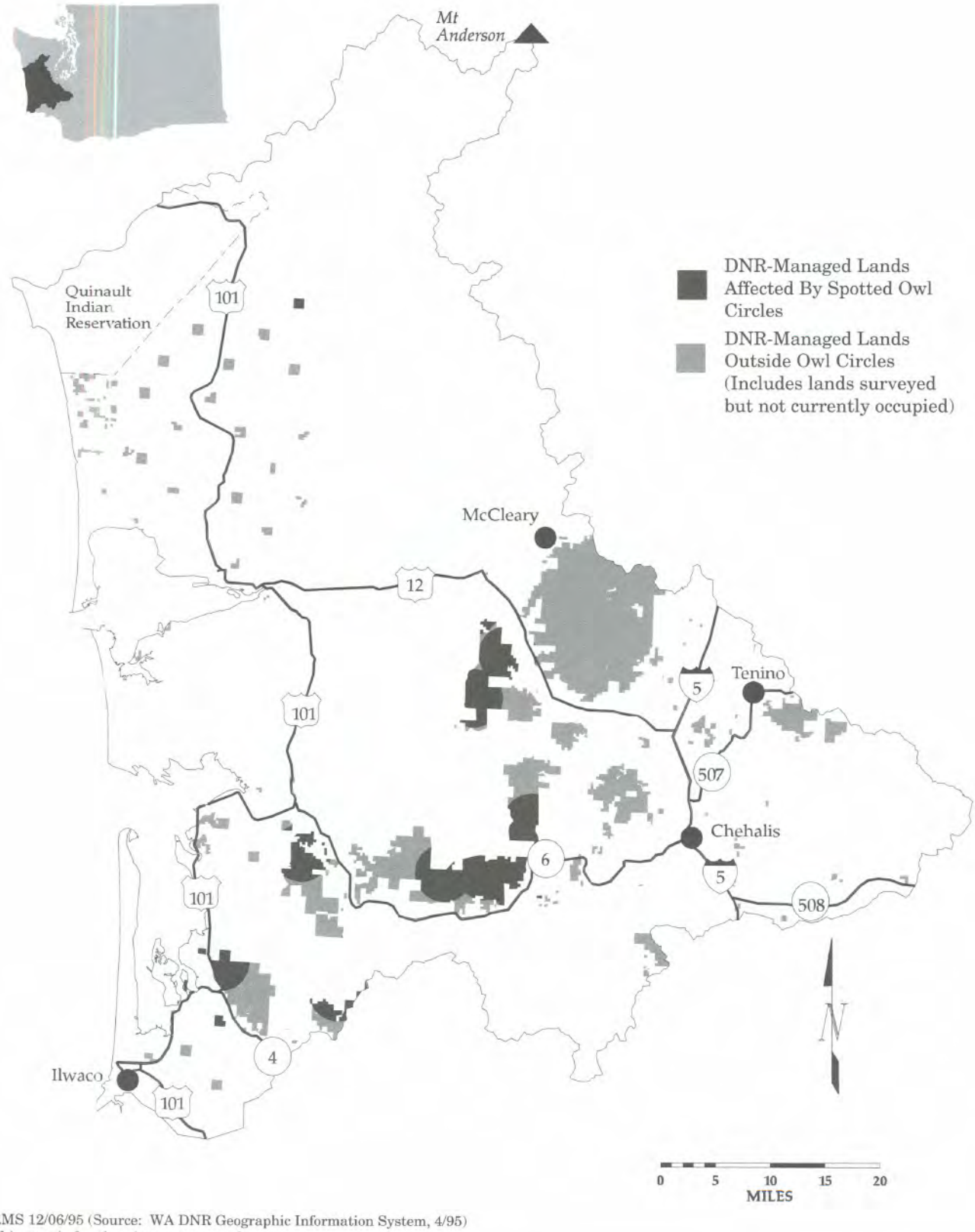
# Map 11: Spotted Owl Conservation under Alternative A within the South Coast Planning Unit

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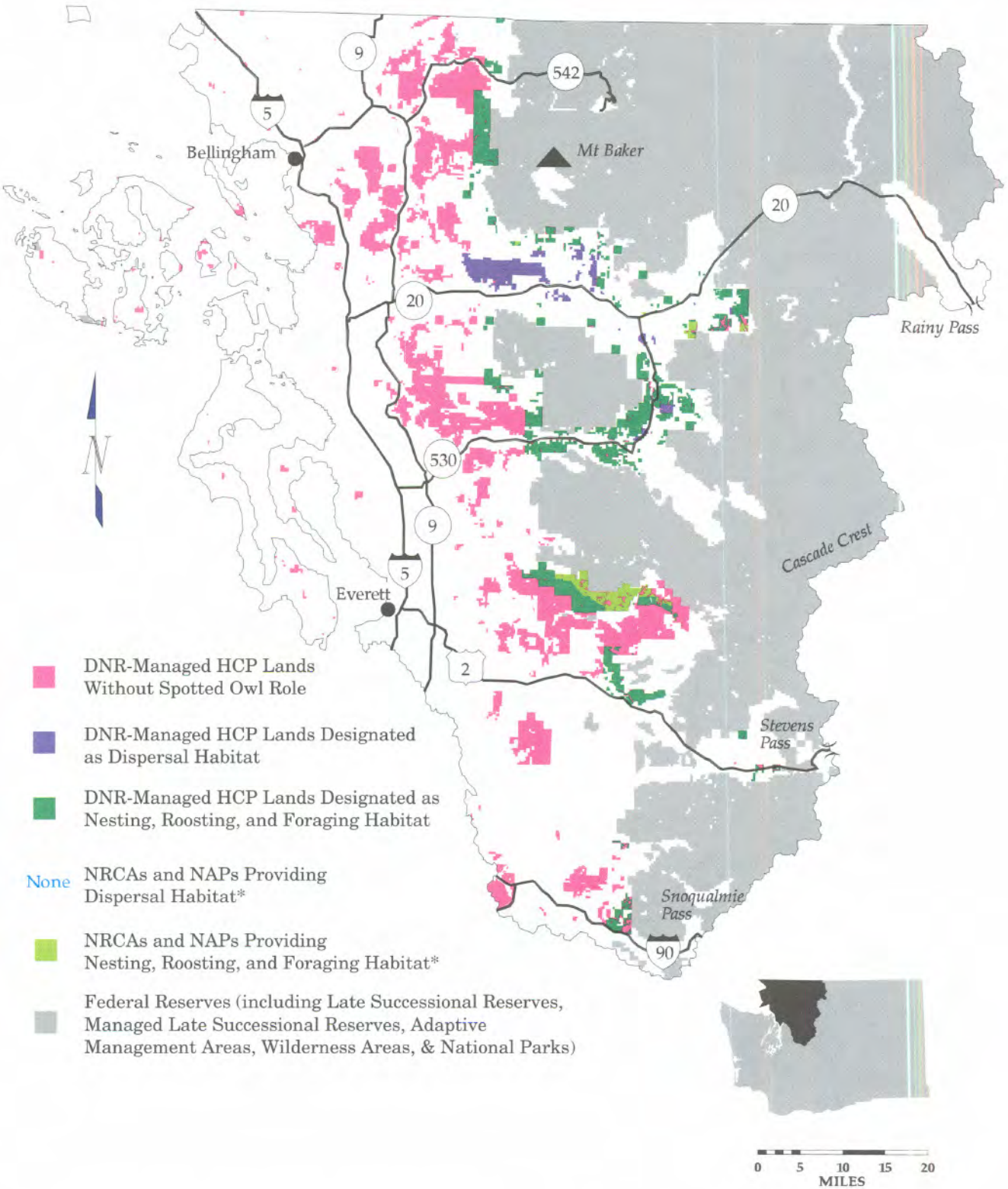
# Map 12: Spotted Owl Conservation under Alternative B within the North Puget Planning Unit

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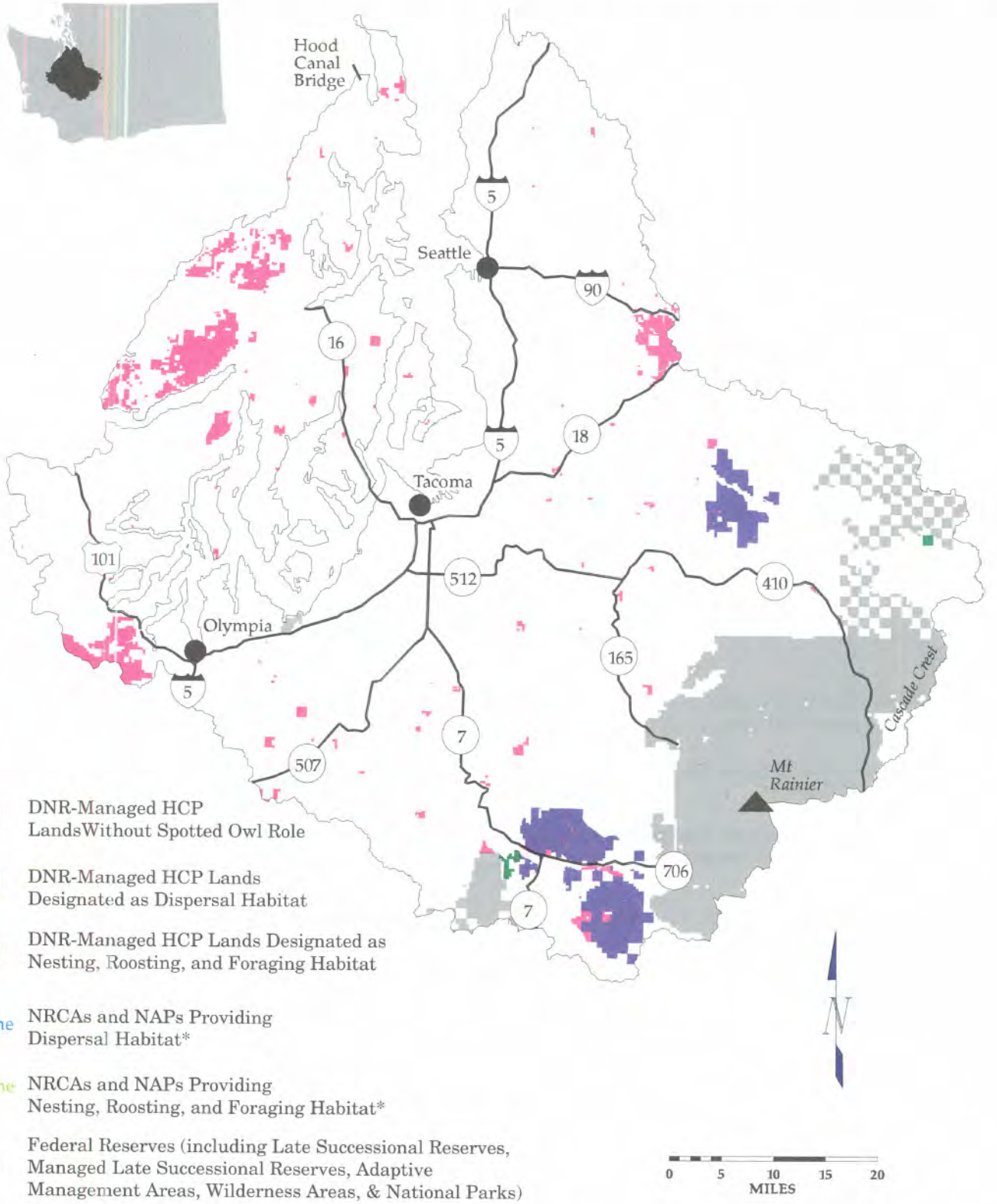
*Natural Resource Conservation Areas and Natural Area Preserves

# Map 13: Spotted Owl Conservation under Alternative B within the South Puget Planning Unit

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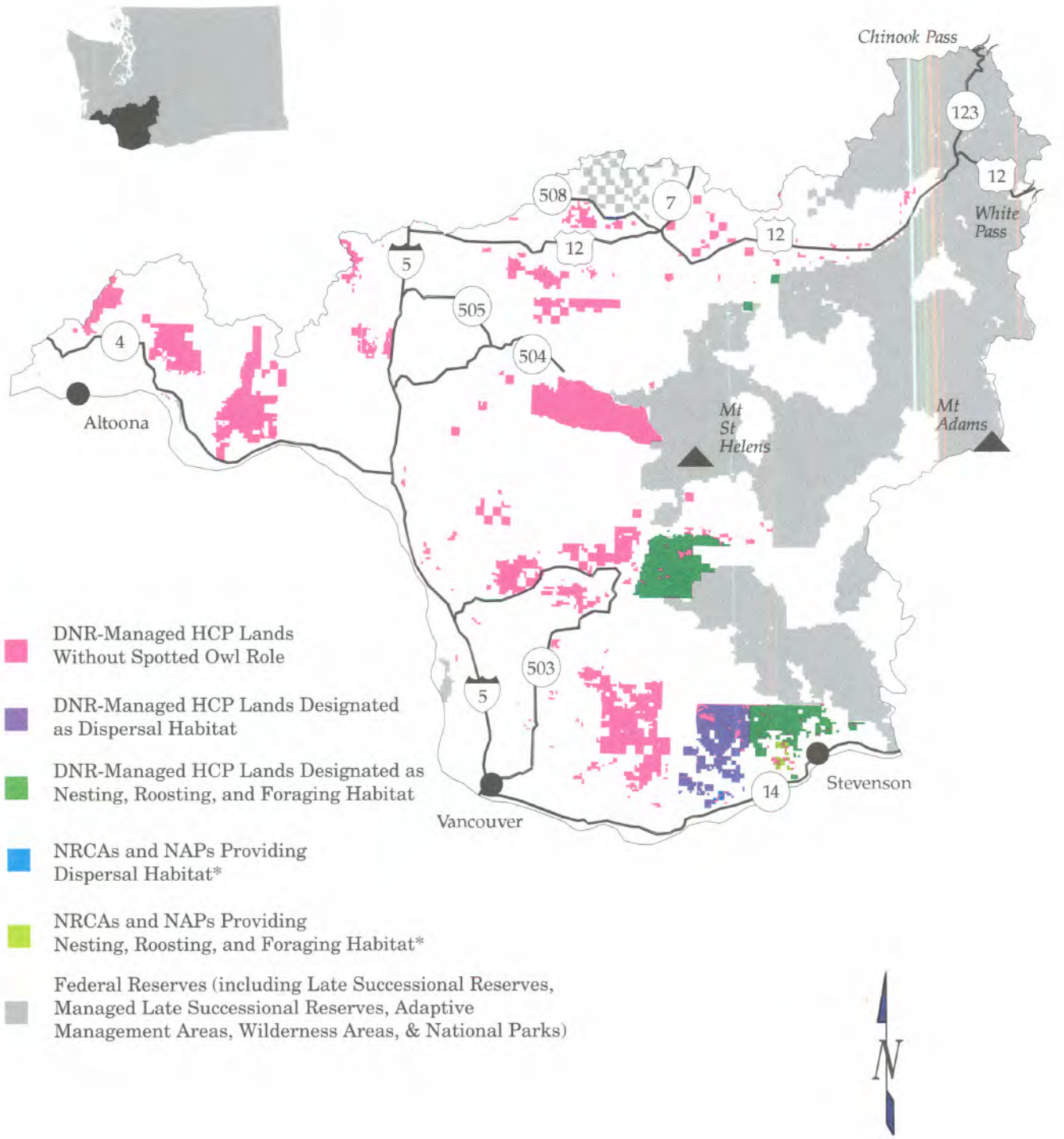
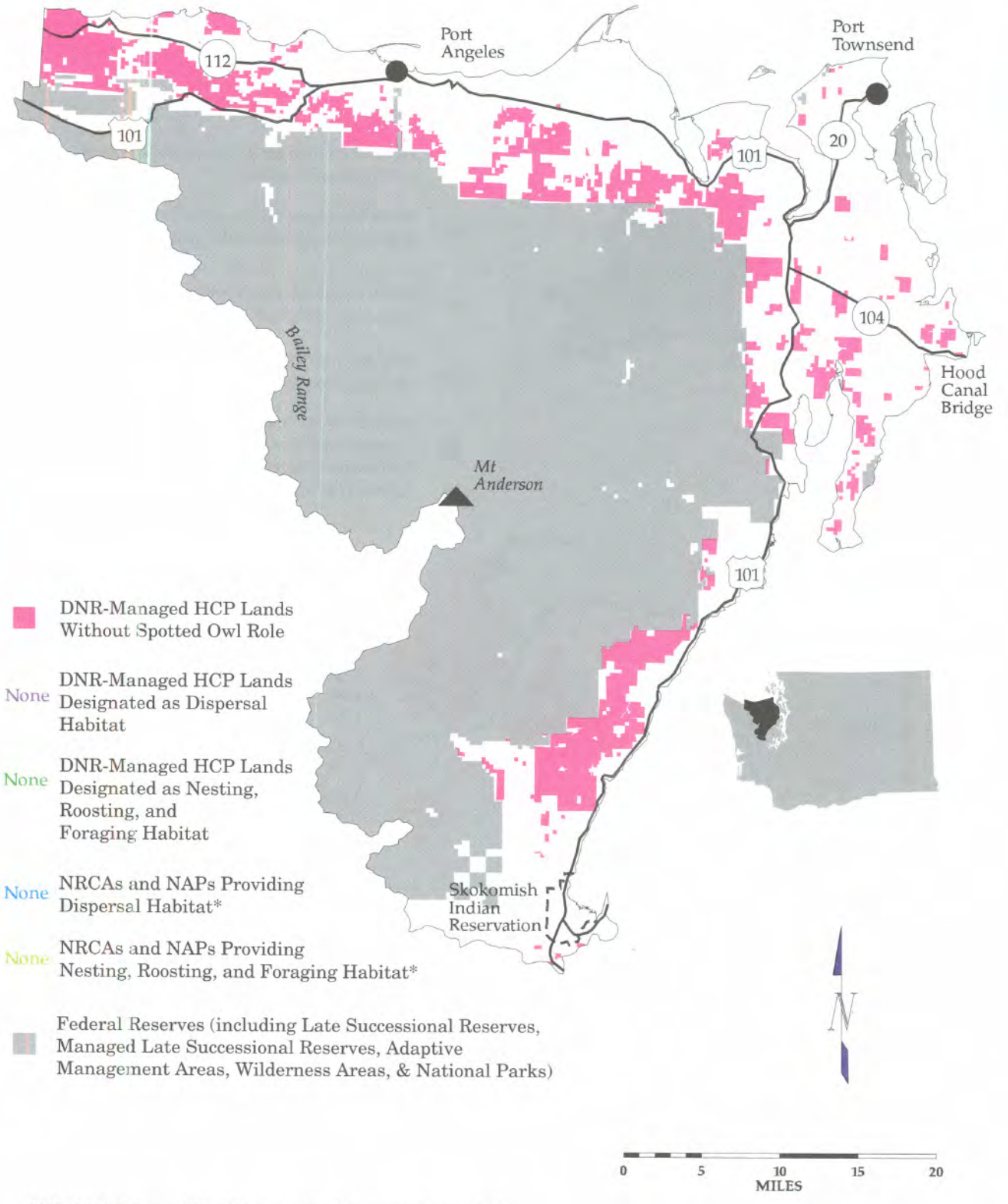
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves

# Map 14: Spotted Owl Conservation under Alternative B within the Columbia Planning Unit



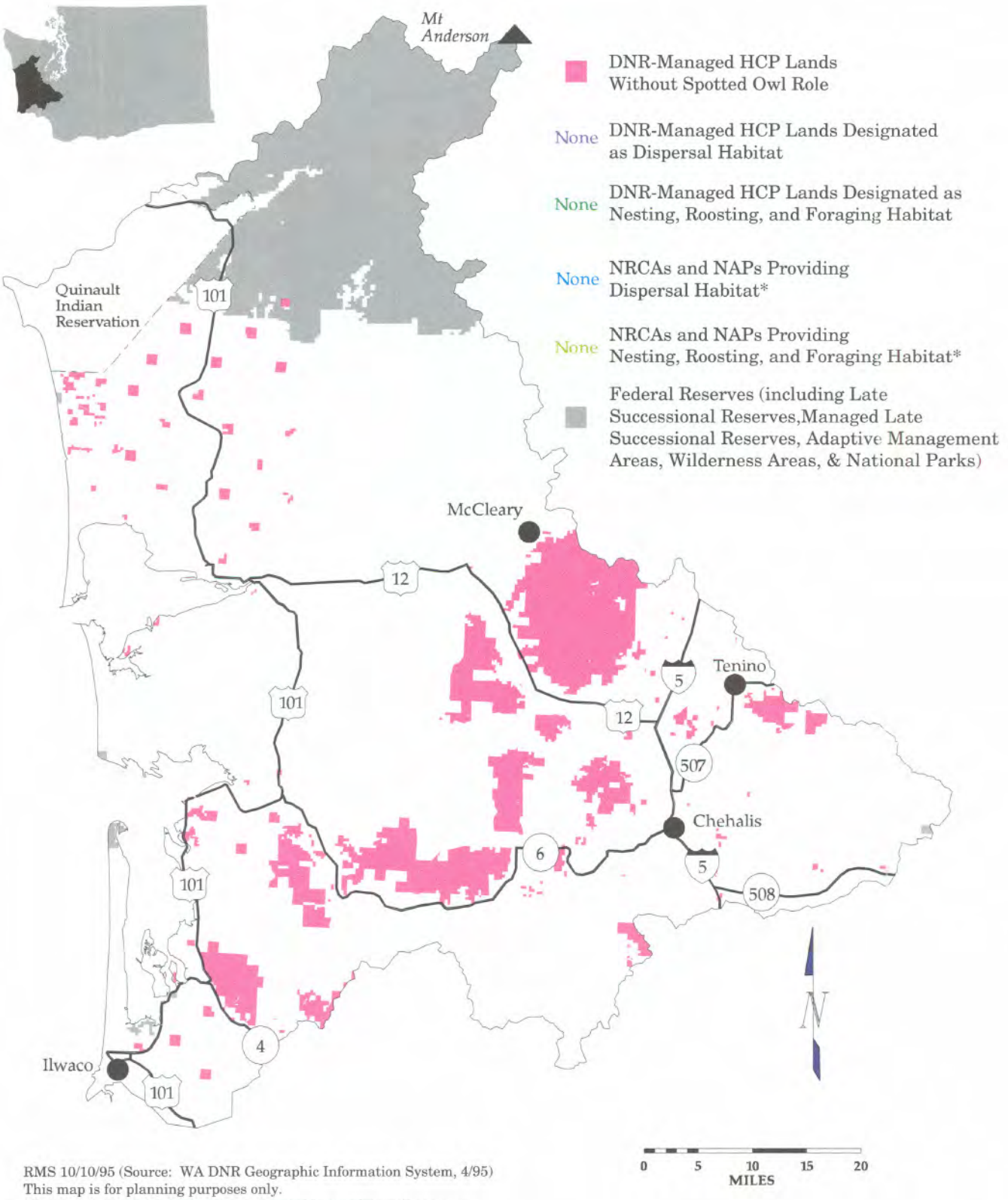

RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves

# Map 15: Spotted Owl Conservation under Alternative B within the Straits Planning Unit



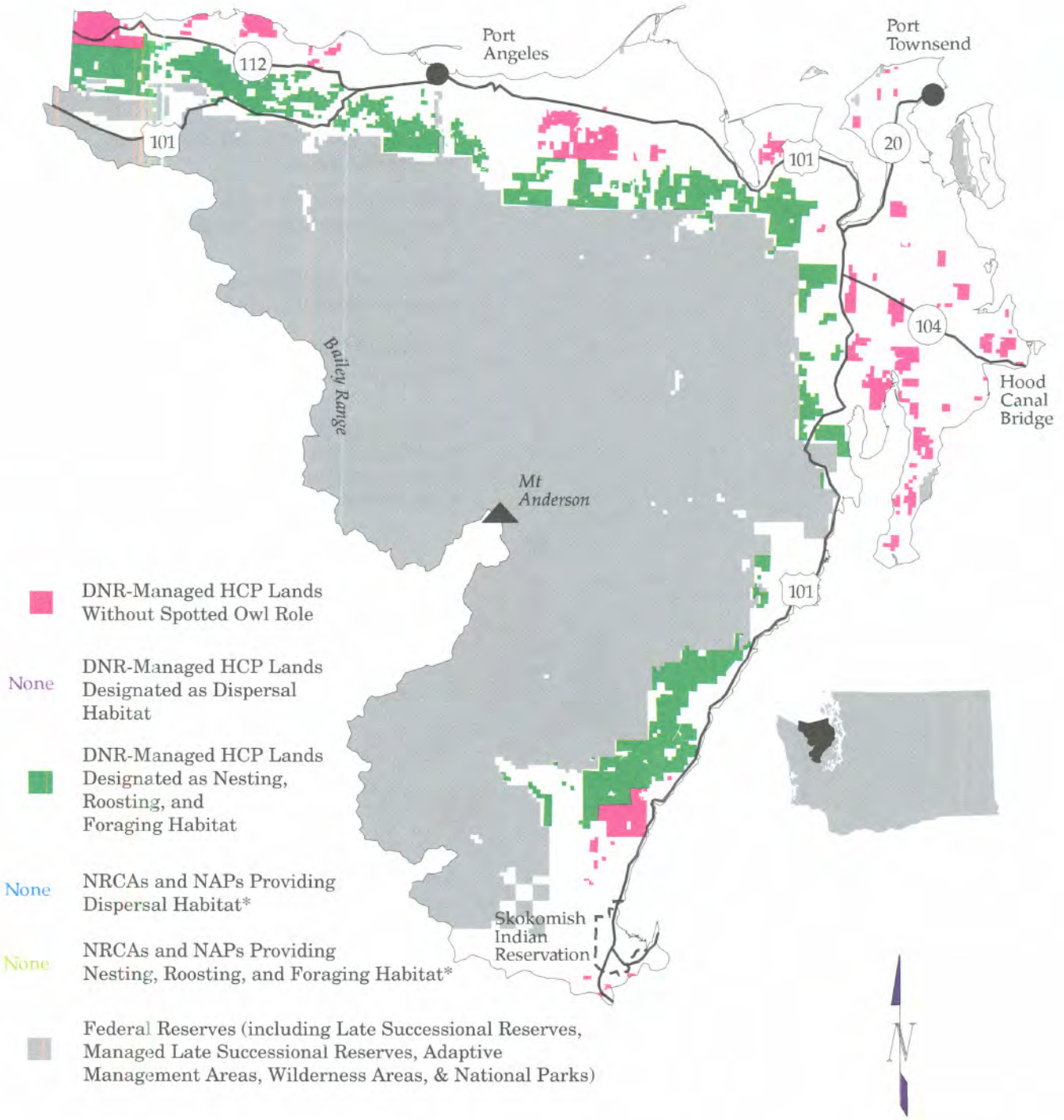

RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves

# Map 16: Spotted Owl Conservation under Alternative B within the South Coast Planning Unit



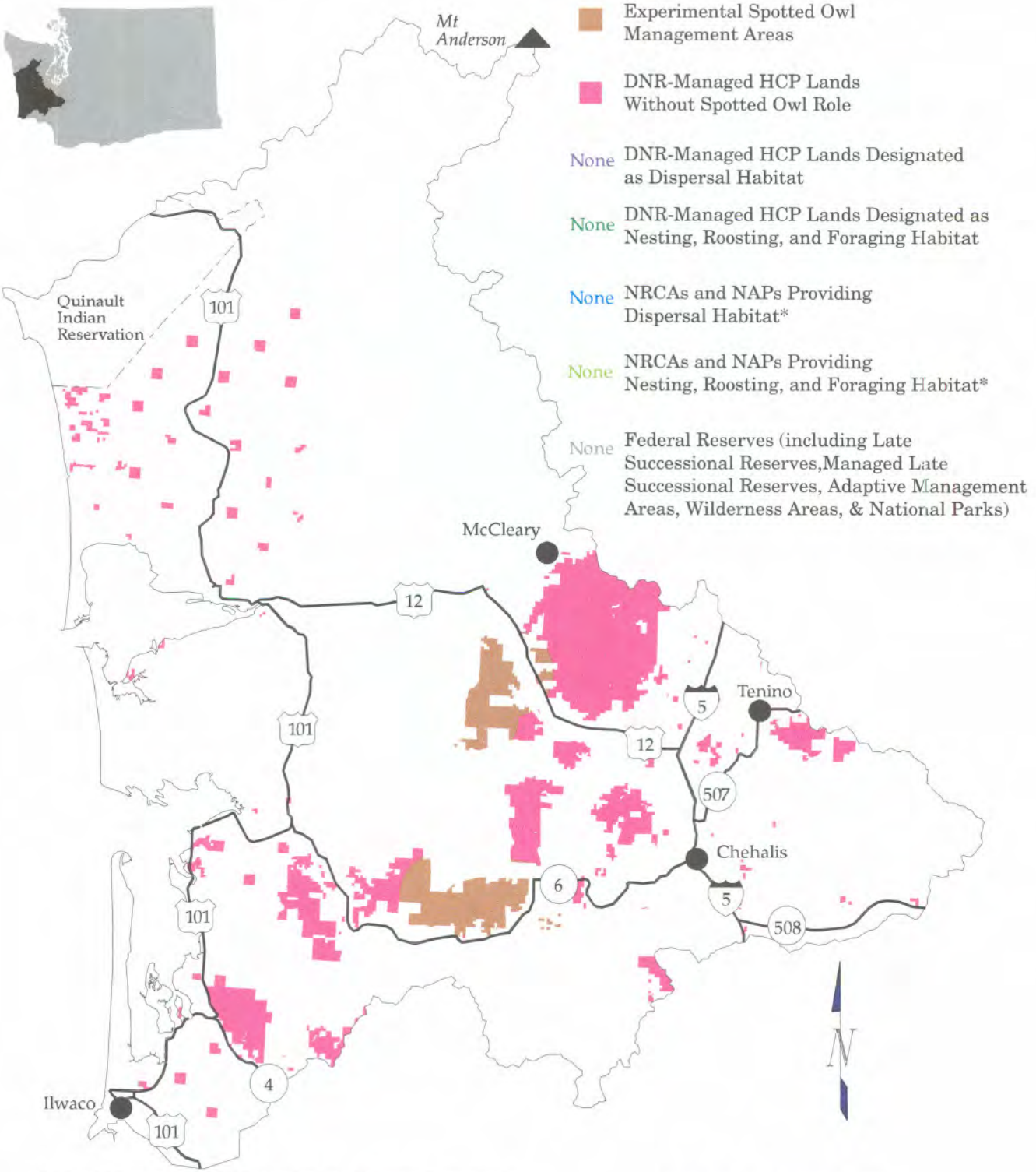

RMS 10/10/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves:

# Map 17: Spotted Owl Conservation under Alternative C within the Straits Planning Unit



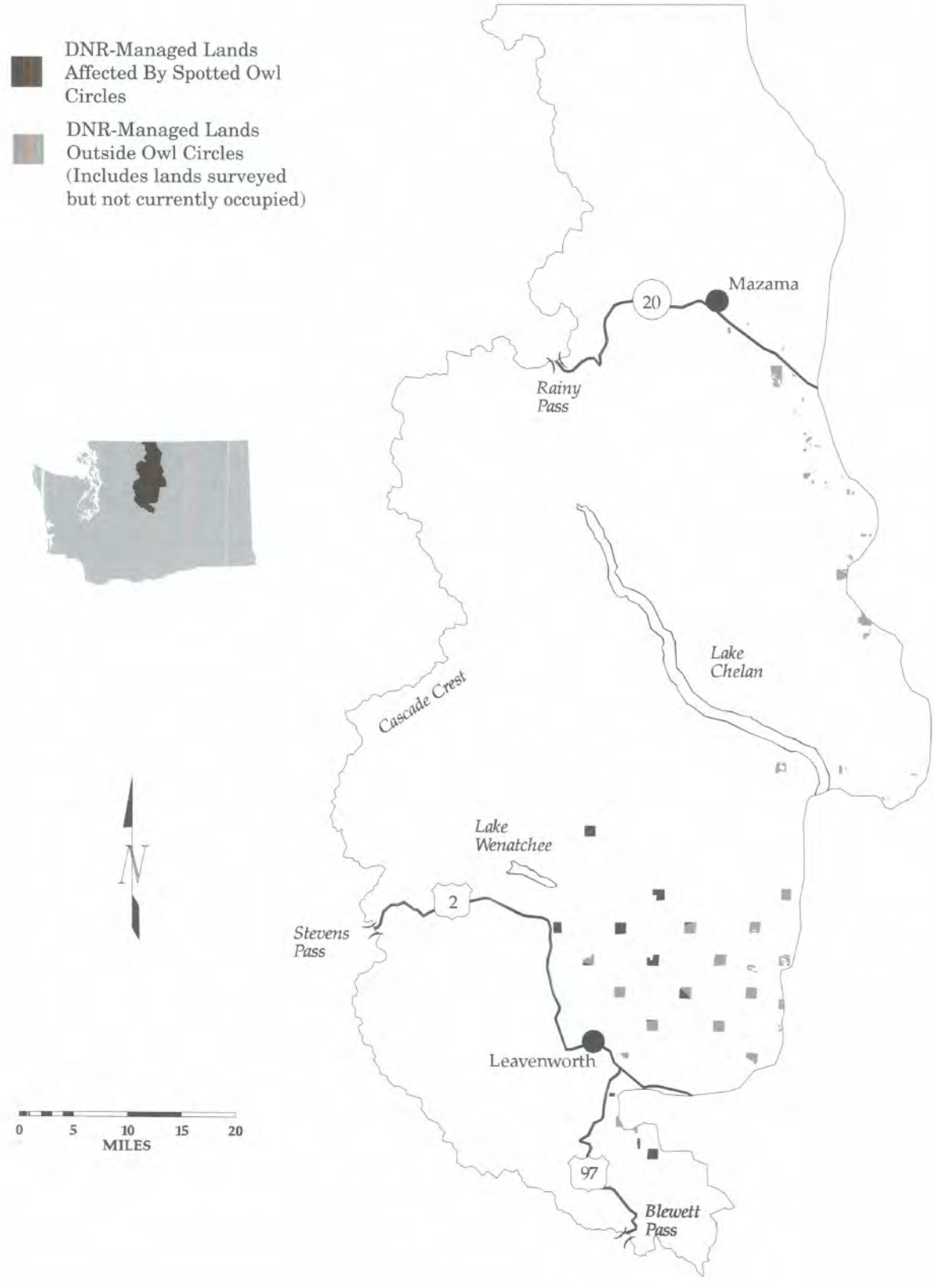

RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves

# Map 18: Spotted Owl Conservation under Alternative C within the South Coast Planning Unit



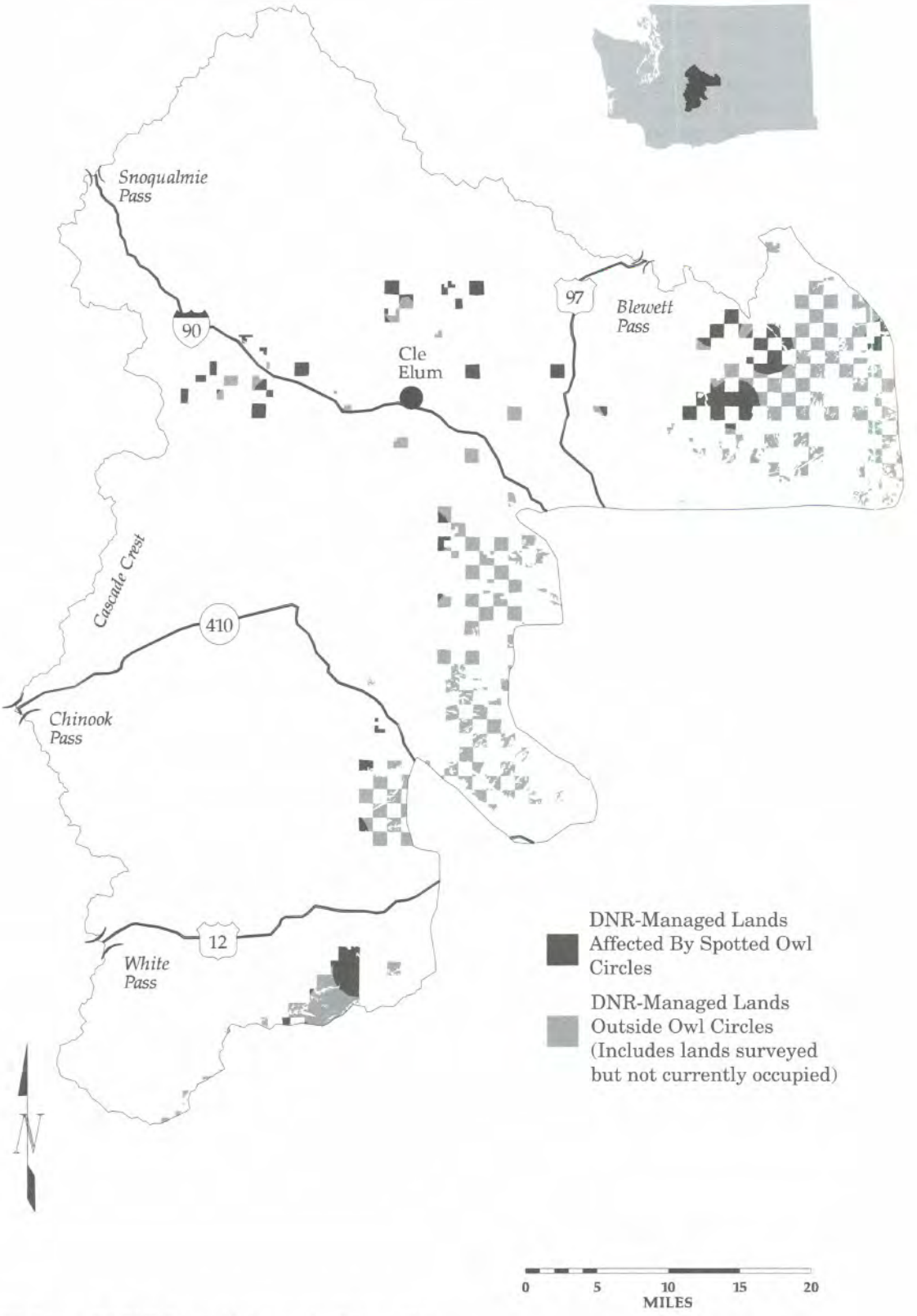

RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves

# Map 19: Spotted Owl Conservation under Alternative A within the Chelan Planning Unit



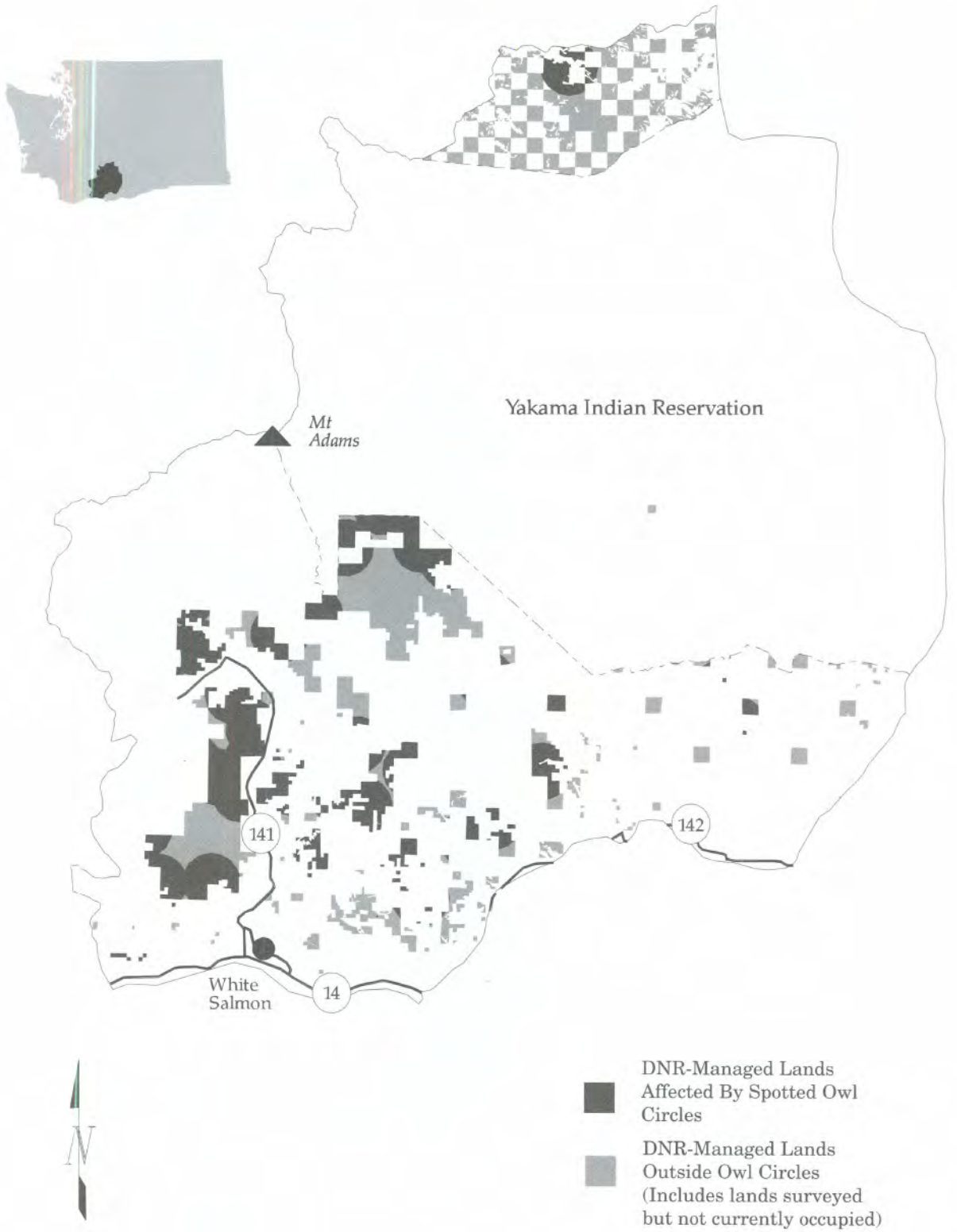

RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.

# Map 20: Spotted Owl Conservation under Alternative A within the Yakima Planning Unit




RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.

# Map 21: Spotted Owl Conservation under Alternative A within the Klickitat Planning Unit




RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.

# Map 22: Spotted Owl Conservation under Alternative B within the Chelan Planning Unit

DNR-Managed HCP Lands Without Spotted Owl Role

None DNR-Managed HCP Lands Designated as Dispersal Habitat

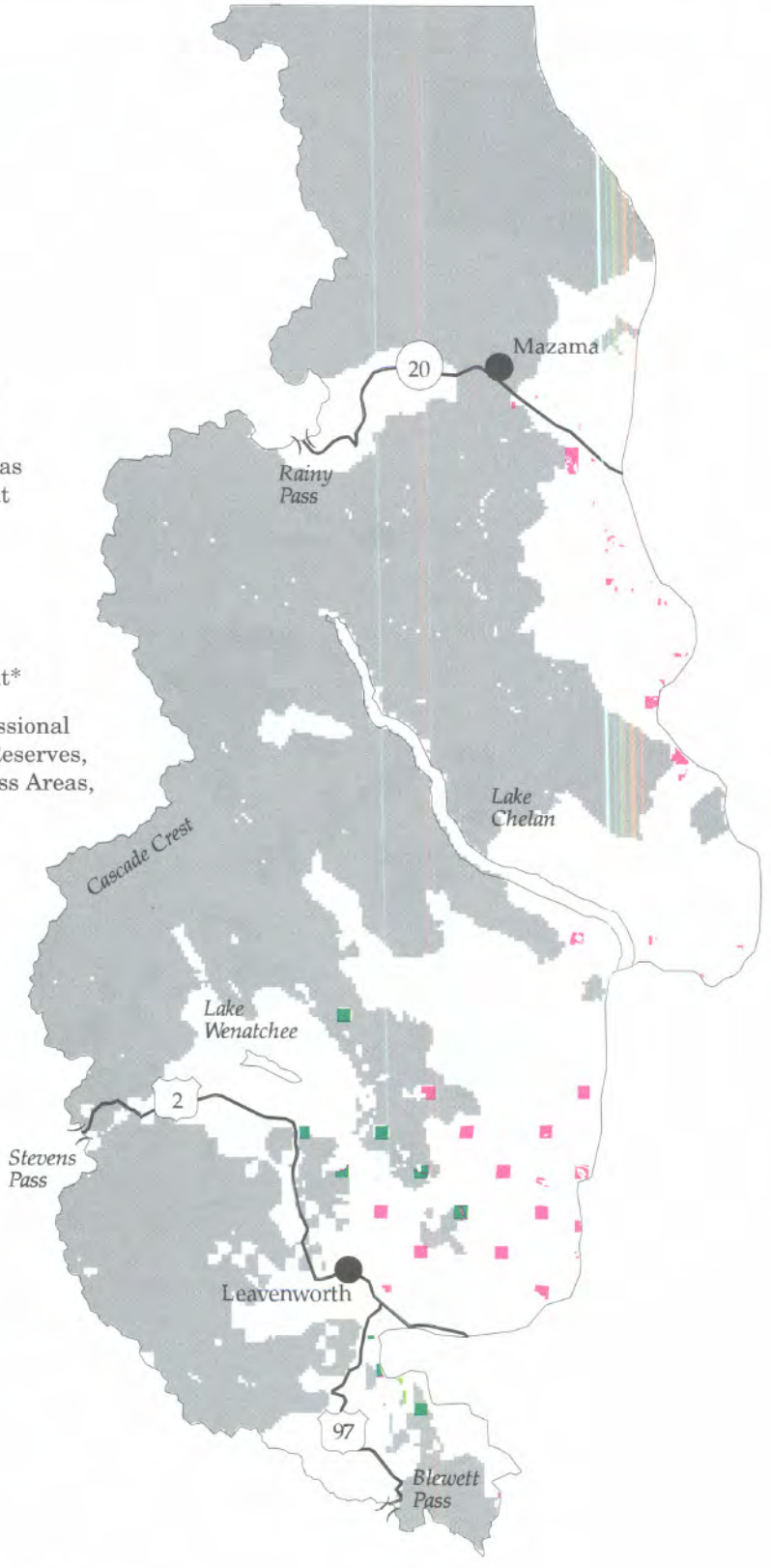
DNR-Managed HCP Lands Designated as Nesting, Roosting, and Foraging Habitat

None NRCAs and NAPs Providing Dispersal Habitat*

NRCAs and NAPs Providing Nesting, Roosting, and Foraging Habitat*

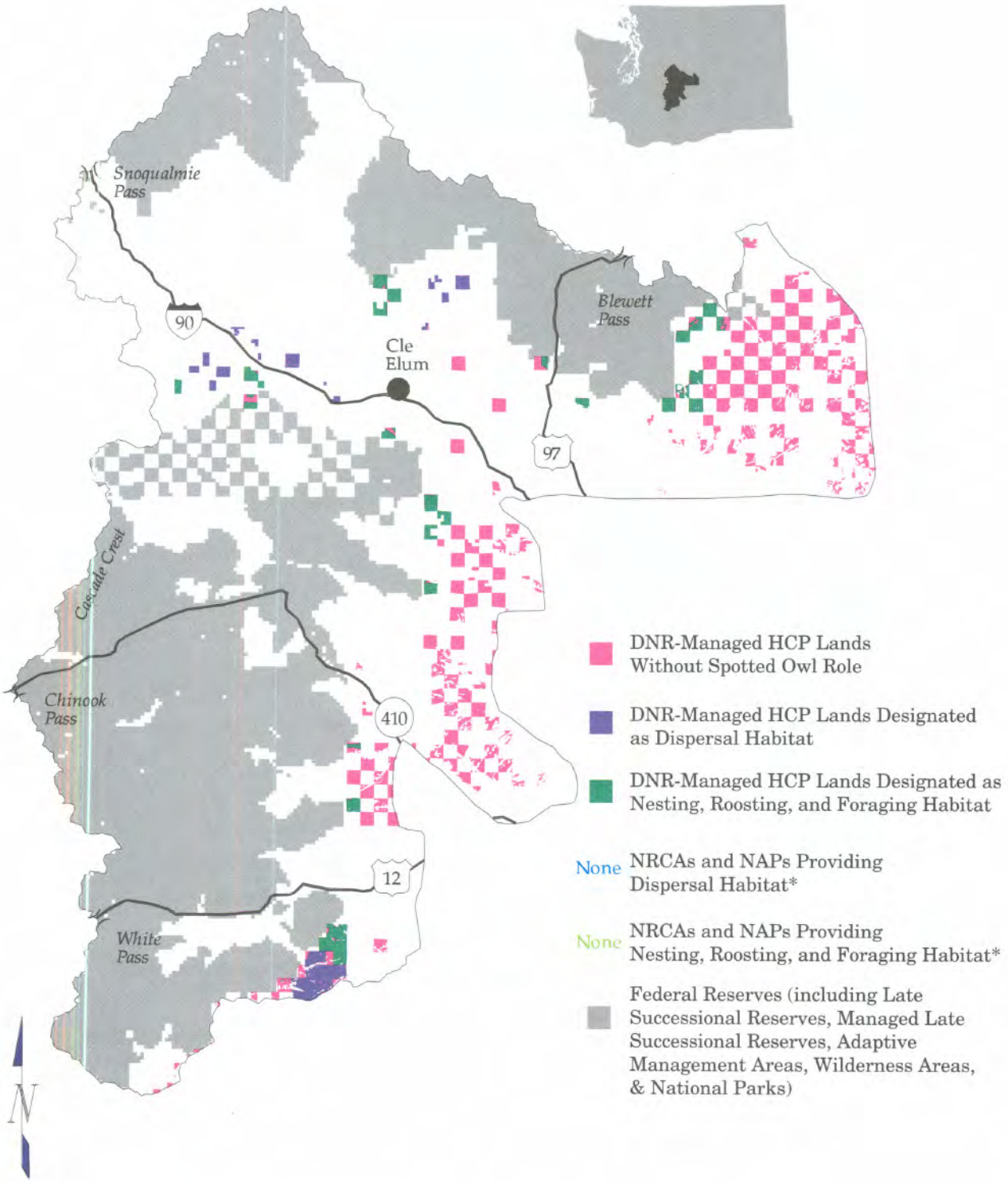
Federal Reserves (including Late Successional Reserves, Managed Late Successional Reserves, Adaptive Management Areas, Wilderness Areas, & National Parks)





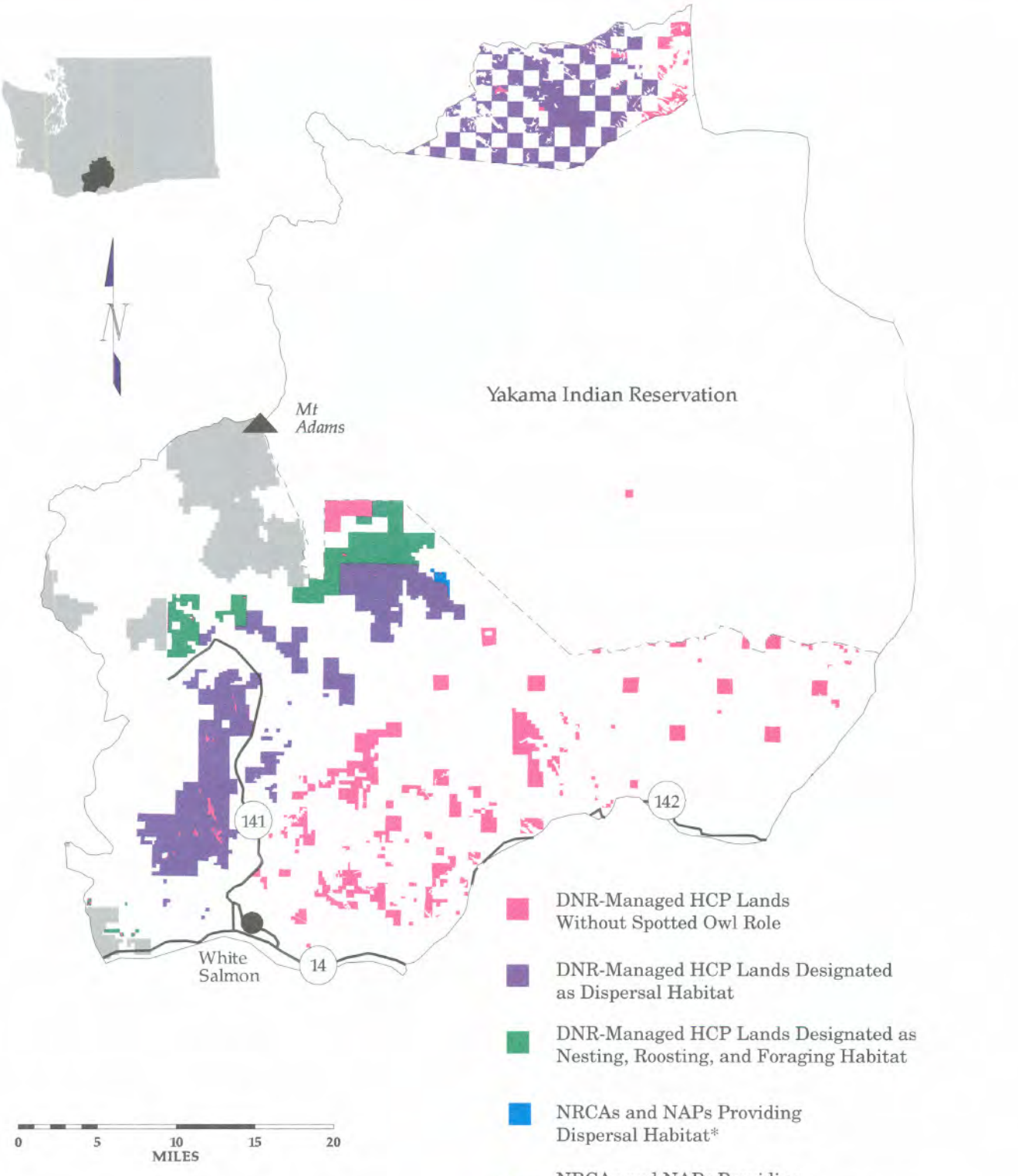

RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves

# Map 23: Spotted Owl Conservation under Alternative B within the Yakima Planning Unit



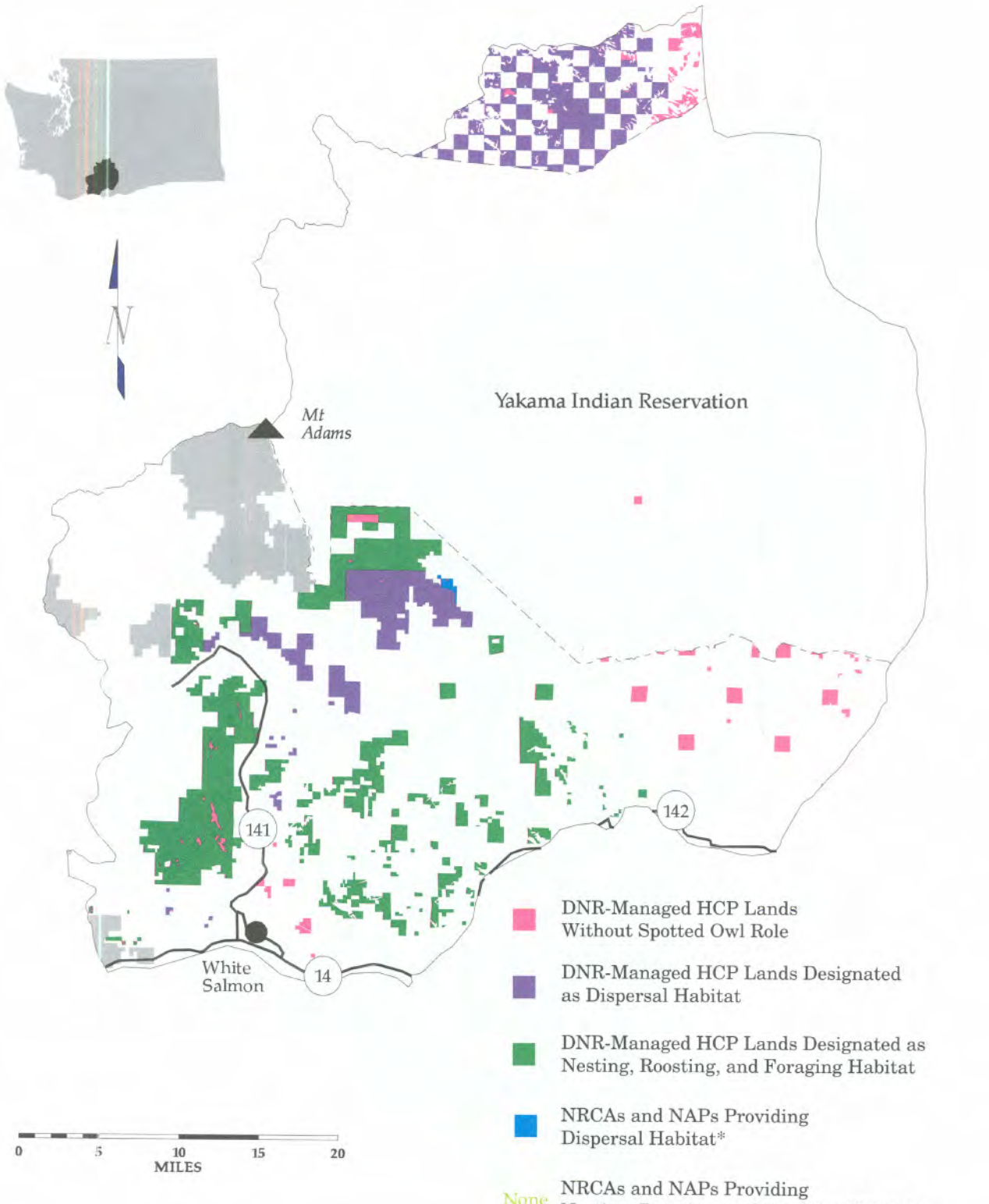

RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves

# Map 24: Spotted Owl Conservation under Alternative B within the Klickitat Planning Unit



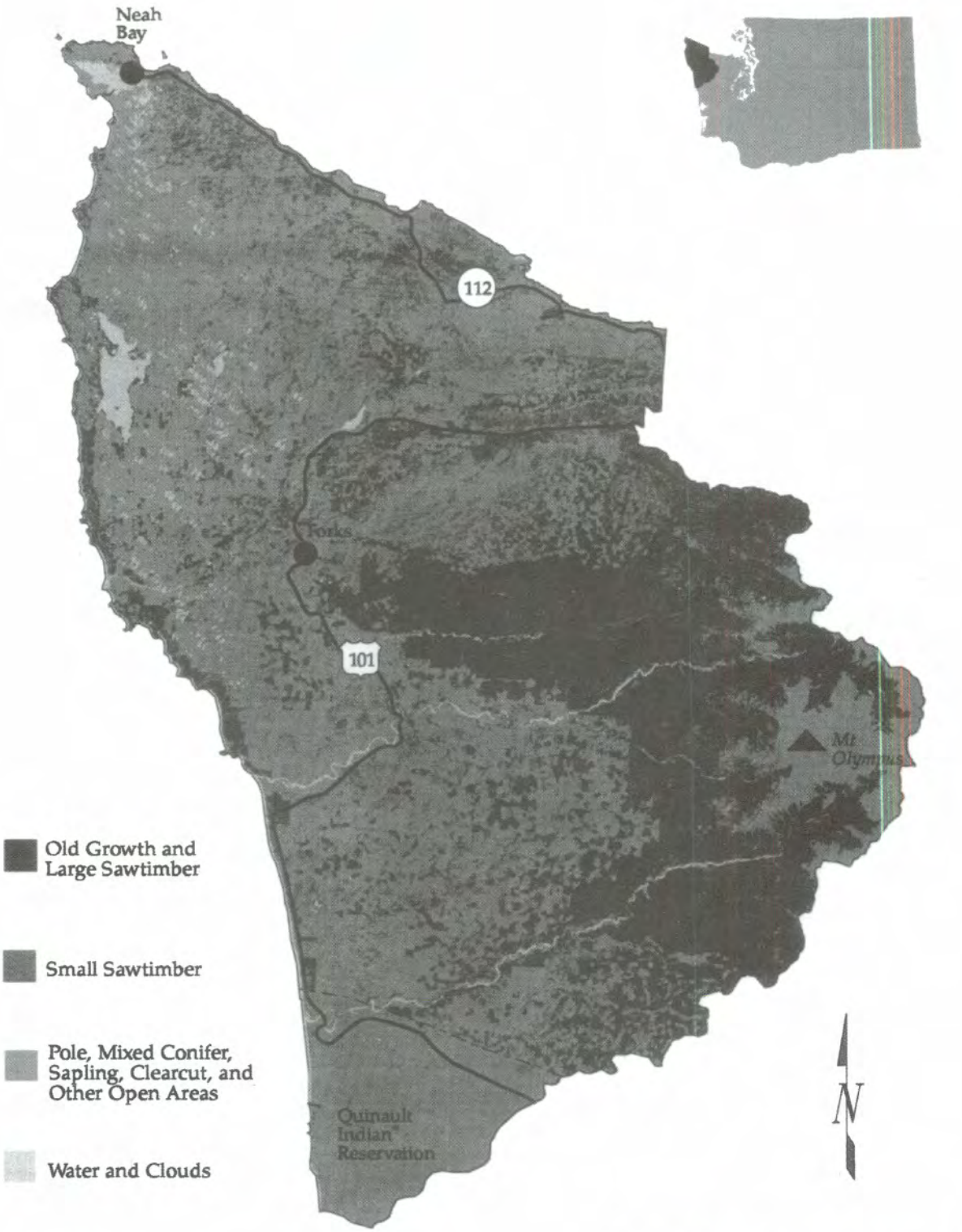

RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves

# Map 25: Spotted Owl Conservation under Alternative C within the Klickitat Planning Unit



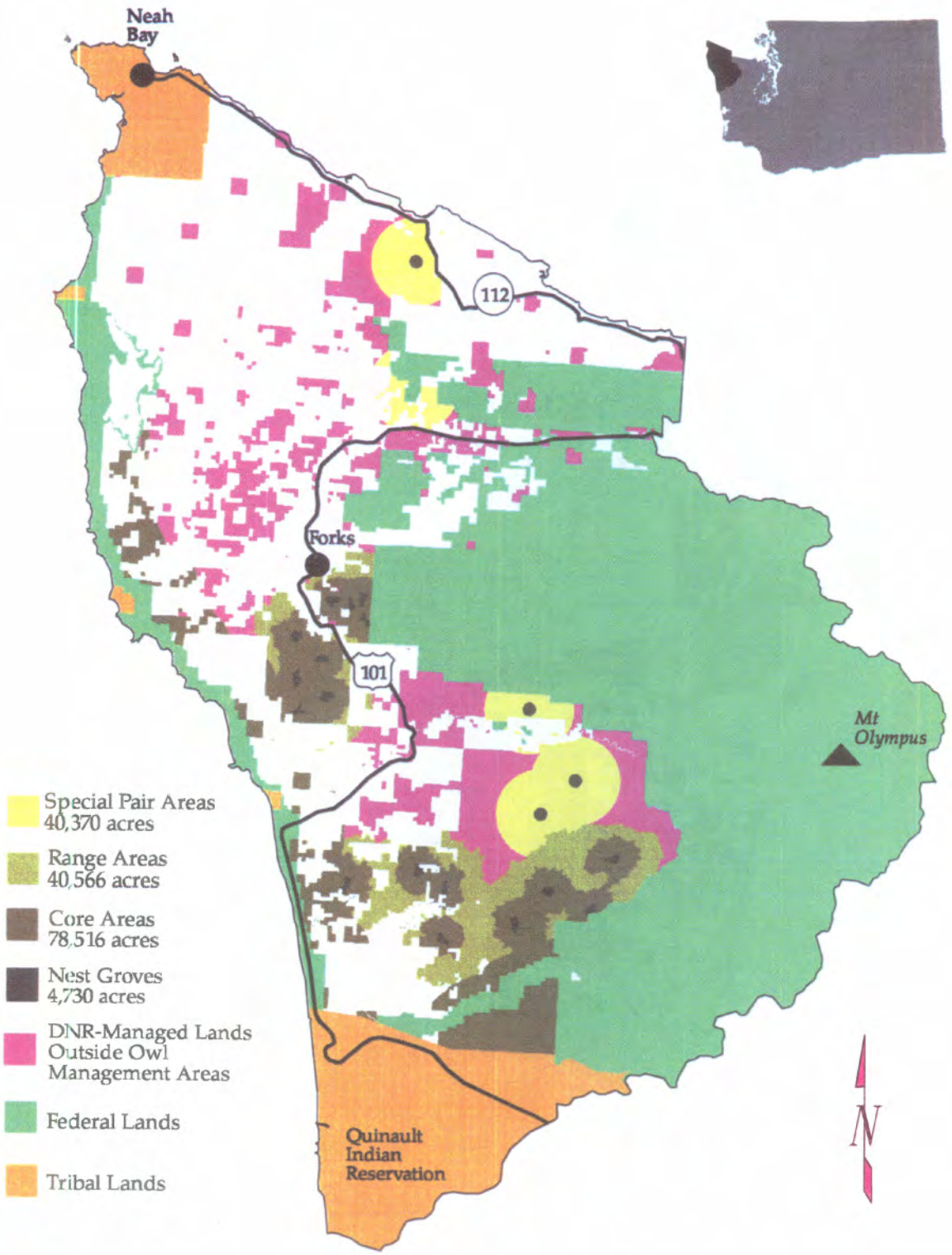

RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves

# Map 26: Current Land Cover from Satellite Imagery of the Olympic Experimental State Forest Planning Unit



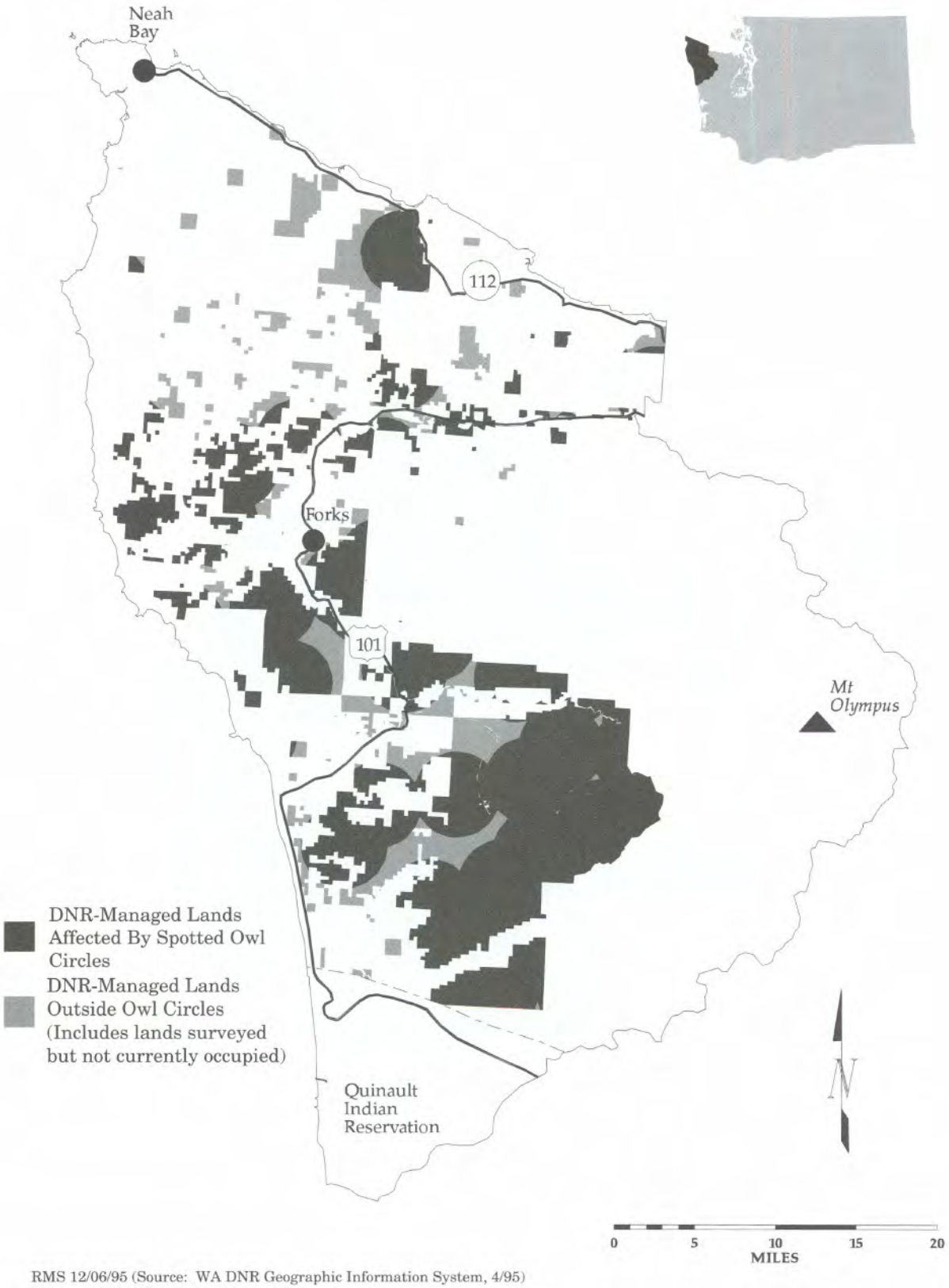

RMS 12/28/95 (Source: WDFW, 1994)
This map for planning purposes only.

# Map 27: Alternative 3 (Zoned Forest) within the Olympic Experimental State Forest Planning Unit



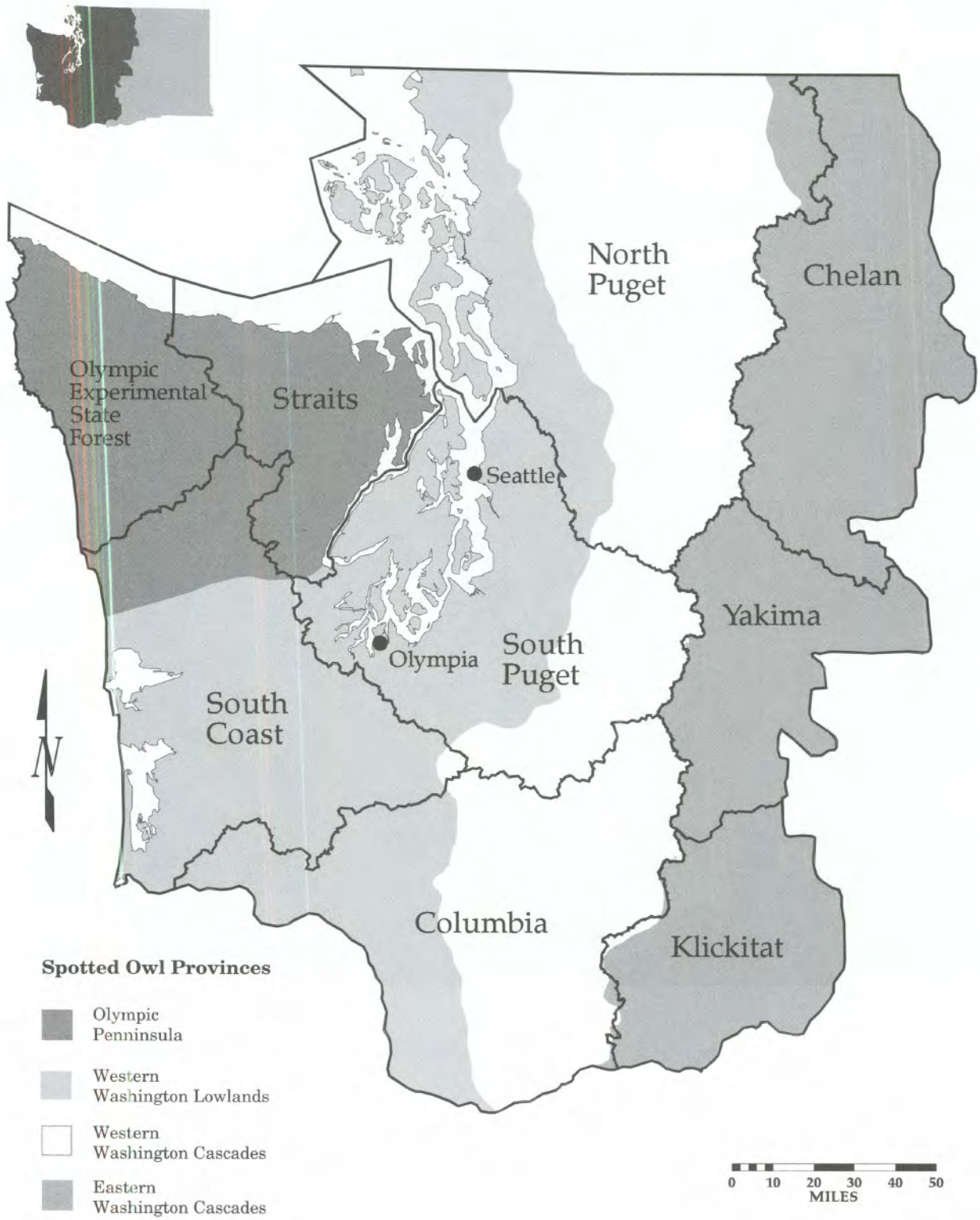

RMS 12/27/95 (Source: WA DNR Geographic Information System, 4/95)
This map for planning purposes only.

# Map 28: Spotted Owl Conservation under Alternative 1 within the Olympic Experimental State Forest Planning Unit




RMS 12/06/95 (Source: WA DNR Geographic Information System, 4/95)
This map is for planning purposes only.

# Map 29: HCP Planning Units and Spotted Owl Provinces




RMS 12/27/95 (Source: Taken from USDI 1992a p.32)
This map is for planning purposes only.

# Map 30: Current Habitat Conditions on the Olympic Peninsula

Old Growth
Pole
Non-forested
Mid-seral
High Elevation Forest
Large Saw
Sapling
Open Canopy
Small Saw
Lands not modelled
Cloud/Shadow
Water

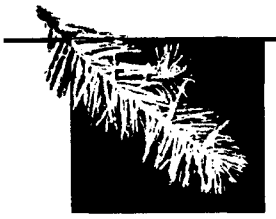
RMS 2/14/96 (Source: 1990 and 1991 Landsat Thematic Mapper Imagery -- scale unknown)
This map is for planning purposes only.

SECTION

3.

# Section 3 - Response to Comments

# Section 3.1 Outline of Comment Categories



# Section 3. Response to Comments

## 3.1 Outline of Comment Categories

### Comments relating specifically to this HCP

**I. GENERAL COMMENTS**

**II. DESCRIPTION OF AREA**

**A. LOCATION, BOUNDARIES, and AREA SIZE**

**III. ABIOTIC ISSUES**

**A. AIR QUALITY**
**B. SOILS**
**C. WATER**
1. Floods/Flow Regime
2. Water Temperature

**IV. BIOTIC ISSUES**

**A. FOREST HEALTH/FIRE**
**B. SPECIAL HABITATS**
1. Old-Growth Habitat
2. Oak Savanna/Woodland
3. Hardwoods
4. Other Key Terrestrial Habitats
   a. TALUS & SCREE
   b. CAVES
   c. CLIFFS
5. Mineral Springs, Springs, Seeps
6. Forested & Nonforested Wetlands
7. Steep and Unstable Slopes
8. Riparian Ecosystem Components
   a. LOCATION AND BOUNDARIES
   b. STREAM SHADING
   c. BANK STABILITY
   d. DETRITUS (litter)

e. HYDROLOGIC MATURITY

9. **Aquatic Habitats**
   a. STREAM CLASSIFICATION
   b. EPHEMERAL/INTERMITTENT STREAMS
   c. INNER GORGES
10. **Aquatic Habitat Components**
   a. LARGE WOODY DEBRIS
   b. SUBSTRATE (SEDIMENT)
   c. CHANNEL MIGRATION & MORPHOLOGY
   d. OFF-CHANNEL HABITATS
11. **Retention of Structural Legacies**
12. **Landscape Planning**
   a. FOREST FRAGMENTATION
13. **Habitat-based Approach**
14. **Unique Forest Types** (in section 3.3 only)

C. **PLANTS**

D. **ANIMALS**

1. **Wildlife**
   a. MAMMALS
      i. **Bats**
      ii. **Other Small Animals**
      iii. **Terrestrial Carnivores**
         (A) wolves
         (B) grizzly bears
         (C) wolverine
         (D) fisher
      iv. **Deer and elk**
   b. BIRDS
      i. **Sea, shore & wading birds**
         (A) marbled murrelets
            habitat-relationship study
            marginal habitat
            unoccupied habitat
            occupied habitat
            marine issues
      ii. **Raptors**
         (A) spotted owls
            population impacts & models
            nesting, roosting, & foraging (NRF) habitat
               *NRF-designated areas*
               *quality/definition*
               *amounts*
               *distribution*
               *management within*
               *nest patches*
            dispersal habitat
               *dispersal-designated areas*
               *quality/definition*

*amounts/distribution*

(B) eagles--bald
(C) falcons-- erigrine
(D) accipiters--goshawk

**iii. Passerines**
(A) Vaux's swift

**c. REPTILES**
**d. AMPHIBIANS**
**i. Frogs** (in section 3.3 only)
**e. FISH**
**i. Anadromous salmonids**
(A) coho
**ii. Resident salmonids**
(A) bull trout
**f. INVERTEBRATES**
**i. Lepidopterids**
**g. Other wildlife issues**
**i. Listed species & species of concern**

## E. ECOSYSTEM HEALTH

## V. HUMAN ENVIRONMENT

## A. ECONOMICS
## B. SOCIAL
## C. CULTURAL
## D. RECREATION
## E. AESTHETICS

## VI. MANAGEMENT PRACTICES

## A. AMOUNT OF HARVEST
## B. HARVEST SCHEDULE
## C. HARVEST METHODS
## D. YARDING METHODS
## E. RIPARIAN MANAGEMENT STRATEGY
1. Riparian Buffer Widths
2. Riparian Buffer Treatment
3. Wind Buffer
4. Wetland Buffers
5. Watershed Analysis Prescriptions

## F. RESERVES/REFUGIA
## G. HERBICIDES
## H. REPLANTING
## I. GROWTH & FERTILIZATION (in section 3.3 only)
## J. THINNING

K. SALVAGE
L. RESTORATION/RECLAMATION
M. ROAD MANAGEMENT
   1. Construction and Maintenance Standards
   2. Alternatives to Roads
N. TRAIL MANAGEMENT
O. SPECIAL FOREST PRODUCTS
P. OTHER PRACTICES

## VII. OTHER PLAN ELEMENTS

A. INVENTORY AND SURVEY
B. RESEARCH
   1. OESF
C. MONITORING/REPORTING

## VIII. IMPLEMENTATION ISSUES

A. LENGTH OF PLAN/PERMIT
B. TRANSFERS OF LANDS, SUCCESSORS AND ASSIGNS
C. FUNDING
D. PHASE-IN IMPLEMENTATION
E. LIABILITY
F. PERMIT ENFORCEMENT, SUSPENSION, OR REVOCATION
G. UNLISTED-SPECIES AGREEMENT
H. DEPARTMENT OF THE INTERIOR and
   DEPARTMENT OF /COMMERCE ASSURANCES POLICY
I. LEVEL OF CERTAINTY/UNCERTAINTY
   1. UNFORESEEN CIRCUMSTANCES
   2. EXTRAORDINARY CIRCUMSTANCES
J. CONTINGENCIES
   1. Level of Flexibility
   2. Amendments
   3. Adaptive-Management Techniques
K. TERMINATION CLAUSE

## IX. RELATIONSHIPS TO OTHER LAND MANAGEMENT

A. RELATIONSHIP TO MANAGEMENT ON FEDERAL LANDS
B. FEDERAL LANDS TAKE BURDEN
C. LANDSCAPE-ASSESSMENT PROCESSES (WSA, BASELINES, THRESHOLDS)

## X. THIRD-PARTY INVOLVEMENT

**A. TREATY RIGHTS AND THE FEDERAL TRUST RESPONSIBILITY**
**B. TRUST RESPONSIBILITIES TO TRIBES** (in section 3.3 only)

## XI. TRUST BENEFICIARIES

**A. MAXIMUM BENEFIT FOR TRUST**
**B. OBLIGATION TO FUTURE GENERATIONS**
**C. PRUDENT PERSON DOCTRINE**
**D. USE OF REGULATORY MINIMUMS**
**E. OTHER DNR AGREEMENTS**
**F. PROJECTED HARVEST & REVENUE**

## XII. PUBLIC INVOLVEMENT

**A. PUBLIC INPUT**
**B. COORDINATION**
   1. **Tribes**
   2. **Adjacent Land Manager Coordination**

## XIII. NEPA/SEPA COMMENTS

**A. RANGE OF ALTERNATIVES**
**B. REASONABLE ALTERNATIVES**
**C. NO ACTION ALTERNATIVE**
**D. COMMENT PERIOD LENGTH**
**E. ADEQUACY OF DOCUMENTS**
**F. SUPPLEMENTAL EIS**
**G. SCIENTIFIC CREDIBILITY**
**H. CUMULATIVE IMPACTS**

## XIV. APPROVAL/DISAPPROVAL

**A. SECTION 7 CONSULTATION**
   1. **Impact of Take** (also refer to Section 7 Consultation)
   2. **Critical Habitat**
   3. **Jeopardy Level**

**B. SECTION 10 ISSUANCE CRITERIA**
   1. **Incidental Take**
   2. **Minimize and Mitigate**
   3. **Funding**
   4. **Jeopardy**

C. DNR DECISION CRITERIA

XV. MISCELLANEOUS COMMENTS

A. HCP LANGUAGE, LOOPHOLES, VAGARIES, AND TYPOGRAPHICAL ERRORS
B. STATE REGULATIONS
C. WASHINGTON FOREST PRACTICES RULES WATERSHED ANALYSIS
D. HCP COMMITMENTS
E. PRESIDENT'S NORTHWEST FOREST PLAN
F. PROPOSED FEDERAL RULES
G. DNR'S FOREST RESOURCE PLAN
H. FEMAT AND RECORD OF DECISION
I. REMARKS REGARDING DNR HISTORY

XVI. THE HCP PROCESS

A. HABITAT CONSERVATION PLANS
B. PROPERTY RIGHTS
C. THE HCP AND OTHER ASPECTS OF THE ESA

# Section 3.2 Comment Summaries and Responses

# 3.2 Comment Summaries and Responses

## Comments relating specifically to this HCP

DNR and the Service received 173 comments (either in written form or from testimony). All comments are available for review at DNR's Olympia office, USFWS' Olympia field office, and at the libraries listed on page A2-10 of this document.

### I. GENERAL COMMENTS

**Summary:** The Services received comments from the U.S. Environmental Protection Agency (USEPA), USDA Natural Resource Conservation Service, Washington Department of Fish and Wildlife (WDFW), Washington Department of Ecology (DOE), one member of the State House of Representatives, the Metropolitan King County Council, two county commissioners and a county prosecuting attorney, the Washington State Association of Counties, the City of Port Angeles, Port of Port Angeles, the Northwest Indian Fisheries Commission (NWIFC), Point No Point Treaty Council, Confederated Tribes and Bands of the Yakama Indian Nation (henceforth referred to as the Yakama Indian Nation), Tulalip Tribes, Hoh Indian Tribe, Squaxin Island Tribe, Muckleshoot Indian Tribe, and Elwha/Clallam Tribe. Comments were received from 3 national, 1 regional, and 7 state environmental organizations, Bogle & Gates (a consultant to Washington State University), 9 local environmental groups, 24 representatives of the timber and/or wood products industry, and 139 individuals. In total, the Services received 174 letters and 41 people testified, representing 181 individuals, organizations, or agencies.

The majority of comments from government agencies, tribes, environmental organizations, timber industry representatives, and individuals supported the general concept of a Habitat Conservation Plan for DNR-managed lands. Comments from WDFW and the vast majority of comments from tribes, environmental organizations, and individuals recommended or requested more protection for fish and wildlife. Some individuals were completely opposed to the draft HCP for ecological/environmental reasons. The majority of timber industry representatives were opposed to many of the specific conservation measures proposed in the draft HCP.

**Response:** Comments supporting and opposing the HCP are noted. For responses to topical comments, please see the topical outline at the beginning of this section.

### II. DESCRIPTION OF AREA

#### A. LOCATION, BOUNDARIES, AND AREA SIZE

**Summary:** Washington DOE, NWIFC, Point No Point Treaty Council, Yakama Indian Nation, Sierra Club, Northwest Ecosystem Alliance, and three individuals recommended that the riparian and/or wetland conservation strategies be applied to the east-side planning units. A representative from Skamania County and the Washington Hardwoods Commission said that all other HCP's have been for smaller areas, and commented that DNR's draft HCP covered too large a geographic area. The Washington Hardwoods

Commission could not envision how such a large plan could address all of the various problems. Two representatives of the timber industry said that all other HCP's have been for "sensitive" areas only, and questioned why DNR's draft HCP was for all state forest lands and not just for "sensitive" state lands. One timber company said the HCP will set aside 30 to 40 percent of DNR-managed land.

**Response:** The conservation planning process enabled in Section 10(a)(1)(b) of the ESA is entirely voluntary. Many HCP decisions, including species and lands the applicant wants covered under the incidental take permit (ITP) and unlisted species agreement, are applicant driven decisions. DNR prepared the HCP voluntarily to address specific species conservation and ecosystem management options for DNR-managed forest lands within the geographic range of the northern spotted owl. DNR has indicated that an HCP with riparian and multispecies strategies may be developed for DNR-managed lands east of the Cascade crest sometime in the future.

Although DNR-managed lands east of the Cascade crest are not included in the HCP riparian and multispecies strategies, these lands would continue to be regulated under Section 9 of the ESA and state law. Furthermore, DNR manages its forests according to policies promulgated in its Forest Resource Plan (DNR 1992b) which has led DNR to implement conservation measures exceeding Washington Forest Practices Rules when in the best interests of the trusts.

DNR's HCP planning area does encompass a large amount of land, it includes all DNR-managed forest lands within the geographic range of the northern spotted owl, or 1.6 million acres. But, the strategy for the northern spotted owl was based on nine smaller planning units. This allowed a flexible strategy which could address the spotted owl conservation issues specific to much smaller regions within the HCP planning area. The same six planning units that are west of the Cascade crest will form the basis of the long-term marbled murrelet strategy. This flexibility is also exhibited by the strategies for salmon and other unlisted species. Strategies for salmon and other unlisted species have not been applied to planning units east of the Cascade crest, and the strategies for the OESF are somewhat different than those for the other west-side planning units.

Because of the large number of owl circles and the large amount of murrelet habitat on DNR-managed land, the ubiquity of salmonid species which are candidates for federal listing, and the presence of several late successional forest and riparian obligate species which are either federal candidates for listing or federal species of concern, nearly all DNR-managed land is considered to be "sensitive."

Over the short-term, the draft HCP designates five types of set-asides or deferrals: forests within 25 feet of Type 1, 2, 3, and 4 Waters; hillslopes with a high risk of mass wasting; owl nest patches; occupied marbled murrelet habitat; and forests in or adjacent to uncommon habitats such as caves and talus. Over the long term, it is anticipated that the only set-asides will be forests within 25 feet of Type 1, 2, 3, and 4 Waters, some unstable slopes, occupied marbled murrelet habitat, and forests in or adjacent to uncommon habitats. Owl nest patches may be harvested after research demonstrates that silviculture can produce high quality spotted owl nesting habitat. Some unstable slopes may be harvested after research demostrates that timber harvest will not increase the frequency or

severity of mass wasting events. Set-asides are expected to be a small proportion of all DNR-managed forests within the HCP planning area.

However, without an HCP a substantial amount of timber currently situated in owl circles cannot be harvested. Also, without an HCP the addition of steelhead or other salmonid species to the federal list of threatened and endangered species is expected to result in regulations which would "lock-up" even more timber.

# III. ABIOTIC ISSUES

## A. AIR QUALITY

**Summary:** Five comments expressed a concern about air quality. A representative of the Western Hardwoods Association and another individual stated that 5 percent more carbon dioxide is absorbed by a young forest than by an old forest. One individual said that reductions in prescribed burning would eventually increase air pollution because of the increase in fire hazard, and that dust abatement on forest roads could be a waste of money because there is no science on the impacts of road dust. Another individual believed that carbon monoxide fumes from motor vehicles would harm owls in NRF Management Areas located in the I-90 corridor.

One individual expressed concern about the sensitivity of various owl species to the noise of diesel equipment.

**Response:** As stated in the draft HCP (p. II.12 to II.14), DNR would comply with all applicable state and federal regulations regarding air quality. It is quite plausible that young forests absorb more carbon dioxide than older forests. DNR's HCP may alter the proportion of DNR-managed land covered by young forest but the overall net effect on the regional and/or global concentrations of atmospheric carbon dioxide should be no different than the No Action alternative. The HCP does not alter to a significant degree the amount of prescribed burning to be conducted by DNR. The one exception to this may be prescribed burns in oak woodland, but only about 500 acres of oak woodland are covered by DNR's HCP. There is no evidence to suggest that spotted owls may suffer adverse effects from highway air pollution in the I-90 corridor.

Restrictions on forest management activities during the breeding season will be in effect within 0.7 mile of known spotted owl site centers (draft HCP Chapter IV, p. IV.9, 20, and 21). The impacts from diesel equipment noise on populations of other owl species would be about the same for all three alternatives thus, would be insignificant.

## B. SOILS

**Summary:** The Rivers Council of Washington, a local environmental organization, and one individual expressed concerns about soils. The Rivers Council of Washington stated that the rate of soil loss is a serious crisis. The local organization believed that insects are extremely important to soil development, and that the draft HCP inadequately addresses these species. This same organization cited a study by Compton and Cole (1991) which supposedly demonstrated that clear-cut logging reduced subsequent forest growth by as much as 40 percent.

**Response:** All harvest activities on DNR-managed land would require a Forest Practices Notification or Approval; issuance of which is contingent on compliance with provisions of the Washington Forest Practices Act (RCW 76.09). Potential adverse impacts to soils are controlled by Washington Forest Practices Rules which require a SEPA environmental checklist for timber harvest where mass wasting exists (WAC 222-16-050) and require that timber harvest leave land in a condition conducive to future timber production (WAC 222-30-020). In addition, DNR manages its forests according to policies promulgated in the Forest Resource Plan (DNR 1992b) which has led DNR to implement conservation measures exceeding Washington Forest Practices Rules when in the best interest of the trusts. Under DNR's HCP, timber harvest will not occur on hillslopes with a high risk of mass wasting, and to protect stream bank stability, timber harvest will not occur within 25 feet of Type 1, 2, 3, and 4 Waters.

The Services and DNR agree that certain insect species are extremely important to soil development. We know of no evidence which suggests that timber management causes any lasting significant adverse impacts on this particular assemblage of forest invertebrates.

## C. WATER

**Summary:** Washington DOE acknowledges that DNR's draft HCP appropriately addresses key elements for water quality protection in lands managed for timber production. The NWIFC commented that DNR's HCP should consider restoration of 303(d) listed water bodies. The Squaxin Island Tribe requested that the HCP clearly state that it does not meet the standards of the Clean Water Act. A timber industry organization asked for clarification on how Forest Practices Rules interact with EPA water-quality regulations. An individual commented that "Water is the key to the life of that forest and if you protect that water and you do it adequately, then a great deal more will be saved."

**Response:** The HCP riparian strategy provides better protection than would occur without the HCP for Type 1, 2, 3, and 4 Waters and will eventually affect the natural recovery of 303(d) listed water bodies. The federal Clean Water Act is implemented through state water quality regulations adopted into law by the Washington State Legislature, and administered by Washington DOE and the Washington Forest Practices Board. DNR complies with all state water quality regulations, and therefore, is in compliance with the Clean Water Act. No similar comment was received from USEPA.

The statement about EPA water-quality regulations in the Draft EIS Section 4.4.2.2i was an error. Water quality protection in the State of Washington is achieved through state water quality regulations adopted into law by the Washington State Legislature, and administered by Washington DOE and the Washington Forest Practices Board.

Undeniably, water is the key to life, and protection of this resource in both quantity and quality is important. The approach taken in the draft HCP to protect riparian ecosystems is a recognition of the critical importance of water for salmonid habitat and other forms of life.

### 1. Floods/Flow Regime

**Summary:** The NWIFC cited court cases which recognize that tribes have a right to as much water as is needed to protect treaty fisheries. They also requested that the Draft EIS acknowledge the various effects of clear-cut logging on periods of low stream flow.

**Response:** The comment regarding water rights conferred through treaty is noted. The draft HCP acknowledges the effects of forest management on periods of low stream flow (p. III.64).

### 2. Water Temperature

**Summary:** The Muckleshoot Tribe pointed out an error in Table 4.8.10 of the Draft EIS (p. 4-521). Specifically, the Tribe wrote there are several streams within the South Puget Planning Unit that are 303(d) listed because of water temperature. According to the Tribe those streams are: Springbrook Creek, the Green River, Hill (Mill) Creek, Gale Creek, and Smay Creek. They pointed out that Gale Creek and Smay Creek may be directly adversely affected by management activity implemented under DNR's HCP.

**Response:** The data in Table 4.8.10 was based on information contained in DNR's GIS database at the time that section 4.8.1 of the DEIS was written. Portions of the DEIS were written over one year ago, and so some information in the DEIS may be out of date. The information in Table 4.8.10 was the most up to date information available when section 4.8.1 was written. The source of the water quality data was given as "Washington Department of Ecology, 1994." If information critical to the analysis of the alternatives is outdated, then DNR and the Services will update such information, otherwise outdated, but relatively recent information will not be edited for the FEIS.

The Services and DNR believe the riparian strategy will likely improve water quality in 303(d) streams through time.

## IV. BIOTIC ISSUES

## A. FOREST HEALTH/FIRE

**Summary:** WDFW, a representative of Stevens County, Bogle & Gates (a consultant to Washington State University), 2 local organizations, 2 representatives of the timber industry, and 8 individuals expressed concerns about forest health issues. WDFW suggested two ways to make NRF habitat management and management for forest health more compatible: (1) conduct trial experiments outside NRF Management Areas that address forest health issues; and (2) defer harvest in suitable habitat adjacent to NRF Management Areas while conducting experiments in NRF Management Areas. The representative of Stevens County, representatives of the timber industry, and Bogle & Gates (a consultant to Washington State University) were all concerned about the increased risk of fire, insect infestation, and disease that might occur due to "set-asides" or "tying our state lands to federal lands." Several individuals believed that "tree farms" would lead to catastrophic losses due to disease and insect infestation. One individual

stated that a reduction in prescribed burning could possibly lead to huge timberland damage from wildfire. One individual believed that old-growth forest must be retained as a "living laboratory" in order to study forest health issues such as insect infestations and disease.

**Response:** Harvest of suitable habitat in NRF Management Areas must be deferred until the landscape prescriptions are met. And, after the landscape prescriptions are met, any harvest of suitable habitat must maintain the landscape prescriptions. With respect to forest health, the main forest management activity that may occur is salvage logging. The inclusion of a salvage logging provision in the spotted owl strategy is driven by state law (RCW 79.01.795 and RCW 76.06.040). The Service will be included in discussions of any salvage activities that may be required under these statutes. If they determine that such activities would have an adverse affect on the conservation strategies, DNR and the Service will work together to find sufficient mitigation to allow the activities to proceed (see draft HCP, Chapter IV, pg. IV.11 and IV.21). DNR and Services believe that this is the best strategy for making NRF habitat management, management for forest health, and DNR's legal duties most compatible.

Many land managers, of both private and public lands, are interested in silvicultural methods that restore and maintain forest health and spotted owl habitat. Other land managers may conduct their own experiments in attempt to develop such methods, and DNR will make use of whatever results become available through such research. If DNR believes that such research may result in a net benefit to the trusts, DNR may conduct its own experiments.

Over the short term, the draft HCP designates five types of set-asides or deferrals: (1) forests within 25 feet of Type 1, 2, 3, and 4 Waters; (2) hillslopes with a high risk of mass wasting; (3) owl nest patches; (4) occupied marbled murrelet habitat; and, (5) forests in or adjacent to uncommon habitats such as caves and talus. Over the long term, it is anticipated that the only set-asides will be forests within 25 feet of Type 1, 2, 3, and 4 Waters, occupied marbled murrelet habitat, and forests in or adjacent to uncommon habitats. Owl nest patches may be harvested after research demonstrates that silviculture can produce high quality spotted owl nesting habitat. Some unstable slopes may be harvested after research demostrates that timber harvest will not increase the frequency or severity of mass wasting events. Set-asides are expected to be a small proportion of all DNR-managed forests within the HCP planning area.

Much of the forest land managed by DNR is "tied" to federal land simply by geographic proximity. Some federal land management (National Parks, USFS Wilderness, Late Successional Reserves) may increase the risk of fire, insect infestation, and disease, and so it is conceivable that there is a higher risk of such disturbances for DNR-managed lands adjacent to federal lands. In recognition of various forest health issues, DNR has retained the flexibility to reduce the risk of fire, insect infestation, and disease (draft HCP, Chapter IV, p. IV.9 and 21).

DNR agrees that some late-seral stage forest should be retained for research purposes. DNR has set aside 12 late seral-stage research areas which have a total area of approximately 2,000 acres. These sites will continue to serve a research function under

the HCP. These areas are in addition to approximately 72,000 acres in NAPs and NRCAs, many of which contain late seral-stage forest.

## B. SPECIAL HABITATS

**Summary:** WDFW stated that balds and forested talus may not be adequately protected. The main concern regarding balds is road construction which may harm the meadow plants on which certain rare invertebrates depend, while their main concern regarding forested talus is the Larch Mountain salamander, particularly in the Columbia Planning Unit. A local environmental organization said that studying insects in more detail would be useful for indicating special habitats. One individual believed that Alternative B seems to be economically sensitive and realistic with regard to protection of special habitats.

**Response:** The Services and DNR agree with the commentor that believes Alternative B, the proposed HCP, is economically sensitive and realistic. However, some strategies required additional measures. For example, talus habitat is known to be very important to the Larch Mountain salamander, especially in the Columbia Planning Unit where most known occupied sites occur. In response to concerns of various commentors, protection of this special habitat has been increased throughout the planning area with specific measures added for talus in the Columbia Planning Unit that includes no-harvest areas, and a 100-foot buffer requiring at least a 60 percent canopy closure (draft HCP, Chapter IV, Section F and Appendix 3, Chapter IV, Section F of this document). Balds are often associated with drier soils, south facing slopes and valley hillsides, and are more commonly found in the Coast Range, Siskiyou Mountains and certain river valleys in Oregon, and in the sub-alpine fir zone of eastern Oregon and Washington (Franklin and Dyrness 1973). In moister western Washington, balds are uncommon but do occur south of Olympia, e.g. Bald Hill and Grand Mound. The DNR HCP is proposed for DNR-managed forested lands within the range of the northern spotted owl. Most of the lands managed by DNR in these areas have already been roaded and harvested once. It is unlikely that new roads will be needed on DNR-managed land in western Washington that contains a bald. DNR will avoid road construction through balds consistent with their landscape-based road management plan. The Services and DNR agree that studying insects may be useful for indicating the presence of unique habitats, and that as this type of information becomes available it may be useful in the application of specific land management activities. The HCP, as proposed, includes conservation strategies aimed at special habitats currently known to be important to listed species or species of concern, as well as conservation strategies that provide some protection for the habitat types that exist on DNR-managed lands; more protection than what would occur under Alternative A.

### 1. Old-Growth Habitat

**Summary:** WDFW, National Audubon Society, National Council of the Paper Industry for Air and Stream Improvement (NCASI), Washington Environmental Council, Northwest Ecosystem Alliance, Rivers Council of Washington, The Mountaineers, 5 local environmental organizations, and 70 individuals commented on old-growth forest issues. Fifty-one individuals used an identical form letter. Six of the comments were presented at public hearings. Eighty of the 82 comments on old-growth issues expressed a preference for saving some or all old-growth forest on

DNR-managed lands. WDFW and a local organization thought that some old-growth forest should be maintained in southwest Washington to reduce the risks to late successional species and to preserve biodiversity, respectively. NCASI noted that the activities described for the OESF might reveal how to provide satisfactory habitat for old-growth species in a managed forest. The National Audubon Society, Washington Environmental Council, and a local organization questioned whether enough old-growth forest will exist at low elevations in Washington. Several individuals thought that DNR would cut half of the remaining old-growth on state lands.

**Response:** The amount of late-seral stage forest on DNR-managed lands will decrease under the HCP, but some late-seral stage forest will remain. Over the short-term, the draft HCP designates five types of set-asides or deferrals: forests within 25 feet of Type 1, 2, 3, and 4 Waters; hillslopes with a high risk of mass wasting; owl nest patches; occupied marbled murrelet habitat; and forests in or adjacent to uncommon habitats such as caves and talus. Over the long term, it is anticipated that the only set-asides will be forests within 25 feet of Type 1, 2, 3, and 4 Waters, some unstable hillslopes, occupied marbled murrelet habitat, and forests in or adjacent to uncommon habitats. These set-asides are expected to be a small proportion of all DNR-managed forests within the HCP planning area.

The OESF spotted owl strategy requires at least 20 percent of DNR-managed land in a landscape planning unit, to be in the understory-reinitiation to old-growth forest stages. In most landscape planning units, this results in the deferred harvest of old-growth for several decades.

DNR has preserved some late-seral stage forest for research purposes. DNR has set aside 12 late-seral stage research areas which have a total area of approximately 2,000 acres. These sites will continue to serve a research function under the HCP. These areas are in addition to approximately 72,000 acres in DNR-managed NAPs (25,000 acre in 45 sites) and NRCAs, (47,000 acres in 23 sites), many of which contain late-seral stage forest.

Some managed forests on DNR-managed lands are expected to be late successional forest, with some portion possessing old-growth characteristics. Over the long term, it is anticipated that spotted owl nest patches in NRF Management Areas will be replaced with managed forest that functions as high quality nesting habitat. These areas will not necessarily function as "old growth" for all species. The amounts of fully functional forests (as defined in draft HCP, Table IV.14) that the HCP is expected to provide are displayed in Table IV.14. The riparian buffer will be managed to provide salmonid habitat. Salmonids require riparian ecosystems with late successional conifer forest to provide large diameter, long-lasting woody debris. While these areas will not be the true old-growth forest, it is expected that many of these areas will provide suitable habitat for some species that depend on old-growth forest.

Under Section 10 of the ESA, the issuance of an ITP requires that: (1) take be incidental to otherwise lawful activities; (2) take be, to the maximum extent practicable, minimized and mitigated; (3) take not appreciably reduce the likelihood

of the survival and recovery of a species in the wild; (4) adequate funding for the plan will be provided by the applicant; and, (5) measures, if any, the Services may require as being necessary and appropriate for the purposes of the plan will be met. The first criterion is easily satisfied. "Practicable" is generally thought of as connoting an action that can be accomplished given technological and economic constraints. Therefore, the second criterion establishes an economic test. Standard models for forest economics show that preserving old-growth forest results in a loss of potential revenue. DNR has a legal duty to produce long-term income for the trust beneficiaries. Setting aside more old-growth forest than is necessary and sufficient to obtain incidental take permits and unlisted species agreements is considered counter to this legal duty.

The third criterion establishes a biological test. FEMAT (1993) and USDA and USDI (1994a) present the results of species viability assessments for mature and old-growth forest species conducted by expert panels for the President's Northwest Forest Plan (commonly reffered to as the Northwest Forest Plan). The vast majority of terrestrial vertebrate species assessed were assigned 100 percent likelihood of having habitat "of sufficient quality, distribution, and abundance to allow the species population to stabilize" on federal land under the President's Northwest Forest Plan. That is, the expert panel was absolutely certain that each of these species would survive under the President's Northwest Forest Plan. Only two species of terrestrial vertebrate in the state of Washington were assigned less than 90 percent likelihood of population stabilization -- the Columbia torrent salamander and Van Dyke's salamander.

Also, all functional groups of arthropods in the northern range of the spotted owl (which includes Washington) were assigned a 100 percent likelihood of population stabilization. In contrast, only seven of the 102 mollusk species which were assessed were rated as having at least 80 percent likelihood of population stabilization. If mature and old-growth species are certain, or nearly certain, to survive on federal land, then DNR's HCP cannot appreciably reduce the likelihood of their survival in the wild. The Columbia torrent salamander,Van Dyke's salamander, and the majority of mollusk species are riparian species. As explained above, late successional forest will be maintained in the riparian buffer. In fact, in most riparian areas, the habitat conditions for these species will improve substantially. For these species, the answer to the second question is that the likelihood of their survival and recovery will increase under the HCP. Thus, it appears the three Section 10 criteria are satisfied for all late successional forest species assessed in FEMAT (1993) except terrestrial mollusks, and an unlisted species agreement should very likely not require the preservation of old-growth forests in southwest Washington and in lowland areas of Washington. Another report (Thomas et al. 1993) found that federal lands alone may not be adequate for the continued conservation of many species, particularly those species for which information is most limited (e.g., most invertebrate, many bat species, the wolverine). The Services remain concerned about the preservation of late-successional forest species about which little is known.

An accurate estimate of the amount of old-growth conifer forest on DNR-managed lands is not available. This is partly due to the problem of defining "old-growth",

and partly due to the problem of completing a forest inventory on 1.6 million acres. Similar problems were encountered when attempting to estimate the amount of spotted owl habitat on DNR-managed land. As explained above, some old-growth forest will be retained through application of the various conservation strategies, but there is no way to accurately determine how much.

### 2. Oak Savanna/Woodland

**Summary:** WDFW, the Northwest Forestry Association, Washington Environmental Council, two local environmental organizations, and 51 individuals commented on oak woodlands. WDFW stated that the protection afforded west side oak woodlands is commendable. The Northwest Forestry Association said that "special forest harvest may be the salvation" of oak woodlands. The Washington Environmental Council (WEC) said that conifers should be retained to increase canopy cover, shrubs should not be part of the canopy cover calculation, and that harvest in oak woodlands should be light. The 51 individuals, who mailed an identical form letter, questioned why DNR needed to cut any oak woodlands.

**Response:** The Services and DNR recognize the uniqueness of oak woodlands and their importance to species such as Lewis' woodpecker and the western gray squirrel. The conservation strategy calls for maintaining the quality and distribution of oak woodlands. Clarifying text has been added which describes the strategy for this special forest habitat type (draft HCP, Chapter IV, Section F and Appendix 3, Chapter IV, Section F of this document). When partial harvests are conducted, all very large dominant oaks will be retained. Canopy coverage will not include shrubs. Thinning will be from below, removing the smallest trees first to maintain the integrity of the oak woodland. Where practicable, DNR will also retain western white pine where it occurs with oak, thus maintaining a mixture of conifer and oak woods cited as being important to the western gray squirrel by one commentor.

### 3. Hardwoods

**Summary:** The Muckleshoot Indian Tribe pointed out an apparent discrepancy between the draft HCP (p. IV.66) and the Draft EIS (p. ix) in the proportion of hardwood forest reported to comprise DNR-managed forests. The Northwest Forestry Association wanted to know what level of evaluation was conducted for riparian management zone hardwood to conifer conversion. Two representatives of the Washington Hardwoods Commission, one individual from the Western Hardwoods Association, and one hardwood products company pointed out the beneficial habitat value of riparian and upland alder forests and the important contribution that hardwood stands make to overall forest biodiversity.

**Response:** Page IV.66 of the draft HCP gives the proportion of hardwood forests which comprise DNR-managed forest in riparian areas (25 percent). Page ix of the Draft EIS gives the proportion of hardwood forests which comprise all DNR-managed forest in both upland and riparian areas (10 percent).

Hardwood to conifer conversion of managed stands was modeled in the harvest calculations which were done for the economic analysis for the draft HCP.

The Services and DNR agree that hardwood forests make an important contribution to overall forest biodiversity. Hardwoods will always be a component of DNR-managed forests, particularly in riparian ecosystems where continual natural disturbance creates environmental conditions conducive to the establishment of hardwoods. Many of today's alder-dominated upland stands were generated in an era of natural regeneration without planting. Later, burning was a common method of site preparation which encouraged alder regeneration to a degree which lead to extensive herbicide spraying and eventually resulted in lesser amounts of alder in regenerating stands. The current trend away from burning will initially result in fewer alder and other deciduous sprouts, thus eliminating the need to spray. This will likely result in a better balanced stand of conifers and deciduous trees over the long term.

## 4. Other Key Terrestrial Habitats

### a. TALUS & SCREE

**Summary:** WDFW stated that forested talus may not be adequately protected. The main concern regarding forested talus is the Larch Mountain salamander, particularly in the Columbia Planning Unit. The NWIFC said that there is no scientific basis for allowing 33 percent of the stems or volume to be removed from the buffer around talus field. The NWIFC and the National Audubon Society questioned the value of a strategy that will avoid impacts only when it is "economically reasonable." Point No Point Treaty Council asked that the HCP establish the maximum percent of talus that would be mined or used for roads. WEC recommended that a large proportion of all talus, "80 percent", be granted protection, and that no harvest be permitted in the interior half of the buffer. A local group suggested that DNR investigate methods for rock mining and road construction that are less damaging to talus wildlife communities.

**Response:** The Services and DNR recognize the importance of protecting talus fields, especially in the Columbia Planning Unit. In response to public comments and concerns of FWS, the talus conservation strategy has been clarified and strengthened to increase protection of talus fields on DNR-managed lands, with additional protection afforded talus fields in the Columbia Planning Unit (draft HCP, Chapter IV, Section F and Appendix 3, Chapter IV, Section F of this document). The language of the strategy has been clarified to exclude the phrase "economically reasonable". Talus fields to be protected are defined as exposed talus greater than 1 acre (1/4 acre in the Columbia Planning Unit) with ≤30 percent canopy coverage and will be treated as no-harvest areas. The edge of the talus field is defined as the point where the canopy coverage is greater than 30 percent. A 100-foot buffer will be applied to the talus field with no harvest permitted unless the canopy coverage is greater than 60 percent, and then 1/3 of the volume will be retained. The conservation objectives in the HCP for talus habitat are to maintain its physical integrity and minimize microclimatic change. At present, the 60 percent minimum canopy coverage is considered necessary by FWS to maintain the temperature and moisture gradients of talus fields utilized by the Larch Mountain salamander. Roading through talus fields will be avoided or minimized when avoidance is impossible. Sedimentation, filling of intersticies within the talus is important for movement within the talus of the

Larch Mountain Salamander to avoid environmental extremes in temperature and moisture. Disturbance of talus will undoubtedly be reduced by the Riparian Conservation Strategy and mass wasting prescriptions. Timber will not be felled into or yarded across talus in such a way that the yarding might disturb the talus field or the humus covering that provides foraging habitat for the Larch Mountain Salamander. The no-harvest area and low-harvest buffer provisions, as well as the provision to avoid mining of talus, are expected to protect talus field integrity.

#### b. CAVES

**Summary:** The Point No Point Treaty Council recommended that no road be built within 0.25 mile of a cave entrance, no exceptions. They also recommended that DNR gate the entrance to caves that are important wildlife habitat. A local group said that DNR should limit road building activity within 0.25 mile of a cave, and that bat-friendly closures be constructed. One individual said that protection of caves is as important as protecting old-growth forest. Another individual strongly urged adoption of either Alternative B or C for cave protection to conserve bats.

**Response:** The alternative proposed by DNR is Alternative B. If approved, this alternative as proposed and/or modified will become DNR's HCP. The Services believe DNR has proposed adequate protection of caves by including provisions to protect cave entrances and passages with no-disturbance buffers and restrictions on road construction that are derived from WDFW management recommendations (WDW 1994). In addition, the confidentiality of cave locations will be maintained. These provisions will serve to maintain the microclimate within and contribute to reducing direct human disturbance to caves important to wildlife. It is expected that, by ensuring roads are at least 0.25 mile away from the cave entrance and keeping cave locations confidential, the gating of cave entrances will not be necessary. This strategy has been strengthened with minor clarifying language, including the elimination of the phrase "economically reasonable"(draft HCP, Chapter IV, Section F and Appendix 3, Chapter IV, Section F of this document).

#### c. CLIFFS

**Summary:** The NWIFC and the National Audubon Society questioned the value of a strategy that will avoid impacts only when it is "economically reasonable." The National Audubon Society also said that the mining of cliffs used by peregrine falcons for nesting must be prohibited. Northwest Forestry Association suggested that mining of cliffs should be allowed provided that the remaining rock structure mimics the natural site or leaves that site attractive to cliff-dwelling wildlife. A local group recommended that a 250 foot buffer be established around 50 percent of cliff faces in a harvesting area.

**Response:** Under the provisions of the HCP, cliffs with active peregrine falcon nests will be protected according to state Forest Practices Rules. The rules require a SEPA environmental checklist for timber harvest and related activities within 0.5 mile of the nest during the nesting season and within 0.25 mile at

other times of the year. In response to public comments and concerns of the USFWS, the conservation strategy for cliffs has been strengthened to include a site specific review of cliff habitat by DNR and FWS with consideration for peregrine falcon surveys and the subsequent development of protection measures for occupied sites (draft HCP, Chapter IV, Section F and Appendix 3, Chapter IV, Section F of this document). Trees along the base and top of cliffs judged suitable for peregrine aeries, especially perch trees, will be retained. In addition, public access to DNR-managed lands within 0.5 mile of a known peregrine falcon aerie will be restricted, and aerie locations will be kept confidential. While not all cliffs will be protected, concerns about the mining of cliffs occupied by peregrine falcons should be alleviated by this strategy, and by edits to the language that eliminate the phrase "economically reasonable".

### 5. Mineral Springs, Springs, Seeps

**Summary:** WDFW believed that springs, mineral springs, and seeps are not adequately protected. Mineral springs were a concern because the band-tailed pigeon depends on them. A local organization recommended that buffers be placed around seeps.

**Response:** Seeps and springs may be adequately protected by the wetland buffers where there is an adjacent pond or pool. Wetlands will receive buffers at least 100 feet wide, measured as the horizontal distance, with the primary objective to maintain hydrologic function. However, springs and seeps are more likely to be in forested areas, i.e. forested wetlands, often associated with headwater streams. Language has been added to address seep protection such that seeps greater than 0.25 acre will be treated as a forested wetland with the same protection, while seeps less than 0.25 acre will receive protection when they occur in the unstable slopes adjacent to Type 5 waters (see Appendix 3, Chapter IV, Section F of this document). Timber harvest is allowed in forested wetlands as long as a minimum basal area of 120 square feet per acre is maintained. This will contribute to the maintenance of seep integrity but it may not provide sufficient perch sites or mast forage for wildlife known to utilize mineral springs and the adjacent area, such as the band-tailed pigeon. In response to concerns expressed by commentors and the USFWS, provisions were added to DNR's HCP to strengthen the protection of mineral springs (Appendix 3, Chapter IV, Section F of this document). Mineral springs will have a 200-foot wide buffer to protect adjacent vegetation. Such activities within these zones will be designed to retain adequate trees for perching, and to maintian berry, fruit, and mast-producing shrubs and trees which provide food sources. Trees designated for harvest will be directionally felled, restriction will be placed on the use of pesticides and herbicides, and no ground disturbance or yarding will be allowed. This conservation strategy should minimize the degradation of mineral springs and serve to maintain band-tailed pigeon habitat.

In response to concerns expressed by commentors, language was added to DNR's HCP to strengthen protection of seeps. Seeps greater than 0.25 acres will be treated as forested wetlands. Seeps less than 0.25 acres will be provided the same protection as Type 5 waters. That is, such features will be protected where part of an unstable hillslope. Research to study the effects on aquatic resources of forest management in

around seeps and small wetlands will be included in the research program for Type 5 waters.

### 6. Forested & Nonforested Wetlands

**Summary:** WDFW, the Point No Point Treaty Council, Muckleshoot Indian Tribe, Bogle & Gates (a consultant to Washington State University), Sierra Club, Northwest Forestry Association, Northwest Ecosystem Alliance, Washington Environmental Council, Washington Rivers Council, Washington Wilderness Coalition, Washington Native Plant Society, eight representatives from seven separate local environmental organizations, one local timber company, and at least 8 individuals commented on wetland issues. Twenty-one of the 28 comments said that more protection of wetlands is necessary. Of these, 12 commentors, including the Point No Point Treaty Council, Northwest Ecosystem Alliance, Washington Environmental Council, and the Washington Native Plant Society, preferred the wetland management strategy described in Alternative C. To satisfy the habitat requirements for many species, WDFW recommended 200 foot buffers with old-growth forest habitat qualities around nonforested wetlands. The Muckleshoot Indian Tribe pointed out that the Draft EIS did not assess the impacts of roads on wetlands. Several commentors questioned the value of Alternative B since this wetland management strategy is the same as the No Action Alternative (Alternative A). The Rivers Council of Washington claimed that the draft HCP wetlands protection was no different than Washington Forest Practices Rules. The Northwest Forestry Association, Bogle & Gates (a consultant to Washington State University), and the local timber company expressed concerns about the effects of the wetland strategy on the amount of timber harvest. The Northwest Forestry Association was also concerned about the effects on forest management operations. One individual said Alternative A provided adequate protection if road density is controlled.

**Response:** DNR did consider wider wetland buffers and "no-harvest" wetland buffers for its HCP. It was determined that an HCP which specified more protection of wetlands than that specified in the draft HCP would not satisfy one of the main purposes of the proposed action -- to produce the most substantial support possible over the long term for the trusts. It is thought that the wetland strategy in the draft HCP satisfies this purpose and is sufficient to satisfy Section 10 of the ESA.

The wetlands management in DNR's HCP provides more protection than the Forest Practices Regulations and will fully implement DNR's Forest Resource Plan Policy No. 21 which says, "The department will allow no overall net loss of naturally occurring wetland acreage of function." This standard is beyond the level of protection provided by the Forest Practices Rules to ensure future flexibility through maintaining a healthy forest environment. The Forest Resource Plan was approved in 1992, but it has yet to be fully implemented. The prescriptions described in the draft HCP (p. IV.57-58) are not DNR's current practices, but are characterized as "no action" because they implement the direction given by the Forest Resource Plan.

The effects of the wetland strategy on forest management operations are the same for Alternatives A and B, and the effects are expected to be insignificant. The wetland acreage on DNR-managed lands is not accurately known, but is estimated to be

approximately 10,500 acres, only 0.6 percent of the entire HCP planning area (all 9 HCP planning units).

Adverse impacts of roads on wetlands should be insignificant. Under Alternatives A and B, no road building shall occur in wetlands or wetland buffers without mitigation (draft HCP p. IV.58). Roads constructed in wetlands or wetland buffers will require on-site and in-kind equal acreage mitigation. Also, the effects of roads on natural surface and subsurface drainage will be mitigated.

### 7. Steep and Unstable Slopes

**Summary:** A county commissioner, the Muckleshoot Indian Tribe, Tulalip Tribes, The Mountaineers, a local organization, and two individuals commented on issues related to steep and unstable slopes. The county commissioner believes that the protection for unstable slopes is excessive. The Tulalip Tribes was concerned that the methods to be used for delineating unstable slopes are not described in the draft HCP. The Muckleshoot Indian Tribe questioned how DNR would demonstrate ways to harvest timber on unstable slopes given that landslides may not occur for 20 years after harvest. The Mountaineers recommended that only helicopter logging be used on unstable slopes in the OESF. An individual was pleased that the draft HCP proposes, "a method for delineating on a site-specific basis portions of hillslopes with a high risk of mass wasting will be described in agency procedures to be developed for this HCP." One individual said to drop the word "random" from the description of landslides in the draft HCP.

**Response:** The protection for unstable slopes described in the draft HCP is not viewed as excessive. Harvest will be deferred on unstable slopes only until it is demonstrated, in a scientifically credible manner, that timber harvest can be accomplished without severely altering the natural input of large woody debris, sediments, and nutrients to the stream network.

DNR chose not to include particular methods for the delineation of unstable hillslopes in the draft HCP. Methods for delineating unstable hillslopes are evolving, and therefore, it is anticipated that more comprehensive and accurate methods than those currently used by DNR will be developed during the term of the HCP. DNR will utilize these tools as they become available.

It may be true that landslides sometimes do not occur until 20 years after harvest, but forest management is a commercial activity that requires a long-term view. Activities are scheduled by the decade. Assessing stand or landscape conditions 20 years after timber harvest is common practice.

Helicopter logging will be considered in the OESF and all other planning units if (1) it is demonstrated that timber harvest can be accomplished without severely altering the natural input of large woody debris, sediments, and nutrients to the stream network; and (2) it is demonstrated that all other less costly methods of yarding timber will severely alter the input of these materials to the stream network.

## 8. Riparian Ecosystem Components

### a. LOCATION AND BOUNDARIES

**Summary:** The Yakama Indian Nation suggested that DNR's HCP be applied to eastern Washington. The Yakama Indian Nation pointed out that 64 percent of the fish stocks in the Columbia River basin were either "depressed" or in "critical" condition, and while DNR's HCP has a riparian strategy for a small portion of the Columbia River drainage in the Columbia Planning Unit, the HCP does not cover aquatic resources on DNR-managed lands in the remainder of the Columbia River drainage. The Yakama Indian Nation pointed out that several eastern Washington bull trout populations are in jeopardy, "yet no emphasis is placed by the WDNR in the HCP or Draft EIS (for bull trout on the east side)." The Point No Point Treaty Council said that without eastern Washington habitat protection, additional listings under ESA could result. The Muckleshoot Indian Tribe stated that in some estuaries DNR's management of state aquatic lands has directly or indirectly impaired the suitability of these areas to support salmon. Also, they said that DNR has demonstrated a reluctance to use such lands for restoration purposes and that the Draft EIS does not addressed DNR-managed state aquatic lands.

WEC supported the HCP for western Washington, but recommended that DNR institute a riparian strategy in the eastside regions. The Washington Wilderness Coalition wants DNR to extend the HCP riparian protection to eastern Washington. The Northwest Ecosystem Alliance said that eastern Washington riparian ecosystems have high biodiversity, and also requested that DNR's HCP provide protection for streams in eastern Washington. An individual stated that he would like the riparian strategy applied to eastern Washington.

**Response:** Many HCP decisions, including species and lands the applicant wants covered under the incidental take permits and unlisted species agreement, are applicant driven decisions. DNR decided not to develop conservation strategies for salmon habitat in the east-side planning units because of the magnitude of non-forestry related adverse impacts (i.e., agriculture, grazing, dams, etc.).

Although DNR-managed lands east of the Cascade crest are not included in the draft HCP riparian and multispecies strategies, these lands will continue to be regulated under the ESA and state law. Furthermore, DNR manages its forests according to policies promulgated in the Forest Resource Plan (DNR 1992b) and the Washington Forest Practices Rules.

### b. STREAM SHADING

**Summary:** The Northwest Forestry Association said that stream temperature does not justify expanded riparian zones. The Washington Forest Protection Association recommended that DNR use the Washington Forest Practices Rules to protect stream temperature. A local environmental group emphasized the need for shade. An individual said that timber harvest will harm microclimate.

**Response:** The width of the RMZs in the draft HCP has been based on conservation of functioning riparian ecosystems, not solely on water temperature

control. Water temperature in the range preferred by salmonids is an important element of riparian ecosystems, but only one of several critical elements (i.e., bank stability, large woody debris, nutrients, etc.). If the buffer is less than 100 feet wide, or if the buffer is selectively logged, considerations such as species composition, stand age, and vegetation density become important (Beschta et al. 1987). As explained in the DEIS (p. 4-158 to 4-162) Alternative B provides superior stream shading to that provided by Alternative A, and Alternative B should provide stream shading similar to that provided by undisturbed old-growth forest.

The Washington Forest Practices Rules allow selectively logged RMZs ranging between 25 to 100 feet wide, along Type 1 through 3 Waters. The forest practices rules provide guidelines for determining the amount of logging that can occur within these RMZs and still maintain the appropriate shade levels. The rules also specify that trees be left along Type 4 Waters where such practices are necessary to protect public resources. There are no specific requirements, however, for protection of Type 5 Waters for the benefit of shade. It has been found that water temperatures in Type 4 and 5 Waters are more sensitive to changes in streamside shading than Type 1 through 3 Waters downstream (TFW Temperature Work Group 1990). Cumulative downstream effects of increased temperature in headwater tributaries have not been documented; however, it would be expected that, assuming similar amounts of ground water inflow into lower streams, the proportion of Type 4 and 5 Waters in a watershed may affect overall downstream water temperature sensitivity.

The riparian ecosystem microclimate will be modified due to the buffer widths described in the riparian conservation strategy of the draft HCP; however, the degree of modification will be mitigated to a large degree. Riparian ecosystem microclimate is the general environmental condition (i.e., air temperature, humidity, soil moisture, etc.) that exist in a forest along a stream. Microclimatic patterns vary with season, time of day, slope, aspect, and tree density. At least three factors will mitigate adverse modification of riparian microclimate.

First, wind buffers will be added to the riparian buffer in areas that are prone to windthrow. The wider buffer should partially mitigate adverse changes to soil and air temperature, soil moisture, relative humidity, wind speed, and radiation in the riparian ecosystem. Second, the distinct, well-defined edge at the boundary of the riparian buffer and clear-cut is temporary. After stand initiation and 20 to 30 years of forest growth, the microclimatic variables in the adjacent riparian ecosystem may be well within the range of natural variation. Therefore, adverse modification of riparian ecosystem microclimate may occur for less than half of each harvest rotation. Third, as mentioned previously, there are no reported measurements of the effects of timber management on the microclimate of riparian areas. It is reasonable to expect that the constant presence of flowing water and saturated soils will act to moderate any changes in microclimate due to edge effects.

### c. BANK STABILITY

**Summary:** The USDA Natural Resources Conservation Service recommended that risk trees be removed to avoid erosion. The Washington Forest Protection Association recommended that DNR use the Washington Forest Practices Rules for bank stability. A local forestry company recommended the removal of risk trees to reduce sedimentation caused by windthrow and commented that this would enhance the recovery of fish. A local environmental group is concerned that use of ground-based equipment within 50 feet of streams may damage the root systems of the structurally important trees within 25 feet of the stream bank. An individual recommended that the 25 foot no-harvest zone be extended to 50 feet. One individual preferred Alternative C for extra protection of bank stability.

**Response:** The use of the term "risk trees" is based on a misplaced fear that trees toppled by bank undercutting or windthrow produce sediments that harm salmon habitat. This approach to riparian management does not recognize the natural dynamics of streams and riparian ecosystems. It is the intent of the HCP that streambank erosion processes be in a balance that is controlled by a naturally functioning watershed. Under these conditions, some erosion is expected as streams migrate across their floodplains. Therefore, site-specific risk trees are not considered to be a major concern.

The DNR is also concerned about the impact of "...ground based equipment ..." within the RMZs. Refer to the draft HCP, p. IV.62, for a discussion of stream stability and the 25-foot no-harvest area and for a discussion regarding root strength.

### d. DETRITUS (litter)

**Summary:** Bogle & Gates (a consultant to Washington State University) stated that there has been an inadequate assessment of riparian zones in the No Action riparian management section of the Draft EIS. The Northwest Forestry Association questioned whether larger buffers are required to supply detritus, because detritus will be supplied by non-arboreal plants within a very short time after harvest. American Rivers Council commented that riparian areas affect the productivity of streams. A local forestry company said that hardwoods are an important source of detritus for aquatic ecosystems, and implied that converting to conifer loses these benefits.

**Response:** Riparian ecosystems are important for controlling many sources of productivity within the aquatic zone of streams. As is discussed in the draft HCP (p.III.57-58) and the DEIS (p. 4-145), riparian ecosystems encompass the aquatic environment and both the riparian and upland plant vegetation communities. A properly functioning riparian ecosystem includes the maintenance of cool clean water, stable stream banks, large woody debris, and detrital recruitment to the aquatic environment. Salmonid fish live within the aquatic environment from which they obtain the food and living space necessary for growth, reproduction, and survival. Each part of the aquatic environment has unique physical and biological characteristics and corresponding riparian elements that are also

unique. Riparian ecosystems directly and indirectly influence the quality of salmonid habitat.

The sources of detrital material are located throughout the riparian ecosystem. Non-arboreal plants are just one of many important sources of detritus that comes from the riparian ecosystem. Each source is important to the overall energy base of the aquatic environment, and ultimately the foodbase for rearing salmonids. The distance away from the stream from which leaf litter input originates depends on site-specific conditions. Thus, the effectiveness of floodplain riparian forests to deliver leaf and other particulate organic matter declines at distances greater than approximately one-half a tree height away from the channel (roughly 80 to 100 feet). Streamside vegetation provides large quantities of organic matter when leaves, needles, and woody debris fall or blow into the stream. In temperate regions, leaves and needles are shed in annual cycles, whereas woody debris enters the stream at irregular intervals as whole trees or branches are felled by wind and bank erosion (Bisson et al. 1987). Leaves and needles usually contribute most of the readily usable organic matter in woodland streams. Because leaves and needles of various species decay at different rates, they form a continuum from fast to slow decay. Red alder leaves, for example, decay at a faster rate than western hemlock and Douglas fir needles.

Hardwoods are an important source of detritus for streams, and these forests are dominant within the floodplains of rivers and streams. In most cases, hardwoods are the natural colonizing vegetation for streamside areas, and this is a process that would be maintained. However, on drier sites outside the floodplain, conifer stands are the dominant vegetative type and an important source of large woody debris recruitment for streams. The intent is to establish and maintain the original balance of hardwood and conifer that would naturally be found growing on the site, before human intervention.

One commentor states that "...the DEIS implies that the No Action riparian management zones are of insufficient width to supply detritus and an energy base to streams...and that...The DEIS cites no authority for this conclusion." The authority cited in the DEIS (p. 4-149) is FEMAT (1993), and this document points out that detrital input declines at distances greater than approximately one-half a tree height (roughly 80-100 feet) away from the channel (FEMAT, Figure V-12).

#### e. HYDROLOGIC MATURITY

**Summary:** The WDFW suggested that instream flow be addressed specifically in terms of "peak flows" and land-use practices that can be controlled, rather than "catastrophic events," or "floods." The NWIFC said that a strategy for maintaining hydrologically mature forests based on the assumptions used to develop the 1991 Washington State Forest Practices emergency rule for rain-on-snow is not scientifically justified or credible. The NWIFC pointed out that hydrologic effects caused by forest management outside the rain-on-snow zone may also have detrimental effects to salmonids, but admitted that the current level of research is not conclusive. They asked that this be acknowledged, and

asked DNR to acknowledge that future research may show that more protection is needed. The Point No Point Treaty Council said the emergency rule for rain-on-snow adopted by the Washington State Forest Practices Board in 1991 has not resulted in any appreciable conditioning of forest practices in rain-on-snow basins; therefore, DNR should develop a more meaningful hydrologic evaluation and protection strategy for rain-on-snow. The Tulalip Tribe also judged the 1991 emergency rule to be inadequate to protect against flooding due to rain-on-snow events. The Muckleshoot Indian Tribe believed that DNR's HCP should consider creation of new peaks of flow where none previously existed or increasing the duration of existing flows and the resultant impacts upon juvenile salmonids. The Muckleshoot Indian Tribe was concerned about the hydraulic simplification of stream channels (i.e., the loss of large woody debris, pools, and off-channel habitats) caused by altered hydro-regimes and other cumulative effects. They also said that the Draft EIS failed to consider the environmental impacts of the various exceptions to the rain-on-snow basin prescription, and they thought that basins less than 1,000 acres in size were also excepted from the strategy.

Bogle & Gates (a consultant to Washington State University) asked why the Washington Forest Practices Rules Watershed Analysis is inadequate. Northwest Ecosystem Alliance said, "In the discussion of rain-on-snow events, the criteria for identifying 'hydrologically mature' watersheds (25 years) is not scientifically defensible." They referred to the report cited in the Draft EIS (p. 4-171) which said that forests are only 50 percent recovered when 25 years old. WEC said that DNR should consider cumulative effects in the rain-dominated zone.

The Northwest Forestry Association said that there is a potential for legal challenges on the statement that "Two-thirds of the DNR-managed forest lands... shall be maintained in... hydrologically mature (forest) (in the rain on snow zone)." They said, "Can DNR meet this standard? We foresee an invitation to legal challenge if the percentage falls below 66 2/3 percent." The Northwest Forestry Association also said there needs to be a more complete discussion of forest hydrology, emphasizing the compatibility of forest harvest activities with proper water management. The Washington Forest Protection Association said that Alternative A and B are basically the same.

Another individual commented that the third exception to the basin hydrological maturity prescription was based on unstated and challengeable assumptions. He suggested dropping the whole thing. The same individual said that we need to the redefine the significant rain-on-snow zone to include the rain-dominated zone. Two individuals said that clearcutting of upper watersheds is bad. An individual stated that Alberta, Canada has fairly good evidence that the rate of flow in streams is significantly impacted by clear cuts in the upland. An individual asked for wider riparian reserves to reduce flooding, and another individual asked DNR to consider the hydrologic impacts on juvenile salmon.

**Response:** DNR and the Services acknowledge that hydrologic effects outside the significant rain-on-snow zone (defined as the snow-dominated and rain-on-

snow zones) may have detrimental effects on salmonid habitat. This is particularly true in the rain-dominated zone where rain-on-snow events may also occur. DNR chose not to address this issue because the general understanding of the relationships between forest hydrology outside of the rain-on-snow zone and adverse impacts to salmonid habitat is weak at this time. For this same reason, instream flow was not addressed specifically in terms of "peak flows", but rather was addressed in terms of the one hydrologic phenomenon which is known to cause significant damage to salmonid habitat, namely, rain-on-snow floods. DNR acknowledges that future research may show that better management of forest hydrology is needed to protect public resources.

DNR agrees that the Forest Practices Board 1991 emergency rule for rain-on-snow floods was inadequate to protect salmonid habitat. DNR's draft HCP greatly increases the level of protection provided by the emergency rule. Under the 1991 emergency rule, for a drainage basin completely within the significant rain-on-snow zone, if at least 1/3 of the basin was covered by hydrologically mature forest, then clear-cut timber harvest could proceed. Under DNR's draft HCP, at least 2/3 of the basin must be covered by hydrologically mature forest.

One objective of DNR's draft HCP riparian conservation strategy is to minimize the adverse impacts to salmonid habitat caused by rain-on-snow floods. DNR's strategy will alter DNR's forest management in the significant rain-on-snow zone. Over the short term, harvest rotations will increase from 60 years to greater than 75 years. Over the long term, DNR will use the Hydrologic Change Module of Watershed Analysis to develop drainage basin prescriptions for hydrologically mature forest. The Hydrologic Change Module of Watershed Analysis is not considered inadequate, but it is considered impractical, at least over the short term, because of the long time period necessary to complete the analysis of all DNR-managed lands in the five west-side planning units.

The report cited in the Draft EIS (p. 4-171) that stated that forests plantations are only 50 percent recovered when 25 years old was an interim report, and the statement attributed to this report was a speculation based on preliminary data (Harr et al. 1989). The final report, Coffin and Harr (1992), contains some of the best data available for comparing young plantation forests to late successional forests (i.e, mature forests older than 75 or 80 years) during rain-on-snow events, but the results are inconclusive. DNR's interpretation of this data is that 25 year old plantations are very close to hydrologic maturity with respect to rain-on-snow events. Coffin and Harr (1992) compared outflow measurements from paired young plantation and late successional forest plots during rain-on-snow events. There were 17 rain-on-snow events recorded from plantation plots that were 25 years old or younger. During 7 of these events (40 percent) the outflow from the plantation plot was less than or equal to the outflow from the late successional forest plot. During 30 percent (5 of 17) of these observations, the late successional forest actually produced a greater outflow.

There is no question that for the maintenance of natural flow regimes, late successional forests will behave more favorably toward salmonid habitat than

young plantation forests. But, for minimizing adverse impacts to salmon habitat during rain-on-snow events, using 25 years as the minimum forest age for hydrologic maturity with respect to rain-on-snow events seems a reasonable compromise. Twenty-five years is the minimum forest age, therefore, when a regulated forest condition is obtained, two-thirds of a drainage basin will be covered by forest between 25 years and 75 years old. Half the forest in the drainage basin will be older than 37 years.

The Draft EIS did fail to consider the environmental impacts of the various exceptions to the rain-on-snow basin prescription. A qualitative assessment of these exceptions follows. Basins less than 1000 acres are not excepted from the strategy. The draft HCP says that DNR will delineate drainage basins of approximately 1000 acres for the purposes of applying the strategy. The first exception is for drainage basins with less than 1/3 of their area in the significant rain-on-snow zone. This exception is based on the assumption that for small basins there exists some threshold proportion for area in the rain-on-snow zone below which special prescriptions are not necessary. Clearly, if only 1 percent of a small drainage basin is in the significant rain-on-snow zone then special prescriptions are not necessary. Choosing 1/3 as the threshold will result in some adverse impacts to salmon habitat, but these impacts are minimized to the extent practicable, but more importantly any adverse impacts will be less than those that might occur under Alternative A. The second exception is for drainage basins with greater than 2/3 of their area in the significant rain-on-snow zone covered by mature forest which is reasonably certain to remain that way. This exception is based on the same assumption as the first, and furthermore, this exception is thought to be a rare situation. As with the first exception, choosing 2/3 as the threshold will result in some adverse impacts to salmon habitat, but these impacts are minimized to the extent practicable, but more importantly, any adverse impacts will be less than those that might occur under Alternative A. Upon further consideration of the third exception, it was determined that adverse impacts to salmonid habitat were not minimized to the extent practicable. The third exception is modified as described below.

DNR agrees that the third exception is based on challengeable assumptions. In drainage basins where DNR manages less than half the area in the significant rain-on-snow zone and there is no reasonable assurance that other landowners will contribute hydrologically mature forest, there will not be an automatic exception to the basin hydrological maturity prescription. Instead, in such situations an interdisciplinary team of scientists will be convened to determine practicable basin level prescriptions for hydrologically mature forest.

DNR disagrees that there is a potential for legal challenges because of the draft HCP's strategy for hydrologically mature forest. DNR can meet this standard. Managing a drainage basin or landscape such that it is covered by specified percentages of various forest types and/or age classes is generally recognized as practical and desirable. A complete discussion of forest hydrology and water management is beyond the scope of the draft HCP and Draft EIS. The discussion of these topics in the draft HCP and Draft EIS are considered adequate for the

purposes of developing the conservation strategy and evaluating its environmental impacts.

## 9. Aquatic Habitats

### a. STREAM CLASSIFICATION

**Summary:** The NWIFC commented that not all streams typed after 1992 are correctly typed. The Muckleshoot Tribe said that to ensure that waters that seasonally support salmonids (intermittent streams) are not incorrectly typed as Type 4 Waters, the emphasis must be to demonstrate the lack of use rather than use. The Tulalip Tribe pointed out that past water typing maps significantly underestimate fish use. WEC asked DNR to justify the assumption that Type 4 Waters classified after January 1992 are correctly classified, and suggested that DNR adopt a standard protocol similar to Oregon's "Surveying Forest Streams for Fish Use." The Northwest Ecosystem Alliance suggests that DNR retype all streams. WEC wanted better verification of typing of Type 5 Waters. An individual suggested that a technical evaluation of the stream type system be conducted and any corrections made.

**Response:** DNR originally classified streams by the water types of Washington Forest Practices Rules using aerial photos and topographic maps. Given the enormity of the task, little field verification could be conducted. It has since been demonstrated that the classification error was, not surprisingly, quite high (Bahls and Ereth 1994). The stream classifications are considered provisional, and are continually revised.

The original stream type information was stored on paper, but DNR has transferred this information to its computerized geographic information system (GIS). This process was completed for western Washington waters in late 1991. Since the completion of the information transfer, all changes to the GIS data have been based on field classification. DNR thinks that it is reasonable to assume that the majority of streams that have been reclassified in the field are correctly classified.

Due to the high cost of a stream classification survey for all DNR-managed lands, it was decided that stream classification would occur on a sale-by-sale basis. When adequate staff and funds are available, DNR will verify the classification of many streams, regardless of their type, but the cost of committing to a program for reclassifying all streams is prohibitive.

DNR recognizes that the incorrect classification of streams as Type 5 Waters could result in a significant adverse impact to salmonid habitat. In order to avoid such impacts, the draft HCP has been modified as follows: A riparian buffer 100 feet wide shall be applied to both sides of Type 4 waters. Type 4 waters classified after January 1, 1992, are assumed to be correctly classified. Type 4 waters classified prior to January 1, 1992, must either have their classification verified in the field or be assumed to be Type 3 waters. In general it is currently standard practice for DNR staff to physically examine the classification of streams within a management unit when preparing the unit for a timber sale. If

an area has already been classified post 1992 and prior to the effective date of this HCP, it is likely in a management activity that is probably sold and or harvested. Therefore, for all practical purposes, stream typing will be examined or verified in the field whether they were typed before or after 1992.

### b. EPHEMERAL/INTERMITTENT STREAMS

**Summary:** The WDFW said that the issue of leaving buffers along Type 5 Waters that are not in mass wasting areas has been left open to far too much subjectivity. They suggested an average buffer width or "pool of buffers" be available for site-specific use, especially on non-mass wasting prone Type 5 Waters.

The Muckleshoot Tribe said that we should develop a Type 5 Water management strategy in 5 years rather than 10 years. The NWIFC recommended that buffers should be wider on Type 4 and 5 Waters. The Point No Point Treaty Council suggested that DNR use Alternative C along Type 5 Waters. The Tulalip Tribe suggested that more protection be provided along Type 4 and 5 Waters. The Sierra Club and Rivers Council of Washington suggested that more protection be given to Type 5 Waters. The Mountaineers were concerned about the lack of immediate protection for Type 5 Waters until the interim research program is completed.

Bogle & Gates (a consultant to Washington State University) was concerned about the uncertainty of the HCP, because DNR commits to a research project which will lead to a long-term management strategy for Type 5 Waters. They said that this creates uncertainty, as the HCP is committing to do something based on research results not yet known. An individual wanted an additional 25 foot buffer on Type 5 Waters. An individual said that trees in Type 5 channels intercept precipitation and provide root cohesion to stabilize thick colluvium in topographic hollows and on steep channel banks and that logging in these areas can cause massive hillslope failure. He was pleased that the draft HCP proposes, "a method for delineating on a site-specific basis portions of hillslopes with a high risk of mass wasting will be described in agency procedures to be developed for this HCP." An individual said that Type 5 Waters are important. Three other individuals stressed the need to protect Type 4 and 5 Waters.

**Response:** The draft HCP policy with respect to protection of Type 5 Waters in the five west-side planning units outside the OESF states the following: (1) those streams crossing unstable portions of hillslopes will be protected (i.e., no timber harvest) to minimize potential for landslides and other mass-wasting activities, in accordance with the Washington Forest Practices Board Rules - WAC 222 (WFPB, 1995a); (2) those streams crossing stable ground will be protected, where necessary, for maintaining important elements of the aquatic ecosystem (e.g., water quality, fish habitat), in accordance with the Forest Resource Plan (DNR, 1992); and (3) an aggressive, 10-year research program will be established to gain better scientific and management knowledge of the physical and biological processes active in Type 5 Waters and their requirements for protection from land-management disturbances, with particular emphasis on

Type 5 channels crossing stable ground. Needs for verifying stream typing, including validation of Type 5 classifications, are discussed in the comment summary "Stream Classification".

The DNR recognizes that insufficient data currently exists for accurately predicting the size, shape, and forest-stand structures necessary to protect physical and biological functions of Type 5 streams on a site-specific basis. Hence, the purpose of the research program is to develop sound strategies that will ensure adequate, long-term protection of Type 5 Waters on both stable and unstable ground while ascertaining what level of commercial timber harvest might occur in these areas. The DNR chose a period of 10 years for this research program as being long enough to obtain measurable, meaningful results and short enough to ensure that results are incorporated in management strategies in the near-term. The DNR is concerned that some trends in resource conditions might not be observable over a period less than a decade and that it might take longer than a few years (e.g., 5 years) to obtain statistically valid results on which to build a long-term conservation strategy. The DNR fully intends, however, to incorporate sound research whenever it becomes available, as part of the draft HCP adaptive-management approach. Hence, management strategies may be modified anytime during the 10-year period or thereafter, based on sound research results derived from any source (i.e., DNR or other entity).

The DNR contends that this approach is no more subjective or uncertain, and is in many regards more proactive, than present treatment of Type 5 Waters crossing stable ground on state lands. Currently, these streams receive no protection under the Washington Forest Practices Board rules - WAC 222 (WFPB, 1995a), and there is no direction in the Washington Forest Practices Board watershed-analysis manual (WFPB, 1995b) for assessing physical or biological conditions, or prescribing forest-management activities, in such areas. Hence, they infrequently are treated during the watershed-analysis process. Type 5 Waters crossing stable ground might be evaluated during TFW Interdisciplinary (ID) team visits to specific sites; however, these visits often are limited to the area encompassed by a proposed timber sale, such that the physical connectivity and biological importance of these streams to the rest of the channel network might be missed. In addition, ID-team visits have occurred only on a fraction of DNR state lands.

The draft HCP strategy acknowledges that Type 5 Waters crossing stable ground are important elements of aquatic and riparian systems, and that steps should be taken on state lands to develop an explicit strategy for their physical and ecological maintenance, which would provide operational certainty for management activities and environmental protection in the long term. Given that there are no predictive methods or models for accurately prescribing riparian buffers on Type 5 Waters occupying stable ground, DNR believes that applied research and adaptive management are the best strategies for developing buffer configurations that meet long-term management and conservation requirements at the site-specific and landscape scales. A goal of the research program is to better understand the connectivity of Type 5 Waters to the rest of the channel

network (i.e., landscape-scale approach), in addition to delineating site-specific requirements for resource protection and opportunities for commercial timber extraction. The intent of the research and adaptive-management program is to determine what should be protected and how it should be protected on all state lands in western Washington, rather than setting an arbitrary buffer width that might under-protect or over-protect physical and ecological functions on any given Type 5 Water. In addition, using a systematic scientific approach yielding reproducible results, rather than arbitrarily designating buffer widths, provides assurance to DNR's trust beneficiaries, other affected parties, and the public that DNR is developing and using the best information available in its management practices. Therefore, DNR's research program strives for long-term certainty and objectivity in management and conservation practices. In the interim, DNR will continue to evaluate Type 5 streams using available methods and qualified staff, and placing additional protection where necessary, as mandated by the Forest Resource Plan (DNR, 1992).

The scientific rationale for buffer widths is presented in the draft HCP and DEIS. The DEIS specifically discusses physical and ecological evidence in support of the proposed buffer widths, as well as holes in the collective knowledge of ecosystem functions and their requirements for protection and restoration. Current land-management and conservation strategies must grapple with the fact that there is a lack of absolute scientific certainty with regard to exactly how wide buffers must be to protect Type 4 and 5 Waters on stable ground. Consequently, DNR proposed several alternatives for buffer widths in the five west-side planning units outside the OESF. The Board of Natural Resources directed the agency to choose the alternative presented in the draft HCP (i.e., Alternative B) as the one to best balance the trust obligations to produce revenue from timber harvest with the need to provide properly functioning aquatic and riparian ecosystems. The Board also concurred with the need for adaptive management to modify conservation strategies over time as new information becomes available.

For Type 4 and 5 Waters crossing unstable ground, buffers will be as wide as necessary to incorporate existing and potential areas of hillslope failure, or will ascribe to the buffer widths proposed in the draft HCP, whichever is wider. This ensures that both physical and biological factors are considered in buffer designs. Within the OESF, approximately 90 percent of Type 5 Waters occupy unstable ground. While statistics have not been compiled for the five west-side planning units outside of the OESF, DNR scientists expect that areas with comparable terrain characteristics (e.g., flanks of the Cascades Range, steeper ground in NW and SW Washington) will display similar statistics once appropriate analyses have been performed.

The relationship between the position of Type 5 channels and topographic hollows or channel-bank seeps is recognized by DNR and discussed in the draft HCP and DEIS (in particular, see sections on the OESF Riparian Conservation Strategy). The DNR has committed to the USFWS and NMFS that qualified staff (i.e., those trained to conduct sound qualitative and quantitative analyses of

slope-failure potential) will perform field and analytical evaluations of areas prone to hillslope failure. Staff will use the best field and analytical methods available to evaluate the potential for forest-management practices to destabilize channel walls and heads, as well as areas physically connected to Type 5 channels (e.g., zero-order basins, forested wetlands). DNR staff are aware of modeling work being done by faculty, postdocs, and students at the University of Washington, as well as at other national and foreign (e.g., Australian) institutions, and intend to make use of whatever applicable models are developed, once they become available to the agency.

Concerns have been expressed by a number of reviewers over the use of a slope-morphology model (Shaw and Johnson, 1995) to assist with field reconnaissance of potentially unstable areas. These concerns include the fact that this model only addresses debris avalanches (i.e., shallow, rapid landslides) and not deep-seated failures or debris-flow runout, and that the model has not been tested adequately outside of the Olympic Peninsula. The DNR refers the reader to the model description (Shaw and Johnson, 1995), in which these and other model limitations are discussed in detail. The DNR does not intend for this model to supplant other, more sophisticated models dealing with either form of landslide behavior. At the time of the draft HCP writing, however, other models (e.g., Miller, 1995) were not available to the agency. This slope-morphology model currently is being tested in its capability to flag areas of debris-avalanche potential outside the Olympic Peninsula. The original intent of the reference was to suggest that this model is one of several that could be used as a preliminary flagging tool to assist field reconnaissances of slope stability. This model will not be used, nor should any other theoretical model, as a substitute for detailed field evaluations of debris-avalanche potential.

#### C. INNER GORGES

**Summary:** The Tulalip Tribe stated that there is a need for protection from debris flows.

**Response:** DNR and the Services recognize the dynamic and catastrophic nature of debris flows emanating from landslide sites and inner-gorge areas. Concerns have been raised over a slope-morphology model currently used by DNR and others as a preliminary screening tool in certain regions of the state (Shaw and Johnson, 1995). The discussion in the draft HCP will be clarified to indicate that this model was not designed to address debris-flow runout or forms of landslide behavior other than debris avalanches. Hence, DNR never intended to use this model for the purpose of evaluating debris flows. Rather, DNR has committed to the USFWS and NMFS that qualified staff (i.e., those trained to conduct sound qualitative and quantitative analyses of slope-failure potential) will perform field and analytical evaluations of areas prone to hillslope failure. A complete, defensible, scientific analysis of hillslope failure should include an evaluation of the potential for a debris avalanche or other slope failure to precipitate a debris flow, as well as an analysis of the potential for and extent of debris-flow runout in the downslope and cross-slope directions (e.g., as per the minimum standards set forth by the Washington Forest Practices Board watershed-analysis manual

(WFPB, 1995b)). It is expected that "qualified staff" should be able to conduct such analyses, as well as remain trained in the best field and analytical methods available to evaluate the potential for forest-management practices to destabilize hillslopes and channel margins.

## 10. Aquatic Habitat Components

### a. LARGE WOODY DEBRIS

**Summary:** The NWIFC asked what is the scientific justification for using the height of trees "of a 'mature' conifer (100 years old)" to delineate the width of the riparian buffer. The NWIFC also asked about "age at breast height." They wanted to know if age varies along different heights of a tree bole. The Point No Point Tribe asked for an explanation of the basis for the riparian buffer widths. The Hoh Indian Tribe said that large woody debris is recruited from upslope outside the buffer.

The Northwest Ecosystem Alliance stated, "According to research conducted by McDade and others (1990), 95 percent of large wood recruited into streams originates within 100 feet of the channel." Based on this citation, they request that the riparian buffer width be one site-potential tree height or 100 foot, whichever is greater, and that this buffer be applied to all stream types.

Bogle & Gates (a consultant to Washington State University) asked why the No Action alternative is inadequate to provide large woody debris, and stated that the wind buffers would actually slow the rate of large woody debris inputs. An individual said that large trees are a crucial element in all channels. A local environmental group said that narrow buffers that don't include all large woody debris sources may take away important sources of large woody debris, and may end up damaging fish habitat. An individual pointed out that Type 4 Waters in steep bedrock channels need large woody debris larger than 2 meters diameter, and therefore, he believed that there is a need to increase buffer widths to a site-potential tree height along Type 4 streams. An individual said that large trees stabilize large woody debris jams.

**Response:** The scientific justification for the riparian buffer width is given on p. III.63 and p. IV.59 to 61 in the draft HCP.

DNR agrees with the observation that on very steep slopes large woody debris can be recruited from distances beyond one site-potential tree height, i.e., from the riparian buffer. The draft HCP has been modified so that riparian buffer widths are measured horizontally. On very steep slopes, this modification should cause the riparian buffer to capture more trees that may slide into streams.

The No Action alternative is inadequate to provide large woody debris because the average buffer widths currently applied by DNR on Type 3 and Type 4 Waters average 85 and 55 feet, respectively. The scientific justification for the riparian buffer width on p. III.63 and p. IV.59 to 61 in the draft HCP indicates why this is inadequate. The purpose of wind buffers is to limit windthrow in the riparian ecosystem to a level which approximates windthrow in an unmanaged

riparian ecosystem. This input can be both gradual and catastrophic, but in most cases it is metered out over the long term at a rate of approximately 1-2 percent input per year (Grette 1985).

The riparian buffer width on Type 1, 2, and 3 Waters is based on the site-potential height of trees in a mature conifer stand (100 years old). This prescription does not specify the age or size of conifer trees in the riparian buffer. One objective of the riparian strategy is "to provide the quantity and quality of instream large woody debris that approximates that provided by unmanaged riparian ecosystems" (draft HCP p. IV.60). To meet this objective, some old large conifer must be retained in riparian buffer.

The difference between total tree age and the age at breast height, as measured by a count of tree rings using an increment borer, can be as much as four to eight years. So, a tree that is 100 years at breast height may have a total age of about 106 years, plus or minus a few years.

**b. SUBSTRATE** (SEDIMENT)

**Summary:** The WDFW asked that the following be added to Chapter III of the draft HCP: "The long overwinter incubation and development for bull trout and other salmonids leave them vulnerable to increases in fine sediments and degradation of water quality (Fraley and Shepard 1989). Embryonic salmonid survival has been shown to be inversely related to the percent of fine material less than 6.35 mm (0.25 in.) in gravel (Watson 1991). Survival to emergence ranged from nearly 50 percent in substrate containing 10 percent fines, to zero survival in mixtures which contained 50 percent fines (Weaver and White 1985)." The NWIFC stated that large woody debris stores sediment in small streams.

**Response:** The adverse effects of sediments on salmonids is widely recognized, and a general description of these adverse impacts is given on p. III.56 through p. III.59 of the draft HCP. Although valuable for many purposes, the highly detailed information presented by WDFW was not considered useful for the development of a riparian conservation strategy. Information regarding sediments which was useful for the development of a riparian conservation strategy appears on p. III.61 through p. III.66 and on p. IV.59 through p. IV.63 of the draft HCP.

The draft HCP discusses the general functions of large woody debris on p. III.60 and on pp. III.62 - III.63.

**c. CHANNEL MIGRATION & MORPHOLOGY**

**Summary:** The Hoh Tribe said that there is a need for a better delineation of channels. The NWIFC, Point No Point Indian Tribe, Tulalip Tribe, Sierra Club, Northwest Ecosystem Alliance, The Rivers Council of Washington, and one individual all recommended that the term "migration zone" be used instead of "active channel". WECsuggested that DNR adopt the approach employed in the Riparian Function Module of the Washington Forest Practices Watershed

Analysis manual to identify and map channel migration zones (CMZ) and then measure the RMZ from the outer margin of the identified CMZ.

A local environmental group and a large number of individuals (51) said that buffer measurements should be adjusted for topography. An individual said that Type 4 Waters should be analyzed for 100 year floodplain migration patterns. An individual said that additional buffer width should be added to account for channel migration.

**Response:** The DNR has committed to the USFWS and NMFS that all riparian-buffer measurements will be made beginning from the outer margin of the channel-migration zone. The channel-migration zone includes side channels or braided channels that are abandoned seasonally during low-flow discharges on the mainstem river, or are abandoned temporarily via channel avulsions. The term "channel-migration zone" is synonymous with the definition of "active channel" provided in the draft HCP: "... the active channel margins might encompass side channels and adjacent floodplain areas that transport water during wetter parts of the year ... [The active channel] might also include: (1) braided channels, (2) mid-channel bars, (3) side channels occupied during frequent flooding, and (4) portions of the floodplain nearest the channel..." (draft HCP, p. IV.53 and 54). The channel-migration zone might correspond to the 100-year floodplain in low-gradient, alluvial systems, or it might coincide with the channel high-water mark in high-gradient systems. Identifying the channel-migration zone will require that all stream channels are delineated clearly. If DNR desires to do something different in a specific case, an alternative proposal will be made and reviewed with the USFWS and NMFS. The draft HCP will be edited to reflect this decision.

In regard to applying methods described in the Washington Forest Practices Board Watershed Analysis manual (WFPB 1995b) for identifying and mapping channel-migration zones, it is likely that such methods would form the basis for delineation of channel-migration zones on state lands covered by the draft HCP. The methods described in Version 3.0 of the Riparian-Function Module are very generalized (i.e., no stepwise procedure or details of analytical requirements given) and are the basic components of any geomorphic analysis of changes in river plan-form over time. In addition, the directions largely leave the details of delineating channel-migration zones up to the analyst. Hence, it is likely that an analysis of channel-migration zones under the auspices of the HCP would follow similar procedures, given that the manual directions do not provide many specifics.

The draft HCP and DEIS indicate that riparian buffers will be adjusted on the ground to reflect topographic relief and site-specific considerations (e.g., local sites of mass wasting and channel-bank failure, large woody debris recruitment). The DNR recognizes that riparian buffers must be tailored to local site conditions if they are to successfully protect physical and biological functions of riparian areas (see draft HCP, p. IV.55 and 97, for further discussion).

### d. OFF-CHANNEL HABITATS

**Summary:** The Muckleshoot Tribe stated that wetlands that function as rearing habitat for salmonids should be protected in addition to wetland hydrology. The NWIFC requested a discussion of "wall-base channels" as salmon habitat, and said it is unclear what kind of protection these habitats would receive under the draft HCP.

**Response:** The main objective for the development of the wetland conservation strategy was to maintain hydrologic function, but the strategy for wetlands should adequately maintain the salmonid rearing habitat function of wetlands as well. Wall-base channels that are classified as Type 1, 2, 3, or 4 Waters or as wetlands would receive the protection described in the draft HCP. A discussion of wall-base channels will be added to the final HCP.

## 11. Retention of Structural Legacies

**Summary:** WDFW, NWIFC, Point No Point Treaty Council, the National Audubon Society, Sierra Club, and at least two individuals commented on some aspect of the retention of structural legacies. WDFW stated that the retention of large, structurally unique trees is commendable. WDFW recommended that more green trees and at least 4 snags per acre that are greater than 20 inches dbh be retained in clearcuts. WDFW also recommended that priority for retention be given to large hollow snags, and that DNR engage in research to create snags in young managed stands. The NWIFC and Point No Point Treaty Council recommended that more snags and logs be retained in clearcuts. The Point No Point Treaty Council recommended that large logs be retained, "e.g., 20 inches in diameter and 20 feet long." They also asked whether the retention of very large, structurally unique trees is in addition to the Washington Forest Practices Rules or substituting for it. The NWIFC claimed that the provisions for snag, log, and green tree retention were minimum Washington Forest Practices Rules and that these must be improved upon in an HCP. The other commentors stated that the provisions for the retention of snags and logs were inadequate.

**Response:** The HCP contains a provision to retain two live trees per acre of harvest according to state Forest Practices Rules, however, DNR has committed to retaining one of these trees from the largest diameter size class of living tree in the harvest unit. A preference will be shown for large, structurally unique trees that would be valuable to wildlife but these would substitute for the required green retention trees, not be in addition to this requirement. The Services and DNR recognize the importance and need to retain an adequate amount of snags and down logs for wildlife, and to retain a sufficient amount of green trees to function as snags in the future. In response to public comment and concerns of the Services, the strategy for structural legacies has been strengthened (draft HCP, Chapter IV, Section F and Appendix 3, Chapter IV, Section F of this document). DNR will retain 3 additional codominant green trees or, as a result of leave-tree clumping, a preference will be shown for intermediate shade-tolerant trees. Although not required by state Forest Practices Rules, DNR will leave 3 snags ≥20" dbh where possible with a minimum dbh of 15". Where snags at least 15" dbh are not available, a one for one replacement will be made with green trees. Preference will be shown for hard snags, and large

hollow snags ≥40 feet in height. All leave trees will be left in the harvest unit and through subsequent rotations. The riparian and wetland buffers, and murrelet habitat will also be a source of large trees with structure, and snags and down wood beneficial to wildlife. In addition, the owl NRF management areas contain a provision to ensure a minimum of 5 percent ground cover of large woody debris which is interim in nature and will be refined with the prevailing science which should ensure an adequate amount of large down logs (draft HCP, p. IV.10). The Services and DNR believe that the owl, murrelet and riparian conservation strategies, as well as these additional provisions for structural legacies will provide an adequate amount of current and future snags for primary and secondary cavity nesters, and down logs for small mammals, amphibians and other wildlife.

## 12. Landscape Planning

**Summary:** The NWIFC said that the landscape assessment for NRF Management Areas and DNR's Landscape Planning were poorly defined. They expressed concerns that DNR's landscape planning may not adequately protect natural resources such as salmon. The Elwha/Clallam Tribe said the Clallam Landscape Plan was one of the best plans they've been involved in.

**Response:** The process for DNR's Landscape Planning is still under development. DNR's Landscape Planning must prescribe management that conforms to the conservation strategies described in the HCP. These conservation strategies are sufficient to satisfy Section 10 of the ESA, and overall provide better conservation of natural resources than Alternative A.

### a. Forest Fragmentation

**Summary:** There were 10 comments on issues related to forest fragmentation. The Point No Point Treaty Council asked that the areas designated for providing connectivity between non-contiguous federal lands be delineated in the HCP. The Washington Wilderness Coalition suggested that connectivity be improved by placing new spotted owl NRF habitat adjacent to old NRF habitat. One local organization and one individual emphasized the need for connective habitat. The National Audubon Society, the Sierra Club, Washington Environmental Council, Rivers Council of Washington, 3 local environmental organizations, and one individual believe that DNR's draft HCP multispecies strategy is inadequate for interior late successional forest species. The majority of such comments questioned the habitat value of riparian buffers for interior late successional forest species.

**Response:** The owl conservation strategy proposed in the HCP contains DNR-managed lands designated as NRF habitat and as dispersal habitat. These designated lands are clearly shown on the maps of each planning unit, exclusive of the OESF Planning Unit (draft HCP Maps IV.1 through 8). The dispersal habitat areas were located where DNR-managed lands were in areas considered important to owl dispersal, where they would provide connectivity to federal lands, and where they were not already designated as NRF management areas. These designated disperal habitat areas that serve to provide some connectivity between non-contiguous federal lands are most notable in the area north of Hwy.

20 in the North Puget Planning Unit, near the I-90 corridor and in the Mineral Block of the South Puget Planning Unit, on the southern edge of the Columbia Planning Unit and from north to south throughout the Klickitat Planning Unit. The latter of which serves to provide connectivity between the Yakama Indian Reservation and federal lands in Oregon. Connectivity in NRF management areas could be improved for species other than the owl that are less mobile by placing new NRF habitat next to old NRF habitat. However, the design of NRF-designated areas is such that the 300-acre nest patches are the only stands that will be providing the nesting function, i.e. will be old forest. Once these patches are in place, no new NRF will be grown. There will be 200 acres of sub-mature or better stands that, although dynamic, will be contiguous with the 300-acre nest patch. The NRF management areas will contain 50 percent sub-mature habitat or better that, except for the 300-acre patch, will move around the WAU. At various times, this acreage will be contiguous with adjacent federal reserves and riparian management zones, thus providing some connectivity throughout the landscape. The riparian buffers on all Type 1-4 streams, and on steep and unstable slopes along Type 4 and 5 streams will also serve to provide connectivity to adjacent forest stands of various ages. Concerns have been raised about the ability of the HCP conservation strategies to adequately provide interior late successional forest. This habitat type will be limited in certain areas of the HCP, such as the South Coast Planning Unit. However, it is anticipated that some late successional interior forest will be protected in this planning unit by the murrelet conservation strategy even after the long-term plan is developed. In the OESF, the combination of the owl and murrelet strategies will also provide some late successional forest. The goals of OESF owl strategy are to retain old forest stands, most of which is old growth, or develop these stands such that they constitute 20 percent of each OESF planning unit. These stands will, at various times, be adjacent to stands that are young forest marginal or better. Although the younger stands can not substitute for interior late successional forest, the buffering effect of these stands may contribute to more of the old forest stands functioning as interior late successional forest habitat. For example, as the younger stands reach 40-60 years they may be of a height and density that contribute to the maintenance of interior late successional microclimate. It is anticipated that the 300-acre nest patches in the other west-side planning units will also provide interior late successional forest when buffered by adjacent sub-mature or better stands, and late successional stands on adjacent federal lands. It is not expected that the riparian buffers will provide interior late successional habitat in and of themselves but will likely contribute to providing this habitat type where the buffers are contiguous with steep and unstable slopes, murrelet habitat, and owl NRF habitat. Although there will not be an abundance of interior late successional forest habitat on DNR-managed lands in the HCP area, it will be more than what would occur if DNR's HCP were not implemented.

### 13. Habitat-based Approach

**Summary:** The Washington Environmental Council, The Mountaineers, and a local organization questioned whether a multispecies conservation strategy based on conservation for the spotted owl, marbled murrelet, and salmon could provide adequate protection for the habitats of all other species.

**Response:** Conservation strategies for habitat types other than those provided for and protected under the owl, murrelet, and salmon (riparian ecosystem) strategies include: talus, caves, cliffs, oak woodlands, wetlands including seeps and mineral springs, snags, and very large, trees. Protection of these "uncommon habitats" is detailed in draft HCP, Chapter IV, Section F. The special protection of these habitats are considered necessary by DNR to provide conservation for unlisted species. The intent of DNR's HCP strategy is to provide habitat that helps to maintain the geographic distribution of unlisted species that have small annual or breeding-season home range (<1 mile), to provide habitat that contributes to the demographic support of populations of unlisted species with large home ranges (>1 mile) on federal reserves, and to provide habitat that can facilitate the dispersal of wide-ranging species among federal reserves.

The conservation strategies for salmonids and marbled murrelets should "reduce the risk of extinction of many unlisted species, in particular those that have small home ranges and depend on riparian/wetland ecosystems or late successional forests." The spotted owl strategy positions large landscapes of mature and old-growth forests within 2 miles of federal reserves. Wide-ranging species on federal lands will benefit from conservation strategies in the HCP due to the proximity of these HCP reserves to federal lands.

It is expected that the conservation measures proposed in DNR's HCP will provide some protection for all the habitat types that exist on DNR-managed lands. The habitat-based approach of DNR's HCP will be further analyzed in the Service's Section 10 findings document prior to a decision on permit issuance or approval of the Implementation Agreement.

**14. Unique Forest Types** (No comments received except for additional Tribal comments in Section 3.3.)

## C. PLANTS

**Summary:** Bogle & Gates (a consultant to Washington State University) claimed that adequate protection for plants is already provided by current regulations and DNR's policies and guidelines. NCASI noted that the activities described for the OESF might reveal how to provide satisfactory habitat for late successional and old-growth plant species in a managed forest. Northwest Ecosystem Alliance requested more protection for wetlands because of the large number of plants species associated with them. The Washington Native Plant Society asserted that the HCP should meet the requirement of the Endangered Species Act, Section 19(a)(1)(B), that "the taking will not appreciably reduce the likelihood of the survival of the species in the wild." They recommended that Alternative C be selected because of its additional protection for riparian and wetland ecosystems. Furthermore, the Washington Native Plant Society recommended that DNR plan to discover and monitor populations of listed or candidate plants. An individual suggested the Endangered Species Act be amended to provide the same protection to plants as is provided for animals. Another individual pointed out that swamp sandwort is an indicator plant and expressed concern about changes in the species' distribution.

**Response:** There are no management strategies for endangered, threatened, or sensitive plant species in the HCP. There are no take prohibitions for federally listed plant species on nonfederal lands. Therefore, USFWS does not issue incidental take permits for plants. However, the Services through the Section 7 consultation process must ensure that the action of issuing an ITP will not jeopardize any federally listed plant species. For that reason, the Services encourage applicants to consider listed and sensitive plant species during the HCP development.

The management of plant species will be consistent with Policy No. 23 of the Forest Resource Plan which directs DNR to "participate in efforts to recover and restore endangered and threatened species to the extent that such participation is consistent with trust obligations."

Amendments to the ESA are beyond the scope of the proposed action. Swamp sandwort (*Arenaria paludicola*) is addressed in the draft HCP (p. IV.163) and the Draft EIS (p. 4-449).

## D. ANIMALS

### 1. Wildlife

**Summary:** WDFW, NWIFC, Point No Point Treaty Council, Tulalip Tribes, Yakama Indian Nation, Bogle & Gates (a consultant to Washington State University), the National Audubon Society, NCASI, Washington Environmental Council, The Mountaineers, League of Women Voters, 5 local environmental organizations, 1 wood products company, and 67 individuals commented on general wildlife issues. Four of the comments were presented at public hearings. Fifty-one individuals, who used an identical form letter, stated that DNR's draft HCP harms wildlife. WDFW was concerned about the lack of discussion on limiting factors, impacts, and mitigation for the hundreds of species which could be listed in the future. NWIFC believed that the measures for wildlife habitat outside of riparian ecosystems, spotted owl habitat management areas, and marbled murrelet habitat are only minimum Washington Forest Practices Rules. Point No Point Treaty Council expressed concern about the effect of high road densities on wildlife. The Tulalip Tribes recommended that to assure the continued health and productivity of native wildlife, DNR's HCP should restore natural functions of the forest on all lands managed by DNR. The Yakama Indian Nation suggested that Alternative C is closer to the level of mitigation that they expect in exchange for incidental take and unlisted species agreements. Bogle & gates (a consultant to Washington State University) claimed that adequate protection for wildlife is already provided by current regulations and DNR's policies and guidelines, and wanted to know the expected cost of the mitigation measures proposed in the multispecies strategy of the draft HCP. The Washington Environmental Council, The Mountaineers, and a local organization said that there is no evidence that DNR's draft HCP multispecies conservation strategy will work. Ten commentors, including the National Audubon Society, The Mountaineers, Washington Environmental Council, and League of Women Voters, asserted that, given the many uncertainties surrounding wildlife conservation, DNR's HCP should be conservative, i.e., "err on the side of species conservation." One individual commented that because it covers such a significant portion of public lands, DNR's HCP must provide greater protection. Four individuals believe that

both Alternatives B and C have the potential to result in the extinction of species that may be listed in the future. An individual states that riparian areas are important for biodiversity. NCASI noted that the activities described for the OESF might reveal how to provide satisfactory habitat for late successional and old-growth wildlife in a managed forest. A wood products company is not opposed to protection of fish and wildlife unless it is unnecessarily destructive to other aspects of quality of life. One individual stated that wildlife concerns should not subjugate the long standing principles of management placed upon DNR by state legislation. Another individual was concerned about effects on small landowners from the reintroduction of listed species. Another individual claimed that wildlife issues were being misrepresented for social/political motives. Specifically, this individual wrote that the set aside, no management approach is wrong.

**Response:** DNR can not justify an HCP which attempts to restore all "natural functions" of the forest on all lands managed by DNR. DNR has a duty to produce the most substantial support possible over the long term to the trusts while complying with all state and federal regulations. DNR's HCP is intended to comply with the federal Endangered Species Act and provide DNR with long-term regulatory certainty. DNR's HCP will restore or maintain many functions of riparian and wetland ecosystems and will protect uncommon wildlife habitats such as talus, caves, and cliffs. Futhermore, DNR's HCP should make an important contribution toward maintaining the geographic distribution of species with small home ranges and support the conservtion efforts on federal lands for species with large home ranges.

The HCP is the principle document supporting DNR's application for incidental take permits and unlisted species agreements. The Services can issue incidental take permits and unlisted species agreements only if the HCP satisfies the criteria listed in Section 10 of the ESA. The overall multispecies conservation strategy of the proposed HCP is designed to provide sufficient protection of all the habitat types found on DNR-managed land to meet Section 10 needs. Through negotiations, DNR and the Services have agreed to modifications of the draft HCP which will improve habitat protection for many species of wildlife. These modifications pertain to snag and green tree retention, talus, cliffs, balds, and springs and seeps.

A discussion on limiting factors, impacts, and mitigation for the hundreds of species which could be listed in the future would be an enormous and unreasonable task. In order to simplify this task, DNR has used a "habitat-based" approach for its multispecies conservation strategy. The draft HCP describes the general landscape conditions that will develop on DNR-managed lands over the term of the HCP (draft HCP p. IV.135 through p. IV.138 and in Appendix 3. Table IV.14 of this document) and describes the special protection that will be given to uncommon habitats (p. IV.139 through p. IV.143). Based on these descriptions, the draft HCP then assesses the conservation of species of concern (draft HCP p. IV.145 through 156 and Appendix 3, Chapter IV, Section F of this document). Species of concern are defined as federal candidates (formerly category 1 candidates), federal species of concern (formerly category 2 candidates), state-listed species that are not federally listed, and state candidates. Many of these species of concern could well be described as indicator or umbrella species, and therefore, it is reasonable to assume that providing

habitat for these species will provide habitat for many other species sensitive to habitat degradation. The Service will provide further discussion of the HCP effects and mitigation in its Section 10 findings document prior to a decision on permit issuance or approval of the Implementation Agreement.

Early in the development of DNR's HCP, the Services conveyed to DNR their belief that current Washington Forest Practices Rules for the protection of wildlife habitat could not satisfy the Section 10 criteria. The Forest Resource Plan is a policy document. It was approved in 1992, but has yet to be fully implemented. Implementation of the Forest Resource Plan policies requires the development of specific management guidelines. The draft HCP presents management guidelines which implements portions of the Forest Resource Plan. Furthermore, the Forest Resource Plan is thoroughly inadequate for issuance of an ITP or unlisted species agreement. It does not contain the degree of management guidance required by the Services for an HCP.

High road densities can be detrimental to fish and wildlife populations. Road construction and use are activities necessary for forest management. In order to minimize the adverse impacts of roads on fish and wildlife, DNR will develop comprehensive landscape-based road network management plans.

The cost of the mitigation measures proposed in the multispecies strategy of the HCP -- such as protection of uncommon habitats, snag and green tree retention, protection of nest sites for certain sensitive species, etc. -- are expected to be minimal compared to DNR's enhanced ability to produce revenue because of the regulatory certainty provided by incidental take permits and unlisted species agreements.

DNR's HCP will reduce the amount of habitat available to some species, but focuses on enhancing protection and recovery efforts on federal lands. It is very unlikely that either Alternatives B or C will result in the extinction of species that may be listed in the future. See the response under the heading Old-Growth Habitat for an explantion.

The reintroduction of listed species is not a part of DNR's draft HCP.

The protection of wildlife habitat is a contentious issue. The foundation of sound, politically unbiased natural resource management is credible, objective science. DNR's HCP is based on the best available scientific information and has been reviewed by qualified scientists from outside the department. For some threatened or endangered species, such as the marbled murrelet, there is a high degree of uncertainty about population sizes and rates of population change. In such cases DNR has proposed a conservative approach to habitat management.

**a. MAMMALS**

**i. Bats**

**Summary:** WDFW said that lack of snags in certain regions may lead to low populations of bats. Point No Point Treaty Council recommended that DNR participate in data collection on myotis bats. Bogle & Gates (a consultant to Washington State University) wanted to know the impact on harvesting of the

mitigation measures for bats. An individual urged DNR to take steps to identify bat roosts prior to logging and to protect caves. Another individual recommends protecting sensitive species like bats everywhere they occur, not just in a few patches of owl nesting habitat.

**Response:** Although data on bat colonies in the Pacific Northwest is scant, it is generally known that myotis bats and Townsend's big-eared bats primarily use caves for maternity roosts and hibercula. Most myotis bats also use fissures in the bark of large trees as solitary roosts or, in the case of long-legged bats, as maternity roosts. DNR's HCP will afford protection of large trees and snags in the owl NRF-designated areas, in riparian and wetland buffers, and with the strengthened snag and green tree retention measures (draft HCP, Chapter IV, Section F and Appendix 3, Chapter IV, Section F of this document) which will provide and protect potential bat roost sites. However, the preservation and conservation of bat roosts, especially caves, is probably the most important issue in bat conservation. Under the HCP, caves important to wildlife, determined in cooperation with USFWS, will be protected with no-harvest buffers and distance restrictions on road construction near caves. In addition, the location of caves will be kept confidential. This provision is important because cave-dwelling bats are especially sensitive to direct human disturbance, such as cave entry. These measures should serve to adequately protect bat habitat without conducting surveys.

### ii. Other Small Animals

**Summary:** The Point No Point Treaty Council, Northwest Ecosystem Alliance, and one individual commented on small mammals. The Point No Point Treaty Council pointed out that big logs are a component of small mammal habitat, and that small mammals serve as a prey base for predators. An individual also noted that small mammals provide food for predators. The Northwest Ecosystem Alliance requested more protection for riparian and wetland areas because 20 species of small mammal are either obligate riparian or wetland inhabitants.

**Response:** In addition to the down logs required by state Forest Practices Rules, it is expected that the additional snags and green trees that DNR has committed to provide will also be a source of down logs some time in the future (draft HCP, Chapter IV, Section F and Appendix 3, Chapter IV, Section F of this document). Not all the large and structurally unique trees, nor the codominant green trees will remain standing. Some of these trees will blow down and become large logs providing habitat for small mammals. In addition, the owl NRF management areas contain a provision to ensure a minimum of 5 percent ground cover of large woody debris which is interim in nature and will be refined with the prevailing science which should ensure an adequate amount of large down logs (draft HCP, p. IV.10). Large woody debris was considered especially important in the design of riparian buffer widths because of the fundamental role it plays in aquatic ecosystems. Except for Type 4 and 5 streams, the buffers will be 100 feet or a site potential tree

height, whichever is greater. Type 4 streams will receive 100-foot buffers on each side of the stream, and it is expected that at least 50 percent of Type 5 streams will have buffers from the strategy to protect steep and unstable slopes. All the buffers will be measured on the horizontal distance, a provision that has been changed from the draft HCP (Appendix 3, Chapter IV, Section D of this document). The Services and DNR believe that the riparian and wetland buffer widths are adequate to provide sufficient down woody debris in the buffers as a result of the buffer widths, and the restricted activity that will be conducted in the minimal harvest zone, including the minimization of ground disturbance. These measures and the snag and green tree retention measures will ensure that a supply of downed wood is available throughout the landscape.

### iii. Terrestrial Carnivores

**Summary:** A county commissioner believed that the majority of people will not tolerate management of productive lands for predators. One individual said that no action is needed for population gains, and that the cougar population is a problem again.

**Response:** There are no special conservation measures for cougars in DNR's HCP. In general, DNR's management for large terrestrial carnivores follows Forest Resource Plan policies for the recovery and restoration of endangered and threatened species (FRP DNR 1992b Policy No. 23) and provision of habitat conditions that have the capacity to sustain native wildlife populations (FRP DNR 1992b Policy No. 22). The relative importance placed on predators versus other species is outside the scope of this HCP. Although there has been an increase in the number of cougars in Washington over the past ten years, the current cougar population is not recognized as a problem by WDFW (Steve Pozzanghera, WDFW Carnivore Program Manager, pers. comm.).

(A) wolves

**Summary:** Bogle & Gates (a consultant to Washington State University) stated that the draft HCP adds further uncertainty and compliance burdens. The same consultant asked whether wolf observations had to be on DNR-managed land, and how many Class 1 observations would affect DNR-managed lands at present. They also asked how many acres of Washington State University trust land would be affected, and what is meant by "economically reasonable" and "limit human disturbance." The National Audubon Society, Northwest Ecosystem Alliance, and WEC said that DNR's draft HCP was inadequate for wolves and that an ITP should not be issued. In particular, all three groups said that state Forest Practices Rules and state wildlife regulations are inadequate. The National Audubon Society and WEC said that the draft HCP does not provide sufficient detail to allow analysis of impacts to wolves. They also asked the Services to scrutinize the intent of the "implement practicable, economically reasonable. . . plans" language. The Northwest Forestry Association wanted; (1) An explicit statement that the conservation

measures for wolves only apply to the HCP planning area; (2) An estimate of the potential impacts of the wolf strategy on DNR management; and, (3) A clear definition of "consultation" with other government agencies that will not abrogate DNR's trust responsibilities. The Northwest Forestry Association believes that the Services and WDFW are not capable of developing "practicable and economically reasonable" conservation measures.

The Washington chapter of the Wildlife Society recommended: (1) conducting surveys for wolves prior to harvest activities; (2) establishing restrictions on ground-based activities within 0.5 mile of dens or rendezvous sites between March 1 and September 30; and, (3) creating a proactive road management program. They also pointed out that the definition used for Class 1 sightings is that for grizzly bears and that it will not work for wolves. A local group recommended that forest management activities and road use be prohibited within 1 mile of known active den sites between March 15 and July 30 and be prohibited within 0.25 mile the rest of the year. Another local group said that wolves cannot tolerate high road densities, and therefore, DNR should not be permitted to road and log areas adjacent to wilderness areas. Fifty-one individuals, who used an identical form letter, wanted to know: (1) If a population viability analysis had been performed; (2) How many roads are on DNR-managed land adjacent to wilderness areas; (3) How many roads are on the rest of DNR-managed lands; (4) How many roads will DNR construct or abandon; and, (5) How will DNR make sure that roads are closed where necessary?

**Response:** There are currently three Class 1 wolf observations on or near DNR's land within the planning area, but all are 1992 observations and or due to expire in 1997. Therefore, based on current data, sometime in 1997 no WSU trust land would be affected, but some WSU trust land could be affected at anytime in the future. Given the current small number of Class 1 wolf observations within 8 miles of DNR-managed land and the rarity of wolves in Washington, DNR expects the strategy for wolves will not have an unreasonable impact on its management. All DNR-managed lands within the planning area are subject to wolf conservation measures should future Class I wolf observations occur on or within 8 miles of DNR-managed land within the planning area. Explicit language regarding the application of conservation measures for wolves only to the HCP Planning Area is found in the title of Chapter IV, Section D of the draft HCP, in the opening paragraph of the section, and in the first sentence of the second paragraph on p. IV.47.

The words "economically reasonable" have been replaced by the word "practicable." See the response under the heading HCP Commitments for an explantion of the use of "practicable." The word "consultation" has been replaced with the word "cooperation." This change was made to avoid confusion with consultation that occurs under Section 7 of the

Endangered Species Act. As used in the HCP, "cooperation" means that DNR and the Services will work together to develop plans that are agreeable to all agencies. "Limit human disturbance" means applying conservation measures such as operational timing restrictions and/or seasonal open road closures.

Measures within the HCP improve upon state Forest Practices Rules for the gray wolf, which focuses on active den sites. In addition to protecting den sites, mitigation features for the gray wolf in the HCP include: (1) The west side riparian conservation strategy which should increase travel and hiding opportunities; (2) The spotted owl conservation strategy which should promote habitat connectivity in areas adjacent to gray wolf habitat on federal lands; and, (3) Measures for road management which should reduce disturbance in areas of documented gray wolf use (see draft HCP, p. IV.47). For wide-ranging species such as gray wolves, the conservation benefits of this HCP are seen as adjunct to those provided by federal reserves. Protection of rendezvous sites was added through negotiations with the Services (see draft HCP Chapter IV, Section D). After a Class 1 gray wolf observation, site-specific wolf habitat management plans, developed in cooperation with USFWS, will potentially include operational timing restrictions and/or seasonal road closures (see draft, HCP Chapter IV, Section D). DNR will be managing roads proactively. Road closures (Forest Resource Plan, Policy No. 25, 28) and road network management (see draft HCP, Chapter IV, Section D) will minimize human disturbance even without Class 1 observations. DNR does not know how many roads near wilderness areas will be constructed and abandoned under the HCP. Because of the many factors beyond DNR's control that may influence wolf recolonization of the Planning Area, no population viability analyses were conducted for the Planning Area during the permit period. Dates for activity restrictions surrounding wolf dens were developed from information presented in (Mech 1981). The Services expect that the combination of these measures would provide adequate protection of ecological requirements for this species.

DNR will not survey for wolves prior to harvest activities. DNR will rely on records of observations maintained by WDFW. WDFW does classify wolf observations as Class 1, Class 2, and so on.

(B) grizzly bears

**Summary:** Bogle & Gates (a consultant to Washington State University) stated that the draft HCP adds further uncertainty and compliance burdens. The same consultant asked whether grizzly observations had to be on DNR-managed land, and how many Class 1 observations would affect DNR-managed lands at present. The consultant also asked how many acres of Washington State University trust land would be affected, and what is meant by "economically reasonable" and "limit human disturbance" the National Audubon Society, Northwest Ecosystem

Alliance, and WEC said that DNR's draft HCP was inadequate for grizzly bears and that an ITP should not be issued. In particular, all three groups said that state Forest Practices Rules and state wildlife regulations are inadequate. The National Audubon Society and WEC also said that the draft HCP does not provide sufficient detail to allow analysis of impacts to grizzlies. They also asked the Services to scrutinize the intent of the "implement practicable, economically reasonable. . . plans" language. The Sierra Club believes that there should be special provisions for grizzly bears. The Northwest Forestry Association wanted: (1) An explicit statement that the conservation measures for grizzly bears only apply to the HCP planning area; (2) An estimate of the potential impacts of the grizzly strategy on DNR management; and, (3) A clear definition of "consultation" with other government agencies that will not abrogate DNR's trust responsibilities. The Northwest Forestry Association believes that the Services and WDFW are not capable of developing "practicable and economically reasonable" conservation measures.

The Washington chapter of the Wildlife Society pointed out two errors in the draft HCP's background information on the grizzly bear, and recommended that an approach as described in the grizzly bear recovery plan be implemented, including the use of Bear Management Units. They also asked that sanitation issues relative to proper food storage at campgrounds be addressed. A local group recommended that forest management activities and road use be prohibited within 1 mile of known active den sites between March 15 and July 30 and be prohibited within 0.25 mile the rest of the year. Another local group said that grizzly bears cannot tolerate high road densities, and therefore, DNR should not be permitted to road and log areas adjacent to wilderness areas. Fifty-one individuals, who used an identical form letter, wanted to know: (1) If a population viability analysis had been performed; (2) How many roads are on DNR-managed land adjacent to wilderness areas; (3) How many roads are on the rest of DNR-managed lands; (4) How many roads will DNR construct or abandon; and, (5) How will DNR make sure that roads are closed where necessary?

**Response:** There are currently no Class I grizzly bear observations on or near DNR-managed land within the planning area. Given the current small number of Class 1 grizzly bear observations within 10 miles of DNR-managed land, the rarity of grizzlies in Washington, and the absence of a program to locate grizzlies, DNR expects that its strategy for grizzly bears will not have an unreasonable impact on its management. It is stated explicitly on p. IV.48 of the draft HCP that the grizzly bear habitat management areas will be created on DNR-managed lands only for Class 1 grizzly bear sightings within 10 miles of DNR-managed lands within the North Cascades Recovery Area.

The words "economically reasonable" have been replaced by the word "practicable." See the response under the heading HCP Commitments for

an explantion of the use of "practicable." The word "consultation" has been replaced with the word "cooperation." This change was made to avoid confusion with consultation that occurs under Section 7 of the Endangered Species Act. As used in the HCP, "cooperation" means that DNR and the Services will work together to develop plans that are agreeable to all agencies. "Limit human disturbance" means applying conservation measures such as operational timing restrictions and/or seasonal road closures.

Measures within the HCP improve upon state Forest Practice Rules for the grizzly bear, which focuses on active den sites. Because grizzly bears often den in upper elevations characterized by deep and lingering snow packs, and such sites are usually not suitable for timber harvest, impacts from the HCP to den sites are expected to be avoided or minimized. A substantial amount of post-emergence habitat occurs in low-elevation areas at the edge of the recovery zone. As of 1993, there were 104 Class 1 and Class 2 sightings in the Washington Cascades (Almack 1993). The locations of the North Cascades grizzly bear observations are widely distributed throughout the ecosystem. Locations and timing of locations indicate at least some of the grizzly bears in the local population are resident to the Washington Cascades, including reproductive females.

DNR believes the conservation strategy for grizzly bears (see draft HCP, p. IV.48) would likely enhance the probability for recolonization of the Planning Area and maintain or further enhance habitat when grizzly bears are inhabitants. The NRF management areas near federal lands will help connect isolated federal reserves and the west-side riparian conservation strategy will provide a network of travel, hunting, and hiding opportunities. DNR will be managing its road proactively. Road closures (Forest Resource Plan, Policy No. 25, and 28) and road network management will minimize human disturbance even without Class 1 observations. DNR does not know how many roads near wilderness areas will be constructed and abandoned under the HCP. The Service believes that high open-road densities and minimal hiding cover could result in mortality and harassment of bears during a tenuous period in a natural-recovery process.

Because proactive provisions to restrict access or reduce road densities incorporated in the strategy are limited to those listed above, the benefits of increased habitat suitability may not be fully realized. High active road densities, where present, could decrease the probability that grizzly bears would occupy DNR-managed lands in those areas. Harvesting and road construction near primary habitats such as avalanche chutes and meadows where no screening is left could negate the value of the habitats. Similarly, unrestricted seasonal activities near primary habitats could also increase disturbance to present but undetected bears.

Although measures in the HCP for grizzly bears are not consistent with the recovery plan, DNR believes that due to the limited acreage of the recovery zone managed by DNR and the specific locations of the parcels, management guidance such as that involving Bear Management Units is impractical. Seasonal road closures, campground sanitation measures, and more specific den site protection strategies will potentially all be a part of the site specific management plans to be developed in response to Class 1 grizzly bear observations. Because of the many factors beyond DNR's control that could influence grizzly bear recolonization of the Planning Area, no population viability analyses were conducted for the Planning Area during the permit period. Errors in the background information for grizzly bears have been corrected.

(C) wolverine

**Summary:** Point No Point Treaty Council recommended that no activity occur within 0.5 mile of a wolverine den. Another local group said that wolverines cannot tolerate high road densities, and therefore, DNR should not be permitted to road and log areas adjacent to wilderness areas. Fifty-one individuals, who used an identical form letter, wanted to know: (1) If a population viability analysis had been performed; (2) How many roads are on DNR-managed land adjacent to wilderness areas; (3) How many roads are on the rest of DNR-managed lands; (4) How many roads will DNR construct or abandon; and, (5) How will DNR make sure that roads are closed where necessary?

**Response:** Wolverine dens occur at higher elevations where heavy snow accumulates (Banci 1994), such as at the base of large talus slopes at timberline. Although such areas are not expected to occur on DNR-managed land within the planning area, management activities will be prohibited within 0.5 mile of known active wolverine den sites located in spotted owl NRF management areas (see draft HCP, p. IV.154). These areas are the most likely to be used by wolverines due to their close proximity to wilderness on nearby federal land. Only a small percentage of the area managed by DNR near federal Late Successional Reserves, is not in NRF management areas. DNR believes that road closures (FRP DNR 1992b Policy No. 25) and road network management will help minimize human disturbance and accidental trapping. DNR does not know how many roads near wilderness areas will be constructed and abandoned under the HCP. Because many factors beyond DNR's control would likely influence wolverine recolonization of the Planning Area, population viability analyses were not conducted for the Planning Area.

(D) fisher

**Summary:** WDFW is concerned about the contraction of the species geographic range. In particular, WDFW is concerned about the loss of low-elevation fisher habitat. Point No Point Treaty Council recommended that no activity occur within 0.5 mile of a fisher den.

Bogle & Gates, a consultant to Washington State University, wanted to know the impact on harvesting of the mitigation measures for fishers.

**Response:** The Services conclude that fisher den site protection measures (see draft HCP, p. IV.155) combined with the spotted owl, murrelet, riparian, snag, and large, structurally unique tree conservation strategies of this draft HCP will contribute to fisher conservation in Washington by providing landscapes of fisher habitat at lower elevations than the majority of federal lands in Washington. Late-seral stage forest would be available on DNR-managed land and in larger patches on federal lands in the Planning Area. Improved connectivity between noncontiguous blocks of federal land combined with the increased conservation of riparian ecosystems, snags, and large, structurally unique trees should facilitate distribution of fishers in the Planning Area. Because fishers may forage and rest in different habitats, it is expected that the mosaic of habitat types resulting from DNR's activity will benefit fishers. Fishers den and rest in late successional areas, but find prey in a variety of successional stages. Within the OESF, it is expected research on developing forest structure (i.e. diversity of tree sizes and shapes, light gaps, woody debris, standing snags, and layers of overhead cover) within managed forests will also benefit fishers. Such structure is hypothesized to influence fisher habitat use more than stand types (Buskirk and Powell 1994). Although no known fisher dens occur in Washington, DNR will restrict activity within 0.5 mile of known fisher dens within NRF management areas, where such structure will be retained (see draft HCP, Chapter IV, Section A). NRF management areas are the most likely places to contain fishers. The anticipated impact of conservation measures for fishers on DNR's activities as the result of implementation of this HCP are expected to be minimal.

Given the natural rarity of fishers in western Washington, DNR expects that its strategy for fishers will not have an unreasonable impact on its management.

**iv. Deer and elk**

**Summary:** The Point No Point Treaty Council is concerned about the effect of high road densities on elk. The Squaxin Island Tribe is concerned about the lack of provisions in the draft HCP for deer and elk. One individual said that the abundance of game in the Northwest testifies to the good and proper management of the past.

**Response:** Though this HCP is a multi-species plan, the Services recognize that there are certain trade-offs when attempting to manage for a variety of species with differing habitat needs. Habitat management directed toward the spotted owl results in decreased amounts of early successional structural stages that could serve as foraging habitat for elk and deer. However, old-growth and other late successional stands that provide thermal cover and winter forage habitat would be available on nearby federal lands. Late

successional stands that provide thermal cover and early-successional stands that provide forage would be available at all elevations used by deer and elk on DNR-managed lands in each Planning Unit. Road effects on deer and elk are indirectly addressed through road closures (FRP DNR 1992b Policy No. 25), road network management and restrictions on activity in NRF management areas.

### b. BIRDS

#### i. Sea, shore, & wading birds

(A) marbled murrelets

**Summary:** WDFW, the NWIFC, Point No Point Treaty Council, Tulalip Tribes, National Audubon Society, Sierra Club, Northwest Forestry Association, WEC, the Mountaineers, Northwest Ecosystem Alliance, three local chapters of the Audubon Society, a local recreation group, 57 individuals (51 copies of an identical letter), and Bogle & Gates (a consultant to Washington State University) made general comments regarding the marbled murrelet strategy described in the draft HCP. The most frequent comment was that, given the uncertainty surrounding the current population status of the murrelet, DNR should not be issued an ITP until more research is completed and a long-term strategy can be formulated. Other comments were as follows: (1) WDFW and USFWS should be designated as cooperators in the formulation of a long-term conservation strategy; (2) DNR should restrict harvest near suitable habitat blocks during the breeding season while the long-term plan is being developed; (3) The conservation objective for marbled murrelets should be to restore populations and habitat; (4) Permanent old-growth reserves should be set aside for murrelet conservation; suitable murrelet habitat must be saved; (5) DNR should grow trees with large branches to serve as nesting platforms; (6) Adopt Alternative C; (7) DNR should provide murrelet habitat well distributed across the murrelet's range; (8) Given the murrelet's strong association with old growth, we can expect the population to decline for 50 years similar to the spotted owl; (9) Due to the interim nature of the murrelet strategy, the HCP as a whole is not a long-term plan; (10) How does the long-term murrelet strategy contribute to certainty in harvest levels over the long term; (11) There is no evidence to support the need for a "no entry" zone around occupied murrelet sites; and, (12) DNR defers harvest in potential habitat instead of participating in a cooperative research program.

One commentor made several points regarding the murrelet ecology section of the draft HCP. These comments are as follows: (1) There are many theories as to why murrelet populations are disjunct along the coasts of Washington, Oregon, and California - other possible reasons in addition to logging should be included in the discussion; (2) Murrelets nest in mid-successional forest - any limitation on the forest types being used by murrelets is premature; (3) There have been no studies to show

the relationship between flight behavior and presence of murrelet nests, thus any reference to "occupancy" as per the Pacific Seabird Group protocol should not be equated to nesting; (4) The number of nests studied to date (59) is too small to be meaningful and a statement should be made that puts this fact into perspective; (5) Generalizations should not be made regarding the habitat characteristics of the entire population; (6) The reference to a correlation between occupancy and nesting should be stricken from the paragraph on p. III.35 of the draft HCP because such a correlation has never been verified; (7) More than three years of data is needed to establish a downward trend in the population; (8) The statement that loss of habitat will have a negative effect on the population is not true in every case as no studies have been done to determine what factors are limiting population growth; (9) It is unwise to draw conclusions from other alcids regarding colonization of new habitat because murrelets are the only member of this family that flies such great distances to find a nest; (10) Natural disturbances have destroyed habitat in the past that is currently occupied by murrelets indicating that they have an ability to colonize new habitat; (11) Packing theory is not applicable to murrelets; and, (12) The effects of forest fragmentation on murrelets is purely speculative.

**Response:** DNR thinks that the proposed conservation strategy provides an appropriate level of protection for marbled murrelet habitat on DNR-managed lands. The certainty gained through the provisions of Alternative B make it preferable to the No Action alternative. Alternative A provides no commitment to develop a long-term plan, to survey potential habitat for occupied sites, or to continue deferral of potentially suitable habitat. It was determined in the DEIS that Alternative A could lead to the extirpation of murrelets on DNR-managed lands. Under Alternative B, a maximum of 5 percent of the occupied sites on DNR-managed would be taken.

Five percent of potential occupied sites on DNR lands represents a far lower percentage of all potentially occupied sites - a maximum of 0.35 percent of population in Washington (DEIS p. 4-121). Furthermore, the strategy would direct impacts to habitat that supports fewer birds and probably has lower reproductive success (DEIS p. 4-121). Site management plans to be developed under the long-term plan would reduce risk of loss of habitat due to fire, windthrow, and disturbances. Small reduction in population size would be offset by the significant benefits of locating and providing long-term protection to the majority of occupied sites and helping conduct research to determine how to protect the breeding potential of the population. The Services think the proposed strategy for murrelets is an acceptable risk in exchange for the level of protection of high quality habitat and the long-term protection of occupied sites. The level of protection is higher in southwest Washington than was analyzed in the DEIS. The HCP proposal has been changed to protect

surveyed unoccupied habitat in that part of Washington until long-term plans have been completed.

The Service will participate in the formulation of the long-term murrelet strategy through a multi-agency Science Team. The Service will have the ability to bring in technical assistance from third parties.

The HCP has been modified to clarify protection of occupied sites and unoccupied but high quality habitat during the period in which the interim conservation strategy is in effect. Suitable but unoccupied habitat will only be released for harvest if it is farther than 0.5 mile from an occupied site, and the harvest would not take the amount of suitable habitat (as identified in the habitat relationship study) below 50 percent of the total suitable habitat on DNR-managed lands in the WAU. In southwest Washington, no suitable occupied habitat will be released for harvest until the long-term plan for this area has been completed or 12 months has passed since the initiation of negotiations with the Service on the draft long-term plan. These provisions would assist in protecting suitable habitat blocks not only during the breeding season, but during the entire time the interim strategy is in effect.

Analysis of Alternative B in the DEIS resulted in the conclusion that the proposed strategy would implement all six actions listed in the Draft Marbled Murrelet Recovery Plan to achieve recovery of the species (DEIS p. 4-127). These actions are to: (1) secure habitat by designating reserves and critical habitat in both marine and terrestrial habitat and develop habitat conservation plans and protect occupied sites; (2) develop and implement landscape management strategies within marbled murrelet recovery zones to stabilize populations and improve habitat conditions; (3) monitor populations and survey potential breeding habitat to identify nesting areas; (4) implement short-term actions to stabilize the population including maintaining habitat distribution and quality, maintaining suitable habitat in large contiguous blocks, maintaining buffer areas, decreasing adult and juvenile mortality, increasing recruitment, and initiating research to determine the impacts of disturbance in both marine and terrestrial environments; (5) implement long-term actions to stop population decline and increase population growth by increasing the amount, quality, and distribution of suitable nesting habitat, decreasing fragmentation, protecting recruitment habitat, and providing replacement habitat through silvicultural techniques; and, (6) conduct research and monitoring to refine survey and monitoring protocols, examine limiting factors, and gather data necessary to develop specific delisting criteria and appropriate landscape management strategies (Marbled Murrelet Recovery Team 1995). While the potential to restore and enhance the population is lower than in Alternative C, Alternative B still would make significant contributions toward preventing further declines in the population by maintaining habitat in all planning units in which murrelets have the potential to occur on DNR-managed lands (maintaining

distribution), identification and protection of at least 95 percent of potential occupied sites on DNR-managed lands, and protection of suitable, unoccupied habitat in southwest Washington during the interim strategy. Alternative B has a reasonable likelihood to contribute toward enhancement of the population through knowledge gained in the proposed research program and through implementation of the long-term conservation plan as outlined in the HCP.

Any old-growth habitat in which occupied sites are located would be protected under Alternative B. One objective of the research to be conducted under the strategy is to determine how much suitable nesting habitat murrelets require to maintain a stable population at the occupied stand level and the landscape level. The amount of old growth that will be protected will be determined as a function of the ecological requirements of the species.

The proposed interim murrelet strategy has not been designed specifically to develop new nesting habitat. However, over the time frame of the HCP, it is likely that the nest habitat provisions of the spotted owl strategy, the riparian strategy, and the snag recruitment and green tree retention strategy will result in the growth of large trees with potential nesting platforms for marbled murrelets.

While it is true that murrelets appear to be highly associated with old-growth forests, and new habitat will not likely be available in federal reserves for at least another 50 years, it is not straightforward to compare spotted owl demographics with marbled murrelet demographics. Spotted owls use mature and late successional forests for all of their life-needs while murrelets use old forests only for the nesting component of their life history. Thus, marine habitat factors also influence population dynamics of the murrelet. It is not possible to predict at this time how much longer the murrelet population may decline.

While it is true that it is not possible to predict how much murrelet habitat would be protected under the long-term marbled murrelet conservation strategy at this time, it is an over-exaggeration to state that this element renders the entire HCP a short-term plan. First, the conceptual elements of the long-term plan have been identified. Second, potential murrelet habitat as it is currently understood constitutes 4 percent of the entire forested land-base covered by the HCP. Thus, development of the long-term plan will not affect a large proportion of DNR-managed lands, and other elements of the HCP are likely to already provide habitat that will be incorporated into any long-term conservation strategy for the murrelet. The need to defer formulating a long-term conservation plan does introduce an element of uncertainty into future harvest plans. The concept of certainty as it is related to conservation science and predictability of harvest levels however, is relative. HCPs are not intended to alleviate the need for adaptive management of threatened and endangered species.

They do however, allow the Service and the applicant to come to agreement on the parameters that will govern formulation of any new conservation strategies. Further, as was noted directly above, the amount of potential murrelet habitat is small compared to the permit area. For modeling purposes, DNR can assume a range of reasonable scenarios based on the total amount of potential murrelet habitat and make its harvest predictions based on this range.

There is enough evidence to support the contention that disturbance around occupied sites can be a significant factor in negatively affecting adult and juvenile survival. Murrelets appear to be particularly vulnerable to predation (Nelson and Hamer 1995b). Current demographic modeling indicates that increasing nesting success and adult survivorship can have a significant positive effect on the population (Beissinger 1995). Thus, protecting potential breeding sites from disturbances that may lower nesting success is a reasonable strategy to employ while more research is conducted on the specific activities that constitute unacceptable levels of disturbance around occupied sites. No entry zones do not necessarily mean complete exclusion of human presence. Such prohibitions are not indicated in the draft HCP.

The commentor who stated that DNR is deferring harvest in potential murrelet habitat instead of participating in cooperative research is in error. The interim murrelet conservation strategy involves both deferral of harvest in potential breeding habitat and participation in cooperative research. Deferral of harvest is fundamentally necessary in order to avoid take and preserve options for future conservation once habitat definitions have been refined and landscape-level conservation problems are better understood. The brief discussion of the possible relationship between murrelet distribution and the occurrence of adjacent late successional forest acknowledges that the evidence at this point is circumstantial. However, this evidence is considerable, and no other plausible explanations have been discussed extensively in published literature on murrelet ecology.

The summary of current research on murrelet ecology including forest types that have been found to be occupied or in which nesting has been documented in no way precludes the possibility or examination of other forest types for potential murrelet use. The habitat relationship study described in Chapter III of the draft HCP (p. III. 43-46) is designed specifically to examine the full range of habitat types that murrelets potentially use and relate occupancy rates to habitat type. The research described on nesting habitat in the murrelet ecology section simply points out that the preponderance of evidence thus far indicates that murrelet breeding habitat is strongly associated with structures that are present in old forests or in uneven-aged stands with old-growth characteristics.

The paragraph regarding flight behavior and nesting ends with the statement "Occupied behaviors suggest, but do not definitively confirm breeding" (draft HCP p. III.26). This statement is an explicit recognition that the flight behaviors used to define a stand as occupied, which have been exhibited by nesting murrelets, serve as good indicators of nesting, but are not direct proof. The paragraph cites research published in the recent Forest Service publication Ecology and Conservation of the Marbled Murrelet (Ralph et al. 1995) in which certain flight behaviors have been observed in nest stands and/or exhibited by murrelets approaching known nests. Nowhere in the paragraph referred to by the commentor is the claim made that these flight behaviors constitute direct confirmation of nesting, nor do statements in this section extend beyond what has been published as observations of murrelet behavior.

The discussion of data presented regarding nest tree and nest stand attributes clearly presents the sample sizes from which the data is drawn and clearly states that "Generalizations of nest stand, nest tree, and nest attributes should be viewed cautiously in light of the small sample size from which they were drawn...In addition, more extensive surveys of non-old-growth habitat will help determine if, and the extent to which, murrelets use younger and smaller trees." (draft HCP p. III.34). While the sample size does warrant caution about range-wide generalizations, it is not too small to be meaningless. Biological conclusions are often drawn from smaller sample sizes. Further, the data which indicates strong associations of murrelet nesting with older forest has been gathered throughout the non-Alaska portion of the species' range indicating that such associations are not coincidental or meaningless. Surveys for murrelet occupancy in non-old-growth habitat have been conducted and do not have occupancy rates that are as high as for stands with old-growth characteristics - i.e., with trees large enough to contain platforms of sufficient size. The HCP explicitly recognized that further surveys need to be done to gain a more precise understanding of murrelet habitat associations.

DNR and the Service disagree with the commentor who suggests that the statement referencing correlation between nest and occupied behavior be stricken from the paragraph on p. III.35 of the draft HCP. The statement reads "Occupied behavior is indicative of nesting activity in a stand." This statement is accurate and does not claim direct correlation between occupied behaviors and nesting. Using occupied stands as a surrogate for nesting stands is not totally unfounded, but actually provides the best picture of potential characteristics of nesting habitat given the difficulty of locating actual nests. It is true that no studies have looked specifically at the statistical correlation between occupied behavior and nesting. However, as was stated above, the behaviors described as indicating that a stand is occupied have been repeatedly observed by murrelets approaching known nests and by birds flying into and out of stands in which nests occur. The current state of data then warrants deriving

descriptions of occupied stands and stating that these could indicate characteristics of potential nesting habitat, which is what is stated on p. III.35 of the draft HCP. The conservation strategy for the murrelet has been designed to gather more data which will help resolve questions about the relationship between occupancy, nesting, and reproductive success.

The section on murrelet demography and population trend clearly shows that long-term data is lacking and needs to be gathered in order to develop a long-term conservation strategy. The author also clearly stated that the current projected rates of population decline are preliminary and the data used to construct the model could have several sources of bias (draft HCP p. III.36 through 38). Therefore, the commentors concerns are already addressed in the original text.

The commentor is correct in noting that loss of habitat may not in every case lead to population declines. It is noted in the HCP that current demographic models do not allow a distinction to be made between habitat loss and other factors that may lead to population decline. The statement regarding the relationship between habitat loss and negative effects on the population is a general observation from what is known about reproductive rates and maintenance of populations. Given that the forest types currently understood to support murrelet nesting have declined in amount and extent throughout the range of the murrelet, loss of this habitat is likely to already have had a negative effect on the population.

DNR refers the commentor to Divoky and Horton (1995) for a full explanation of the conclusions drawn from comparative studies of alcids as they pertain to natal dispersal and potential implications for loss of habitat on the ability of breeding adults to find new sites. The authors of the study did take into account the different flight habits of marbled murrelets compared to other alcids, noting that murrelets likely had higher rates of natal dispersal than other alcids. Neither Divoky and Horton (1995) nor the author of the murrelet ecology section of the HCP suggest that murrelets cannot colonize new habitat. The hypothesis is that reproductive output of the population may be decreased if in fact marbled murrelets have relatively low natal dispersal capability, and the species had to adapt to new habitat conditions requiring that dispersal distances increase.

Given that murrelets nest away from forest edges, and that nest predation is higher in nests closer to forest edges (Nelson and Hamer 1995b), the discussion of the possible effects of fragmentation on murrelets is not purely speculative, but based on reasonable interpretation of existing data.

Packing is also a reasonable threat about which to hypothesize given what is currently known about murrelet nesting ecology.

habitat-relationship study

**Summary:** WDFW, NWIFC, Point No Point Treaty Council, Northwest Forestry Association, Society for Conservation Biology, and Bogle & Gates (a consultant to Washington State University) made comments pertaining to the habitat relationship study component of the murrelet alternatives. Comments were: (1) All potential marbled murrelet habitat in southwest Washington (South Coast and portions of the Columbia Planning Units) should be surveyed for murrelet occupancy; (2) There is no scientific basis for allowing the release of habitat that would support 5 percent of potentially occupied sites; (3) The Tribes should be involved in reviewing the data collected in the habitat relationship studies; (4) The HCP and No Action strategies for the marbled murrelet regarding the habitat relationship study are indistinguishable; (5) No data is presented as to how much suitable habitat will be deferred and no estimates are provided as to how much marginal habitat will be released after the habitat relationship study has been completed; (6) We know little about how the time scale and magnitude of change of habitat surrounding occupied sites will affect murrelet breeding and fledging success thus only protecting habitat around occupied sites may prove inadequate; and, (7) It not scientifically credible to defer all timber sales in potential murrelet habitat on almost a complete dearth of data.

Questions regarding the habitat relationship studies included how intensive a survey effort will be conducted during these studies, and will the effort be adequate to find all or even a majority of the occupied sites?

**Response:** Surveying all potential murrelet habitat in southwest Washington would constitute a lower risk strategy for the species in that portion of its range. The Service, however, thinks that the proposed strategy, including retention of surveyed, unoccupied habitat is a sufficient conservation approach.

The strategy which allows release of marginal habitat that supports 5 percent of the potentially occupied sites is a management proposal that has scientific data suggesting that this release would not cause a large impact to the population (see response in section above, and DEIS p.4-121).

The commentor is correct in noting that the same type of habitat relationship study would be conducted under the No Action Alternative as under Alternative B. The important difference however, is that the No Action Alternative does not specify what will be done with the information gathered in this study, nor is there any commitment to continue deferral of potential habitat or to survey remaining habitat for occupancy.

The Service has the ability to bring in third parties, including the Tribes, for technical assistance in reviewing the results of research conducted as part of the marbled murrelet conservation strategy.

The draft HCP does not contain estimates of the amount of potential habitat that could be deferred during the habitat relationship studies and inventory surveys or the amount that could be released as marginal habitat. These estimates, and the methods for deriving them are described in detail in the DEIS (p. 4-111 through 4-118).

The commentor who noted that we know little about how the time scale and magnitude of change of habitat surrounding occupied sites will affect murrelet breeding and fledging success is correct. The research program associated with the murrelet strategy is designed to study the level of protection required around occupied sites to allow successful reproduction. Questions of the amount of habitat needed at larger scales (e.g., watersheds) will also be examined. The long-term conservation plan is to include occupied site management plans as well as landscape-level measures to reduce gaps in distribution of habitat. The interim strategy should protect adequate amounts of habitat to allow for needed management options once these research questions have been answered.

The Service and DNR disagree that it is not scientifically credible to defer timber sales in potentially suitable habitat. There is not a dearth of data regarding the types of habitat in which murrelets have been observed thus far. There is adequate data upon which to design further research to refine current understandings of murrelet nesting habitat relationships. To not defer timber sales in potential habitat would remove both the ability to learn more what murrelets need and the management flexibility for future conservation options.

The habitat relationship studies are designed to examine a large enough sample of forest stands with a range of habitat characteristics to establish statistically meaningful relationships between habitat types and occupancy. The studies are not intended in and of themselves to accomplish a full inventory survey of habitat on DNR-managed lands. Once habitat relationships have been established, protocol surveys will be conducted to inventory habitat that supports 95 percent of the potentially occupied sites on DNR-managed lands (draft HCP p. III.43-46).

<u>marginal habitat</u>
**Summary:** The NWIFC, Point No Point Treaty Council, the Tulalip Tribes, Northwest Ecosystem Alliance, Washington Wilderness Coalition, a local chapter of the Audubon Society, and Bogle & Gates

(a consultant to Washington State University) commented on marginal murrelet habitat. Six commentors stated that marginal habitat should not be released for harvest while the long-term strategy is developed. One commentor wrote that too much marginal habitat was being protected.

**Response:** The deferral of all suitable habitat, both marginal and higher quality would be the conservative approach that could be taken. It would also constitute a "no take" strategy which does not fit the purpose and need of DNR. It was determined in the DEIS that the benefits of Alternative B outweigh the small reduction in population size that would result through the release of marginal habitat and would not reduce the likelihood of recovery of the population. The Service will make a final determination of the adequacy of the proposal in the Section 7 consultation. The Service does think that release of more marginal habitat than is proposed in Alternative B could pose an unacceptable risk to the species.

unoccupied habitat

**Summary:** WDFW, Washington Wilderness Coalition, and Bogle & Gates (a consultant to Washington State University) made comments pertaining to unoccupied murrelet habitat. One commentor requested that DNR commit to a schedule for carrying out its research proposals in order to ensure that suitable but unoccupied habitat is not completely harvested before the long-term plan is complete and thus future management options can be retained; one commentor requested that suitable but unoccupied habitat be retained as described in Alternative C; and one commentor requested specific information regarding how much timber on Washington State University trust lands would be available for harvest if suitable but unoccupied habitat were made available for harvest within the first two years of the HCP.

**Response:** Language in the HCP has been modified to reflect a commitment to conduct each sequential step of the conservation strategy with no time gaps. Negotiations with the Service on the long-term conservation plan for each planning unit will begin within 12 months of the completion of inventory surveys. The HCP has also been changed so that all surveyed, unoccupied habitat will be retained in southwest Washington until the long-term plan has been completed, or until 12 months have passed since negotiations have commenced on the plan. Suitable but unoccupied habitat will be released in the other planning units. The request for specific information regarding Washington State University lands is outside the scope of this process.

occupied habitat

**Summary:** The Society for Conservation Biology and the Northwest Forestry Association made comments relating to occupied marbled murrelet habitat. One commentor wrote that the proposed habitat relationship study was inadequate to be able to estimate site occupancy and that data needed to be colleted regarding reproductive success, predation rates and site abandonment rates if habitat relationships are to truly reflect murrelet habitat preferences. The other commentor wanted clarification and an upper estimate of how much potential occupied murrelet habitat would be off base and for how long under the HCP murrelet strategy.

**Response:** The proposed habitat relationship study will be adequate to determine site occupancy, as it will use protocol surveys that have a high likelihood of determining if a forest stand is occupied by murrelets. The study will, by itself, be inadequate to answer further questions of how habitat characteristics relate to reproductive success. These questions will be examined as part of larger cooperative research programs on murrelet nesting ecology.

The upper estimate of how much habitat would be off-base to harvest under the proposed HCP is described in the DEIS. There is a total of 60,664 acres of estimated potential murrelet habitat within 50 miles of marine waters that will be deferred during the habitat relationship studies (DEIS p. 4-116). Some portion of this will be released as a result of the habitat relationship studies. Estimates based on current occupancy rates are that 38,442 acres of this habitat will be retained at least until the long-term plan is completed (DEIS p. 4-117).

marine issues

**Summary:** The Muckleshoot Indian Tribe commented on marine issues related to the marbled murrelet. They requested that the HCP be modified so that new fishing restrictions would not be established without first assessing the possibility of increasing habitat protection (refer to the draft HCP p. III.41 and 43).

**Response:** The description of threats to marbled murrelets in the marine environment contained in the murrelet ecology section of the draft HCP is intended for background information. DNR's HCP does not cover fishing restrictions as these are outside of the department's jurisdiction regarding trust land management.

**ii. Raptors**

(A) spotted owls

**Summary:** WDFW, Muckleshoot Indian Tribe, Tulalip Tribes, The Yakama Indian Nation, City of Port Angeles, Sierra Club, Society for Conservation Biology, The Wildlife Society, The Mountaineers, Washington Forest Protection Association, Northwest Ecosystem

Alliance, Tahoma Audubon Society, 13 individuals, and Bogle & Gates (a consultant to Washington State University) made general comments pertaining to spotted owls. The majority of comments took the general position that the proposed strategy was inadequate for owl conservation on DNR-managed lands. Several organizations and individuals commented that Alternatives B and C would result in the extinction of the owl; two individuals commented that Alternative A would provide the best protection for owls. Other specific comments of this nature included a request that the HCP should use demographic restoration and enhancement as another category of lands; the conservation objective for the spotted owl should be to restore nesting, roosting, and foraging habitat throughout DNR-managed lands; the impact to spotted owl site centers in eastern Washington was out of proportion to the level of mitigation provided; the overall conservation strategy for spotted owls is minimal and there should be more provided from the outset; the plan will wipe out half the owls on DNR-managed lands; a population viability analysis should be done on the HCP proposal; the range of the owl will be reduced under the combination of DNR's HCP and the proposed 4(d) rule; the DEIS should include an analysis of the 4(d) rule. Two commentors felt that the HCP should provide less protection for spotted owls than the current proposal. One of these commentors noted that spotted owls live in second growth; the other felt that past harvest restrictions on the Olympic Peninsula for spotted owls were not based on sound scientific information. One commentor also expressed concern that the DEIS underestimated the amount of spotted owl habitat that would be provided under
Alternative A.

**Response:** There are several reasons why it is unlikely that Alternatives B or C would result in extinction of the owl. First, the proportion of total habitat on all ownerships in both eastern and western Washington (outside of the OESF) that occurs on DNR managed lands is small compared to the proportion of habitat on federal reserve lands. In western Washington, 55 percent of all habitat occurs on federal reserves, while between 6 and 14 percent of it occurs on DNR-managed lands (DEIS p. 4-64). In eastern Washington, 60 percent of all habitat occurs on federal lands, while only 6 percent occurs on DNR lands (DEIS p. 4-212 and 213). Under the President's Northwest Forest Plan, habitat conditions are expected to improve on federal reserves over time. Thus, the likelihood that either Alternatives B or C, which both make nonfederal contributions of habitat in areas identified by the Northern Spotted Owl Recovery Team and other owl conservation planning efforts to be important to the population, would result by themselves in the extinction of the species. Second, in the long term, Alternatives B and C would provide demographic support to spotted owls at a higher level than Alternative A. Given that both Alternatives B and C provide habitat in support of medium to large clusters of owls on or near federal reserve lands and that the USFWS determined in its biological opinion for the President's Northwest Forest

Plan that the owl had a high chance of persistence over the next 100 years, it is unlikely that either of these Alternatives would cause extinction of the species. In addition, the USFWS will not issue an ITP to DNR if it determines in its Section 7 consultation that the proposed HCP would impair the long-term survival of the spotted owl.

The Service and DNR disagree that Alternative A is better for spotted owls than either Alternatives B or C. The DEIS demonstrates that over a 100 year period, Alternative A contributes the least to spotted owl conservation. Because of near-term take of spotted owls under both Alternatives B and C, Alternative A provides a higher level of protection for the next 10 to 20 years. However, because of the incentive to keep habitat levels at a minimum (40 percent within existing owl circles) and the disincentive to allow forests to develop into habitat under Alternative A, conditions for the owl would very likely deteriorate over time.

If DNR were to adopt a conservation objective to restore spotted owl habitat on all the trust lands it manages, the agency would probably be acting in violation of its trust duties. In addition, such a standard is beyond what is required for issuance of an ITP under Section 10 of the Endangered Species Act.

The Services and DNR disagree with the commentor who said that the impact to spotted owl site centers in eastern Washington was out of proportion to the level of mitigation provided. The DEIS stated that there are approximately 67,500 acres of suitable spotted owl habitat on DNR-managed land in eastern Washington. The DNR has estimated that over the short term, approximately 44,400 acres of this owl habitat would be located in owl circles and unavailable for harvest. This habitat would be sparsely distributed, fragmented, and would decrease in quantity over the long term. The proposed HCP provides 19,600 of NRF habitat and 42,500 acres of dispersal habitat in close proximity to federal reserves. The strategic placement of DNR-managed habitat with respect to federal reserves and the long-term certainty for the existence of this habitat is thought to be adequate mitigation for the short-term adverse impacts to owl site centers. Furthermore, more mitigation would not have satisfied a main purpose of the proposed action, namely, "produce the most substantial support possible" for the trusts.

In designing the conservation strategies for the HCP, DNR has to satisfy two main legal obligations. The first is compliance with issuance criteria under Section 10 of the ESA, the other is to produce long-term income for the trust beneficiaries. The spotted owl strategy was developed to provide support to the federal population as a way to not appreciably reduce the likelihood of survival and recovery of the species, while allowing DNR to fulfill its trust obligations. The draft HCP represents what DNR considered to be the most reasonable balance of its conservation and trust duties. Through Section 7 consultation, the Services will determine

whether the proposal meets the biological criteria established under Section 10 of the Endangered Species Act.

To say that the proposed HCP will "wipe out" half the owls on DNR-managed lands is an overstatement of impacts. The HCP would, if adopted, have negative impacts on between 123 and 151 known and projected site centers whose regulatory circle overlaps DNR-managed lands. These sites would be at risk for incidental take and they represent between 40 and 49 percent of known and projected sites that influence DNR-managed lands. However, "take" based on the 40 percent guideline is a regulatory concept. When the amount of habitat in a circle that approximates a median annual home range falls below 40 percent, mortality does not necessarily ensue. Impairment of reproductive success may result, as may displacement. At some point, if the nest site is harvested, or enough habitat is removed to make survival impossible, mortality may occur. Another element to consider is that for most of the site centers that influence DNR-managed lands, DNR is not the major contributor of habitat. For between 73 and 80 percent of sites, habitat on DNR-managed lands constitutes less than 10 percent of the area of a median home range size circle to each site. In eastern Washington, habitat on DNR-managed lands amounts to less than 2.5 percent of the area of a median home range radius circle at 45 percent of the sites. In western Washington, 47 percent of sites that influence DNR-managed lands fall in the same category. Outside of NRF management areas proposed in the HCP, there are only three sites on the west side in which DNR-managed lands contribute more than 20 percent of the circle in habitat. In contrast, NRF areas on the west side include 14 sites in which DNR lands contribute more than 20 percent of the circle in habitat. DNR's management activities do not exert the main influence on most of the circles that overlap its lands outside of proposed NRF management areas.

Quantitative population viability analyses require models and data on how owl populations respond to factors that affect their ability to persist into the future. Such factors include changes in demographic attributes of the population, degree of genetic variation within and among individuals in the population, variation in behavioral attributes of individuals within the population, systematic and catastrophic losses of habitat, changes in distributional patterns of habitat (e.g., fragmentation), interspecific interactions such as competition and predation, and the effects of disease pathogens and environmental contaminants (USDA 1992; USDA and USDI 1994). Existing data for these factors is either insufficient or non-existent in most parts of the owl's range, making a meaningful population viability analysis impossible to conduct at this time. Risk analysis of all proposed and accepted management plans (e.g., the President's Northwest Forest Plan) for spotted owls continues to rely on professional judgement based on an incomplete understanding of even such factors as

demographic trends for which five to eight years of quantitative data exits. DNR's proposed HCP is no different.

The Services and DNR agree that the combination of DNR's HCP and the 4(d) rule will contribute to the contraction of the current and historical range of the spotted owl.

The 4(d) special rule-making process has not yet been completed. Thus, the possible action of implementing a 4(d) rule is still too speculative to allow analysis as a complete alternative. The cumulative effects of DNR's HCP and the proposed special 4(d) rule are described in the DEIS (p.4-93 and 94 and p. 4-235 and 236).

The fact that spotted owls have been located in second growth forest does not provide any justification for DNR to provide a lower level of protection for spotted owls than what is provided in the draft HCP. The strategy is actually based primarily on the hypothesis that spotted owls can use managed forests to meet at least part of their life needs. This hypothesis is based on observations of owls in landscapes that contain structural remnants of old growth in otherwise disturbed stands - either from natural or human management processes. DNR's proposal contains a large research and monitoring component to verify this hypothesis. There are many questions that remain unanswered about the extent to which spotted owl populations can survive and reproduce in managed landscapes and the amount and distribution of structural components that adequately provide nesting, roosting, and foraging functions. The DNR strategy would not have been proposed in its current form without the existence of large blocks of unmanaged old-growth forest that will be in reserve status on federal lands.

The rationale behind the conservation strategy for spotted owls in the OESF planning unit is explained on pages IV.74-75 and IV.88-90 of the draft HCP. It was developed in consideration of available information on owl and forest ecology as well as current and predicted future land-management trends in the context of the long-term vision for the OESF that was derived from the 1989 report of Commission on Old-growth Alternatives for Washington's Forest Trust Lands (see pages I.14-15 of the draft HCP).

The Services and DNR disagree that the amount of spotted owl habitat that would be provided in Alternative A was underestimated in the DEIS. The estimate is based on how DNR would continue to implement it Forest Resource Plan policy without an HCP. In addition, the data used to approximate the total amounts of potential spotted owl habitat results in many cases in an overestimation of the amount of habitat on DNR-managed lands (see DEIS p. 4-16 - 4-18). Furthermore, many forest

stands that contain the structural attributes of habitat may be too small and or too isolated to function as spotted owl habitat on a landscape level.

population impacts & models

**Summary:** NCASI, The Northwest Forestry Association, the City of Port Angeles, the Port of Port Angeles, three individuals, and Bogle & Gates (a consultant to Washington State University) commented on spotted owl population issues and population models used in the DEIS. Four commentors stated that the Olympic Peninsula population has exceeded recovery goals set in the Recovery Plan, or that recent population studies have demonstrated that the population is not in decline. Some of these commentors further stated that DNR should take this "new" information into account in its conservation planning and decrease the level of protection for owls in the OESF. One commentor wrote that the DEIS inaccurately described the impacts of the unzoned forest alternative compared to No Action to the owl population in the OESF. Two commentors provided detailed technical comments regarding the population models used for both the non-OESF and the OESF portions of the HCP in the DEIS. One of these commentors felt that DNR deliberately manipulated spotted owl demographic data in the estimates of future take used in the DEIS to present an overly optimistic picture of the current status of the population in Washington State. This commentor presented alternative models using the rates of population decline that ranged from 1 percent per year to 12 percent per year. He concluded that higher rates of decline were more realistic and that if the population was declining at a rate of 4.5 percent as opposed to 1 percent as presented in the DEIS that the HCP would contribute to the extinction of the owl. The second commentor's remarks were specific to the model used for the OESF. This commentor wrote that demographic rates used in the model from Burnham et al. (1994) were too pessimistic and that more recent data from Forsman et al. (unpublished) should be used or some justification given for using the older data. Another point of concern was the lack of statistical justification for the habitat quality index. The commentor felt that the speculative nature of this index should be emphasized in the text. This person also recommended the use of data which shows that precipitation has more of a statistically significant effect on owl reproductive success than amount of habitat within an owl territory.

**Response:** DNR did not manipulate data used in its projections of future take to present an overly optimistic picture of the current status of the population. DNR used existing data, with all assumptions about its use of that data clearly stated, to present a worst case scenario for DNR's impacts on spotted owls in NRF Management Areas. DNR used the upper limit of the 95 percent confidence estimated for $\lambda$, the population's rate of change, in its projections for

future take (DEIS, p. 4-64 and 4-213). The commentor wrote that using this value rather than the mean was unconscionable. DNR contends that the methods and data selected for any population estimate depend on the objectives of the estimate. The projections the commentor refers to in the DEIS were intended to show a worst case scenario of future take. Models using a higher value for $\lambda$, i.e., the upper limit of its 95 percent confidence interval, would project more owls in NRF Management Areas, and therefore, a higher likelihood for incidental take in the future. Models using a lower value for $\lambda$, i.e., the mean, would project fewer owls in NRF Management Areas and DNR's proposed HCP would be projected to have much less potential for incidental take over the long term. As stated in the DEIS (p. 4-64 and 4-204), the FSEIS for the Northwest Forest Plan (USDA and USDI 1994a, p. 3&4-233) explained that high values for $\lambda$ are more consistent with observations of owl densities over the period of time to which the demographic data applies. According to USDA and USDI (1994a), a 4.5 percent per year decline ($\lambda$=0.955) is highly unlikely. Furthermore, the DEIS did not use $\lambda$ to draw any inferences about spotted owl populations outside of the OESF planning unit.

The Draft Recovery Plan described region-specific "biological goals" for habitat protection, and projected the numbers of owls that might be supported after habitat recovery. Those goals were for habitat protection and recovery, not for owl numbers and do not alter the context in which the HCP proposal was developed (see draft HCP, p. II.5 through 10). The conservation strategy for the OESF was developed in light of current estimates of owl population numbers and trends on the Olympic Peninsula (see draft HCP p. III.15 through 18 and DEIS p. 4-308 to 311), thus the draft HCP proposes a conservation strategy in which there is a reduction in the amounts of habitat in the near-term.

The population model was only one of several means used to evaluate alternatives for the OESF, and was intended to provide qualitative, objective comparisons among those alternatives, not numerically accurate predictions of the outcomes of those alternatives. Thus, demographic rates used in the modeling effort were chosen to be reasonably consistent with then-published analyses (i.e., Burnham et al. 1994, Holthausen et al. 1994). With the exception of juvenile survivorship, all of the demographic parameters were taken from (or tuned to) Burnham et al. (1994) and Forsman et al. (1984), with some guidance from Holthausen et al. (1994). We used a set of juvenile survival rates (0.38, 0.41, 0.44, 0.47, 0.50, 0.51 in the DEIS, Appendix D, Table 5) which respresented a range of plausible values, considering adjustments for juvenile emigration. These values were greater than the Burnham et al (1994) estimates, but less than the larger estimates presented in Holthausen et al. (1994). Coincidentally,

the model runs discussed in the DEIS (Chapter 4, p. 4-321 to 324, 4-329 to 331, and 4-336 to 348) were performed with adult survival rates approximately equal to those reported by Forsman et al. (in press).

The commentor makes a legitimate point about the statistical validity of the habitat quality index used to define a gradient of quality across the spectrum of young- to old-forest habitat (DEIS, Appendix D, p. 8 and 9). As the commentor suggests, readers should understand that the index is based on empirical observations, is consistent with knowledge of habitat relationships of owls in the western hemlock forest zone, and is intuitively reasonable, but it is also speculative and has not been validated by rigorous statistical analyses.

It is evident that spotted owl populations respond to other environmental features than forest structure (e.g., Irwin 1993, Seaman 1995). This was noted in developing the habitat parameters for the population model in that an elevation/climatic model (Henderson et al. 1989) was used to classify some old forests as non-habitat (DEIS, Appendix D, p. 8). Modeling that more accurately reflects reality is always desirable, however the population model was developed and model runs were completed before Knight and Seaman (1995) made their preliminary presentation on the relationship between weather and spotted owl fecundity. While those results appear to have substantial explanatory power, they have not been fully peer-reviewed. And even if they prove to have substantial explanatory power, the model results used in the DEIS are sufficient to provide objective, qualitative comparisons among HCP alternatives because weather patterns are relatively homogenous across the OESF area of the Olympic Peninsula.

<u>nesting, roosting, & foraging (NRF) habitat</u>

**Summary:** The Yakama Indian Nation, the NWIFC, Society for Conservation Biology, a timber company, seven individuals, and Bogle & Gates (a consultant to Washington State University) submitted general comments pertaining to spotted owl nesting, roosting, and foraging habitat. The majority of the commentors requested stronger protection measures for spotted owl habitat than is provided in the HCP. One commentor wrote that less protection could be provided. One commentor noted that the landscape assessment process that will be used to determine habitat conditions within NRF management areas is not described in detail in the HCP nor is the time line for completion of these assessments. This commentor requested that this information be disclosed in the final HCP.

Other specific comments were: (1) The owl population cannot wait 100 years for habitat to recover in NRF areas; that it is presumptuous to assume that owls will use habitat set aside for them if they are not already there; (2) That no more than 20 percent of the required habitat in NRF areas should be in a sub-mature condition - the remainder should be higher quality habitat (3 commentors); (3) None of the alternatives provides maintenance of species distribution in southwest Washington or the rest of the western Washington Lowlands province therefore an ITP should not be issued because the HCP will not allow for long-term survival of the owl; (4) There is no evidence to support a strategy that allows habitat to move over time within NRF areas thus requiring owls to reestablish their territories; (5) The amount of replacement spotted owl habitat should eventually exceed what is harvested under the HCP; (6) Based on the forest habitat type comparison in Chapter 2 of the DEIS, it appears that the No Action alternative will provide more habitat for spotted owls than the HCP proposal, yet the DEIS portrays the HCP as a better alternative for owls; (7) Management should not be allowed in Type A habitat, there should be no salvage logging in NRF areas, prohibition of harvest of habitat during the breeding season within NRF areas would reduce impact to owls; (8) There should be no harvest of historical sites because of metapopulation dynamics; (9) Habitat restoration should not be used as mitigation; (10) How will riparian management zones in OESF areas serve as NRF habitat; how much of RMZs will serve as functional spotted owl habitat; and, (11) a proper analysis of projected management of Forest Service matrix lands in the White Salmon area would reveal that less protection is required for the issuance of an ITP.

Regarding the OESF, one commentor was concerned that the HCP document discussed ecosystem management but stated that spotted owls do not direct that management. The commentor disagrees with that approach and thinks that ecosystem management has little meaning unless ecosystem-level wildlife concerns are addressed and met. This commentor was especially concerned with the degradation of old-growth forest habitat.

**Response:** The proposed HCP will most likely result in improved habitat conditions within NRF management areas in the five west-side planning units over time as a result of the nest patch approach, the riparian management strategy, and the marbled murrelet strategy. Field data indicates that most of the spotted owl habitat on DNR managed lands in these planning units is Type C habitat. There are currently a total of approximately 35,000 acres of forest lands older than 200 years in the five west-side planning units (DEIS p. 4-19, Table 4.2.3) with 23,700 acres of forest older than 150 years within proposed NRF management areas. There will be a projected 51,000

acres of forests older than 150 years old within NRF management areas by the end of the permit period, with much of that likely in a geographic location and patch size to be useful to spotted owls because of the 50 percent habitat requirement within WAUs and the configuration of nest patches. If the research phase results in a different strategy for providing nesting structure in the landscape, then it is likely that forest stands whose primary cohort is younger than 150 years old would serve as habitat that supports nesting spotted owls. In addition, the overall amount of suitable spotted owl habitat will be greater in Alternative B (the proposed HCP) than the No Action alternative in the five west-side planning units (DEIS, p. 4-45). In the three east side planning units, the overall amount of NRF habitat that will be developed and maintained on DNR-managed lands would be less under the proposed HCP than under the No Action alternative. The strategy in the HCP, however, is to maximize DNR's contribution to the owl population as supported by federal reserves. There are 19 WAUs in which the amount of habitat will increase from current levels in order to reach a 50 percent level in designated NRF areas. The strategy in eastern Washington is consistent with both the proposed 4(d) rule and the recently adopted state permanent Spotted Owl Rule.

The Services do believe that less protection for NRF habitat would be unacceptable for issuance of an ITP.

The landscape assessment process is not described in detail in the HCP. The HCP document does not in general contain the details for implementation of the plan. The HCP does specify that a landscape assessment process will take place in each WAU in which harvest activity is planned and that the goal of such assessments is to ensure that the amount and quality of spotted owl habitat has been accurately determined in the field and that spotted owl ecology has been taken into account when planning where to place timber sale units. The amount of time required for an assessment will depend on the size of designated NRF areas in the particular WAU in which harvest is intended, but should not take more than one field season to complete.

DNR designated NRF areas (under Alternative B) are at present in a variety of spotted owl habitat conditions. According to existing habitat data, there are 54 WAUs in which NRF areas are below the habitat target. However, of the total 101,000 acres that will be maintained in NRF habitat under the proposed HCP, there is presently a total deficit of 14,100 acres - approximately 3,200 acres in 19 WAUs in the three east side planning units and 10,900 acres in 35 WAUs in the five west-side planning units. Given that the deficit of habitat is spread among a relatively large number of WAUs, there are no large areas that are without habitat. Those areas that are currently

not in a habitat condition were designated because of the importance of their geographic location for long-term owl conservation. The Service thinks that the proposed strategy of allowing harvest of habitat outside of designated NRF areas in exchange for the maintenance of existing habitat and development of new habitat within designated NRF areas will not place the owl population at a greater risk of extinction than under the No Action alternative.

There is ample evidence to demonstrate that spotted owls disperse to unoccupied habitat. This is the basic mechanism of population dynamics in a territorial population. In addition, owls occur in landscapes that have been subject to disturbance, i.e. forests which have not always been habitat. Thus, it is not presumptuous, but a well-grounded ecological concept that if a forest develops structural attributes required by spotted owls, and if this forest occurs within dispersal distances of reproductive owl pairs, then it is likely it will be used by spotted owls.

The Service and DNR think that the proportion of sub-mature habitat and high quality nesting habitat for NRF areas in the five west-side planning units is adequate. Approximately 20,400 acres of high quality nesting habitat will be arranged as 300 contiguous acres surrounded by an additional 200 contiguous acres of habitat that is sub-mature quality or better. These nest patches will total 12.5 percent of the designated NRF areas in high quality nest habitat and will be embedded in a larger landscape of habitat that is sub-mature quality or better. In conjunction with the other components of the HCP, namely the riparian, snag and green tree retention, and marbled murrelet strategies, the remaining 38.5 percent of the habitat will eventually be mix of habitat that is both sub-mature and higher quality. Forest growth and harvest modeling done for Alternative B projects that 51,000 acres of forest will be older than 150 years by the end of the 100 plan period (DEIS p. 4-39), which amounts to 31 percent of the NRF areas and approximately 62 percent of the spotted owl habitat to be maintained in NRF areas in the five west-side planning units. This amount is higher than the 30 percent suggested by the commentor, and represents more forest older than 150 years than the 23,700 acres that currently exists in NRF areas designated under Alternative B.

For response to issues surrounding southwest Washington, see category heading NRF Distribution in this section.

The amount of replacement habitat within NRF areas will not replace all the habitat that could eventually be harvested outside of NRF areas under Alternative B. Mitigation for habitat harvested outside NRF

areas is to maintain and develop habitat in areas thought to most efficiently support the spotted owl population. The overall HCP in the five west-side planning units will provide more forests that could potentially serve as spotted owl habitat outside of NRF areas than occurs at present (DEIS p. 4-39). These forests (forests older than 70 years old) however, would not be managed specifically for spotted owls, thus the DEIS did not count these forests as making a definite habitat contribution.

DNR and the Services disagree with the commentor who stated that Chapter 2 of the DEIS portrays Alternative A as providing more spotted owl habitat than Alternative B. The long term consequences of implementing current spotted owl management policy are consistently portrayed in Section 2 and Section 4 of the DEIS as leading to loss and degradation of habitat over time. Matrix 2a (p.2-63) does state that the No Action Alternative could potentially result in 16 percent of DNR lands outside the OESF in fully functional forest as compared to 12 percent under Alternative B. There are major differences between these alternatives for spotted owls, however. First, as is described in the analysis of impacts of the alternatives to spotted owls, continued implementation of spotted owl circle management will lead to smaller habitat patches and a loss of habitat over time as circles move or become decertified. This aspect of Alternative A was not modeled, thus the results described in Matrix 2a and in Chapter 4 of the DEIS (p. 4-472) overestimate the amount of fully functional forest that will be retained as a result of regulatory protection of spotted owl circles under Alternative A. For spotted owls, the habitat that would be provided under Alternative B would be in geographic locations and spatial configurations useful to owls on a landscape level, and maintenance of projected levels guaranteed. Second, there is great uncertainty involved in projecting present day forest management policies for 100 years under the No Action Alternative. While an HCP does not completely eliminate uncertainty, it does allow projection under the terms of the legal contract that would bind both DNR and the Services to a known level of species and habitat protection for the duration of the agreement. Thus, it is quite speculative to say that DNR-managed lands will be covered by 16 percent fully functional forest in 100 years under Alternative A.

The idea to allow management of Type A spotted owl habitat within NRF areas was originally put forth as one of two options by the HCP Science Team (DNR 1995e). This option has a recognized higher risk level than the option that would preclude management within Type A habitat. In exchange for allowing such management to occur, DNR committed to establishing nest patches in the five west-side planning units to retain exisiting nest structure in the landscape and to doing

research on spotted owl nesting ecology in managed landscapes. This provision was thought by the Science Team to not pose large risks to owls in eastern Washington due to the presence of nesting owls in sub-mature habitat types. The Service accepts this approach.

The inclusion of a salvage logging provision in the spotted owl strategy is driven by state law (RCW 79.01.795 and RCW 76.06.040). The Service will be included in discussions of any salvage activities that may be required under these statutes. If they determine that such activities would have an adverse affect on the conservation strategies, DNR and the Service will work together to find sufficient mitigation to allow the activities to proceed (see draft HCP p. IV.11 and p. IV.21).

In order to reduce potential impacts to nesting spotted owls within NRF areas, the Services or its designee will conduct surveys within WAUs in which the amount of suitable habitat has exceeded the target levels in order to update information on spotted owl site locations. These surveys will be conducted in such WAUs every three to five years. DNR will use this information to plan harvest activities farther than 0.7 mile from the site center during the breeding season. The text of the HCP has been changed to reflect this commitment.

The HCP spotted owl conservation strategy recognizes the importance of metapopulation dynamics. The NRF area approach represents a shift from regulatory owl circle by owl circle management, which results in habitat fragmentation and decreasing levels of habitat over time, to landscape level management. In this approach, a constant level of habitat will be maintained and current or historical site occupancy does not drive timber harvest decisions (except to avoid harvesting nest sites). Under Alternative A (No Action), however, decertification surveys are part of the strategy to reduce the amount of forest land that is not available for harvest due to the 40 percent habitat threshold within owl circles. Three successive years of no occupancy can result in a circle attaining a "historical status" and thus releasing that habitat for harvest. This possibility is precisely why the No Action Alternative can result in long term loss of spotted owl habitat on DNR trust lands and is precisely why DNR is proposing to move to landscape-level management of spotted owl habitat. Dispersing juvenile owls are easily capable of movements that traverse the distances necessary to accomplish this (see DEIS p. 4-310). Current thought is that the Olympic Peninsula subpopulation is large enough that it is likely to be self-sustaining (see Holthausen et al. 1994, or the brief review in DEIS p. 4-313 and 314). Historic owl sites (most of which are unoccupied because, currently, habitat conditions are inadequate to support owls, DEIS p. 4-326 through

327) are likely to play little or no role in the near- or long-term support of that subpopulation without habitat restoration. The OESF conservation strategy for the spotted owl intends to support the geographic and ecological distribution of the Olympic Peninsula subpopulation by maintaining or restoring landscape conditions that support owl pairs over a significant portion of their potential range (see DEIS p. 4-330 to 331, 4-334 to 335, 4-341, and 4-347).

DNR and the Service disagree that habitat restoration should not be used as mitigation for incidental take. Commitment to habitat restoration is the primary tool by which the Service can secure agreements from proponents to develop and maintain habitat in areas that are important to the spotted owl population but currently are in a poor habitat condition. Habitat restoration in the context of the HCP strategy for the OESF means developing forest stands and landscapes that support successfully reproducing spotted owls that are a functional segment of the Olympic Peninsula subpopulation (draft HCP p. IV.75). Spotted owls are known to successfully re-colonize forests that regenerated either after natural disturbances or logging (see Horton 1996 for a review of spotted owl ecology in the context of managed forests). It is widely thought that spotted owl populations can respond favorably to habitat restoration (e.g., USDI 1992, USDA and USDI 1994a, b). The *status quo* in the OESF area is currently not adequate to support successfully reproducing spotted owls that are a functional segment of the Olympic Peninsula subpopulation (DEIS p. 4-333, 4-338 to 339; and the draft HCP p. IV.77 and IV.78), thus habitat restoration is necessary to meet the mission of the OESF (see draft HCP p. IV.69 through 75). This habitat restoration meets the definition of mitigation (see draft HCP, Glossary, p. 9).

Of all DNR-managed lands that provide habitat for spotted owls, DNR's proposed level of incidental take of spotted owls is highest in the White Salmon area. The strategy for this area was to establish NRF management areas within 1.8 miles of federal reserves and in key areas directly south of the Yakama Indian Reservation. There are several spotted owl site centers on or within 1.8 miles of DNR-managed lands for which DNR would no longer provide support precisely because of the location of federal matrix lands and or the lack of federal lands at all. DNR and the Service do not think it is acceptable to provide less protection in this area than is already proposed.

It is hypothesized that streamside forests provide particularly important habitat for spotted owls (Carey et al. 1992, Carey and Johnson 1995). Streamside and unstable hillslope areas in the OESF that will be managed under the proposals of the riparian conservation strategy will have the potential to function as nesting, roosting, and

foraging habitat for spotted owls when the following conditions are met: 1) the structure and composition of forest stands in those areas are similar to those described as old-forest habitat by Hanson et al. (1993), and 2) either the sizes of older streamside or hillslope stands are sufficiently large that interior forest (greater than 50 m from an abrupt edge) comprises an appreciable proportion of those stands or those older streamside or hillslope stands are embedded in upland stands that are similar to those described as young- or old-forest habitat by Hanson et al. (1993). Streamside and hillslope stands with structure and composition similar to those described as young-forest habitat by Hanson et al. (1993), and also meet criterion 2 above will have the potential to function as foraging and roosting habitat for owls.

Currently, only 28 percent of streamside forest stands and an unknown proportion of stands on unstable hillslopes are older than 50 years (draft HCP p. IV.121-122). An unknown proportion of those also meet criterion 2 above and currently have the potential to function as young- or old-forest owl habitat. If the HCP proposal is implemented in the OESF, it is hypothesized that most streamside and unstable hillslope areas (approximately 1/3 of the land base in the OESF) would attain stand-level characteristics of owl habitat because of management to maintain and restore riparian functions (draft HCP p. IV.121). However, not all such stands will have the potential to function as owl habitat because some will be too small or narrow to function alone, and will be periodically embedded in young forests that are not potential habitat.

The distribution of potential habitat in streamside and unstable hillslope areas will vary across landscape planning units with some steep, unstable drainages such as many in the Willy-Huel and Clearwater landscapes (see draft HCP p. IV.78 through 85) having much more of their area managed for riparian conservation (draft HCP p. IV.121) and thus, more potential habitat regardless of the characteristics of the surrounding uplands. Three independent, preliminary efforts modeling forest growth and harvest in the OESF projected that young- and old-forest habit will comprise approximately one-half of the uplands (draft HCP p. IV.79 through 85, DEIS p. 4-340, and DEIS, Appendix D p.2). If both streamside and unstable areas, and habitat in the uplands were distributed evenly across the OESF then half of the areas managed for riparian conservation would be embedded in habitat in the uplands and eventually have the potential to function as owl habitat. However, because of the large streamside and unstable hillslope areas in several landscapes, it may be that as much as two-thirds of the total area managed for riparian conservation in the OESF may ultimately have the potential to function as owl habitat.

The draft HCP (p. IV.74 and 75) states that the forest ecosystem values of stand-level function for dispersal, foraging, roosting, and nesting habitat for spotted owls, and landscape-level functions that include supporting successfully reproducing owls that are a functional segment of the Olympic Peninsula subpopulation are explicit objectives of the OESF conservation strategy. The portion of the comment regarding degradation of old-forest habitat will be addressed in the response to the following series of comments.

*NRF-designated areas*

**Summary:** WDFW, the Point No Point Treaty Council, Northwest Forestry Association, Society for Conservation Biology, and two individuals commented on NRF designated areas. WDFW had several suggestions for corrections in the maps of NRF areas presented in the DEIS as well as for additions to proposed NRF areas. Other comments include a recommendation to not remove NRF areas if federal reserves become sufficient to support spotted owls on their own at some point in the future because other late successional species depend on owl habitat; areas excluded due to elevation should be evaluated on a case-by-case basis to determine whether or not the area is capable of supporting the growth of spotted owl habitat; the average range of a female spotted owl is 15 miles so NRF areas should extend 15 miles from federal reserves instead of 2 miles; small parcels of DNR lands that are designated as NRF areas are not likely to make a significant contribution to demographic support and thus should no longer be designated in exchange for a higher habitat requirement in an adjacent WAU that contains larger parcels; NAPs and NRCAs should not count toward the 50 percent habitat goal because they are not legally part of the HCP and the legislature could change the way these lands are managed so they no longer contribute NRF habitat; and the Siouxon area should be excluded from NRF designation because adjacent federal lands will adequately support owls in this area.

**Response:** DNR and the Service reviewed comments and questions from WDFW regarding potential errors or omissions in NRF area designations. The resulting changes are shown in the map section of this FEIS. In the North Puget Planning Unit, no changes were made to actual designations. However, the map has been clarified to show which NRCAs and NAPs are also designated NRF areas and which ones, though not designated NRF areas, will be providing nesting, roosting, and foraging habitat by virtue of their current habitat condition and location. The Greider Ridge NRCA in the Spada Lake basin is one such

non-NRF designated NRCA that will provide suitable habitat. This NRCA was not designated as an NRF management area because it currently has no overlapping owl circles and it is further than 2 miles from a federal reserve. Portions of the Morning Star NRCA which are adjacent to a federal reserve were not designated as a NRF area because of high elevation, non-habitat conditions.

In the South Puget Planning Unit, a small parcel directly north of the Mineral Block was shown as having no spotted owl role. This was a mapping error and has been corrected to show that it is a designated NRF area. There are two sections near the end of Highway 706 that are designated for a dispersal function. WDFW asked is these were intended for a NRF function because of the proximity to federal reserves. These parcels occur in an area recommended by the Spotted Owl Recovery Team to serve a dispersal function and will thus retain that designation.

In the Columbia Planning Unit, WDFW pointed out a section south of Mount St. Helens that is adjacent to a federal reserve. The HCP Science Team did not designate this parcel for a NRF function because it currently has no habitat and is not within an owl circle, thus they did not think it was an efficient use of DNR land for spotted owl conservation. The "no role" designation will be retained.

In the Yakima Planning Unit, the dispersal areas directly to the south of federal reserves and north of the Yakama Indian Reservation (south of Highway 12) were not designated for a demographic support function because ecological conditions (a combination of elevation and soil type) of these lands do not support spotted owl habitat. The dispersal designation is retained.

In the Klickitat Planning Unit, six sections directly adjacent to Forest Service matrix land in the White Salmon area (T05N R10E, sections 34, 33, 28, 27, 22, and 21) have been changed from dispersal management to NRF management to provide more support for existing site centers. These sections were redesignated in exchange for changing six sections in T07N R12E of NRF management area to dispersal management. The parcels changed to dispersal management areas are peripheral to nearby site centers. This change results in three fewer site centers being at risk for incidental take than was originally assessed in the DEIS for Alternative B. It was also thought that DNR-managed lands would be more efficiently used by supporting four of the site centers in the cluster that spans both

federal and nonfederal lands within the boundaries of the SOSEA under the new state spotted owl rule. Habitat contributions from private land owners in the area are also possible because of the provisions of the new rule.

The draft HCP includes language that allows the Board of Natural Resources the option to approach the Service with a proposed amendment to remove NRF designations if sufficient data exists at some point in the future to indicate that federal reserves are sufficient to support the spotted owl population. Any such proposal would be considered by a multi-agency Science Team that will be convened to make recommendations on any biological amendments to the HCP. Multi-species issues would be taken into account in any decision.

An elevational screen has commonly been used when considering potential spotted owl habitat (Stearns 1991). DNR believes the use of such a screen is appropriate for its HCP.

There is no data to support the contention of the commentor who stated that the average home range radius of a female spotted owl is 15 miles. A home range with this radius would encompass 452,390 acres which is an order of magnitude larger than the largest home range sizes reported in Hanson et al. (1993). This data is based on the use of the minimum convex polygon method. Other methods of home range estimation such as the 60 percent adaptive kernel technique often produce smaller home range sizes. Hanson et al. (1993) determined that the radius of a median annual home range for spotted owl pairs is 2.7 miles in the Western Washington Lowlands and Olympic Peninsula Provinces, 2.0 miles in the Western Washington Cascades Province and 1.8 miles in the Eastern Washington Cascades Province. The Service will evaluate any new data that suggests that basing owl conservation strategies on these radii would result in jeopardizing the species and take appropriate action under the extraordinary and unforseen circumstances clauses of the implementation agreement.

The proposal to de-designate small parcels of NRF areas in exchange for higher levels of habitat in adjacent WAUs is an interesting idea. However, in some planning units, the Yakima and Chelan in particular, there are very few options for designating NRF areas other than the small parcels that exist. In other areas where this option may exist, DNR and the Service think that it will be more beneficial at this time to have more forested area in a 50 percent habitat condition as opposed to fewer areas in a 60 percent habitat condition. This is because

data is lacking on the distinction in habitat quality between a 50 and 60 percent level, so the trade-off may not be that beneficial to owls. In addition, in areas where small parcels occur in SOSEAs designated under the newly adopted State Spotted Owl Rule, the opportunity exists for adjacent private landowners to manage spotted owl habitat using a landscape approach rather than a spotted owl circle approach. Thus, DNR's habitat contribution could be complimented by other nonfederal lands increasing the value of the contribution.

The location and habitat condition of a small number of NRCAs and NAPs make them valuable to the HCP spotted owl conservation strategy. The Service does recognize that management plans for these areas could change by legislative action. Thus, the HCP requires that sufficient mitigation be found for the loss of habitat contribution should these particular NRCAs and NAPs be de-designated or their management change such that older forest that currently exists there be degraded or harvested as a result of legislative action.

DNR-managed lands along with other nonfederal lands in the Siouxon area will remain important to the spotted owl population in Washington regardless of the habitat condition on federal reserve lands. This is due to the fact that they lie farther to the west than federal lands, thus contributing to the maintenance of species distribution and serving as a potential demographic link between Oregon and Washington populations, and to the fact that they contain low elevation habitat which is uncommon on federal lands (USDI 1992b). The Washington Forest Practices Board Spotted Owl Science Advisory Group (SAG), also considers habitat in the Siouxon as essential to the spotted owl population in Washington (Hanson et al. 1993).

*quality/definition*

**Summary:** WDFW, The NWIFC, the Point No Point Treaty Council, National Audubon Society, Sierra Club, NCASI, Washington Wilderness Coalition, WEC, Northwest Ecosystem Alliance, two local chapters of the Audubon Society, and 55 individuals (an identical letter sent by 51 different individuals) made comments relating to spotted owl nesting, roosting, and foraging habitat definitions. Most comments generally conveyed the opinion that higher quality habitat than that defined as sub-mature in the HCP should be provided in NRF areas. Six commentors wanted the down woody debris component in sub-mature habitat increased from 5 percent ground cover to 15 to 20 percent ground cover. One commentor felt that it was inappropriate to include sub-mature habitat as NRF unless it

contained significant structural legacies of snags, large trees, and down woody debris. This commentor also requested that DNR establish minimum standards for numbers of large trees, snags and down woody debris to qualify sub-mature habitat as NRF. Another commentor felt that the provisions for snags and down woody debris in sub-mature habitat were in general below a safe level. One commentor wrote that the GIS habitat analysis in the EIS which included some 60 year old forest as owl habitat constituted a statistical "sleight of hand" and that 70 percent canopy closure was inadequate. Fifty-one commentors (same form letter from 51 separate individuals) wrote there were not enough snags, large trees and down wood in the nesting habitat definition.

Regarding the OESF, one commentor wrote that the strategy of allowing some high quality old forest to be degraded in exchange for commitment of habitat that was of uncertain value was too risky for owls in that planning unit. This commentor felt that experimentation in old growth was reasonable, but should proceed more cautiously and allow DNR the flexibility to conclude that more old growth was required than what is currently being proposed for the OESF.

Other comments and questions included how, in the absence of surveys, will DNR determine if sub-mature habitat is actually being used by spotted owls in the manner in which the HCP strategy intends; there should be Tribal input on the development of new habitat definitions after the research phase; replacement habitat should develop naturally; the HCP should acknowledge that scientists have a relatively crude understanding of what constitutes suitable spotted owl habitat; and, that because little is understood about survival strategies of spotted owls in eastern Washington habitat types, there should not be more manipulation allowed than in western Washington.

**Response:** In the five west-side planning units, the combined overall provisions of the HCP will result in NRF management areas that have a mix of sub-mature and higher quality spotted owl habitat. The overall quality of habitat in NRF areas will be higher at the end of the permit period than when the HCP would go into effect. Approximately 20,400 acres of high quality nesting habitat will be arranged as 300 contiguous acres surrounded by an additional 200 contiguous acres of habitat that is sub-mature quality or better. These nest patches will total 12.5 percent of the designated NRF areas in high quality nest habitat and will be embedded in a larger landscape of habitat that is sub-mature quality or better. In conjunction with the other

components of the HCP, namely the riparian (including protection of unstable slopes), leave tree, and marbled murrelet strategies, the remaining 38.5 percent of the habitat will eventually be a mix of habitat that is at minimum sub-mature quality, but will likely have more large trees and snags. Forest growth and harvest modeling done for Alternative B projects that 51,000 acres of forest within NRF areas will be older than 150 years by the end of the 100 year plan period (DEIS p. 4-39), which amounts to 31 percent of the NRF areas and approximately 62 percent of the spotted owl habitat to be maintained in NRF areas in the five west-side planning units. This amount represents more forest older than 150 years than the 23,700 acres that currently exists in NRF areas designated under Alternative B.

A clarification of the definition of NRF habitat used in the HCP for the five west-side planning units has been inserted into the text of the document that is analyzed as part of this FEIS. The definition reads " For the purposes of this HCP, NRF habitat refers to habitat that is primarily roosting/foraging habitat with sufficient amounts of nesting structure interspersed such that the entire area can be successfully utilized by reproducing owls". Spotted owls nest in sub-mature habitat in eastern Washington. The strategy for provision of NRF habitat during the research phase is to retain two 500 acre nest patches (300 acre patches of the highest quality nesting habitat available plus 200 acre sub-mature buffers) per the most contiguous 5,000 acres of designated NRF areas possible. Additional nesting structure will most likely be retained in occupied marbled murrelet habitat, steep and unstable slopes and riparian areas, as was explained above. This approach essentially recognizes that not every acre of NRF habitat used by spotted owls would be capable of allowing the establishment of a nest site. Outside of the nest patches, the landscape will be at least sub-mature habitat which the SAG determined to provide all the characteristics that owls need for roosting and foraging (Hanson et al. 1993). This habitat type corresponds to the high end Type C habitat from the former DNR habitat classification system. The goal of the research phase is to determine what constitutes adequate amounts and distribution of nesting structure for spotted owls in managed landscapes in western Washington. The results of this research will be implemented if this HCP is approved.

DNR chose a minimum of 5 percent down-woody debris for inclusion in its definition of sub-mature habitat for the following reasons. First, it is minimum and can be increased if research shows that more is required. Second, Carey and Johnson's

(1995) study demonstrated that on the Olympic Peninsula, populations of small mammal communities reach higher levels in unmanaged stands with abundant down woody debris versus managed stands with lower amounts of down woody debris. The study did not examine optimum population levels of small mammals vis a vis spotted owl foraging use of those areas. While spotted owls do prey on ground-dwelling small mammals, flying squirrles are their primary prey species. Snags are the structural feature that best predict the presence of flying squirrels (Carey 1995). In addition, their work is from the Olympic Peninsula, which is not representative of forested areas in the western Washington Cascades. Third, as Carey and Johnson (1995) pointed out, managed stands do not contain high percentages of down woody debris cover. From an initial analysis of DNR's forest inventory data, down woody debris is apparently a limiting factor for spotted owl habitat on DNR-managed lands at the present time. Management of NRF areas under the HCP will move forest stands toward higher levels of down woody debris with 5 percent as a minimum target level. In the meantime, it will conduct research and use any new data generated by other researchers on what constitutes adequate amounts of down woody debris for spotted owl prey populations in managed landscapes. Carey and Johnson's (1995) data is not definitive on this topic. Fourth, inclusion of a down wood component goes beyond the original definition of sub-mature habitat (Hanson et al. 1993). Their definition assumed that the snag component would eventually contribute to a down wood component. Thus DNR's approach will require down wood in addition to what may eventually accumulate from the retention of snags and leave trees.

DNR and the Services disagree that the nest habitat definition has too few large trees and snags. The high quality nest habitat definition is derived from the only two studies of vegetation characteristics around spotted owl nest sites in Washington state that are currently available (draft HCP p.IV.12 to 16). The number of snags and large trees is higher than any currently used definition of NRF habitat in the state and is characteristic of unmanaged old-growth forests. An initial examination of DNR forest inventory data indicates that a very small percentage of DNR-managed forest lands contain all the characteristics described in the high quality nesting habitat definition.

The methodology used for assembling the multiple data source spotted owl habitat map is explained in the DEIS (p. 4 through 16). The fact that field typed habitat data most closely matched 60 year old stands in some planning units reflects one or a

combination of factors. The field typed data was primarily low quality Type C habitat thus giving a low standard of comparison. Second, those stands could have contained enough residual structure to qualify as Type C or better habitat. Third, the original inventory data that classified age class of the primary species in the stand could be in error. As was discussed in the DEIS, the quality of existing habitat data is less than optimal, which is why the Interdisciplinary Team decided to use two methods of estimating the amount of habitat. It is acknowledged in the DEIS that the amount of habitat estimated by the multiple data source method probably represents an overestimate (p. 4-14 to 18).

The HCP Science Team and the Spotted Owl Science Advisory Group (Hanson et al. 1993) think that 70 percent canopy closure is an adequate minimum standard, based on the literature. Many mature stands will exceed this level of canopy closure.

The HCP monitoring program will include examining the ability of sub-mature habitat to support spotted owl prey populations, and expanding current understanding of the role of various habitat components in providing roosting and foraging functions. The validation monitoring that will occur primarily in the OESF will study spotted owl use of various habitat types including sub-mature habitat. Additional research on spotted owl habitat will be conducted in eastern Washington as appropriate.

The HCP strategy is cautious regarding manipulation of sub-mature habitat in eastern Washington (see draft HCP p.IV.19 and 20). Given that spotted owls nest in landscapes that have been disturbed by fire and past timber harvest, the Services think that this approach is acceptable.

DNR and the Services disagree that habitat restoration should proceed without management intervention. In many instances, thinning and other silvicultural techniques will accelerate the development of habitat structures (USDI 1992b; USDA and USDI 1994b; Carey and Johnson 1995). The precise techniques to be used and a better understanding of the structure, composition and function of spotted owl habitat in managed landscapes are the subject of much of the research and monitoring that are proposed as part of the HCP.

If signed, the HCP is a contract between DNR and the Services. The Services have the ability to designate other parties to assist in overseeing the implementation of the agreement, including

seeking tribal input into the development of nesting habitat definitions upon completion of the research phase.

The conservation strategy for the OESF proposes to achieve three objectives that are functional responses to forest stand and landscape conditions, i.e., responses of individual spotted owls as well as of the Olympic Peninsula subpopulation at-large (draft HCP p. IV.74 and 75). The working hypotheses that is the basis for the management approach proposed in the draft HCP (p. IV.75 through 88) sets a threshold level for old-forest habitat, as defined by Hanson et al. (1993), of at least 20 percent of each landscape planning unit. Their definition was adopted from that of Thomas et al. (1990) who described structure, composition, and function of this habitat-type. Functionally, it is the cover type that the majority of radio-tagged owls showed significant selection for. They also described structure and composition of the habitat-type. The HCP does not propose to replace functional old-forest habitat with habitat of "uncertain value" as part of the 20 percent per landscape planning unit threshold. With our current knowledge, only forest stands with structure and composition consistent with definitions of old-forest habitat could be used to "replace" current old-forest habitat, and then only if landscape-level abundance was above the threshold level. Spotted owls respond to forest structure, composition, and function - not to degrees of naturalness. Structurally diverse forests with abundant large live trees, snags, and logs are likely to have the potential to be good owl habitat whether they regenerated after natural disturbances or logging.

*amounts*

**Summary:** The Yakama Indian Nation, National Audubon Society, Sierra Club, Society for Conservation Biology, the Mountaineers; a local chapter of the Audubon Society, 53 individuals (51 copies of the same form letter) and Bogle & Gates (a consultant to Washington State University) submitted comments regarding amounts of habitat within NRF management areas. These comments were as follows: the target for NRF areas should be 75 percent instead of 50 percent; the target should be 80 percent instead of 50 percent; the target should be 60 percent not 50 percent; why increase the habitat amount to 50 percent when 40 percent has been proven adequate; more nesting habitat should be provided; there should be 60 percent habitat within 0.7 mile of a nest; the HCP would provide too much marginal habitat; there is not enough nesting habitat; NRF habitat should be comprised of no more than 20 percent sub-mature quality habitat and the remaining 80 percent should be higher quality such as Type A and Type B habitat; and

federal estimates of habitat on federal lands vary over time, this inconsistency could have a negative financial impact on DNR-managed lands, thus the strategy should be reconsidered.

**Response:** The rationale for providing 50 percent suitable spotted owl habitat in NRF management areas on a WAU scale is described in DNR's draft HCP (p.IV.25 and 26). While 60 percent habitat might provide a higher level of demographic support than 50 percent, the absence of a statistically significant difference in owl density or reproductive success between 50 and 60 percent habitat coverage (Bart and Forsman 1992) led DNR to propose the lower level as a compromise position between meeting the biological requirements of the Endangered Species Act and the requirement to produce the most substantial support to the trusts possible. Providing 40 percent habitat at a landscape level has not been proven sufficient, and could lead to less than adequate amounts of habitat at a territory scale (Bart 1995). The Service thinks that the proposed strategy is acceptable to meet Section 10 criteria.

Retaining 60 percent habitat within 0.7 mile of nest sites may constitute a lower risk conservation strategy for spotted owls than that in the proposed alternative. Data originally analyzed in the Interagency Scientific Committee's Conservation Strategy for the Northern Spotted Owl (Thomas et al. 1990) and reanalyzed by Bart (1995) indicates that owls are more likely to occupy sites with greater than *h* acres of habitat within 0.7 mile of the site center than with less than *h* acres with *h* ranging from 200 to 800 acres. While this data indicates that habitat near the nest site is important, it does not indicate how much suitable habitat owls need around their nests. Data analyzed in the FEIS for the Washington State Forest Practices Board Spotted Owl Rule indicates that the majority of sites with reproductive output that would support a stable or increasing population have more than 500 acres of (approximately 50 percent) habitat within a 0.7 mile core versus less than 500 acres (WFPB 1996a p.2-112). However, a large number of sites with low reproductive output also had more than 500 acres within a 0.7 mile core (WFPB 1996a pp.2-101, 2-103, 2-107, 2-109). Again, data on the correlation of amount of suitable habitat around nest cores and reproductive output indicates that habitat amount is important near the nest, but no threshold is evident. The HCP Science Team thought that maintaining an overall landscape condition of 50 percent habitat and establishing nest cores with 500 acres suitable habitat (300 acres nesting habitat, 200 acres of sub-mature habitat or better) was adequate protection. Further, the draft HCP has been modified such that DNR is committing to

harvest habitat away from known site centers in WAUs that have habitat above the target level. This provision will result in the retention of all existing habitat within a 0.7 mile core of known sites within NRF areas. In addition, the draft HCP has been modified to incorporate a take schedule of sites outside of NRF areas to allow important sites to be retained for the first decade of the HCP. Sites with high reproductive output will be prioritized for take avoidance.

DNR-managed lands in NRF areas are currently dominated by forests that are sub-mature habitat or lesser quality, with smaller amounts of older forest (DEIS Figure 4.2.5 and 4.2.8, p. 4-35 and 4-37). The proposed HCP will result in an overall improvement of habitat conditions within NRF areas (see response under *Nesting, roosting, foraging habitat - quality, definitions* above).

Federal habitat estimates vary as better information becomes available. DNR does not think that the use of the best available habitat data constitutes a financial impact to DNR or a reason to reconsider the proposed strategy. Linking the target amount of habitat in DNR NRF areas to adjacent federal reserves is a sound landscape strategy that allows DNR to complement the President's Northwest Forest Plan and provides relief from incidental take prohibitions in other areas.

*distribution*

**Summary:** WDFW, Muckleshoot Indian Tribe, Yakama Indian Nation, NWIFC, NCASI, Society for Conservation Biology, Sierra Club, the Mountaineers, Northwest Ecosystem Alliance, 53 individuals (51 copies of the same form letter), and Bogle & Gates (a consultant to Washington State University) commented on the distribution of NRF habitat and NRF areas.

Comments are as follows: The DEIS notes that declining habitat is a severe threat in the southern portion of Western Washington Cascades Province yet little NRF habitat will be protected on DNR-managed lands - this appears to be a discrepancy and needs to be clarified; establish 4 mile radius experimental areas around all known sites in southwest Washington to maintain distribution of owls in Washington state and allow some economic return; lack of provisions for spotted owls in southwest Washington is contrary to recommendations in the Recovery Plan, thus DNR should add NRF areas here; DNR should analyze an alternative that supports clusters that are further than a median home range radius from federal reserves; add NRF areas to southwest Washington and the rest of the Western Washington Lowlands

Province for HCP; protection of NRF habitat in southwest Washington is needed for linkage to Oregon Coast Range; in the east side planning units, extend NRF areas to within at least 5 miles of federal reserves and Yakama Indian Reservation; DNR could reduce the edge-to-area ratio in a portion of the Columbia Planning Unit by including lands north of Interstate 2 and west of Mount St. Helens in a NRF area and in the North Puget Planning Unit by changing the dispersal designations north of Route 20 to NRF areas; provide NRF area(s) in the Sultan Basin to provide a solid, low elevation connection between federal lands to the north and south; why are there no NRF areas in the Straits Planning Unit; NRF areas would be better used if they added demographic support to small clusters instead of ones that already consist of 20-25 pairs; and the WAU approach which requires that DNR lands contribute at least 50 percent habitat on its lands regardless of the condition of federal reserves unfairly burdens DNR. One commentor wanted to know how the 5,000 acre blocks in which nest habitat patches are to be located are going to be determined.

**Response:** DNR and the Services disagree with the commentor who stated that little habitat is protected on DNR-managed lands in the southern portion of the Western Washington Cascades Province. The Northern Spotted Owl Recovery Team (USDI 1992b) divided the Western Washington Cascades Province into northern and southern sections roughly at Mount Rainier. DNR has designated large blocks of its managed lands in the Siouxon and Columbia Gorge areas as NRF management areas, following the recommendations of the Recovery Team. In fact, the proportion of existing habitat protected on DNR-managed lands is the highest of any other province. Approximately 73 percent of the habitat on DNR lands within 6 miles of federal reserves in the Columbia Planning Unit are within NRF areas. The next highest proportion of habitat on DNR-managed lands that falls within NRF areas is 67 percent in the Chelan Planning Unit.

The situation with regard to owls in Southwest Washington is complicated, and is directly related to the physical and biological features of that area. This area is relatively accessible with a climate and soils well-suited to growing trees. It has been intensively harvested beginning early in Washington's history. Many portions of this area have already been harvested three or more times. Old-growth forest is conspicuously absent, and the landscape is dominated by younger plantations (e.g., <45 years old). Yet, in spite of the low densities of what we normally consider to be suitable owl habitat, a number of owls (including two breeding pairs) have persisted. This may be related to the

inherent productivity of this area. Southwest Washington (south of Highway 8 and west of Interstate 5) contains only negligible amounts of Ederal lands.

The proposed 4(d) special rule also plays an important role in development of this HCP. Because HCPs are developed through a negotiated process, it is difficult for the Service to extract mitigation in excess of what a land-manager would be required to provide without a permit. The proposed 4(d) rule does not contain any Special Emphasis Area (SEA) in Southwest Washington. An option available to DNR is to not pursue an ITP covering owls in Southwest Washington and merely wait for the 4(d) rule to be completed. The 4(d) special rule, as proposed, would not require land-managers to provide demographic support outside SEAs.

The Service must assess DNR's proposal in several ways; two of the considerations are discussed below. One consideration will be to determine if the lack of demographic support in Southwest Washington, as proposed in DNR's HCP, will significantly reduce the likelihood of survival and recovery of that species in the wild. In conducting that analysis, the Service will not consider the 4(d) special rule proposal. The Section 7 consultation process uses a "first in line, first in right" approach. In other words, because the 4(d) special rule proposal is also a federal action, it will also be evaluated according to Section 7 at the time of that action. Should DNR's HCP be completed prior to the promulgation of the proposed rule, DNR's HCP would be evaluated with the assumption that other lands would continue to be subject to Section 9 prohibitions on take.

Currently there are about 20 owl sites in the Province; 13 of these are in Southwest Washington and the remaining sites are adjacent to the Western Washington Cascades province immediately to the east of this area. All 20 of these sites are at risk of take from the proposed rule. The southern most sites in the Olympic Peninsula Province would also be at risk. Promulgation of the 4(d) rule as proposed, and in the absence of landowner incentives, would place all owl sites between the Mineral Block and the Peninsula at risk and all sites between the Cascades Range and the Coast in Southwest Washington at risk. Of the 13 sites in Southwest Washington, DNR lands contain the site centers and/or significant amounts of habitat for at least half of the sites, including both of the two breeding pairs that occur in Southwest Washington.

Second, another consideration is whether DNR's HCP would minimize and mitigate the effects of the take to the maximum extent practicable. This must be viewed in the overall context of the amount of owls to be taken and the impacts that would result. A relatively small number of sites (13) exist in Southwest Washington. The DNR HCP would likely result in the take of over half of those sites, including both breeding pairs. This would have a major impact on the owl population in the Province. A larger number of owl sites will be taken throughout the remainder of the State but these will represent a smaller percentage of the sites in the other Provinces. The impacts of take to occur Statewide will be assessed relative to the mitigation proposed in DNR's HCP, which includes nesting habitat, foraging and roosting habitat, and dispersal habitats in key locations across the State. The amount of mitigation in Southwest Washington, however, is minor and merely incidental with respect to owls. One factor the Service will consider is the effects at the Province level and how those impacts are addressed by the mitigation which occurs elsewhere in the State.

The Service notes that recommendations of the final draft Recovery Plan will not be met by DNR's proposed HCP. However, there is no requirement for HCPs to be consistent with Recovery Plans. The relationship between Southwest Washington and the Oregon Coast Range was referenced by one commenter. The Service notes that the relationship is unclear at this time with regards to mutual demographic support and exchange between those two areas.

The Service will further analyze the above-addressed factors, as well as other factors, as it considers its responsibilities under Section 7 of the ESA and as it assesses whether the issuance criteria for a Section 10 permit are being met.

The DEIS analyzed two options that do provide protection to spotted owls farther than a median home range radius from federal reserves. Alternative B provides protection for owls in the Siouxon, Columbia Gorge, and White Salmon areas that extend up to 8 miles from federal reserves. Alternative C provides more protection in the White Salmon and farther to the east in the Klickitat Planning Unit. Under Alternative C, 77 percent of the territorial site centers that influence DNR lands would have some portion of their median home range radius circle covered by NRF management areas. Options that provide more protection do not fit the purpose and need of the proposed action and thus were not developed further.

The commentor who recommended that NRF Management Areas be extended to 5 or more miles from federal reserves in the eastern Cascades supported their recommendation with the fact that 80 percent of spotted owls on DNR-managed lands occur on DNR-managed lands within 10 miles of federal reserves. Table 4.3.2 (DEIS, p. 4-186) shows the spatial distribution of spotted owls within a median home range radius of DNR-managed land with respect to federal reserves. Actually, close to 90 percent of spotted owls on DNR-managed lands occur on DNR-managed lands within 10 miles of federal reserves. But, nearly 60 percent of site centers lie within 2 miles of federal reserves. Table 4.3.2 shows that beyond two miles from federal reserves, a law of diminishing returns exists for the conservation of spotted owl site centers. NRF Management Areas designated for DNR-managed lands within 2 miles of federal reserves benefit 60 percent of site centers within a median home range radius of DNR-managed land. Extending NRF Management Areas another two miles from federal reserves would benefit only another 10 percent of site centers within a median home range radius of DNR-managed land. A strategy based on NRF Management Areas extending 4 miles from federal reserves would be a less efficient strategy for the conservation of spotted owls.

One commentor suggested that designation of DNR lands north of Highway 2, west of Mount St. Helens, and north of Highway 20 as NRF habitat would reduce the edge-to-area ratio created by large indentations in the boundaries of federal reserves. DNR-managed lands north of Highway 2 are designated as NRF areas. DNR-managed lands to the west of Mount St. Helens are currently non-habitat and do support spotted owls, thus would not constitute an efficient or useful designation, nor assist in reducing the edge-to area ratio habitat patches in the area for quite some time into the future. All DNR-managed lands north of Highway 20 that are adjacent to federal reserves and thus have the potential to reduce edge-to-area ratio are already designated as NRF areas. Lands that are designated for a dispersal function are too distant from reserves to assist in reducing landscape-level fragmentation.

In response to the commentor who suggested that DNR establish NRF areas in the Sultan Basin to provide north-south linkage in the western Cascades, the proposed strategy does establish NRF management areas in this location. The entire basin is not designated, but most existing habitat and all presently known site centers that are on or overlap the area are included in NRF areas. In addition, the Greider Ridge Natural Resource Conservation

Area, which is not designated as an NRF area but will continue to make a *de facto* habitat contribution as long as it is managed as an NRCA, also occurs in this area. DNR and the Service think that this combination of NRF areas and NRCAs constitutes adequate protection for spotted owls and owl habitat in the Sultan Basin.

By virtue of the location of DNR-managed lands throughout the range of the spotted owl in Washington State, the criteria use to establish designated NRF areas has resulted in areas that support both large clusters and small to medium clusters. Support of small to medium clusters will assist in demographic support of metapopulations that could be prone to extirpation due to lower number of reproducing individuals. Due to current habitat conditions on federal reserves, nonfederal habitat contributions to medium to large clusters is thought to assist the demographic stabilization of clusters that occur in areas with less than optimal habitat conditions (see DEIS p. 4-82 and Lamberson et al. 1994).

DNR and the Service disagree that the WAU approach which commits DNR to maintaining NRF areas at 50 percent habitat level even if adjacent federal reserves exceed 50 percent habitat unfairly burdens DNR lands. This strategy constitutes mitigation for harvest of habitat over a substantial portion of DNR-managed lands with a net gain in acres over which DNR can manage its lands for trust income.

The 5,000 acre groupings of NRF areas for the purposes establishing nest habitat patches will be done by DNR staff biologists during the first year of implementation of the HCP. The process will use GIS and professional judgement to find the most contiguous groupings of NRF areas possible and the optimum distribution of nest patches across the landscape given current habitat conditions and location of known nest sites. DNR will seek professional consultation from the WDFW in this process.

*management within*
**Summary:** WDFW, the NWIFC, Northwest Forestry Association, Society for Conservation Biology, two individuals, and Bogle & Gates (a consultant for Washington State University) commented on issues pertaining to management practices within NRF areas. Specific comments are as follows: (1) WDFW suggests that language should be inserted in both the west side and east side sections regarding management of sub-mature habitat which requires DNR to avoid manipulation of habitat near known spotted owl activity centers within

demographic support areas until those sites move; (2) WDFW is interested in discussing participation in a cooperative or some other inexpensive program in which the location of spotted owl activity centers is monitored in each WAU with excess habitat every three to five years; (3) The HCP should discuss the possibility of using nest boxes to enhance the northern flying squirrel population; (4) There should be no logging in areas established for spotted owls; there should be no harvest of any Type A spotted owl habitat nor any salvage logging within NRF areas; (5) The discussions of management activities allowed within NRF areas highlights the need to document the silvicultural, operational, and economic effects of such practices and guidelines; (6) Given that the definition of NRF habitat in the glossary included structural legacies of trees that are more than 200 years old, it appears that the concept of allowing NRF habitat to "move" around NRF management areas over the course of the HCP misrepresents what can actually occur because the plan only goes for 100 years; and, (7) In eastern Washington, the standards for allowing management within NRF habitat create a high price to pay for minor mistakes (e.g., if the tree density standard is not met).

A few commentors posed the following questions regarding management standards within NRF areas: (1) Of the factors listed that may be considered in a landscape assessment process, when habitat in excess of the target amount is to be harvested, which ones will DNR actually commit to considering? (2) What quantity of sub-mature characteristics must be present in determining if an additional five percent of sub-mature habitat can be manipulated? (3) What is the basis for determining that two years is an adequate amount of time to detect whether or not sub-mature characteristics have been attained or retained after manipulations? (4) Is the sub-mature habitat that is not designated as nesting habitat subject to a total aggregate 10 percent harvest limitation during the research phase or are successive five percent harvests allowed as long as the most recently harvested five percent meets the sub-mature definition? (5) Is it silviculturally appropriate to allow partial cutting in old growth? (6) What are DNR's assumptions about partial harvesting of old growth (i.e., how much will take place and under what conditions) and can this actually take place? (7) Will roads be prohibited to access partial harvest units if they require the removal of habitat for construction? (8) What happens if a natural event causes a stand that has been treated as part of the five percent limit to not meet the sub-mature habitat definition -- will any further harvest in the WAU be prohibited until that stand has recovered? (9) How will the two year, five percent

limitation on harvest within sub-mature habitat affect timber sale contract extensions? (10) Is the two year, five percent limit on partial harvest of sub-mature habitat too restrictive in eastern Washington, given that this will only allow a stand to be entered approximately every 40 years and that spotted owls appear to do fine in stands that have been partially harvested? (11) Is the landscape assessment process used to determine habitat amounts and a plan for harvest of habitat in WAUs that exceeded the specified target subject to NEPA and/or approval by the federal government?

**Response:** The HCP has been modified to incorporate the suggestion that harvest be avoided around known nest sites in demographic support areas until those sites move. If the HCP is adopted, DNR will avoid harvest of habitat within 0.7 mile of known nest sites in WAUs in which the amount of habitat exceeds the target level. In addition, the Service (or its designee) has committed to conducting spotted owl surveys in WAUs in which habitat is, or will soon be, available for harvest in order to update locations of site centers. These surveys will be conducted every three to five years, and DNR will use this updated survey information in planning harvest activities within NRF areas.

DNR and the Service think that habitat management for conditions that support flying squirrels is a more biologically sound approach to spotted owl conservation than using nest boxes as a surrogate for snags. In addition, many other wildlife species will benefit from the continued existence of snags in the landscape.

The Service does not think that it is necessary to establish reserves in which logging is prohibited in order to successfully provide habitat for spotted owls. Such requirements would also make applying for an ITP and preparing an HCP an action that would not fit DNR's purpose and need.

The management of Type A habitat and provisions for salvage logging are addressed previously under the comment category *Nesting, roosting, foraging habitat.*

The operational, silvicultural, and economic effects of the spotted owl management guidelines will be documented as either part of the monitoring and research component of the HCP or, for those economic aspects not required to be reported as part of the monitoring plan, as part of the regular business operations of DNR.

The definition of NRF habitat contained in the glossary of the HCP is a generalized definition and was not intended to convey stand-level requirements under the spotted owl conservation strategy. The definitions, along with guidelines for amounts, distribution, and management activities permitted that are described in Chapter IV, Section A of the draft HCP, are those by which to assess what will occur on the ground. Thus, it is not misleading to portray the spotted owl strategy as one in which the location habitat will move over time as habitat targets are exceeded in NRF areas. (See also the clarified NRF habitat definition as described under the comment category *Nesting, roosting, foraging habitat in this section.*)

DNR and the Service do not agree with the commentor who stated that the standards used to allow management within forest stands that are already sub-mature habitat are a high price to pay for small mistakes. The fact that management will be allowed in sub-mature habitat at all represents a high degree of confidence in the ability of foresters to manage within spotted owl habitat and still have that habitat function in the intended manner. This is still largely a management hypothesis. The standards established constitute an experimental safeguard against mistakes that could be quite expensive for spotted owls.

Of the listed factors that may be considered when conducting landscape level assessments in WAUs in which habitat has exceeded target levels, DNR is not committing to carrying out any of them in the legal sense of commitment because it would be difficult to define what constituted a legal commitment to "considering" these factors. However, the intent of this language is that DNR make a good faith effort to provide habitat in an arrangement and of quality that is optimal for spotted owls.

When existing sub-mature habitat is manipulated under the provisions of the HCP, all the characteristics described in the definition must be present in order for an additional 5 percent to be available for management activity.

The rationale for the two-year period for assessing the retention of sub-mature habitat characteristics and for a minimum period before any subsequent partial harvest can take place was developed by the Washington State Forest Practices Board Spotted Owl Science Advisory Group (SAG). Their thinking was based on the following reasons: (1) Spotted owl prey populations could be negatively impacted immediately post-harvest due to mechanical destruction of food sources, burrows, and dens; (2) Two years would allow prey populations to recover

and may allow spotted owl populations to adapt to new structural characteristics; (3) The full extent of habitat modification may not be apparent immediately post-harvest; and (4) Two years would likely allow measurement of those changes. The SAG also cited unpublished data from Lorin Hicks in which owls fitted with radio-transmitters avoided areas in which partial harvest activities had taken place for two years (Hanson et al. 1993 p.73).

The two-year, five percent guideline does not limit manipulations in sub-mature habitat to an aggregate of 10 percent during the research phase, but it allows successive five percent areas to undergo partial harvest as long as the previous 5 percent meets sub-mature characteristics.

The provision of the draft HCP to allow degradation of old forest to sub-mature outside of nest patches represents another attempt to allow maximum flexibility for DNR while providing owl habitat. The HCP Science Team viewed this option as a higher risk option than one that did not allow such degradation. The Board of Natural Resources directed DNR staff to further develop the higher risk option, which became Alternative B. If, after the nest habitat provisions have been met, along with the other requirements of the HCP, any old-forest habitat that is available for manipulation could be degraded to sub-mature habitat. It is not yet clear how much of this type of management activity will take place until the nest patches have been delineated and the marbled murrelet habitat relationship study and inventory have been completed. Experimental manipulation of old growth would occur in the OESF.

The goal of the OESF is to learn how to integrate production and conservation in managed forest, including conserving the ecosystem values of old-growth forests (draft HCP p. I.14 and 15, IV.69 through 74). In that regard, it is likely that partial cutting in old-growth forests will be one of the techniques tested to learn how to achieve that integration. The few existing studies relevant to partial-harvesting in old growth are retrospective studies of sites that were harvested for reasons other than integrating ecosystem and commodity outputs. But it is thought that partial harvesting in old growth is a silvicultural technique that might have some promise for integrating production and conservation goals (Franklin 1989, Franklin and Spies 1991, U.S. Department of the Interior 1992). One of the goals of the OESF is to learn whether, and how, it is silviculturally appropriate to conduct partial harvests in old growth.

It is likely that partial cutting in old growth will proceed cautiously in the OESF for several reasons: (1) It is not known how effective such a technique will be in meeting diverse objectives, thus thoughful experiments will need to be designed, implemented, and evaluated before larger-scale partial-cutting efforts would be initiated; and, (2) Few areas are available for such manipulative experiments because, under the spotted owl conservation strategy for the OESF, old-forest habitat can not be reduced below 20 percent of any landscape planning unit and current estimates are that only 4 of 11 landscapes have more than 20 percent of that cover type (draft HCP p. IV.77-78, 86-87). Most, but probably not all, of the estimated old-forest habitat in HCP Table IV.5 (draft HCP p. IV.78) is old-growth forest. In addition to owl conservation, partial harvest in old-growth stands in the OESF is constrained by the riparian conservation strategy, in the near term (and likely the long term as well) by the marbled murrelet conservation strategy. Without the constraints of the riparian and murrelet strategies, current estimates are that approximately 12 percent of the existing old-growth forest would be available for partial-cutting. It is likely that with full realization of the riparian and murrelet strategies, the amount of old growth available for partial cutting would be somewhat less.

Road construction would be prohibited only if such construction brought the habitat level below 50 percent in a WAU, or if it was planned to go through the 0.7- mile core of a known nest site.

If a natural event caused a stand that had been treated as part of the five percent not to meet the habitat definition, further manipulation in existing sub-mature habitat would be prohibited until that stand recovered.

Timber sale contract extensions would be granted under current DNR contract language. However, if the contract in question covered the maximum 5 percent of sub-mature habitat in a WAU, no other contracts could be offered in sub-mature habitat in that WAU for at least two years after completion of management activities under that contract. The time until the next sale would only be more than two years if the previously harvested five percent had not yet attained sub-mature characteristics.

Given the amount of spotted owl habitat that would be released from harvest restrictions due to spotted owl circles in eastern Washington, DNR and the Services do not think that the five-percent, two-year limitation on manipulation of sub-mature habitat within NRF areas is too restrictive.

The landscape assessment process used to determine amounts of habitat and plans for harvest in WAUs is not subject to NEPA review on an assessment-by-assessment basis. The results of the assessments will be reviewed by the Service only as part of monitoring plan implementation during regularly scheduled reviews.

*nest patches*

**Summary:** WDFW, the NWIFC, Point No Point Treaty Council, the Tulalip Tribes, National Audubon Society, Sierra Club, WEC, Northwest Ecosystem Alliance, Black Hills Audubon Society, nine individuals (four signers on one letter), and Bogle & Gates (a consultant to Washington State University) commented on the provisions for spotted owl nesting habitat within the HCP. The most frequent comment on this topic is that the 300-acre nest patches are inadequate. Several commentors requested that a minimum of 500 acres of nest habitat be required within a 0.7-mile-radius of a nest patch and some commentors made general requests that the amount of nesting habitat be increased. One commentor requested that 500 acres be retained around all known sites. Two commentors stated that the HCP allows less than 300 acres of high- quality nesting habitat within a nest patch. Other comments are as follows: (1) The scientific rationale for 300-acre nest patches described in the HCP is weak, and other sources indicate more habitat should be included; (2) In the OESF, riparian management zones will not provide areas large enough to provide adequate nesting habitat with interior forest conditions; (3) Criteria for success of nest habitat creation experiments during the research phase should be that a resident pair has successfully bred for a minimum of five years; (4) success of nest habitat creation should be occupation of a site by a breeding pair for three consecutive years; (5) We do not know enough about how spotted owls choose their nest sites to know whether the proposed strategy of creating nest habitat will work; (6) Research results on creation of nest habitat should be approved through a peer review process before any habitat within nest patches is harvested; (7) Nest site protection should not be based on location of current site centers; (8) DNR should acknowledge that the research phase for nesting habitat renders it impossible to predict harvest levels after the research phase is complete; and, (9) DNR assumes a heavy burden by stating that it will ensure that adequate nesting habitat is provided.

The following questions were posed regarding the nest habitat provisions of the HCP: (1) How long will it take to demonstrate that DNR can successfully use silvicultural techniques to create

nesting habitat in managed stands; (2) What are the standards for success; (3) How long will it take to locate nest habitat patches on the ground; (4) For how many WAUs must this process be completed; (5) Is the intent of the HCP not to require nest habitat patches or a research phase in the east side planning units; and (6) What is the advantage of the nest habitat approach over the spotted owl circle approach?

**Response:** Examination of age-class distribution data on DNR-managed lands and distribution of known status 1 and 2 site centers and an initial examination of new forest inventory data collected by DNR over the past five years show that DNR-managed lands currently do not contain enough high-quality nesting habitat to meet the requirements established in the HCP, both in terms of stand-level characteristics and landscape-level distribution of forest that contains nesting structure. By adopting the strategy of requiring two 500-acre patches (300 acres of high quality nest habitat with a 200-acre buffer of sub-mature habitat, or better) per 5,000 acres of designated NRF areas, with these patches being embedded in a larger landscape of suitable spotted owl habitat (sub-mature quality or better), the overall quality of habitat will improve over time. The riparian and murrelet provisions of the HCP will add patches of older forest habitat throughout NRF landscapes that will exceed the acreage of older forest retained in nesting habitat patches. Given all of these factors, the HCP strategy will accomplish its objective of providing demographic support to the population. The Service thinks that this is an acceptable approach.

As was noted above, the draft HCP has been modified such that all habitat within 0.7 mile of known nest sites in NRF areas will be retained.

The commentor who stated that the provisions of the HCP allow less than 300 acres of high-quality nesting habitat to be included in nest patches is in error. Habitat that meets the high-quality definition in the HCP will be included first. There are cases however, where there will not be enough high-quality nesting habitat available in a particular 5,000-acre landscape to establish a 300-acre nest patch. In such cases, the next best available habitat will be protected and allowed to develop into higher quality habitat.

The rationale described in the HCP for establishing 300- acre nest patches with a 200-acre buffer of sub-mature or higher quality habitat is based on the work of Irwin and Martin (1992). As was noted above, data analyzed by Bart (1995) and in the

Forest Practices Board FEIS for the Permanent Spotted Owl Rule (WFPB 1996a) does not give conclusive results on how much habitat spotted owls need around their nests. The HCP acknowledges that information regarding adequate amounts of nesting habitat at the stand and landscape level is less than conclusive and thus DNR has included an extensive research plan to answer these questions. DNR also commits in the HCP to provide adequate amounts of nesting habitat per the results of this research program. Furthermore, if the HCP is adopted, DNR is committed not to harvest existing habitat within 0.7 mile of known nest sites.

The comment in regard to provision of nest habitat through the OESF riparian strategy is addressed under topic heading *Nesting, roosting, and foraging habitat* in this section of the FEIS.

Comments regarding what criteria should be used to determine whether spotted owls are successfully reproducing in managed landscapes have been noted and will be considered during the development of the specifics of the nesting habitat research plan.

The commentor who noted that we do not know enough about how spotted owls choose their nest sites to know if creating nesting habitat will work is correct. The proposed strategy is a management experiment that includes monitoring and research programs designed to test the hypothesis that nest habitat can be created through management. The Service and DNR think that the proposed strategy of retaining existing nest structure in the landscape is adequate protection while these owl management questions are researched.

Research results regarding creation of nest habitat and any new management guidelines based on this research will be approved by the Service before nest habitat in the 300-acre patches becomes available for management.

In its harvest modeling of the spotted owl strategy, DNR assumed that the research phase would last for the entire permit period because it was not possible to model potential new management strategies based on the results of the research phase. The assumptions used in the harvest model are included in the FEIS.

DNR and the Services disagree that DNR is assuming a heavy burden by stating that it will ensure that adequate nest habitat will be provided. The Service cannot issue an ITP if the

applicant's proposal will appreciably reduce the likelihood of survival and recovery of a species. If DNR did not ensure provision of adequate amounts of nesting habitat in NRF areas, the Service could not issue an ITP based on this criterion.

It is not known how long it will take to demonstrate that DNR can successfully use silvicultural techniques to create nesting habitat in managed stands. This is why no time limit was attached to the research phase. The standards for success will, in general terms, be the observance of successful spotted owl reproduction for a consistent period of time in stands that have been subject to a variety of treatments which resulted in the creation of nesting structure. The specific standards for success will be determined based on the best available science regarding spotted owl ecology.

Nest patches will be located on the ground during the first field season after the HCP has been approved. Designation of nest patches will occur in a maximum of 48 WAUs. It could be a smaller number if two nest patches are placed in a large WAU. The nest patch strategy does not apply to the three east-side planning units because spotted owls nest in sub-mature habitat in the eastern Cascades.

The nest habitat patch approach is different than the spotted owl circle approach because these patches will occur within a larger landscape context in which 50 percent of NRF areas in each WAU will be in a suitable habitat condition. The circle approach results in a maximum of 40 percent habitat within a median home range radius of a site center. Establishing nest patches is a way of ensuring that nesting structure is distributed within NRF areas in a configuration thought to be used by spotted owls (i.e., habitat concentrated within a 0.7 mile area). In contrast to the former "500-acre rule", the nest patches will not constitute the only habitat available to spotted owls in the landscape.

dispersal habitat

**Summary:** Two individuals and Bogle & Gates (a consultant to Washington State University) made general comments regarding spotted owl dispersal habitat. These comments are as follows: (1) There is no scientific evidence that dispersal habitat works; there should be numbers associated with down woody debris and green tree retention portion of dispersal habitat standards; (2) There should be validation monitoring of dispersal habitat; and, (3) harvest parameters of dispersal habitat need to be clarified in the HCP.

**Response:** While there is no evidence that dispersal habitat will "work", there is no evidence that it will not work. The ability to create spotted owl dispersal habitat in a managed forest is a working hypothesis. Thomas et al. (1990) and the Northern Spotted Owl Recovery Team (USDI 1992b) both supported the concept of creating spotted owl dispersal habitat through forest management. In fact, the Northern Spotted Owl Recovery Team thought that providing dispersal habitat was the most appropriate role of some nonfederal lands.

The optimal characteristics of forests that can function as spotted owl dispersal habitat are not known. Current descriptions of dispersal habitat do not include down woody debris, and for this reason, down woody debris is not included in DNR's definition of dispersal habitat (draft HCP p. IV.11 to 12), but down woody debris will be incorporated if and when research demonstrated its necessity (draft HCP p. IV.18). The draft HCP states that in dispersal managment areas four green trees per acre will be retained from the largest size class (draft HCP, p. IV.12). The optimal silvicultural treatments for developing dispersal habitat are not known. For this reason, and in order to retain operational flexibility, the harvest parameters are not specified in the draft HCP.

Validation monitoring of dispersal habitat is impractical. A monitoring program that would have reasonable statistical power would be unreasonably expensive. Validation monitoring of dispersal habitat would require radio-tagging a large number of juvenile owls. The number of owls tagged and tracked through radio-telemetry would need to be very large because only a small proportion of those tagged might actually traverse DNR-managed dispersal habitat. For this reason, effectiveness monitoring is a much more reasonable approach to evaluating the value of dispersal habitat on DNR-managed lands.

*dispersal-designated areas*

**Summary:** WDFW submitted comments specific to designated dispersal areas in the draft HCP. They had recommendations for additional dispersal areas near Spada Lake and in the southern portion of the Mineral Link area.

**Response:** Given the areas included for NRF management, the existence of the Greider Ridge NRCA in the Spada Lake Basin and the proximity of these NRF areas to federal reserves to the north and south, DNR and the Service do not think that additional dispersal habitat designations are warranted.

In the Columbia Planning Unit, the HCP proposal has been modified to include DNR-managed lands south of the Mineral Block that occur within the Mineral Link SOSEA designated under the new state spotted owl rule as dispersal management areas (see map IV.3 in Appendix 3 of this document). Dispersal areas in the North Puget Planning Unit have also been modified such that the western portion of the Harry Osborn State Forest (west of Township 7 North) has been changed from dispersal to no role. This change is consistent with the Finney SOSEA boundary.

*quality/definition*

**Summary:** WDFW, NWIFC, Point No Point Treaty Council, Bogle & Gates (a consultant to Washington State University), and three individuals commented on dispersal habitat definitions. These comments are as follows: (1) The justification for dispersal habitat definition is not well supported by the literature, and DNR should do validation monitoring to verify usefulness of dispersal habitat; (2) Use the definition of dispersal habitat developed by Beak Consultants for the Murray Pacific HCP; (3) Include down woody debris as a component of dispersal habitat; (4) The definition for dispersal habitat needs more snags; (5) Fifty percent canopy cover does not constitute dispersal habitat; (6) Harvest age of dispersal habitat is too old; and (7) NRF habitat should be double counted as dispersal habitat so as to reduce the regulatory burden for providing dispersal habitat.

**Response:** It is true that the definition for spotted owl dispersal habitat is not well supported by the scientific literature, but this reflects the current state of knowledge. The definition was based on the best scientific information available. Furthermore, the definition in the draft HCP is an interim definition (draft HCP, p. IV.17). DNR's definition is very similar to that developed by Beak Consultants (1993), and DNR's definition may change over time as more is learned about the creation of dispersal habitat in managed forests. The same can be said regarding the amount of down woody debris, snags, and canopy cover.

The draft HCP does speculate about the harvest age of forests in dispersal management areas (p. IV.137), but it does not specify a harvest age. The harvest age of forests managed for dispersal habitat will depend on the landscape conditions within a WAU, but more importantly, it will depend on the final definition for dispersal habitat and the silvicultural treatments used to develop habitat.

NRF management areas also function as dispersal habitat, but counting them as dispersal habitat would not reduce the regulatory burden for providing dispersal habitat. DNR's HCP designates dispersal habitat areas in order to reduce the regulatory burden for providing NRF habitat in areas where it was thought the provision of NRF habitat would not make an important contribution to spotted owl conservation in Washington State (draft HCP p. IV.3). This strategy was considered the most efficient means to meet the purpose and need of the proposed action (DEIS, p. 1-2 to 1-4).

*amounts/distribution*

**Summary:** The Muckleshoot Indian Tribe, one individual, and Bogle & Gates (a consultant to Washington State University) submitted comments pertaining to the amount and distribution of dispersal habitat. Comments are as follows: (1) In the South Puget Planning Unit, designated NRF areas are useless without adjacent NRF areas; (2) Dispersal areas in the Klickitat Planning Unit are far from federal reserves or DNR NRF areas; and, (3) Dispersal areas farther than 2 miles from federal reserves make no sense -- the HCP itself acknowledges that lands further than two miles serve no useful function for spotted owls. One commentor wanted to know if there were spatial requirements for dispersal habitat beyond the 50 percent requirement in a WAU in western Washington and questioned how harvest calculations were made for eastern Washington given that estimates were not made of how much dispersal habitat existed in the east side planning units.

**Response:** There are two large blocks of DNR-managed land designated as dispersal management areas in the South Puget Planning Area. One is intended to facilitate dispersal to the Late Successional Reserve known as the Mineral Block. The other is intended to facilitate dispersal between federal Late Successional Reserves and Seattle's Cedar River watershed.

The HCP does not say that lands farther than 2 miles from federal reserves serve no useful function for spotted owls. Lands beyond 2 miles from federal reserves can serve a useful function as spotted owl NRF habitat, but the draft HCP spotted owl conservation strategy designates very little DNR-managed land beyond 2 miles from federal reserves as NRF management areas. A distance of 2 miles was used for the designation of NRF management areas because 2 miles was thought to be a reasonable compromise between DNR's trust mandate and the ESA Section 10 criteria for the issuance of an ITP. Dispersal management areas many miles from federal reserves do make

sense if they are located between large blocks of NRF habitat. For 111 juvenile spotted owls studied in the Wenatchee National Forest and on the Olympic Peninsula, the mean dispersal distance was approximately 15 miles (E. Forsman, unpubl. data; USDA Forest Service, Corvallis, OR). During the same studies, one juvenile owl dispersed 76 miles.

(B) eagles--bald

**Summary:** The National Audubon Society, Northwest Ecosystem Alliance, and WEC said that DNR's draft HCP was inadequate for bald eagles and that an ITP should not be issued. In particular, all three groups said that state Forest Practices Rules and state wildlife regulations are inadequate. The National Audubon Society and WEC also stated that an ITP for the bald eagle should not be issued for the east-side planning units because the prescriptions for large, structurally unique trees do not apply there.

**Response:** Measures for protecting eagles and their habitat include provisions for retaining large, structurally unique trees, maintenance of salmonid habitat through the conservation of riparian areas and wetlands on the west-side planning units (explained in draft HCP p. IV.46). Site-specific management plans in both the east and west-side planning units (Forest Practices Rules) will also ensure protection of active nests. These strategies and the snag and green tree retention requirements added to the HCP, (see Appendix 3 of the document) should provide an adequate amount of suitable roosting and nest structures, as well as protection of potential food sources in the west-side planning units. Most bald eagle nesting and wintering areas occur within the west-side planning units. Bald eagle populations have doubled every 6 or 7 years since the 1970's, rising 10 percent since 1993 to more than 4,500 nesting pairs (Vickery 1995). State Forest Practices Rules for bald eagles have contributed to this recovery. Therefore, it seems reasonable to DNR that continuation of this strategy will provide adequate protection of this species.

USFWS has concerns that site-specific management plans in the east-side planning units will protect only nest sites and communal roosting sites, and provide no protection of other eagle use areas such as foraging sites.

(C) falcons--peregrines

**Summary:** The National Audubon Society, Northwest Ecosystem Alliance, and WEC and a local organization said that DNR's draft HCP was inadequate for peregrine falcons and that an ITP should not be issued. In particular, all four groups said that state Forest Practices Rules are inadequate. The National Audubon Society and WEC also stated that an ITP for the peregrine falcons should not be issued for the east-side planning units because the prescriptions for cliffs do not apply there. The

local organization recommended more protection around peregrine nest sites.

**Response:** Through negotiations with USFWS additional protection for the peregrine falcon has been incorporated. Management of cliff habitats will include measures for retaining obvious perch/nest trees and trees that maintain the integrity of cliff habitat on both west- and east-side planning units. Also, DNR will survey sites identified as suitable for peregrine falcon occupancy to prevent direct harm to the species (draft HCP, Chapter IV, Section F). In addition, public access to DNR-managed lands within 0.5 mile of a known peregrine falcon aerie will be restricted, and aerie locations on DNR-managed lands will be kept confidential. State Forest Practices Rules have contributed to the increasing peregrine falcon population, which is now estimated at more than 1,000 pairs in the contiguous 48 states (USFWS 1995). The Services expect these measures, in addition to the stated commitment to limit human disturbance near known aeries, will provide adequate protection of the ecological requirements for this species.

(D) accipiters--goshawk

**Summary:** WDFW is concerned about the contraction of the species' geographic range. WDFW recommended that goshawk nest sites be protected through site management plans, that harvest rotations be lengthened in some areas to provide more mature forest, that more snags and green tress be retained in clearcuts, and that goshawks be protected in areas outside of NRF management areas. One individual said is was unfortunate that goshawks in the eastern Cascades would not be protected.

**Response:** It is outside the scope of DNR's HCP to address problems with the contraction of the geographic range of the goshawk. However, DNR does recognize that conservation measures can be developed to protect the goshawk on all DNR-managed lands. Developing an HCP is a voluntary process in which applicants are free to include whatever lands they choose in their plan. Applicants are also free to choose the conservation measures they wish to implement to get coverage for unlisted species. DNR chose not to include conservation measures for goshawks east of the Cascade crest. If the goshawk becomes listed, DNR will not be issued an ITP for goshawks where they occur on DNR-managed lands on the eastside. In the west-side planning units goshawks will likely benefit from the owl, murrelet, and riparian ecosystem conservation strategies. Murrelet habitat, as well as owl NRF management areas and dispersal habitat, will provide potential nesting structures and dispersal habitat for goshawks. The riparian buffers will also provide potential nest structures that likely will be protected when adjacent stands develop. Within NRF management areas all active goshawks nests will receive seasonal protection. The strengthened snag and green retention tree conservation strategy will also be a source of

potential nest structures, especially the commitment to retain large, unique wildlife trees and one tree of the largest size in each harvested unit (Appendix 3, Chapter IV, Section F of this document). These strategies contain provisions for some habitat to continue to grow and develop throughout the HCP term (e.g., the 300-acre nest patches, occupied murrelet stands, and riparian buffers) while other potential goshawk habitat such as sub-mature stands in NRF management areas will move around the landscape. Although extending harvest rotations and/or site management plans would provide additional benefits to goshawks, it is anticipated that goshawk habitat will be available in some areas of all west-side planning units as a direct result of the HCP conservation measures. These conservation strategies, which take a habitat-based approach, will be in addition to protection required by state law to protect from harvest snags or trees known to contain active goshawk nests.

### iii. Passerines

(A) Vaux's swift

**Summary:** WDFW said that lack of snags in certain regions may lead to low populations of Vaux's swifts. NWIFC said that determining whether a hollow snag is a Vaux's swift nest site can only be done during the nesting season. Bogle & Gates (a consultant to Washington State University) wanted to know the impact on harvesting of the mitigation measures for Vaux's swifts.

**Response:** The green tree retention provision of the HCP, which was better in quality than state Forest Practices Rules, has been strengthened to include a total of five green trees. In addition to the large, structurally unique tree and one from the largest size class of living trees, three more green trees will be retained from the codominants (Appendix 3, Chapter IV, Section F of this document). A provision to retain snags has been added to this conservation strategy. DNR will leave three snags greater than or equal to 20 inches dbh where possible, with a minimum dbh of 15 inches. Where snags at least 15 inches dbh are not available, a one-for-one replacement will be made with green trees. Preference will be shown for hard snags, and large hollow snags greater than or equal to 40 feet in height. All leave trees will be left in the harvest unit, and through subsequent rotations, thus ensuring they continue to function as wildlife trees. This measure to protect current snags and provide future snags should result in the availability of potential Vaux's swift habitat on DNR-managed lands throughout the HCP area. Instead of attempting to determine whether specific snags are used by Vaux's swifts to justify protecting the snag, a preference for retaining large, hollow snags likely to be used by Vaux's swifts (and other wildlife) is built into this conservation strategy, thereby negating the need to conduct Vaux's swift surveys during the nesting season. The Department of Labor and Industry standards preclude the retention of all snags. Only safe snags will be

retained, and therefore there should be no impacts to timber harvesting with implementation of this part of the strategy. There will be some impacts to harvesting with the retention of additional green trees in that not all trees available for harvest under state Forest Practices Rules will be harvested. The intent of retaining these trees is to provide habitat for a variety of currently unlisted species to, hopefully, preclude future listings and additional harvest restrictions and provide adequate mitigation for the take of unlisted species that may occur in the future while conducting timber harvest activites.

### c. Reptiles

**Summary:** The Northwest Ecosystem Alliance requested more protection for riparian and wetland areas because six of Washington's reptile species are associated with wetlands. One individual expressed a concern for pond turtles because of their role in the food chain.

**Response:** A goal stated in DNR's HCP is " no net overall loss of naturally occurring wetland acreage and function". The draft HCP contains riparian protection of Types 1 through 3 streams and wetlands protection for wetlands greater than 0.25 acre in the form of buffers that will be 100 feet wide or a site potential tree, whichever is greater. Type 4 streams will have 100-foot buffers on each side of the stream, and it is expected that at least 50 percent of Type 5 streams will have buffers resulting from the strategy to protect steep and unstable slopes. All the buffers will be measured on the horizontal distance, a provision that has been changed from the draft HCP (Appendix 3, Chapter IV, Section F of this document). A minimum basal area of 120 square fee per acre will be maintained in the forested portions of wetland buffers. The wetlands buffer should provide adequate protection for the types of marshes, ponds, sloughs, and small lakes the western pond turtle has been known to inhabit. DNR must still adhere to state Forest Practices Rules that require a SEPA environmental checklist for activities within 0.25 mile of a known individual occurrence of the western pond turtle. However, these additional measures should ensure that the loss of habitat for wetland-dependant species will not occur.

### d. Amphibians

**Summary:** WDFW was concerned about the protection of forested talus for the Larch Mountain salamander. NWIFC said that buffers should be placed on Type 4 and 5 streams because they are important as amphibian breeding habitat. They also asked how the Services will calculate the number of individuals incidentally taken if an amphibian species is listed in the future. Point No Point Treaty Council suggested amphibian surveys be part of the evaluation of effects of forest management activities along Type 5 streams. Point No Point Treaty Council and WEC said that seeps, Type 5 streams, and moist talus should receive greater protection because they are inhabited by Van Dyke's salamander. The Northwest Ecosystem Alliance requested more protection for riparian and wetland areas because amphibians are sensitive to changes in hydrology, water temperature, and substrate characteristics resulting from timber harvest. A local group urged

DNR to design harvesting plans that will allow the dispersal of less mobile species such as amphibians. An individual pointed out that the dissapearance of frogs and toads change the food chain and asked whether research information would indicate habitat restoration that will continue the food chain.

**Response:** Concerns about the Larch Mountain salamander are addressed in the response to concerns about special habitats (see p. 3-13 in this section) and in the response to concerns about adequate protection of talus (see p. 3-17 and 3-18 in this section). The effects of the Riparian Conservation Strategy for the five west-side planning units and the Olympic Experimental State Forest are detailed in the DEIS, p. 4-396 to 404. The Services and DNR believe that the buffers of a site potential tree height or 100 feet, whichever is greater, on both sides of Type 1 through 3 streams, and 100-foot buffers on both sides of Type 4 streams are scientifically justified and would provide all the important habitat elements necessary for protecting amphibians. This is particularly true for stream-breeding amphibians. All Type 4 Waters that were classified prior to January 1, 1992, must either be verified in the field or assumed to be Type 3. Type 5 Waters are considered important to amphibians, as well, and all Type 5 Waters flowing through an area with a high risk of mass wasting will be protected according to the subsection titled Unstable Hillslopes and Mass Wasting (draft HCP, p. IV.56 and 57). It is expected that 50 percent of these streams will be buffered through this strategy. A 10-year research program will be initiated to study the effects of timber activities along Type 5 Waters (draft HCP, p. IV.54). As a result, a long-term conservation strategy for Type 5 Waters will be developed and incorporated into the HCP. Outer wind buffers will be applied to protect the riparian buffer in areas that are prone to windthrow. Types 1 and 2 Waters, and Type 3 streams wider than 5 feet, with moderate potential for windthrow, will receive 100-foot and 50-foot wind buffers, respectively, along windward sides. Where riparian buffers could be subject to strong winds, wind buffers will be placed along both sides providing additional protection to riparian obligate species. These measures will result in a forested network of riparian buffers made up of many dispersal corridors for amphibians and many other riparian obligates. Documentation shows, several species of frogs benefit from the herbaceous cover and subsequent increases in local invertebrate populations provided by recently harvested areas. An increase in sunlight reaching a small stream or wetland has also been shown to increase aquatic invertebrate populations, thus providing a short-term increase in the forage base for stream-dwelling amphibians.

Implementation monitoring will document the types, amounts, and locations of forest management activities carried out on the plan area. Effectiveness monitoring will document changes in habitat conditions, including general forest structures and specialized habitat features (e.g., large woody debris). Monitoring will ensure that habitat requirements for amphibians are met. Specific populations will not be surveyed or monitored, rather habitat will be monitored by comparing it to the baseline condition if quality and quantity over the life of the plan. In the event that a species' further existence might be jeopardized by the action (the HCP), the strategy for that species will be reevaluated and

amended appropriately to address the species needs. The premise of the HCP is to preclude the need to elevate the status of an unlisted species by providing adequate habitat for that species through the provisions of the plan. Without a conservation plan, an unlisted species receives little consideration. The Services and DNR are confident that habitat for amphibians on the plan area will improve as a result of the measures undertaken in this HCP and that this improvement will in turn not contribute to the subsequent need to elevate the present status of amphibians as a result of activities carried out under DNR's HCP.

**i. Frogs** (in section 3.3 only)

**e. FISH**

**Summary:** The American Rivers group stated that healthy fish populations and rivers are of critical importance to the economy of Washington. Fifty-one individuals (and identical letter sent by 51 individuals) commented that riparian areas are very important to all kinds of fish. One individual pointed out that DNR works for the public and that there is a responsibility to protect fish for the public.

**Response:** DNR agrees that it is important to maintain healthy fish populations in the streams that drain DNR-managed lands and other lands as well. The riparian strategy that is presented in the draft HCP on pages IV.51 to 67 is a scientifically based attempt to provide a protection and restoration strategy for fish habitats on DNR-managed lands.

**i. Anadromous salmonids**

**Summary:** Clallam County believed that habitat degradation is not the problem, overfishing is. The Squaxin Indian Tribe commented that most Washington streams lack most salmon habitat components. The tribe also said that the state of knowledge about salmonids and riparian zones is such that the trends are toward increased protection, and therefore, marginal improvements over current practices are simply not adequate to protect these resources over the long term. The tribe was concerned about protection of salmon through treaties that were signed between the tribes and the federal government. The Elwha/Clallam Tribe said that they are mostly concerned about watershed health and salmon populations. The Hoh Indian Tribe asked how the OESF will fit with the wild salmon policy. The Tulalip Tribes suggested that DNR develop information on the potential limiting factors for each species and quantify this, where possible, for existing stocks.

Bogle & Gates (a consultant to Washington State University) stated that salmon are already protected by current regulations, policies, and guidelines. The Northwest Forestry Association stated that just using salmonid freshwater habitat as a "proxy" to evaluate the effects of riparian conservation says that fish are of no consequence; therefore, numbers of fish should be evaluated with proper acknowledgment of factors influencing this data. The

Mountaineers said that protection of salmonids and salmon habitat is a very important part of the whole HCP strategy.

A local group said the most critical issue for salmon is "...how to best sustain propagation in our streams." An individual commented there is a need to protect and restore crucial salmonid habitat on DNR-managed lands, or to curtail land-use activities on DNR-managed lands that negatively impact salmonid habitat outside of DNR-managed lands. Also, he said that DNR's draft HCP failed to utilize state-of-the-art salmonid or forest invertebrate conservation biology. The same individual also pointed out the need to think more on a watershed basis of the effects of clearcuts on stream habitat.

An individual said that DNR must protect spawning grounds. Another individual said that salmon declines are caused by timber harvest. An individual stated that the HCP Alternative B riparian protection is not enough to protect salmon. Many individuals (51) implied a need to protect the remaining old-growth timber for salmon.

**Response:** Recent reviews of the status of Pacific Northwest salmon stocks indicate that many are either already extinct or are in an at-risk status. The causes of these declines have been summarized into four general categories: (a) overharvest of weaker stocks, (b) problems caused by hatcheries, (c) hydropower facilities, and (d) habitat loss. Nehlsen et al. (1991) concluded that there is a need for a paradigm shift that "...advances habitat restoration and ecosystem function...for many of these stocks to survive and prosper into the next century." Undoubtedly the decline of pacific salmon has come from myriad of impacts, and to solve this problem will require the recognition by all impactors of the need to do their part to work toward a comprehensive solution.

DNR is aware of the status of salmon stocks in Washington, as is pointed out on pages III.66 through III.73 of the draft HCP, and understands the need to develop a comprehensive, scientifically based approach to habitat protection to put salmon habitat on the road to recovery. DNR believes that the riparian conservation strategy for the five west-side planning units presented on pages IV.51 through 67 of the draft HCP is just such an approach.

The large number of instances in which habitat degradation and simplification have been cited as a factor in salmonid stock declines suggests that loss of critical habitat has played an important role in some extinctions, particularly species spending extended periods in fresh water and undertaking extensive seasonal movements within the drainage system. At present there is little direct evidence that diversity of fishes has been reduced in simplified streams in the Pacific Northwest because few studies have attempted to relate fish community composition to habitat characteristics (Bisson et al. 1992). Some of the few studies that have addressed loss of habitat diversity after logging were carried out by Erman et al. (1977) on aquatic insects and Bilby and

Bisson (1992) on loss of diversity in forms of terrestrial organic matter entering streams. Bisson and Sedell (1984) found that streams in western Washington from which logging debris had been removed had fewer pools and longer riffles than streams in old-growth forests. Although total salmonid biomass was greater in logged and cleaned streams than in old-growth sites, the communities were dominated by underyearling trout and there were proportionately fewer older trout.

Most salmon streams on DNR-managed lands have been logged in past years at least once. The lack of understanding of watershed processes and riparian function during those years often resulted in salmonid habitat degradation due to logging, and today many streams are still recovering from past practices. There is a clear recognition in the draft HCP riparian strategies (p. IV.54) of the need to "...maintain and restore the quality of salmonid habitat..."

As explained in the Forest Resource Plan, the protection of salmon habitat on DNR-managed lands is a legitimate objective for the department. The purpose of the riparian conservation strategy for the five west-side planning units (draft HCP, Chapter IV, p. IV.51 to 68) is to meet this objective. After exhaustive literature review, it was concluded that the No Action alternative was not sufficient to protect salmon habitat. That alternative did not address the riparian ecosystem needs to the extent that was called for in the literature, and it did not sufficiently address logging near drainages on steep and unstable slopes. Restoration of riparian ecosystems is an objective of riparian management, and this is discussed on pages IV.54 and 55 of the draft HCP. A restored riparian forest will lead to the natural recovery of inchannel habitat, a recovery that will be sustainable through the long term. Active restoration of inchannel salmon habitat (i.e., log placement, gravel supplementation, etc.) is a separate issue outside the commitments of the draft HCP, but one that can still be accomodated if the Board of Natural Resources approves the HCP. Along with forest management in RMZs, attention paid to unstable slopes and mass wasting, road network management (draft HCP, p. IV.56), hydrologic maturity in the rain-on-snow zone (draft HCP p. IV.56 and 57), and wetlands protection (draft HCP, p. IV. 57 and 58) are an attempt to address salmon habitat protection on a watershed basis.

DNR thinks that Alternative B is clearly a scientifically sound approach to riparian ecosystem protection and one that is justifiable under the current DNR Trust mandate.

The counting of salmon will definitely help monitor the effectiveness of the various habitat protection measures that have been brought out in the draft HCP. Monitoring salmon populations (both catch and spawning escapement numbers) is the responsibility of the WDFW, not DNR.

(A) coho

**Summary:** An individual commented there is a need to protect small streams to benefit coho salmon.

**Response:** Coho salmon are the most ubiquitous salmon species, utilizing many different kinds of habitat, including not only mainstem rivers, but also the innumerable medium to small headwater tributaries and floodplain wall-base channels. The intent of the draft HCP riparian strategy is to protect all water types -- large and small streams, lakes, ponds, and wetlands.

### ii. Resident salmonids

(A) bull trout

**Summary:** The WDFW said that bull trout are extremely sensitive to water temperature and that work around Type 5 Waters could compromise the state or federal government's ability to avert an elevated listing of bull trout. WDFW recommend future research on this species. The Yakama Tribe pointed out that several eastern Washington bull trout populations are in jeopardy, "yet no emphasis is placed by DNR in the draft HCP or Draft EIS (for bull trout on the east side)."

A local conservation group suggested that DNR "...check for bull trout and wherever present should ensure that their habitat requirements such as cool water temperatures are being met." An individual stated that USFWS should not issue a permit to DNR because of the inadequacy of the buffers on Type 1 through 4 Waters and discretionary buffers on Type 5 Waters. An individual expected bull trout will probably be listed in western Washington some time in the next 100 years. Many individuals (51) said there is a need to check for bull trout on DNR lands and, whenever they are present, to ensure that their habitat requirements, such as cool water temperatures, are being met and that this should apply to the waters upstream of bull trout habitats as well.

**Response:** Protection of bull trout, a member of the collective family of salmonids, is assumed to occur in the five west-side planning units under the draft HCP riparian conservation strategy. Bull trout can be found in streams on both sides of the Cascade Range, and those within the west-side planning units will benefit from the draft HCP. DNR-managed lands east of the Cascade crest are not covered by the draft HCP riparian conservation strategy.

### f. INVERTEBRATES

**Summary:** The Northwest Ecosystem Alliance, The Mountaineers, two local environmental organizations, and 51 individuals commented on invertebrate species issues. The Northwest Ecosystem Alliance requested more protection for riparian and wetland areas because 248 terrestrial invertebrates are associated

with wetland and riparian habitats. The 51 individuals, who mailed an identical form letter, questioned how DNR could provide for all species, including invertebrates, if all old-growth forest on DNR-managed lands is to be "quickly liquidated." The Mountaineers and one local organization assert that DNR's draft HCP does not adequately address forest invertebrates.

**Response:** The riparian conservation strategy for the five west-side planning units and the OESF, detailed in the draft HCP, Chapter IV, parts D and E, will provide habitat for invertebrates. The Services and DNR believe that the buffer widths of a site potential tree height or 100 feet, whichever is greater, on both sides of DNR Types 1 through 3 Waters, and 100-foot buffers on both sides of Type 4 streams is justified and would provide a substantial amount of the important habitat elements necessary for protecting invertebrates in the riparian and some habitat for upland invertebrates. Type 5 Waters flowing through an area with a high risk of mass wasting will be protected according to the subsection titled Unstable Hillslopes and Mass Wasting (draft HCP, p. IV.56 and 57). It is expected 50 percent of these streams will be buffered through application of this strategy providing protection for invertebrates in headwater areas. These measures will result in a forested network of riparian buffers made up of many dispersal corridors for riparian obligates and other species.

The conservation goal for wetlands is to allow no overall net loss of naturally occurring wetland acreage and function. Wetland buffers will be 100 feet with low ground disturbance which should protect the invertebrates associated with wetlands and adjacent vegetation. Additional protection is provided for bogs and mineral springs, which are specialized habitat types (Appendix 3, Chapter IV, Section F of this document). Protective measures have been developed for other special habitat types such as talus, caves, and cliffs. The conservation strategies for these special habitat types in conjunction with the murrelet, owl, and riparian ecosystem conservation strategies provide some protection for all habitat types that occur on DNR-managed lands within the range of the northern spotted owl. This includes old-growth forests. Old-growth stands occupied by murrelets will be protected in the short term until a long-term plan is developed with the USFWS. It is anticipated that some potential murrelet habitat will be harvested, however, many occupied murrelet stands will be protected. The owl strategy in the OESF Planning Unit is designed to retain old-forest habitat, most of which is old growth, at a level that is 20 percent of each of the OESF planning units. The result of this strategy is that much of this old growth will remain until such time as DNR can demonstrate to USFWS that they can replicate the structure and function of old growth. Old growth will also occur in the other west-side planning units as 300-acre nest patches distributed throughout the landscape. Although these are not large acreages, they will provide refugia for many old-growth-dependent invertebrate species.

The premise of the HCP is to preclude the need to elevate the status of an unlisted species by providing adequate habitat for that species through implementation of the plan. Without an HCP, an unlisted species receives little

consideration. The Services and DNR are confident that, overall, habitat for invertebrates on the plan area will improve as a result of the measures undertaken in this HCP and that this improvement will in turn avoid the subsequent need to. elevate the present status of invertebrates as a result of activities carried out under DNR's HCP. Specific populations will not be monitored, rather habitat is monitored by comparing it to the baseline condition in quality and quantity over the life of the plan. In the event that a species' further existence might be jeopardized by the HCP the strategy for that species will be reevaluated and amended appropriately to address the species needs.

**i. Lepidopterids**

**Summary:** One local group recommended that 50 percent of currently existing potential Oregon silverspot butterfly habitat be protected.

**Response:** No existing potential Oregon silverspot butterfly habitat is known on DNR-managed lands within the planning area. A small parcel of potential habitat on Long Beach Peninsula was sold to the State Parks and Recreation Commission in 1994. (See DEIS, p. 4-353.)

### g. OTHER WILDLIFE ISSUES

**i. Listed species and species of concern**

**Summary:** A local organization requested that sensitive species be protected to prevent their decline to levels requiring that they be listed as threatened or endangered. Fifty-one individuals, using the same form letter, requested that sensitive species be protected everywhere they occur, not just in NRF Management Areas. Two other individuals claimed that DNR's draft HCP would "wipe out" half of the remaining endangered species in Washington in the next 10 to 20 years. Another individual asserted that very little evidence was presented that additional protection of endangered species is necessary. One individual asked if recovery is a goal, then how many years of new management practices are necessary?

**Response:** The HCP proposes a habitat-based approach to conservation for all species, including species of concern. The primary assumption with regard to the goal of the unlisted species conservation strategy is if adequate amounts of habitat of sufficient quality are provided, these species will persist. The question is whether the combination of the described protective measures, natural diversity within the habitats on DNR-managed lands, and the diversity of treatments to be implemented under the HCP would provide a sufficient amount of habitat. Without an HCP an unlisted species receives little consideration.

The HCP is the principle document supporting DNR's application for incidental take permits and unlisted species agreements. The Services can issue incidental take permits and unlisted species agreements only if the HCP satisfies the criteria listed in Section 10 of the ESA. Additionally, the overall

multispecies conservation strategy of the proposed HCP is designed to provide sufficient protection of habitat for species of concern to meet Section 10 needs. Through negotiations, DNR and the Services have agreed to modifications of the draft HCP that will improve habitat protection for species of concern. These modifications include strategies relating to snag and green tree retention, talus, cliffs, balds, and springs and seeps. The overall multispecies conservation strategy of the proposed HCP should provide better protection of habitat for species of concern than Alternative A.

Implementation of the HCP is unlikely to "wipe out" half of the endangered species in the state of Washington. The Services think perhaps the commentors were referring to the fact that the HCP would have negative impacts on between 123 and 151 known and projected spotted owl site centers whose regulatory circles overlap DNR-managed lands. These sites would be at risk for incidental take and they represent between 40 and 49 percent of known and projected sites impacted by DNR-managed lands. (See response under the heading Old-Growth Habitat in this section.)

Whether additional protection of endangered species is necessary is a contentious issue. For the marbled murrelet, there is a high degree of uncertainty about population sizes and rates of population change, therefore, DNR has proposed a conservative approach to habitat management.

Recovery is the goal for threatened and endangered species. The number of years that new management practices will be necessary depends on the species. The recovery or listing status of listed species is periodically reviewed, but estimates of the time period until full recovery are rarely attempted. For most listed species, accurate estimates of a recovery period are difficult, if not impossible, to calculate.

## E. ECOSYSTEM HEALTH

**Summary:** Washington Wilderness Coalition, one local organization, and 64 individuals, 51 of whom used an identical form letter, expressed concerns about ecosystem health. The vast majority of these comments requested that ecosystems be preserved or adequately protected. A few such requests used the terms "ecologically sound" or "sustainable" to describe the protection of ecosystems. The Washington Wilderness Coalition believed that Alternative C comes closer to ensuring the health of forest ecosystems. One individual asserted that the ESA should be used to preserve ecosystems. One individual stated that DNR's draft HCP is ecologically sound. Another individual said that more research is needed to improve our understanding of ecosystems.

**Response:** DNR's proposed HCP is a habitat-based plan consisting of conservation strategies whose essence is ecosystem health. Without the means to provide for long-term productivity and management flexibility, DNR would not be meeting its trust obligations. The monitoring program and the research program provide the tools to refine the conservation strategies through time, as new knowledge is gained.

## V. HUMAN ENVIRONMENT

**Summary:** One local chapter of a national conservation organization and four individuals provided comments on the Human Environment. One individual asserted that managing for predators is unsafe for humans. A commentor wrote that an increasing human population increases pressure on state forests to produce revenues. Two individuals commented that the HCP undermines the ESA and is therefore harmful to the human environment. Black Hills Audubon Chapter wrote that ancient forests need to be protected, not just for biodiversity, but to perhaps provide healthful benefits to humans that are as yet undiscovered.

**Response:** The Services agree that certain predators can be dangerous to humans. The Services and DNR disagree that managing habitat to mitigate for the possible incidental take of certain wildlife species is inherently dangerous to humans. The Services acknowledge the various pressures our growing population creates on the state's forests. The Services note that the abilitity of nonfederal landowners and managers to prepare HCPs is provided in the ESA and therefore are one method of complying with the ESA.

### A. ECONOMICS

**Summary:** Environment Resource Center, GBA Forestry Inc., Inland Wood Specialties, Green Crow, Mt. Baker Plywood, Washington State Association of Counties, Cascade Hardwood, State Representative Mark Schoesler, City of Port Angeles, Port of Port Angeles, American Rivers, Clallam County Commissioner Phillip Kitchel, Northwest Forestry Association, Washington Forest Protection Association, Washington Contract Loggers Association, Bogle & Gates (a consultant to Washington State University), Merrill & Ring, Northwest Timber Workers Resource Center, Western Hardwood Association, and 7 individuals all provided comments on the Economic Effects Analysis provided in the DEIS. While some commenters focused much of their comments on the economic analysis, others mentioned it among many other topics on which they also provided comments. However, all comments fell into one of the following categories:

- The DEIS needs to provide more details on the derivation of the projected harvest levels that were used to develop the economic effects analysis;

- Provide more specific information about the assumptions and methods used in estimating both the harvest levels and the economic effects;

- The analysis should also provide regional effects to income as well as to employment;

- Economic effects include degradation of fish resources;

- The analysis should use a greater range of sensitivity analysis;

- The analysis failed to consider the effects of the proposed HCP on "X resource." X resource ranged in comments from operational costs at the unit or stand level, to the effects on specific industries, such as those based on hardwood supplies; and

- The analysis cannot possibly be any good because it is only five pages long.

The Services and DNR also received commentary and criticism for not including an analysis of the effects on trust revenues under the proposed action. Again, these types of comments took several, related forms. Predominantly, commentors requested information on overall effects of implementing an HCP on income to the trusts. A very few commentors suggested the analysis should predict effects on revenue flows on a trust-by-trust basis for all 26 trusts.

**Response:** The Council on Environmental Quality has addressed, in NEPA implementing regulations, the need for economic analyses in environmental documents. Specifically, when an environmental impact statement is prepared and economic or social effects are interrelated with natural or physical environmental effects, then the environmental impact statement will discuss all of the effects on the human environment (40 CFR 1508.14). Determining what economic variables are interrelated to issuance of this ITP has been the subject of much attention preceding the preparation of the DEIS. Obviously, many of the measures of economic effect are influenced by factors (such as those suggested by commentors for inclusion in the present analysis) well outside the scope of the process of issuing a Section 10(a)(1)(B) ITP. Examples of such influences include market and nonmarket factors. On the one hand, the volume of timber harvest is clearly affected by the proposed action and was predicted by DNR. On the other hand, any attempt to address the myriad economic factors outside the scope of the proposed action, for example grade and species of timber, would have been outside the scope of the necessary analysis.

The analysis of the impact of the proposed HCP alternative on regional employment, by planning unit, was performed by the USFWS. Regional employment was selected as an indicator of predictable economic effects for this HCP largely because of the interrelation of this economic measure with the human environmental effects of the proposed action. Furthermore, the effects of similar actions on employment has been a prominent concern of both the government and affected communities in recent years. For example, the economic effects analysis performed for the SEIS on the President's Northwest Forest Plan focused primarily on the effects of the alternatives on regional employment. Similarly, economic effects analyses performed in NEPA environmental documents for the analysis of other recently approved HCPs in this region have focused on local employment effects (Plum Creek Timber Company and Weyerhaueser Millicoma). Where the land base involved in recently approved HCPs was too small to have appreciable effects in the local community, analyses have focused on employment effects within the applicant's own business (Port Blakely Tree Farms and Murray Pacific Corporation).

Perhaps the strongest precedent for performing an employment impacts analysis for the environmental documentation prepared for the present proposed action, was the Environmental Assessment prepared for the Oregon Department of Forestry's (ODF) Elliott State Forest ITP application. ODF, a state forest land manager overseeing commercially productive forests under mandates similar to DNR's, assisted the USFWS preparation of their Environmental Assessment, including the economic effects analysis.

That analysis examined the effects of various predicted harvest levels on employment and income in the affected communities there. While the size and scope of DNR's proposal are larger than was ODF's, the core criteria in forming the scope of the economic analysis are the same: The action proponents are both state agencies that manage state forest lands under similar revenue production and resource protection mandates.

Following the precedent of prior ITP applications, the USFWS performed the employment effects analysis based upon the same harvest level predictions that DNR developed for its presentation of effects on trust revenues made to the Board of Natural Resources in 1995. While the analysis did not include effects on income in affected communities, a regional income analysis has been prepared in response to comments and is included in the FEIS. On the other hand, DNR had already prepared and presented an analysis of predicted effects on trust revenues to the Board of Natural Resources, in public meetings, in advance of the publication of the DEIS. Since DNR need not prepare an economic analysis for its SEPA purposes, a written version of the trust income analysis was not prepared for the DEIS.

In response to public comments, the Services and DNR have provided information regarding the assumptions DNR used in developing the harvest predictions for its trust presentation, and that the Services relied on in preparing the DEIS's employment effects analysis. A discussion of the assumptions used in developing harvest level projections appeared in an unpublished DNR report entitled, "Background and Analytical Framework for the Proposed Draft Habitat Conservation Plan." For the convenience of commentors requesting this background information, the chapter of that report that discusses the underlying assumptions used by both DNR and USFWS has been attached to this document, and can be found in Appendix 5. A two page synopsis of methods used by DNR to develop the harvest level projections is also included in Appendix 5 of this document.

In response to suggestions about the contents of the analysis, the Services emphasize that an HCP such as the one at-issue here, is a programmatic document composed of the elements stated in ESA Section 10(a)(2)(A). Suggestions were made that the EIS expand the level of analysis of silvicultural effects and logging operations effects. A suggestion was made that the analysis consider the effects of natural regeneration regimens. These suggestions would be more appropriately made regarding an operations-level proposal, not for a programmatic proposal such as the present proposed action. For an HCP, forest practices changes at the stand or unit level are rarely analyzed except to discuss prescriptive aspects of take mitigation, if at all. In recently approved forest land HCPs in this region, analysis of economic effects of stand level operational factors has not been conducted. Accordingly, analysis of issues such as the effects of the proposed action on the costs of operating in individual sale units is beyond the scope of the present analysis, and not examined.

In response to comments regarding the derivation of the projected harvest levels, the methods used by DNR to develop those projections are provided in this document, as mentioned above. The manner in which those projections were used by USFWS in

developing the analysis of effects on employment was provided in the DEIS in section 4.10.

In response to comments suggesting the analysis would be more complete with an accompanying analysis of regional income effects, the Services have prepared an analysis which is presented in Section 2 (Changes to the DEIS) of this document.

In response to those comments requesting the analysis be conducted by trust land base, the Services and DNR reiterate that the projections themselves were conducted by planning unit, without differentiating amongst the individual trusts. This approach reflects DNR's desire to prepare the HCP without separating the individual trusts. Since the harvest level projections were generated by planning unit, regional employment and income analysis was conducted by planning unit as well.

In response to those requests for a baseline analysis for comparison of economic effects, such an analysis is presented in the DEIS. NEPA's core tasks of public disclosure and informed decision making are accomplished by comparison of the increment of effects amongst the several action alternatives and the No Action alternative. The baseline for comparison is the level of effects that would occur under the No-Action Alternative. As presented in the DEIS, the effects of the proposed action (employment levels under the proposed HCP alternative) are compared to the effects of no action (employment levels under the No Action alternative). This comparison is typical of NEPA analysis. The DEIS analysis has been enhanced in response to public comment by including analysis of effects to income by planning unit as well.

In response to comments that the analysis should consider nonextractive values or values from sources other than timber that can be derived from forest management such as special forest products and recreation, the Services and DNR note that these values were considered in response to scoping. DNR informed the Services that it already derives some value from these resources and that no change of income would accrue regardless of the alternative selected. Accordingly, the Services did not analyze effects to these resources. The Services note further that in scoping the proposed action, development of an alternative based on emphasizing income from these sources was considered but eliminated from detailed analysis as beyond the scope of alternatives that DNR could practicably implement. This determination was based on the fact that DNR's mandate regarding income would make such an alternative too expensive to implement based on forgone timber harvests and the fact that DNR derives a very small percentage of Trust Revenues from the harvest and sale of these resources.

In response to comments suggesting that the economic analysis should account for the effects of the proposed action on salmon and the industries that rely on them, the Services note, as explained elsewhere in this section, that implementation of the proposed HCP would have a net beneficial effect on this resource, and an induced net benefit to any sector that relies on this source. This is supported by the analysis provided in the EIS of the effects of the proposed action on habitat factors that would receive beneficial treatment as the result of implementing the proposed HCP.

In response to those commentors that suggested the analysis is inadequate because, proportionally, it is too short, the Services are mindful that ultimately, the responsible official has to make its decision on permit issuance in light of the statutory permit issuance criteria stated in ESA Section 10(a)(2)(B). NEPA analysis expands on these criteria by ensuring the decision maker also considers other factors that the ESA may not require, such as effects on the human environment. However, where the difference in effects to a certain resource is insignificant, NEPA demands no further attention to those resources. Effects are considered insignificant where, among other things, no net adverse effect is predicted.

## B. SOCIAL

**Summary:** Rivers Council of Washington suggested DNR consider how the HCP could bring about a political, social and cultural climate of stewardship among private landowners.

**Response:** If an HCP has the effect described by the commentor, then that is an unexpected beneficial result of the Section 10 process. Purposefully achieving that result is beyond the scope of the proposed action and has not been analyzed.

## C. CULTURAL

**Summary:** The Muckleshoot Tribe commented that DEIS Table 4.9.2 does not mention trade corridors to Stampede Pass. The Yakama Indian Nation stated that a professional archaeological survey is necessary for every project prior to any ground-disturbing activity and that a tribal cultural specialist should be consulted regarding non-archaeological resources for each project. The Tulalip Tribes asked that survey techniques to identify cultural resources and management responses to avoid impacts to those resources be defined. Both the Tulalip Tribes and Yakama Indian Nation mentioned that despite procedures for protection of culturally important sites in the HCP, they have yet to be contacted by DNR prior to site operations that might have affected such sites.

**Response:** Table 4.9.2 is illustrative, not comprehensive. Omission of any particular resources of cultural import was not intended to imply that such resources would be ignored under the proposed action. Instead, the Services believe that project level effects should be adequately addressed under the procedures described in the DEIS. The Services were disappointed to receive reports from at least two individual Tribes that DNR had yet to comport with those described procedures. The Services expect that the commitment to those procedures will be upheld as the Services have relied on those commitments in assessing DNR's mitigation commitments. Furthermore, complying with the stated commitments is a condition of permit issuance. As such, failure to comply with those commitments would be grounds for suspension or revocation of the requested permit.

## D. RECREATION

**Summary:** An individual member of the Blue Ribbon Coalition commented the HCP could result in recreational land use closures, which the commenter vigorously opposed. One individual commented the demand for recreational use is increasing.

**Response:** Different recreational users have different recreational needs. While some may see closures as degrading the recreational experience, others prefer closures for enhancing recreational experiences. The proposed plan and each of the other alternatives contemplate varying degrees of riparian protection forest management, harvest deferral, and road closure, all of which directly and indirectly affect the quality of the recreational experience as well as affecting the quality and quantity of fish and wildlife habitat. Some recreational experiences would be enhanced while others would be diminished. The Services do not purport to pass judgement on which recreational experiences are preferable to others. Instead, the Services believe that, as mentioned above, the measures in the proposed HCP will have a variety of effects, none of which will be significant, on the recreational resource.

State trust lands were designated in the Enabling Act, State Constitution, and other state law to provide support to the trust beneficiaries in perpetuity. DNR has proposed the HCP and is seeking an ITP as a prudent trust manager. Recreation is a secondary benefit that cannot legally interefere with the trust mandate.

## E. AESTHETICS

**Summary:** Several individuals and one timber industry member provided comments on aesthetics under the proposed HCP. One individual wrote that one of the responsibilities of local, state and federal government is to preserve the aesthetic qualities of the landscape. A forester with Merrill & Ring wrote that as buffers protecting Type 4 and 5 waters "unravel," they would become unsightly. Several individuals wrote that continuing forest management and clearcutting makes the state less aesthetically appealing to visitors and residents.

**Response:** Under NEPA, the action agencies are responsible for addressing effects on the aesthetics of the human environment where, on a net basis, those effects are significant. Almost all of the lands that would be covered under the proposed HCP, are presently managed as commercially productive forests. This primary land use would continue whether or not an ITP is issued and HCP implemented. As for the unsightliness of added protection for Type 4 and 5 streams, the Services note that most comments on aesthetics concerned the effects of harvest and not the effects of protective measures on aesthetics. Accordingly, this comment appears to be a matter of the "eyes of the beholder."

# VI. MANAGEMENT PRACTICES

**Summary:** Northwest Forestry Association, GBA Forestry (for Washington Hardwoods Commission), and three individuals requested more detailed descriptions of the sequence, timing, and specific quantity of silvicultural activities that will be used to manage state land to produce the harvest levels and maintain the habitats described in the HCP. A member of the Washington State House of Representatives, a Stevens County

Commissioner, and one individual commented that the HCP would place unnecessary restriction on the management of state lands. Point No Point Treaty Council and one individual commented that a simple landscape plan based solely on forest stands available for various silvicultural treatments, while ignoring best management practices and non-timber resources, is not acceptable. An identical letter from 51 individuals requested assurance that sufficient habitat will exist to make up for losses of wildlife that will occur under this plan. One individual commented that active management can improve watershed and wildlife habitat characteristics. USEPA Region 10 noted the proposed riparian management strategies are a departure from the historic one-size fits all approach. Blue Ribbon Coalition requested a definition of stabilize and environmental problems as used in the OESF objective to *stabilize and close access to roads that no longer serve a management function or that cause intractable management or environmental problems.* Blue Ribbon Coalition commented that other activities which are served by roads in our public forests need to be considered.

**Response:** An HCP is the principle document supporting an application for incidental take permits and unlisted species agreements. The purpose of an HCP is to describe the management practices and/or guidelines to which the applicant willingly commits in exchange for incidental take permits. DNR chose not to present detailed descriptions of silvicultural activities in the HCP because doing so might unduly constrain DNR over the long term. DNR and the Services believe that DNR's HCP describes silvicultural activities at a level of detail sufficient to satisfy Section 10 of the ESA. Silvicultural activities will comply with the Washington Forest Practices Rules and will be consistent with the direction given by Board of Natural Resources as expressed in Forest Resource Plan (DNR 1992b).

The DNR's HCP does not place unncessary restrictions on the management of state lands. The conservation commitments presented in DNR's HCP are only those necessary to obtain incidental take permits and unlisted species agreements.

DNR and the Services agree that landscape plans which ignore nontimber resources are not acceptable. DNR's Landscape Planning process does consider non-timber resources such as fish and wildlife habitat.

The Services' principal motivation for issuing incidental take permits and entering into unlisted species agreements is to obtain assurances that various fish and wildlife habitats will be maintained over the long term.

DNR and the Services acknowledge that for some wildlife species active management can improve habitat characteristics.

In the passage cited from the OESF riparian conservation strategy, "stabilize" means to minimize mass-wasting and surface erosion caused by roads, and "environmental problems" refers mainly to the adverse impacts of roads on water quality and fish habitat. The Services did not require DNR to consider in its draft HCP or draft EIS other activities which roads in forests serve. DNR chose not to consider in its draft HCP these other

activities, such as recreational use of roads, because doing so might unduly constrain DNR over the long term.

## A. AMOUNT OF HARVEST

**Summary:** Comments from Honor the Earth Children's Circle and one individual requested preserving the forests that are left on DNR-managed land. One individual commented that two tables which included higher harvest figures for HCP options were false because they were based on including thinning and pole sale harvests that were excluded from other options. Merrill & Ring requested more information on how harvest levels are arrived at and where they come from, while Bogle & Gates (as a consultant to Washington State University) questioned how harvest levels can be higher under the HCP when more land is deferred from harvest.

**Response:** See the response for "Old-Growth Habitat" on page 3-13 in this section.

The harvest calculations done to compare the economic consequences of the HCP alternatives used identical silvicultural treatments, including periodic commercial thinning, for all three alternatives. A summary of the methods and results of the harvest calculations are part of the public record and can be obtained from DNR. Under HCP Alternative B, the issuance of an ITP for spotted owls results in a net increase in the amount of forest available for harvest.

## B. HARVEST SCHEDULE

**Summary:** A member of the House of Representatives stated it is important for DNR to demonstrate how planning, such as the creation of multiple landscape planning units, as proposed by the HCP will not interfere with a predictable and stable timber supply and economic return. Bogle & Gates (a consultant to Washington State University) commented that the discussion of the OESF is misleading in that, while the unzoned approach suggests that areas will not be deferred from timber management, portions of the OESF actually contain forests that cannot be harvested under the HCP for the foreseeable future -- in some cases for decades.

**Response:** As expressed in Forest Resource Plan Policy No. 16 (DNR 1992b), DNR has been directed by the Board of Natural Resources to use landscape planning. Hence, landscape planning is an element of all three HCP alternatives. Planning is generally believed to result in more predictable and stable outcomes.

The mission of the OESF is to develop and test forest management strategies which will optimally integrate commodities production with ecological conservation. DNR and the Board of Natural Resources expect that the trust beneficaries, citizens of Washington state, and forest products industry will benefit greatly from the knowledge acquired through research in the OESF. The management strategy proposed for the OESF in the draft HCP, the unzoned forest, is a working hypothesis. Through adaptive management this initial management strategy will change with each decade. In some landscape planning units, a deferral of timber harvest will be necessary to satisfy the mission of the OESF.

## C. HARVEST METHODS

**Summary:** One individual and the NW Biodiversity Center questioned the use of any clearcutting on state lands. Northwest Forestry Association suggested using language clearly stating areas prone to mass wasting may be harvested in the future when the knowledge to assess site conditions and prescribe suitable harvest methods is developed. NW Timber Workers Resource Council commented on the need to change public perceptions of the real impacts of various logging methods. Two individuals requested a better description of the silvicultural practices that will be used to develop habitat structures and manage state forests in a way that is sustainable over time.

**Response:** DNR is concerned about the impacts of intensive forest management, in particular, the impacts of repeated clearcut harvest over many rotations. The department has a legal duty to produce long-term income for the trust beneficiaries. A lasting diminution of soil productivity due to intensive forest management would be counter to this duty. There are many unanswered questions surrounding the effect of forest management on soil productivity. To answer some of these questions, DNR is engaged in long-term site productivity research near Sappho on the Olympic Peninsula.

The draft HCP (p. IV.56) does clearly state that areas prone to mass-wasting may be harvested in the future when knowledge to assess site conditions and prescribe suitable harvest methods are developed.

Changing public perceptions is beyond the scope of the proposed action.

An HCP is the principle document supporting an application for incidental take permits and unlisted species agreements. The purpose of an HCP is to describe the management practices and/or guidelines to which the applicant willingly commits in exchange for incidental take permits. DNR chose not to present detailed descriptions of silvicultural practices in the HCP because doing so might unduly constrain DNR over the long term. DNR and the Services believe that DNR's HCP describes silvicultural practices at a level of detail sufficient to satisfy Section 10 of the ESA.

## D. YARDING METHODS

**Summary:** Bogle & Gates (a consultant to Washington State University) requested clarification on whether ground yarding equipment will be allowed in buffers.

**Response:** Ground yarding equipment may be allowed in buffers. Specific prescriptions regarding activities in the riparian zone that will be applied under the various on-the-ground circumstances will be developed as part of a comprehensive strategy subject to the adaptive management provisions of the HCP. So long as such yarding does not diminish the value of the habitat for salmonids, those yarding activities would be allowed.

## E. RIPARIAN MANAGEMENT STRATEGY

**Summary:** The USEPA Region 10 commented that to protect aquatic resources and fisheries health and to carry out restoration and protection efforts, one must take a

landscape-scale approach. The USDA Natural Resource Conservation Service said that making an RMZ off-limits to management will slow down the recovery of riparian areas. The WDFW stated that, while offering potential benefits for salmonids, DNR's HCP is weak in providing life requisites for other species dependent on riparian habitat.

The Elwha/Clallam Tribe was "particularly pleased with the riparian strategy" as outlined in DNR's draft HCP and further stated "implementation of the riparian strategy will be a significant contribution to recover salmon populations in western Washington." The Muckleshoot Tribe recommended that the "six points of the Riparian Conservation strategy for the OESF" be added to the Riparian Conservation Strategy for the west-side planning units. The NWIFC said, "It is difficult to evaluate what DNR's intentions are for riparian buffers." They also said, "a broader range of habitat protections should be set forth in the HCP, including a higher and lower range. DNR would then commit to maintaining habitat within that range, in light of experience it gains through the adaptive management process." The Squaxin Tribe recommended that the selective harvest area from 25 to 100 feet in the riparian buffer be eliminated. The Tulalip Tribe stated that most culverts are impediments or blockages to fish passage.

Clallam County questioned the riparian strategies as laid out in the draft HCP and suggested the paper "Economic Analysis of Forest Landscape Management Alternatives" by Lippke, Sessions and Carey be used as a guide toward better forest stewardship. Metropolitan King County said that they will benefit from harvest practices that minimize downstream impacts, a major mitigation cost for urbanizing counties. They wanted the HCP to reduce the risk for future federal listings of threatened and endangered species, particularly salmonids that inhabit upland streams. The City of Port Angeles said that forest management should be watershed based. The Port of Port Angeles was concerned about the "...tremendous amount of land set aside for riparian management zones" and said that leaving 100 foot or wider zones along Type 4 and 5 Waters is "...detrimental to good forest management." Bogle & Gates (a consultant to Washington State University) said that it is difficult to asses the impacts of the draft HCP guidelines when so much future research and planning is involved and the results won't be known for some time.

WEC supported the draft HCP's riparian strategy for western Washington. American Rivers said the draft HCP is inadequate for fish protection. The Northwest Ecosystem Alliance suggested that DNR use the FEMAT approach to riparian protection. The Rivers Council of Washington wanted site-specific management. The Washington Native Plant Society encouraged DNR to select Alternative C.

Cascade Hardwood said that a greater than four-fold increase in the amount of land set aside for riparian protection, relative to the present forest practices rules, is inappropriate. Inland Wood Specialties said that wider riparian zones endanger the hardwood industry. Merrill & Ring said that riparian strategies decrease land base and decrease harvest levels. NCASI stated that DNR needs to balance resource protection and timber value when dealing with riparian protection. NCASI called the riparian conservation strategy "a costly option" and "overly conservative in protection." NCASI stated, "There is a law of diminishing returns which needs to be exploited if we are to efficiently protect natural resources and still allow for timber use." Northwest Forestry Association said that the

draft HCP ". . .lays out a riparian strategy which substantially deviates from forest practices regulations and FRP." The Northwest Forestry Association suggested that DNR analyze the Forest Resource Plan and forest practices regulations against the HCP in terms of benefit versus cost. Western Hardwood Association stated that the draft HCP riparian protection has not been proven to be better than the forest practices regulations. The Washington Forest Protection Association commented that Washington Forest Practices Rules provide adequate protection of public resources and suggested that DNR use the Forest Resource Plan for stream protection. Washington Hardwood Commission recommended that DNR use the current forest practices rules because "they haven't hurt anything." Washington Hardwoods Commission urged that DNR consider the commission's analysis of the draft HCP.

A local group said that no-harvest RMZs are bad for habitat recovery. An individual supported the draft HCP with some modification. Another local organization asked for more riparian protection. Two individuals wanted the riparian protection measures wider. An individual wanted the riparian protection increased to FEMAT standards. An individual said that a combination of HCP Alternatives B and C is best, especially with respect to Type 5 Waters. An individual said the no-logging buffer is probably too small. An individual wanted the riparian zones to be wider and preferred no-cut buffers. An individual said that riparian protection strategies should be watershed based.

An individual commented that site-specific needs are a key issue. An individual stated that maximizing tree height in the riparian zones will require growth beyond 100 years and that these larger trees will be needed to stabilize jams and are crucial for long-term success of riparian buffers. He also stated that maximizing conifer tree diameter in riparian zones is vital for quality of salmonid habitat.

**Response:** Specific comments on riparian buffer width or forest management within riparian buffers are addressed below.

### 1. Riparian Buffer Widths

**Summary:** The USEPA Region 10 stated that there needs to be more protection along Type 5 Waters. WDFW commented that riparian ecosystems will receive less protection in steep slopes when slope distances are used to measure RMZ widths. Clallam County said there is no biological justification for buffering Type 4 and 5 Waters. The City of Port Angeles said that wide buffers on Type 4 Waters are "detrimental to good forest management."

The Sierra Club and The Rivers Council of Washington commented that riparian zones need to be wider and do not go far enough to address wildlife needs.

The Hoh Indian Tribe requested that horizontal distance be used to measure RMZ widths because on steep slopes large woody debris can be recruited from distances beyond one tree height. The Tulalip Tribes requested that horizontal distance be used to measure RMZ widths because most literature pertaining to riparian function is based on research which has measured horizontally from the stream. The Muckleshoot Indian Tribe suggested that buffers on Type 4 Waters be based on their

sensitivity to changes in inputs (wood, sediment, water, energy) and how they could deliver such inputs to salmonid bearing areas downstream. The NWIFC suggested that interim guidelines provide all Type 5 streams buffers. The Rivers Council of Washington and Sierra Club want wider buffers.

The Washington Forest Protection Association wanted to know why DNR's Forest Resource Plan is not used for streams other than Type 5. Washington Hardwoods Commission asked why DNR's draft HCP buffers are wider than those recommended by other studies. The Inland Wood Specialties commented the riparian buffers should be kept as specified in the forest practices rules and regulations and that riparian protection zones greatly affect the amount of alder available for harvest. Merrill & Ring said that expansion of riparian areas is the largest impact of the proposed HCP. After comparison of the draft HCP to the Plum Creek Timber Company HCP, Mt. Baker Plywood claimed that the riparian buffer widths are excessive. NCASI stated that riparian protection along small streams, Type 4 and 5, is where the most land is lost to management. The Northwest Forestry Association questioned the need for 100-foot buffers on Type 4 Waters. Washington Hardwoods Commission wrote that it has not been proven that wider riparian buffers can help fish and wildlife. Washington Hardwood Association asked DNR to consider other current research with regard to buffer widths. The Washington Hardwoods Commission cited a GIS pilot study in which they compared DNR's OESF and west-side riparian strategies to state regulations, the Elliott State Forest (Oregon Department of Forestry) HCP, and Plum Creek Timber Company's HCP. They noted that the amount of land included in DNR's west-side riparian strategy was proportionally very similar to Plum Creek's.

Many individuals said that the riparian buffers should be wider. A local group and many individuals said that 25-foot no-logging buffers are not enough. Another local group suggested doubling buffer widths on all streams. Several individuals suggested that DNR follow the FEMAT recommendations for riparian protection. A local organization attempted to make a case, using information in FEMAT (1993) on shade, large woody debris, and soil temperature, that DNR's riparian buffers are too narrow. An individual said that wider RMZs benefit water quality. An individual said that Type 5 streams would be protected with buffers only where found in unstable slopes. An individual suggested that DNR adopt 100-foot buffers along streams like the state of Alaska.

Fifty-one individuals wrote the buffer width should be adjusted for topography. An individual suggested that DNR provide 200-foot no-logging buffers. An individual suggested that riparian zones be no-cut, and that no harvest occur within 100 feet of any Type 1 through 4 streams or within 25 feet of Type 5 streams, except for necessary habitat improvement. Another individual said the 25-foot no-harvest area should be extended to 50 feet to avoid erosion, root damage, and incidental take of trees and associated riparian species. An individual commented that a 100 foot buffer could be destroyed in a flood. An individual stated that Douglas-fir can easily grow an additional 50 percent in height in the second 100 years, implying that buffer widths should be based on 200-year-old trees. An individual said that riparian zones

include the full width of waterways at historical flood levels, not an average width. An individual said if DNR uses the slope distance, then it may not always comply with minimum buffer widths required by state forest practices rules. An individual asked for more explanation of the benefits of moving toward larger riparian management zones. Two individuals said that buffers are too narrow for deep-forest species of wildlife that tend to avoid forest edges.

**Response:** DNR did consider a riparian conservation strategy with wider riparian buffers. It was determined that an HCP which specified substantially wider buffers than those specified in the draft HCP would not satisfy one of the main purposes of the proposed action -- to produce the most substantial support possible over the long term for the trusts. The HCP is the principle document supporting DNR's application for incidental take permits and unlisted species agreements. The Services can issue incidental take permits and unlisted species agreements if, and only if, the HCP satisfies the criteria listed in Section 10 of the ESA. Early in the development of DNR's HCP, the Services conveyed to DNR their belief that current Washington Forest Practrices Rules would not satisfy the Section 10 criteria. The basic elements of the riparian strategy in the draft HCP will allow DNR to produce the most substantial support possible over the long term for the trusts and are sufficient to satisfy Section 10 of the ESA. After negotiations with the Services and in response to public comments, DNR has agreed to minor modifications of the draft HCP riparian conservation strategy which will increase the buffer width on steep slopes or in wide flood plains. As explained in the DEIS, the overall riparian conservation strategy of the proposed HCP should provide better protection of salmonid habitat and other aquatic resources than Alternative A.

DNR's Forest Resource Plan was used to develop the conservation strategy for all stream types. Policy No. 20 of the Forest Resource Plan says:

"The department will establish riparian management zones along Type 1-4 Waters and when necessary along Type 5 Waters. The department will focus its efforts on protecting nontimber resources, such as water quality, fish, wildlife habitat and sensitive plant species."

The Forest Resource Plan was approved in 1992, but it has yet to be fully implemented. The draft HCP riparian strategy is an implementation of this policy. For Type 5 streams there is insufficient information to determine "when necessary." Type 5 streams may need more protection, but DNR realizes that this is a contentious issue. During the first 10 years of its HCP, DNR will conduct research to study the effects of forest management along Type 5 Waters on aquatic resources. At the end of the 10 years, a long-term conservation strategy for forest management along Type 5 streams shall be developed.

Numerous recommendations exist for the management of riparian ecosystems. Simplistic comparisons of DNR's riparian strategy with these recommendations can lead to spurious conclusions, for recommendations are often based on management objectives. The riparian strategy presented in the draft HCP is thought to be

sufficient to create properly functioning riparian ecosystems. For example, WDW (1991) recommended riparian buffers 200 feet wide, and FEMAT (1993) specified that riparian buffers be 300 feet wide on fish-bearing streams.

With respect to the Washington Hardwoods Commission's comparison, the Services note that state regulations provide no regulatory relief from the ESA. The Elliott State Forest HCP was for owls and murrelets only and did not address riparian or aquatic species. Plum Creek's HCP addressed over 285 vertebrate species, and DNR's HCP addresses all species.

The riparian strategy of DNR's draft HCP is similar to that described in the Plum Creek Timber Company HCP. DNR specifies a 25 foot no-harvest area. Plum Creek specifies a 30 foot no-harvest area. On Type 1, 2, and 3 Waters, DNR's riparian buffers should average 150 feet. Plum Creek's riparian buffers on Type 1, 2, and 3 streams are 200 feet. Both DNR and Plum Creek allow management activities to occur in the buffer, excluding the no-harvest area. DNR adds a wind buffer (either 100 feet or 50 feet wide) to the riparian buffer in areas that are prone to windthrow. In most instances, the wind buffer would only be added to the windward side of the stream. The total width of riparian buffer along Types 1, 2, and 3 streams is less under DNR's draft HCP than under Plum Creek's HCP. DNR's total width equals 400 feet (150 feet + 150 feet +100 feet) along Type 1 and 2 streams, and 350 feet (150 feet + 150 feet + 50 feet) along Type 3 streams. Plum Creek's total width is 400 feet along Type 1, 2, and 3 streams (200 feet + 200 feet). Along Type 4 streams, both HCPs specify a 100 foot riparian buffer, and both HCPs allow management activities within the buffer.

DNR agrees with the observation that on very steep slopes large woody debris can be recruited from distances beyond one tree height. The draft HCP has been modified so that riparian buffer widths are measured horizontally. This modification will also adjust the buffer width for topography, and the riparian buffer width will always comply with minimum buffer widths required by state forest practices rules.

DNR agrees that the riparian buffer could be greatly reduced, and possibly destroyed, in a flood. This could occur mainly through stream bank erosion and lateral channel migration. The HCP will be modified so that the riparian buffer is measured from the edge of the 100-year flood plain instead of the active channel margin.

The justification for using site-potential height of a mature conifer stand (age approximately 100 years) rather than the site-potential height of an old-growth stand (age approximately 200 years) for the width of the riparian buffer is presented in the draft HCP (p. III.63, and p. IV.59 to IV.61). The reasons for 100 foot buffers on Type 4 Waters are explained in the draft HCP (p. IV.59-IV.61).

The issue of adequate riparian buffer widths for deep-forest species of wildlife is addressed under the heading of forest fragmentation.

## 2. Riparian Buffer Treatment

**Summary:** The USEPA (Region 10) asked for an explicit definition of physical habitat targets or performance standards related to "low harvest" or "minimal harvest" areas. The USDA Resource Conservation Service said DNR should manage the forest "right to the stream bank." This includes planting, topping, or removing risk trees up to the stream bank. The WDFW asked for proof that single and multiple tree harvest in the buffers would not compromise riparian ecosystem functions, especially short-term and long-term large woody debris recruitment.

The NWIFC commented that DNR should use the wild salmonid policy or Priority Habitat and Species Management Recommendations (WDW, 1991) as habitat standards. The NWIFC said that prescriptions are vague and need to address restoration. Also, they said that DNR needs to put limits on single tree removal. The Point No Point Treaty Council also requested that measurable criteria, or habitat standards, for biological success, both terrestrial and instream, be included in the HCP. The Hoh Indian Tribe suggested that a certain minimum number of trees be contained within an RMZ to make it functional, so that slope distance or site condition irregularities do not reduce large woody debris recruitment below what could actually be attainable. The Muckleshoot Indian Tribe stated the HCP is unclear regarding how DNR will determine whether minimal harvest activities are appreciably reducing stream shading, etc. The Point No Point Treaty Council, Tulalip Tribes, and Squaxin Indian Tribe recommended that the inner 100 feet of the riparian buffer be a no-harvest zone and commented this would insure that large woody debris recruitment needs are met. The Squaxin Indian Tribe said standards would allow the last big trees to be removed from riparian ecosystems. The Tulalip Tribe says that the buffer treatments are not well defined.

Bogle & Gates (a consultant to Washington State University) requested that the HCP's riparian buffers be compared to forest practices rules, i.e., the regulatory minimums, and to buffer prescriptions that have been developed in recent watershed analyses. This consultant said that standards for buffers are impossible to meet, the amount of allowable harvest is unclear.

The Sierra Club wanted wider no-cut zones. The Rivers Council of Washington wanted a wider no-cut zone in RMZs and wider RMZs overall. The Northwest Ecosystem Alliance wanted no-harvest buffers and more information on buffer treatments. American Rivers wanted to wider buffers with no harvest. The National Audubon Society preferred DNR's Alternative C.

The Northwest Forestry Association asked what level of harvest will be allowed in buffers and which species can be removed. NCASI stated the management which occurs and the silvicultural objectives are equally important as the width of the buffer. The Washington Forest Protection Association commented that there are inconsistencies in what kind of tree removal will be allowed and what kind of restoration of conifers will take place in the RMZs. The Cascade Hardwood Association wanted more tree removal in RMZs and funding for stream restoration. The Washington Hardwoods Commission asked that DNR allow entry into buffers

for harvest and reclamation. The Western Hardwoods Association said that conversion of buffers from hardwood to conifer is preferential toward one species group. Also, they said that increased buffer widths and the addition of wind buffers have not proven to be any more effective for fish than the current rules in the Forest Practices Rules and Regulations. The Western Hardwoods Association said that there is a need to allow selective harvest in buffers. Inland Wood Specialties believed that the riparian zone management should include harvest and reclamation, and that this would enhance water quality and fish and wildlife. Merrill & Ring Logging Company said that blow down will increase with partial cutting of RMZs. GBA Forestry expressed the hope that the DNR technical staff will lead the way in demonstrating forest practices that provide adequate habitat while maintaining productivity of the forest for other uses. A small forestry group said that they need to be able to manage to stream for rehabilitation.

The local chapter of the Society for Conservation Biology wanted the no-harvest zone increased to 50 feet and said that if only one side of stream could be harvested at a time, then potential "edge effects" (both physical and biological) would be greatly reduced. A local environmental group wanted no harvest in buffers and no roads. An individual said that we need all foresters "to work right to the stream" to avoid blowdown damage that comes from downed trees and resulting stream sedimentation. Another individual said that if it is allowable to leave a 25-foot buffer, then allow foresters to take some of the leave trees to get revenue from them, since this would keep them from falling into the streams and plugging up the streams and causing further problems. An individual offered information on forest management in riparian buffers.

Several individuals said that the term "buffer" had been flagrantly misused in the draft HCP. They believed that "buffer" is synonymous with "preserve." These individuals and several others wanted no-harvest buffers and no entry into buffers. Two individuals commented vehicles should stay out of riparian zones, because stream temperature and sediment load are compromised. An individual wanted the no-cut buffers clearly defined. Many individuals (51) wanted snags, logs, and no roads in RMZs. An individual said that the provisions for riparian buffers allow logging over 175 feet of the 200-foot buffer and that this is not a wise provision. An individual wanted the no-harvest zone extended to 50 feet. A local group commented that heavy equipment and clearcutting are not desirable because they cause blowdown and risk trees can cause siltation due to the huge root balls that are exposed.

**Response:** DNR did consider "no-harvest" and "no-entry" riparian buffers for its HCP. DNR determined that an HCP which specified less forest management in riparian ecosystems than that specified in the draft HCP would not satisfy one of the main purposes of the proposed action -- to produce the most substantial support possible over the long term for the trusts. It is thought the riparian strategy in the draft HCP satisfies this purpose and is sufficient to satisfy Section 10 of the ESA. Futhermore, as explained in the DEIS, the overall riparian conservation strategy of the proposed HCP should provide better protection of salmonid habitat and other aquatic resources than Alternative A.

The decision to allow forest management activities in the riparian buffer was based on a common sense assumption. It is assumed that for a healthy riparian ecosystem there exists some threshold of timber harvest below which salmonid habitat will not be degraded. Clearly, if only one tree, even one exceptionally large tree, were harvested from a healthy riparian ecosystem, there would be no measurable adverse impact to the salmon inhabiting that ecosystem. DNR anticipates that through monitoring and adaptive management this threshold will be discovered and methods for determining site-specific thresholds can be developed. DNR believes, based on this common sense assumption, that the standard for forest management in the riparian buffer, "maintain or restore the quality of salmonid habitat, is not impossible to meet.

It is difficult and expensive to assess the impacts of resource management plans with the scope and scale of DNR's HCP. For this reason, DNR chose to assess the impacts and outcomes of Alternative A, which is DNR's best characterization of its current management, and two other alternatives, B and C, which capture the range of reasonable management scenarios for the HCP. The regulatory minimums of the Washington Forest Practices Rules are not a reasonable alternative. The regulatory minumums are inconsistent with the direction given to DNR by the Board of Natural Resources through the Forest Resource Plan. Also, early in the development of DNR's draft HCP, the Services conveyed to DNR their belief that current Washington Forest Practrices Rules would not satisfy the Section 10 criteria. Washington Forest Practices Rules Watershed Analysis was also eliminated as a resaonable alternative for the HCP. Watershed Analysis is inadequate for the HCP because it does not yet have a wildlife module, and it is considered impractical, at least over the short term, because of the long time period necessary to complete the analysis of all DNR-managed lands in the five west-side planning units.

Hardwoods will always be a component of DNR-managed forests, particularly in riparian ecosystems where continual natural disturbance creates environmental conditions conducive to the establishment of hardwoods. However, DNR intends to manage riparian ecosystems to achieve a more natural mix of hardwood and conifer species.

Buffer is defined in Webster's New World Dictionary (1976) as "any person or thing that serves to lessen the shock or prevent sharp impact between antagonistic forces." The glossary of the draft HCP defines buffer as "a forested strip left during timber harvest to conserve sensitive ecosystems or wildlife habitat." DNR's intention to conduct management activities in the riparian buffer is consistent with these definitions.

There may be situations where managing forest "right to the stream" is appropriate and even beneficial to salmon habitat, but given the current state of freshwater salmon habitat in western Washington, the risks of managing "right to the stream" outweigh the benefits. DNR is permitted to conduct restoration activities in the no-harvest area of the riparian buffer, but such activities will be the exception rather than

the rule. Over the long term, the riparian strategy should result in the natural recovery of most, if not all, riparian ecosystems on DNR-managed land.

DNR has chosen not to specify performance standards or habitat standards for the management of riparian areas. DNR's objective is to manage riparian ecosystems so that important elements of salmonid habitat (large woody debris, sediments, detrital nutrients, and shade) are within the natural range of variability for functional habitat; in other words, they are properly functioning riparian habitats. For some habitat elements, in particular large woody debris and detrital nutrients, the natural range of variability or the minimum requirements for functional salmonid habitat are poorly understood. DNR anticipates that through monitoring and adaptive management our understanding will evolve to the point where scientifically credible performance standards can be specified.

The draft HCP provides a general description of the forest management allowed in the riparian buffers in Chapter IV, p. IV.54 through 56 and p. 62 and 63.

In theory, harvesting just one side of a stream at a time would reduce potential "edge effects." And if streams were sparsely distributed across the landscape, then this would be a practical management prescription. However, in western Washington it is often the case that a stream, or several streams, flow through a single management unit, so in reality such a prescription is highly impractical.

As part of road network management DNR will develop a comprehensive landscape-based road network management process that will specify conservation objectives that minimize adverse impacts to salmonid habitat. The issue of minimizing vehicles in riparian zones would be addressed in the comprehensive landscape-based road network management process (draft HCP p. IV.56). DNR will avoid constructing roads in riparian ecosystems to the maximum extent practicable, but road stream crossings in some situations are unavoidable.

### 3. Wind Buffer

**Summary:** Clallam County said that the wind buffers need to have an economic analysis. The Hoh Indian Tribe commented that adding an exterior wind buffer to either side of the stream along the interior buffer on the Hoh River mainstems or side-channels may still be inferior to short-term measures already required along the Hoh River. The Muckleshoot Indian Tribe said that there needs to be a method for determining on a site-specific basis the harvest activity in the wind buffer. The Point No Point Treaty Council said that they support DNR's Alternative C and want to be involved in developing the wind buffer guidelines. The Tulalip Indian Tribe stated that they cannot evaluate the effectiveness of DNR's wind buffers because no specific method is proposed in the draft HCP.

Bogle & Gates (a consultant to Washington State University) said that the Draft EIS does not support its conclusions about wind buffers. They point out that after a lengthy discussion of scientific studies of windthrow, the Draft EIS summarizes several studies as finding little or no correlation between riparian buffer width and

amount of windthrow. The consultant also said that there are inconsistencies regarding when a wind buffer will be applied and that the standard for requiring wind buffers as set forth is unclear. The Northwest Forestry Association asked what is the legal liability for wind buffers? The Northwest Forestry Association said that wind buffers do have a place in a land managers "tool kit" but suggested that in some places it makes sense to have zero wind buffer.

The Sierra Club and The Rivers Council of Washington said that to be effective and to avoid blowdown, the percentage of trees to be removed in wind buffers should be limited. Merrill & Ring and Mt. Baker Plywood said the proposed wind buffers are excessive. Merrill & Ring said that wider buffers would cause more timber to blow down as management occurs on the adjacent stands. Washington Hardwoods Commission said there is not enough science to prove a need for wind buffers. An individual said that windthrow is occurring because of current buffer zones. An individual said that wind buffers are crucial to success of RMZs.

**Response:** A number of reviewers have referred to the interior riparian buffers and/or exterior wind buffers proposed in the HCP and OESF plans as "no-entry" or "no-harvest" buffers. As clearly stated in the draft HCP and DEIS, interior and wind buffers are part of the managed forest, where partial or selective harvest is permitted in both types of buffers, except within the first 25 feet on either side of streams in the five west-side planning units outside the OESF. The 25-foot, no-harvest buffer was established primarily to protect the stability of streambanks, and no harvest would occur other than that necessary for ecosystem-restoration activities. Otherwise, some level of commercial harvest will occur within riparian management zones (including the interior and wind buffers) on state lands covered by the HCP and OESF plans. For example, 33 percent removal of trees by volume is permitted (in addition to pre-commercial thinning) from the wind buffers on the OESF during any given rotation. Several harvest-impact and/or economic analyses prepared by non-DNR sources (e.g., Marshall and Associates, Inc. et al., 1996) assume "no-harvest" scenarios, which are not consistent with the strategies stated in the draft HCP. For further clarification, see discussions on p. IV.54 through 56 and IV.97 through 106 in the draft HCP.

Several reviewers stated that economic analyses of the wind-buffer strategies should be performed. DNR included statistical analyses of these strategies in its overall economic analysis of the HCP and OESF plans. Hence, the economic analyses presented to the Board of Natural Resources include the economic and harvest-level consequences of imposing wind buffers on all state lands covered by the draft HCP. These economic analyses are part of the public record.

Several reviewers stated that there is little evidence that forest-practices rules, instated in [1992], are not working and that the proposed strategies in the draft HCP are excessive. DNR contends that it has sufficient evidence from portions of state lands in western Washington, particularly on the western Olympic Peninsula, to indicate a need to manipulate riparian-buffer configurations in order to make them more windfirm. DNR has lost a sufficient number of riparian buffers, in whole or in

part, from blowdown during the past decade that it cannot ignore the problem. Blowdown has resulted in measureable bank erosion (i.e., substantial input of sediment to streams) and loss of stream shade and has, in more inaccessible areas, incurred economic loss because salvage has been operationally difficult. Therefore, DNR recognizes blowdown as a critical issue and one that must be addressed as part of a 100-year management plan.

In addition, few systematic studies (with the exception of one currently being conducted by DNR's Forest Practices Division) have been conducted that evaluate the physical or biological integrity of riparian buffers established since 1992 in western Washington. One hypothesis currently being tested in DNR's study is whether 4 years (1992-1996) is long enough to witness substantial alteration of riparian buffers due to wind, given that blowdown often occurs incrementally over a number of years as the outer margins of a buffer are disturbed during winter storms. A number of studies conducted in other regions of the Pacific Northwest (e.g., COPE studies in Oregon) are not directly applicable because they deal with different forest types, soil and geologic characteristics, meteorological conditions, and other site-specific factors. Hence, DNR believes that "little evidence" does not necessarily equal "no problem" in western Washington.

Consequently, DNR has decided to rely on the information it has from years of management experience and to judiciously apply wind protection where field evidence suggests there might be a risk of blowdown with the potential for altering bank stability, shade availability, long-term recruitment of large woody debris, and other critical riparian functions. Wind buffers on the OESF are intended to be laboratories for testing how best to make riparian stands windfirm, and results from replicated experiments of stand manipulation are expected to provide some guidance for managing riparian buffers on other state lands covered by the draft HCP. Wind-buffer experiments will include everything from total harvest (no wind buffer) to partial harvest to no harvest, in a variety of configurations designed to meet site-specific requirements for maintaining the structural integrity of interior riparian buffers. The number of trees removed at any given site will depend on the capability of the remaining stand to withstand blowdown.

With reference to concerns regarding the mainstem Hoh River, the draft HCP does not supplant the Shoreline Management Act, chapter 90.58 RCW, or the regulatory authority of the Washington Department of Ecology and Jefferson County in enforcing regulations within areas designated as shorelines of the state. Similarly, other Shoreline Management Areas will continue to be regulated by Washington DOE and the appropriate local governmental authority. In addition, the HCP must adhere to other state regulations. Hence, management strategies applied under the HCP must meet or exceed the level of resource protection afforded by current rules and regulations.

With reference to the draft HCP's Alternative C, presented in the DEIS, it was the decision of the Board of Natural Resources to select HCP Alternative B. This choice was based on their assessment of the alternative most likely to meet the fiduciary

obligations of the trust while providing adequate protection of aquatic and riparian system functions.

Harvest activities within wind buffers will take into account site-specific factors, including local topography, meteorological characteristics, riparian-stand composition and structure, age and structure of adjacent upland stands, and physical site conditions. Field procedures for carrying out such analyses will be described in the HCP implementation guidelines for the five west-side planning units outside the OESF. Experimental protocol for wind buffers on the OESF will be described in the OESF implementation guidelines. Hence, in response to the concern that wind-buffer strategies are poorly defined (the original comment states, "... they [DNR] propose no specific method that we are able to evaluate"), specific methods are not addressed in the draft HCP or DEIS but will be detailed in the implementation guidelines. By state legislative mandate, DNR cannot develop these implementation guidelines until the HCP is approved by the Services and the Board of Natural Resources.

A number of reviewers stated that the percent of trees removed from wind buffers should be limited in order to enhance the effectiveness of those buffers. Given the relative lack of data regarding how many trees should be removed and the variability of site conditions over 1.6 million acres of state lands, DNR must test a number of management hypotheses to determine the most effective strategy for each riparian setting. The needs for extensive wind buffers might be less in some areas (e.g., narrow valley bottoms in areas of high topographic relief) than others (e.g., low-gradient, wide valley bottoms in coastal regions). Hence, the configuration and tree density of wind buffers must be tailored to fit specific site conditions, in order for them to be effective in the long term. These questions cannot be answered with current information. Consequently, DNR has proposed to conduct a systematic research program on wind-buffer strategies, in order to gain some answers and certainty that management practices are effectively treating windthrow problems.

As stated in the preceding paragraphs, DNR has obtained sufficient evidence from managing riparian buffers over the past decade to indicate that windthrow is an important management concern on portions of state lands in western Washington.

The purpose of the literature review in the DEIS is was to indicate how little is known about windthrow behavior, particularly in western Washington where very few rigorous studies have been conducted, and to support the need for gaining better scientific and management understanding of this phenomenon. There are several interpretations that one might make regarding the value of current literature. One is that the current literature shows few relationships between buffer width and windthrow potential and, therefore, that no windthrow problem exists. The other is that there have been too few published studies relevant to site conditions on state lands in western Washington to prove or disprove the existence of a windthrow problem. The draft HCP was developed on the latter interpretation and on the observations of DNR foresters, managers, and scientists that indicate measureable windthrow problems in riparian buffers on state lands. Until effective management strategies are developed, DNR will continue to establish riparian buffers, a number of

which are susceptible to blowdown, and face uncertainty with regard to just how wide buffers should be to maintain windfirm trees.

There are no recipes available for establishing buffers to meet every site condition effectively. In the face of little information on appropriate buffer widths and a real management problem, DNR has proposed to move forward proactively with the support of other local land managers who feel that they will benefit from new information shared by DNR (as per written and oral testimony received by DNR). The research program moves DNR into the arena of experimentation and adaptive management, in order to achieve more long-term certainty. This is a trade-off between short-term uncertainty, which already exists irrespective of the buffer strategy applied (i.e., via forest-practices rules, Forest Resource Plan), and long-term certainty in the economic and ecologic soundness of management and conservation practices.

As stated in the draft HCP, the terms "moderate potential" for windthrow and "no evidence" of windthrow potential, used in the strategy for the five west-side planning units outside the OESF, will be defined operationally in the HCP implementation guidelines. Standards for designating wind buffers (i.e., when, where, and how) outside the OESF will also be detailed in the HCP implementation guidelines. The procedure for developing experimental protocols has been summarized on p. IV.114 through 120 of the draft HCP. Specific directions for choosing experimental designs and applying them to given riparian areas will be discussed in the OESF implementation guidelines.

The values of 1 percent or 10,000 acres were presented as rough estimates of wind-buffer extent in the five west-side planning units outside the OESF in order to broadly illustrate what the landscape potentially might look like under the draft HCP. These numbers are estimates only (i.e., rounded to the nearest 1000 acres) and were not derived from a comprehensive analysis of actual, on-the-ground placement of wind buffers. The actual number of acres placed in wind buffers may be smaller or larger than 10,000 acres. Hence, these values should not be interpreted as a standard to which DNR is contractually bound.

### 4. Wetland Buffers

**Summary:** WDFW wants more discussion of importance of wetland buffers for wildlife. The Muckleshoot Indian Tribe said that the draft HCP indicates that management in and around wetlands will be consistent with DNR Policy No. 21 without offering any process as to how this will be determined. They said the procedures for restoration are unclear and wanted to know who decides if restoration has been achieved. The Point No Point Treaty Council supported DNR's Alternative C and suggested that to achieve no net loss of functional wetland, a larger area should be required for mitigation if wetlands are destroyed. Bogle & Gates (a consultant to Washington State University) said that there is a need to know the current amount of wetlands in order to determine no net loss of wetlands.

The Rivers Council of Washington commented that DNR's draft HCP does not differ from the Forest Practices Regulations. The Sierra Club commented that DNR's HCP is no different than current practices. To adequately protect plants and wildlife, the Northwest Ecosystem Alliance, Washington Wilderness Council, WEC, and Washington Native Plant Society recommended Alternative C. Northwest Forestry Association commented there is a need for more information: (1) How much wetland acreage is involved by region? (2) What will be the economic effect of protecting wetlands? (3) What will be the operational effect? And (4) Will it affect road construction, use, and maintenance? A forestry company said that the wetlands protection provision will take thousands of acres of timberland out of production.

The local chapter of the Society for Conservation Biology recommended a 50 foot no-harvest zone surrounding all wetlands greater than 0.25 acre. Two local environmental groups preferred Alternative C. Another local environmental group wanted more protection. Many individuals stated DNR should select Alternative C. An individual did not think DNR's draft HCP goes far enough to protect the "...small bogs and ponds of the forest". An individual recommended no-logging buffers. An individual suggested that the acreage for wetland mitigation should be 3:1. An individual said that buffers and small bog should be no-cut. An individual said that DNR's Alternative A is adequate if roads are controlled.

**Response:** DNR did consider wider wetland buffers and "no-harvest" wetland buffers for its HCP. It was determined that an HCP which specified more protection of wetlands than that specified in the draft HCP would not satisfy one of the main purposes of the proposed action -- to produce the most substantial support possible over the long term for the trusts. It is thought the wetland strategy in the draft HCP satisfies this purpose and is sufficient to satisfy Section 10 of the ESA.

The wetlands management in DNR's HCP provides more protection than the Forest Practices Regulations and it is not quite DNR's current practice. DNR's Forest Resource Plan Policy No. 21 says, "The department will allow no overall net loss of naturally occurring wetland acreage of function." This standard surpasses the level of protection provided by the forest practices rules.

The Forest Resource Plan was approved in 1992, but it has yet to be fully implemented. The prescriptions described in the draft HCP (p. IV.57 and 58) are not DNR's current practices but are characterized as "no action" because they implement the direction given by the Forest Resource Plan.

For all commitments made in the HCP, such as the restoration of wetland drainage or equal acreage mitigation for damage to wetlands, USFWS and NMFS, or their designee, will decide whether or not restoration or adequate mitigation has been achieved.

The operational and economic effects of the wetland strategy are the same for Alternatives A and B. The wetland acreage on DNR-managed lands is not accurately known, but is estimated to be approximately 10,500 acres, or 0.6 percent of the entire

HCP planning area. One does not need to know the current amount of wetlands in order to determine no net loss. The "no net loss" policy can be adhered to on a site-by-site basis.

### 5. Watershed Analysis Prescriptions

**Summary:** USEPA Region 10 said that there needs to be more discussion concerning use of Washington's Watershed Analysis process as it relates to Total Maximum Daily Load (TMDL) requirements. The NWIFC said DNR's HCP does not account for cumulative effects. The Point No Point Treaty Council supported the OESF 12-Step watershed assessment procedure. The Northwest Forestry Association commented that the OESF watershed assessment procedure may add needless planning complexities and may lead to unwanted legal actions if the process is not followed to the letter. The Washington Forest Protection Association and an individual pointed out that there is an error in the DEIS on page 4-267 about the new riparian function module in the watershed analysis manual. (The Draft EIS said that the latest version of the watershed analysis manual increases the minimum debris recruitment distances in western Washington from 66 to 100 feet. Actually, this version utilizes a 100 foot assessment width to determine large woody debris potential.) The Washington Forest Protection Association also claimed that Forest Practices Rules - Watershed Analysis provided adequate protection of riparian ecosystems because it assesses components such as large woody debris and stream shading. Another individual said that the OESF strategy ignores watershed analysis.

**Response:** Conducting watershed analysis as an HCP alternative was considered impractical because of the long time period necessary to analyze the many Watershed Administrative Units (WAUs) that contain DNR-managed lands in the west-side planning units. Consequently, following the formal watershed-analysis process was eliminated from the list of reasonable HCP alternatives.

DNR recognizes that there are a number of advantages to applying many of the watershed-assessment methods described in Version 3.0 of the Washington Forest Practice Board manual (WFPB, 1995b) in order to meet the needs for evaluating physical and biological conditions under the draft HCP. For example, these methods generally are accepted by most entities as the standard for credible analytical work, and they have been peer-reviewed and tested over the course of several years. The draft HCP, however, goes beyond the scientific issues addressed in the current Board manual by treating wildlife species other than salmonids, species habitat other than fish habitat, and components of the riparian ecosystem other than water temperature and large-woody-debris recruitment. The Board manual can provide a foundation for some physical and biological assessments within areas covered by the draft HCP; that foundation must be expanded and modified to incorporate other resource-protection and land-management issues. Conducting watershed analyses per the Forest Practices Act is the prerogative of the landowner and, as such, DNR has decided to integrate watershed-analysis methods, where appropriate, with other management tools including landscape planning and harvest planning. DNR will continue to participate in formal watershed analyses and will sponsor landscape-planning efforts on large blocks of state-land ownership (as per FRP DNR 1992b Policy 16). The

procedures for landscape planning under the Forest Resource Plan currently being developed by DNR, contain elements of the watershed-analysis methods and procedures. Where watershed analyses are conducted on lands covered by the draft HCP, prescriptions resulting from the assessments will be applied unless HCP requirements meet or exceed the level of protection afforded by the prescriptions (as per alternate-prescriptions clause, WAC 222-22-070(2)). See the draft HCP, p. IV.51 for further discussion.

The Washington DOE and DNR Forest Practices Division currently are working together to determine the relationship between the Forest Practices Board watershed-analysis process and TMDL development. As of the draft HCP writing, no formal agreements had been reached, and no procedures or methods for analysis had been made available for consideration by the HCP team. The Washington DOE and DNR Forest Practices Division are the appropriate entities for developing a relationship between TMDL regulation and watershed-analysis prescriptions.

A concern was raised that the OESF Riparian Conservation Strategy does not mention the Washington Forest Practices Board watershed-analysis process (WFPB, 1995b). The discussion of watershed assessments, beginning on page IV.115 of the draft HCP, will be edited to reflect that the results of forest-practices watershed analysis will be employed wherever they are available. It would not be necessary to duplicate assessments of physical and biological conditions via the 12-step method developed for the OESF, although some additional assessment work might be conducted to address issues not covered by the state's watershed-analysis process.

Although the draft HCP and DEIS for the five west-side planning units outside the OESF do not explicitly address the issue of cumulative effects in a specific chapter section, this issue is dealt with implicitly in the DEIS. Inasmuch as the Washington Forest Practices Board watershed-analysis process (WFPB, 1995b) deals with cumulative effects, the draft HCP also addresses cumulative-effects processes by treating mass wasting, surface and road erosion, hydrologic change, riparian functions, physical channel conditions, fish habitat, and water quality and quantity (the same issues addressed in the eight modules of the Board manual). The draft HCP also stresses the importance of on-the-ground adjustment of riparian management zones to appropriately protect key physical and biological functions. This will require integration or synthesis of field information on physical and biological conditions, in order to meet the stated objectives of the riparian-conservation strategy. Details of the field-assessment process and buffer designation will be given in the HCP implementation guidelines. Where watershed analyses or landscape-planning efforts are conducted, the watershed-analysis procedures for cumulative-effects assessment, or similar methods, will be applied.

Comments regarding an error in a reference to the riparian-function module are correct. The sentence on page 4-267 of the DEIS should state: "This version [of the Board manual] potentially strengthens protection for coarse-woody-debris and shade sources by increasing the minimum assessment-zone widths for debris recruitment distances in western Washington from 66 to 100 feet. Therefore, observed depletions

in long-term sources of woody debris within 100 feet of the channel margin might require additional prescriptions for protecting wood *sources*." (See Section 2, changes to the DEIS, of the FEIS.)

A comment was made that current forest-practices rules provide adequate protection of riparian ecosystems because they assess large-woody-debris recruitment and stream shade. Whereas the current forest-practices rules might be adequate in many instances to protect a substantial percentage of large woody debris and shade availability, they do not address other aspects of riparian systems known to be important in maintaining habitat for riparian obligate species (i.e., salmonids as well as other mammals, reptiles, amphibians, and plants). As described in the DEIS, these include detrital (nutrient) input, sediment input (as affected by windthrow and other riparian disturbances), microclimate, and reduction in riparian-buffer functions due to windthrow activity. This is a multi-species plan, whereas the forest practices rules pertaining to riparian management zones deal exclusively with fish habitat. In addition, DNR currently leaves considerably wider buffers than the forest practices minimums, on average, (discussed on p. 4-152 of the DEIS) because present physical and biological conditions demonstrate the need for additional protection. Regardless of whether the HCP is adopted, DNR likely will not revert to smaller buffers where evidence indicates the need for wider riparian management zones than specified in the forest practices rules.

## F. RESERVES/REFUGIA

**Summary:** Bogle & Gates (a consultant to Washington State University), and two individuals questioned the need for increasing permanent habitat deferrals for expanded riparian buffers, wetland buffers, wind buffers, special habitat buffers and special species management plans. Black Hills Audubon Society and one individual requested remaining old growth be protected as refugia. One individual asked that no-logging buffers and habitat reserves be clearly defined so they can be identified by anyone.

**Response:** See the response for "Old-Growth Forest". Buffers and forest set-asides or deferrals will be clearly defined as the HCP is implemented or when management units are prepared for timber sales.

## G. HERBICIDES

**Summary:** The Muckleshoot Indian Tribe stated it is unclear what size buffers will be established for areas that will be sprayed with herbicides, using ground and aerial applications. Cascade Hardwood and the Point No Point Treaty Council requested that the value of non-coniferous species be recognized and that herbicide applications be reduced or eliminated. One individual requested that DNR increase its use of aerial herbicide applications as an effective vegetation management technique.

**Response:** Herbicide use will comply with the Washington Forest Practices Rules and will be consistent with the direction given by Board of Natural Resources as expressed in Forest Resource Plan Policy No. 33, "Control of Competing Vegetation" (DNR 1992b). Also, see page IV.178 in the draft HCP.

## H. REPLANTING

**Summary:** Northwest Forestry Association stated that the site preparation discussion is grossly inadequate and should include estimates of productivity loss and the effect on site preparation of the new land management regimes.

**Response:** See response for "Management Practices."

## I. GROWTH & FERTILIZATION (in section 3.3 only)

## J. THINNING

**Summary:** Northwest Forestry Association commented that DNR would be wise to carefully assess how much thinning can be done without producing negative results in light of compaction from multiple entries and exacerbated disease problems in western hemlock.

**Response:** Comment noted.

## K. SALVAGE

**Summary:** WDFW commented that salvage of blowdown needs to be conducted in such a way that it does not perpetuate additional blowdown, that live trees need to be left in blowdown areas, and that some large down logs should be retained to provide habitat.

**Response:** Comment noted. See responses for "Forest Health" and "Wind Buffers."

## L. RESTORATION/RECLAMATION

**Summary:** Comments from the Forks office of the NWIFC, Point No Point Treaty Council, and Northwest Biodiversity Center call for maintaining existing mature and old-growth stands while evaluating where, how, and when riparian zones will need to be restored to conifer or a conifer/hardwood mix. Northwest Forestry Association felt the OESF restoration discussion presents a false picture of a sea of stumps and wasted streams completely devoid of fish and wildlife. Cascades Hardwoods suggested controlled, environmentally friendly hardwood removals to fund restoration activities, while GBA Forestry, Inc. (for Washington Hardwoods Commission) stated that techniques for removing hardwoods to establish conifers are problematic in terms of economics, logistics, and operations.

**Response:** Comments noted. See responses for "Old-Growth Forest" and "Riparian Buffer Treatment."

## M. ROAD MANAGEMENT

**Summary:** USEPA Region 10, NWIFC, Bogle & Gates (a consultant to Washington State University), Black Hills Audubon Society, and one individual commented on the need for a more detailed description and time line for the proposed comprehensive road network management plan and how it will deal with road densities, roadless areas, road

maintenance, and associated forest management activities. Bogle & Gates requested information on the cost of developing a comprehensive road network management plan and clarification on what restrictions would be placed on harvesting by the lack of a road plan. Washington Forest Protection Association and Bogle & Gates question how an environmental assessment can be done on the impacts of a road plan that does not exist. Point No Point Treaty Council, The Tulalip Tribes, Northwest Ecosystem Alliance, and Northwest Biodiversity Center commented on the lack of discussion on the changes to basin hydrology as the result of road networks. NWIFC, The Mountaineers, 51 individuals (using an identical form letter) and one other individual commented on limiting or eliminating roads in wetlands or areas with high mass wasting potentials. WEC and one individual recommended larger areas of mitigation than the one-to-one replacement of wetland areas disturbed by road construction. The Rivers Council of Washington, Sierra Club, and The Wildlife Society stated a net reduction in roads is necessary. Yakama Indian Nation commented on the HCP's failure to address the impacts of roads on salmonids in eastern Washington.

**Response:** An HCP is the principle document supporting an application for incidental take permits and unlisted species agreements. The purpose of an HCP is to describe the management practices and/or guidelines to which the applicant willingly commits in exchange for incidental take permits. DNR chose not to present detailed descriptions of road management in the HCP because doing so might unduly constrain DNR over the long term. DNR and the Services believe that DNR's HCP describes road management at a level of detail sufficient to satisfy Section 10 of the ESA.

The impacts of road management under the proposed HCP (Alternative B) are expected to be less than those under No Action (Alternative A). The effects of road networks on basin hydrology are briefly discussed on pages 4-171 to 4-172 of the draft EIS for the HCP. A brief qualitative assessment of the impacts of roads on basin hydrology for each of the alternatives appears on pages 4-173 through 4-175. Road management will comply with the Washington Forest Practices Rules and will be consistent with the direction given by Board of Natural Resources as expressed in Forest Resource Plan (DNR 1992b).

The draft HCP does limit or eliminate roads from wetlands (p. IV.58) and from hillslopes with a high risk of mass wasting (p. IV.56)

In order to reduce certain environmental impacts, DNR and other land managers have reduced the size of forest management units. The main reason for the reduction in unit size is to decrease the size of clearcuts. A consequence of this action is an increase in the amount of roads necessary to access the smaller management units. Conequently, under all three HCP alternatives there will be a net increase in roads. DNR will minimize the adverse environmental impacts of roads by managing the road network for a net decrease in active roads.

DNR's HCP riparian conservation strategy, which includes commitments for road network management, does not cover DNR-managed lands east of the Cascade crest.

### 1. Construction and Maintenance Standards

**Summary:** The Blue Ribbon Coalition recommended proper road maintenance, limited traffic, and utilizing gates for selective road closures as a better alternative than road reclamation. Bogle & Gates (a consultant to Washington State University) requested clarification as to what outlays would be required for "retrofitting or removal" of some stream-crossing structures as a result of DNR's commitment to minimizing adverse impacts caused by its road networks.

**Response:** DNR intends to consider many different methods for reducing the adverse environmental impacts of roads, including proper road maintenance, road use restrictions, road closures, and road reclamation or abandonment.

Fish blockages caused by road stream crossings, i.e., culverts, inflict a major adverse impact on salmon stocks. DNR'S commitment to the removal or retrofitting of culverts to remove blockages to fish passage is a continuation of current DNR practice.

### 2. Alternatives to Roads

**Summary:** The Washinton Forest Practices Association commented that the draft HCP, as presently worded, raises expectations for helicopter yarding and other sophisticated, expensive yarding methods. They went on to state: if that, indeed, is the intent, it should be so stated and put forward with a cost analysis.

**Response:** Alternatives to road construction (e.g. yarding systems) will be used where such alternatives are practicable and consistent with other conservation objectives (draft HCP p. IV.56).

## N. TRAIL MANAGEMENT

**Summary:** Black Hills Audubon Society and 51 individuals (using an identical form letter) recommended that trails be kept out of riparian buffers, wetland buffers, and unstable slope areas.

**Response:** The Services did not require DNR to consider trail management in its draft HCP or draft EIS. DNR chose not to consider trail management in its draft HCP because doing so might unduly constrain DNR over the long term.

## O. SPECIAL FOREST PRODUCTS

**Summary:** Two individuals commented on the lack of recognition and discussion of special forest products and the failure to consider the value of non-timber resources in economic analysis.

**Response:** Relative to timber harvest, special forest products currently gathered from DNR-managed land have insignificant environmental impacts and make inconsequential contributions to trust revenue and local economies. The Services did not require DNR to consider special forest products in its draft HCP or draft EIS. Additional details

regarding DNR's non-timber management activities are included in Appendix 3 of this FEIS (see pages A3-55 through 61) as changes to the draft HCP.

## P. OTHER PRACTICES

**Summary:** As an example of conflicting comments on intended management, Northwest Forestry Association commented that the draft HCP discussion of riparian buffers clearly implies old-growth conditions as a target while DNR continues to state that the zones will be managed to produce timber. One individual, while supporting wider riparian buffers, proposed that additional selective harvest in the minimum 25 foot buffers would make more sense than letting the trees fall into streams.

**Response:** See the responses for "Riparian Management Strategy" and "Riparian Buffer Treatment." The draft HCP says that the riparian buffers will possess forest with a range of late-successional characteristics, including old-growth charcteristics (p. IV.136). Management of the riparian buffer will be site-specific, and hence, "a range of late-successional characteristics" is the expected outcome of the riparian management strategy. At some sites, forest in the riparain buffer will be best described as "mature" at other sites the forest will resemble old-growth. "Old-growth characteristics" refers to the main qualities which are typically used to define old-growth forest: multilayered canopy, at least 8 trees per acre greater than 32 inches dbh, at least 4 snags per acre greater than 24 inches dbh and 15 feet tall, etc (Franklin and Spies 1991). The possession of such characteristics by a small stand, such as a riparian buffer, does not preclude selective timber harvest from that stand.

There may be situations where selective harvest within the 25 foot no harvest area is appropriate and even beneficial to salmon habitat, but given the current state of freshwater salmon habitat in western Washington, the risks outweigh the benefits. Large woody debris are a vital element of salmonid habitat, and therefore, one function of the riparian buffer is to provide the quantity and quality of instream large woody debris that approximates that provided by unmanaged riparian ecosystems.

## VII. OTHER PLAN ELEMENTS

**Summary:** Washington DOE, The NWIFC, Point No Point Treaty Council, Squaxin Island Tribe, Tulalip Tribes, Muckleshoot Tribe, Bogle & Gates (a consultant to Washington State University), Northwest Forestry Association, a local organization, a timber company, and three individuals commented on the HCP's implementation. Nearly all of the tribal organizations and tribes want to be consulted during plan implementation, as does the timber company. NWIFC, Muckleshoot Tribe, and one individual were concerned that the HCP's implementation is poorly described. Washington DOE implicitly recognizes this as well. Washington DOE stated that it is imperative that a process exist to track the success of implementation. Bogle & Gates (a consultant to Washington State University) stated that the draft HCP is a plan for large-scale deferrals of management combined with research. The Northwest Forestry Association suggested the creation of a new document or new section within the HCP that would provide silivicultural and operational information explaining how DNR intends to achieve the

levels of environmental protection proposed and manage forests for timber production. One individual suggested that the interdisciplinary teams of scientists involved in implementation be broad-based. Another individual asserted that no studies have been done at the district level to determine if the plan is practical to implement.

**Response:** The HCP is the principle document supporting DNR's application for incidental take permits and unlisted species agreements. The ESA does not require silivicultural and operational information in an HCP. Including such information in the HCP would create a prescription-based, rather than an outcome-based, document constraining management flexibility.

There are no large-scale deferrals of management. Over the short-term, the draft HCP designates five types of set-asides or deferrals: forests within 25 foot of Type 1, 2, 3, and 4 Waters; hillslopes with a high risk of mass wasting; owl nest patches; occupied marbled murrelet habitat; and forests in or adjacent to uncommon habitats such as caves and talus. Over the long term, it is anticipated that the only set-asides will be forests within 25 foot of Type 1, 2, 3, and 4 Waters, some unstable hillslopes, some occupied marbled murrelet habitat, and forests in or adjacent to uncommon habitats. Owl nest patches may be harvested after research demonstrates that silvicultural practices can produce high quality spotted owl nesting habitat. Some unstable slopes may be harvested after research demostrates that timber harvest will not increase the frequency or severity of mass wasting events. Ultimately, set-asides are expected to be a small proportion of all DNR-managed forests within the HCP planning area.

DNR believes that the plan is practical to implement. The stand and landscape prescriptions proposed in the HCP -- retaining snags and green trees, RMZ management, wetland management, maintaining 50 percent owl habitat in NRF management areas, etc.-- are based on practices that are familiar to DNR staff.

The composition of interdisciplinary teams of scientists will be dependent on the purpose for convening such a group

## A. INVENTORY AND SURVEY

**Summary:** The Washington Chapter of The Wildlife Society and a local environmental organization recommended that DNR conduct surveys for rare and poorly known species. Both organizations commented that such surveys should be part of adaptive management practices. Bogle & Gates (a consultant to Washington State University) questioned whether there was any difference between the owl surveys and murrelet habitat relationships study conducted under Alternative A and the owl research and murrelet habitat relationships study conducted under Alternative B.

**Response:** Surveys for rare and poorly known species will not be included in DNR's HCP monitoring program. Because DNR's HCP is habitat based, rather than species based, such surveys are not considered necessary to minimize and mitigate the impacts to wildlife species.

There is no difference between the marbled murrelet habitat relationship study conducted under Alternative A and that conducted under Alternative B. The methods of data collection and analysis are the same under both alternatives. There is, however, a profound difference in how the results of the study would be used. Under Alternative B, forest identified as marginal habitat unlikely to be occupied by marbled murrelets would be made available for harvest, but only if DNR conducts intensive inventories in the suitable habitat and uses the information in developing long-term conservation strategies. Until a long-term strategy is aproved by the USFWS, no known occupied sites will be harvested. Under Alternative A, the results of the study could not be used to release marginal habitat for harvest because DNR would not have an HCP in place committing to long-term murrelet habitat conservation. Murrelet surveys would continue to be necessary to avoid take. Under Alternative A, information gathered through habitat relationship studies would be used to make future decisions concerning DNR-managed murrelet habitat.

Owl surveys conducted under Alternative A and owl research conducted under Alternative B are very different. The purpose of owl surveys is to protect DNR, the Board of Natural Resources, and the trust beneficiaries from prosecution for the take of a federally listed threatened species. Owl surveys are done to determine whether management activities will occur within a median home range radius of a spotted owl site center. The timing of management activities is tightly linked to the completion of owl surveys. The surveys must follow a standard protocol.

## B. RESEARCH

**Summary:** The City of Port Angeles, Point No Point Treaty Council, Squaxin Island Tribe, Tulalip Tribes, Washington State Association of Counties, Bogle & Gates (a consultant to Washington State University), Northwest Forestry Association, the National Audubon Society, WEC, NCASI, three local environmental organizations, and nine individuals commented on research under the HCP. Point No Point Treaty Council recommended that basic scientific research be conducted before management-oriented applied research. The Squaxin Island Tribe and two individuals emphasized the need for a scientific advisory board and/or outside peer review for research conducted under the HCP. The Tulalip Tribes stated that the research goals are vague. Bogle & Gates (a consultant to Washington State University) asserted that research must be done before a competent HCP can be proposed and that there is much uncertainty as to the duration of the HCP's spotted owl habitat research phase. Bogle & Gates also wants to know the expected costs of the research projects. The Washington State Association of Counties said that knowledge should be an objective, and the City of Port Angeles and Northwest Forestry Association both said that there is a need for experimental forestry and applied forestry research, but the Northwest Forestry Association cautioned DNR to "get real" about research costs. NCASI requested more details about spotted owl research to be conducted in the OESF. The National Audubon Society said that an aggressive research program is necessary to test the assumptions used to develop the conservation strategies. WEC and two local organizations claimed that the HCP creates disincentives to do research. These same groups suggested that initially requiring a very conservative level of habitat protection would create an incentive for DNR to conduct research. Several individuals said that research is necessary to ensure the survival of endangered species.

An individual suggested that DNR establish a schedule for completion of the research phase. One individual believed that old-growth forest must be retained as a "living laboratory" in order to study forest health issues such as insect infestations and disease.

**Response:** An HCP is the principle document supporting an application for incidental take permits and unlisted species agreements. The purpose of an HCP is to describe the management practices and/or guidelines to which the applicant commits in exchange for incidental take permits. Given the current state of knowledge and the rate at which knowledge is accumulating, flexibility is preferable to specificity for some aspects of an HCP. This is particularly true for the HCP research program. DNR and the Services believe that the research goals and objectives presented on p. V.1 through 6 in the draft HCP are specific enough to guide the HCP research program.

Basic scientific research and management-oriented applied research will be conducted concurrently, particularly in the OESF. Research used to modify the HCP conservation strategies will be subject to review by the Sevices.

The research program will test the assumptions used to develop the conservation strategies. That is the purpose of the validation monitoring component.

The HCP does include incentives to do research. The spotted owl nest patches in NRF management areas must be deferred from harvest until DNR can demonstrate the successful application of silvicultural techniques to create functional nesting habitat (draft HCP, p. IV.7). Unstable hillslopes must be deferred from timber harvest until it can be demonstrated that harvest can be accomplished without increasing the frequency or severity of slope failure and without severely altering the natural input of large woody debris, sediments, and nutrients to the stream network.

Recognizing that forest land management cannot be delayed until all research questions are answered and all uncertainty is eliminated, DNR has proposed a plan consisting of conservation strategies based on today's knowledge and an intent to conduct research to further the knowledge. The purpose of much of the proposed research is to develop an understanding of how to enhance timber production in a manner that ensures efficacy of the conservation commitments of the HCP.

DNR agrees that some late-seral stage forest should be retained for research purposes, and DNR set aside 12 late-seral stage research areas totalling approximately 2,000 acres. These sites will continue to serve a research function under the HCP. These areas are in addition to approximately 72,000 acres in NAPs and NRCAs, many of which contain late-seral stage forest.

With regards to research funding, the draft HCP (p. V.7) states, "DNR shall request from the legislature at least $1 million per year for HCP research until the Priority 1 projects are completed."

## 1. OESF

**Summary:** Washington DOE, WDFW, NWIFC, Point No Point Treaty Council, Muckleshoot Indian Tribe, Port of Port Angeles, Bogle & Gates (a consultant to Washington State University), WEC, NCASI, a timber company, and a local organization commented on the OESF. Washington DOE stated that the focus of the OESF on answering questions related to restoring and maintaining riparian ecosystem integrity with ongoing forest management is conceptually extremely valuable. WDFW suggested that experimentation in old-growth habitat in the OESF is reasonable but DNR should proceed with caution. NWIFC commented a transition from the zoned to unzoned forest should be considered to reduce the possibility of forest fragmentation. The Point No Point Treaty Council supports the research objective of the OESF. The Muckleshoot Indian Tribe asked that information gathered in the OESF be used to modify management activities in the other planning units. Bogle & Gates (a consultant to Washington State University) described the OESF as a "forest ecology theme park" and wants to know how much it will cost and what will be the trusts' share of that cost. WEC urged DNR not to sacrifice conservation in the name of research and to make the information gathered in the OESF the challange. The Northwest Forestry Association believes that the OESF places habitat protection before beneficiary support and that it has an overly prescriptive plan which abrogates the entire reason for the OESF. The Port of Port Angeles hopes DNR will allow experimentation in the OESF that will enhance benefits to the trusts. A timber company hopes DNR will lead the way in demonstrating forest practices that provide adequate salmon habitat and allow timber harvest. A local organization thinks that the impacts of recreational use on long-term health of the forest should be studied in the OESF.

**Response:** It is DNR's intention that information gathered in the OESF will be used to modify management activities on DNR-managed land outside the OESF where the new knowledge is applicable. DNR intends to ensure that future modifications to conservation strategies will preserve their original intent. The goal of the OESF is to learn how to integrate production and conservation across the landscape. DNR fully expects that the information gained through experimentation will enhance benefits to the trusts. DNR will make the information gathered in the OESF widely available. (See draft HCP, p. IV.73.) DNR does not concur that the OESF plan is overly prescriptive. The forest management and fish and wildlife conservation measures described for the OESF are working hypotheses and will be modified through a program of monitoring and adaptive management.

DNR considered an alternative that was described as a transition from a zoned forest to an unzoned forest (DEIS, p. 2-35). The reasons for eliminating this alternative from the set of reasonable alternatives is presented in the DEIS, p. 2-35 to 2-36.

Research costs are those committed to in the draft HCP (p. V.7).

The impacts of recreational use on long-term health of the forest are not currently a high priority for research in the OESF.

## C. MONITORING/REPORTING

**Summary:** The USEPA, Washington DOE, WDFW, Metropolitan King County Council, NWIFC, Point No Point Treaty Council, Muckleshoot Indian Tribe, Squaxin Island Tribe, Tulalip Tribes, Bogle & Gates (a consultant to Washington State University), the National Audubon Society, Northwest Forestry Association, WEC, Washington Native Plant Society, Washington Wilderness Coalition, Washington Chapter of the Wildlife Society, three local environmental organizations, and 60 individuals commented on various aspects of monitoring (fifty-one individuals used identical form letters). The majority of comments emphasized the importance of an adequate monitoring program. The plurality of comments, including those from USEPA, Washington DOE, WDFW, Metropolitan King County Council, NWIFC, Point No Point Treaty Council, Squaxin Island Tribe, and Tulalip Tribes, said the results of monitoring must be linked to changes in management, (i.e. adaptive management). USEPA stated that the monitoring section was the weakest part of the draft HCP. Absent a monitoring plan, they were unable to evaluate whether the overall HCP objectives are achievable. Washington DOE believes that Alternative B should meet most water-quality needs if it is implemented with adaptive management. Several comments, including those of WDFW and the Squaxin Island Tribe, recommended that validation monitoring not be limited to the OESF. The NWIFC requested validation monitoring for juvenile salmon rearing habitat, effectiveness and validation monitoring as part of the interim murrelet strategy, validation monitoring for spotted owl dispersal habitat, and the opportunity to review the monitoring plan. The Northwest Forestry Association also suggested that validation monitoring be conducted for salmon. Both the NWIFC and Point No Point Treaty Council questioned the validity of implementation monitoring that does not involve field work and said, along with the Muckleshoot Indian Tribe, that more detail is needed in the monitoring program. NWIFC and Squaxin Island Tribe questioned the lack of criteria for effectiveness, (i.e., the desired habitat conditions for salmon).

Point No Point Treaty Council and Squaxin Island Tribe asked to be involved in the review of data collected through monitoring. Several comments, including those from the Squaxin Island Tribe and WEC, suggested an oversight committee or scientific review board to evaluate monitoring data. WEC also suggested that a disinterested expert panel oversee the monitoring plans. The Washington Native Plant society wants monitoring of listed and candidate plant species. Several comments said that incentives to insure that DNR conducts adequate monitoring, such as a reduction in habitat protection if it is shown that conservation objectives have been exceeded, should be built into the HCP. The National Audubon Society asserted that the draft HCP gives no assurance that funding will be available for monitoring. An individual suggested that a trust fund be established to support monitoring in the future. The Northwest Forestry Association questioned the cost of the "open-ended" monitoring program, and Bogle & Gates (a consultant to Washington State University) asked about the expected cost of the monitoring program.

**Response:** DNR's obligation is to USFWS and NMFS. This does not preclude DNR from continuing ongoing working relationships with the tribe and the public. All HCPs must include a monitoring plan and assurance of adequate funding. The Services must find that these components are adequately provided or an ITP cannot be issued.

Monitoring and adaptive management are implicit in the riparian conservation strategy. According to the draft HCP, management in the riparian buffer must "maintain or restore the quality of salmonid habitat. During periodic reviews of the HCP, DNR will be required to demonstrate to the Services that it has kept this commitment. Considering the geographic scale of DNR's HCP, convincing evidence can only be obtained through a statistically valid monitoring program. Because of the trust mandate, DNR has an incentive to determine how to manage the riparian buffer for commodity production, but riparian ecosystem management must "maintain or restore the quality of salmonid habitat." This establishes a situation which calls for adaptive management.

The draft HCP has been modified to incorporate field surveys into implementation monitoring. Such monitoring will be primarily accomplished through DNR's planning and tracking system and geographic information system, but statistically valid sampling of management activities will be conducted to evaluate the reliability of information stored in these databases.

The reasons for not conducting validation monitoring on salmon are presented in the draft HCP, p. IV.65 and p. V.2. These reasons include, the watershed-level effects of forestry and non-forestry activities involving other land ownerships, the effects of salmon fisheries and hatcheries, and natural at-sea effects. Effectiveness and validation monitoring may be part of the long-term murrelet strategy. The reasons for not conducting validation monitoring for spotted owl dispersal habitat are presented in the spotted owl comment category in this section.

DNR has chosen not to specify performance standards or habitat standards for the management of riparian areas. DNR's objective is to manage riparian ecosystems so that important elements of salmonid habitat (large woody debris, sediments, detrital nutrients, and shade) are within the natural range of variability for functional habitat. For some habitat elements, in particular large woody debris and detrital nutrients, the natural range of variability or the minimum requirements for functional salmonid habitat are poorly understood. DNR anticipates that through monitoring and adaptive management our understanding will evolve to the point where scientifically credible performance standards can be specified.

There are no take prohibitions for federally listed plant species on nonfederal lands. Therefore, USFWS does not issue incidental take permits for plants, and the HCP is not required to monitor plant populations. However, the Services through the Section 7 consultation process must ensure that the action of issuing an ITP will not jeopardize any federally listed plant species. For that reason, the Services encourage applicants to consider listed and sensitive plant species during the HCP development.

Under Section 10 of the ESA, one criterion for the issuance of an ITP is that adequate funding for the plan be provided. The same criterion will be applied for unlisted species agreements. This provides assurance that funding will be available for monitoring.

State legislative authority would be required for establishing a trust fund to support monitoring.

## VIII. IMPLEMENTATION ISSUES

**Summary:** The Services and DNR received comments from four individuals, the Hoh Indian Tribe, Prosecuting Attorney Bradley Andersen on behalf of Skamania County, the Washington State Association of Counties, NWIFC, WEC, the Black Hills and Skagit Audubon Societies, the Northwest Ecosystem Alliance, Sierra Club Cascade Chapter, Rivers Council of Washington, the Wildlife Society, The Mountaineers, and two local groups regarding general concerns on implementation. The Hoh Tribe questioned whether short term protection losses could occur without long-term gains. Skamania County wrote the HCP should be the product of "hard-nosed negotiations." Several individuals and groups including The Mountaineers, Sierra Club, and Rivers Council asserted the IA contained too many inequities favoring DNR's needs at the expense of species. These same individuals and groups wrote that the agreement must present a fair balance in needs between DNR and the public resource. The Northwest Ecosystem Alliance and another local group wrote that the agreement prevents further public involvement or citizen suit. Skagit Audubon Society wrote that the agreement would discourage research and monitoring. Black Hills Audubon wrote that an Incidental Take Permit should not be granted on the basis of such weak commitments. NWIFC stated the provision in the IA barring citizen lawsuits may violate the ESA. WEC wrote that even though IA Section 21 allows for periodic comprehensive reviews, it does not state the method of review or how policy may be affected.

**Response:** Over the term of implementation, the effects of take must be mitigated to the maximum extent practicable. The possibility that take occurring early in the permit term might not be adequately mitigated upon early termination could arise, creating a "mitigation debt" owed by DNR. However, adequate mitigation is a permit condition with an underlying contractual obligation on the part of the applicant. As a result, early termination resulting in a "mitigation debt" would have to be remedied by DNR, most liklely through the continuation of certain HCP provisions and permit conditions.

Modifications have occurred during the review period to address the needs of all parties and to respond to public input. The draft IA circulated for review had not been negotiated prior to publication. The IA has since been redrafted and changes in the IA are presented in Appendix 4 of this document. The Services concur with commentors that the agreement should reflect a balance of the needs of all parties and the resources involved.

The Services cannot, by contract, abrogate the statutory right concerning public comment and participationof the public to be involved in, or challenge thier actions. Accordingly, the Services note that nothing in the IA or requested ITP limits or affects the public's rights and recourse under the ESA or any other statute; language in Section 30.6 of the IA now acknowledges the rights of the public under the ESA.

## A. LENGTH OF PLAN/PERMIT

**Summary:** The Services and DNR received comments on the length of the proposed plan from several groups, including 14 from individual commentors. Squaxin Island Tribe, Clallam County, American Rivers, The Mountaineers, Environmental Resource Center, and the 14 individuals all asserted 100 years was too long. Squaxin Island Tribe suggested a 50-year agreement allowing incremental increasing protection. Another commentor suggested that the HCP run 20 years. WEC commented that a plan where benefits only begin to be incurred after 50 years of implementation is inappropriate.

**Response:** HCP term length is generally decided as a matter of the purposes and needs of the applicant who engages in this voluntary process. Another major factor that affects the length of the term is the expected period of time contemplated as necessary to adequately mitigate for the amount of take that might occur. As of the time of publication of the IA, the precise term of the agreement sought had not been determined by the applicant. Nonetheless, a 100-year term is not extraordinary in view of the amount of take that is sought. The Services note that the Murray Pacific Corporation HCP and All-Species Amendment is for 100 years, the Plum Creek 2-Phase HCP could run as long as 100 years, the Weyerhauser Millicoma HCP could run 80 years, and the Oregon Department of Forestry Elliott State Forest HCP will run 60 years as to spotted owls. Following these examples, the possibility of DNR's HCP spanning 100 years is not extraordinary.

DNR and the Services have modified the term of the permit. The Implementation Agreement now calls for a 70-year term with provisions for up to three, 10-year extensions. Such extensions could occur at DNR's option if commitments of the HCP are met at year 70, or at the Service's option if commitments have not been met at year 70.

## B. TRANSFERS OF LANDS, SUCCESSORS AND ASSIGNS

**Summary:** Nine commentors wrote or testified on this topic, including one individual. WDFW questioned the effects of DNR dispositions where the HCP would not be implemented by the new owner. Clallam County wrote about transfers to the federal government. Rivers Council, Sierra Club Cascades Chapter, The Mountaineers, and two local groups asserted transfers should be allowed only where the HCP provisions are maintained by the new owner. Washington Forest Protection Association wrote that an HCP should not encumber land exchanges.

**Response:** The manner in which HCP lands are disposed of by DNR during the permit term will depend on each transaction. Nonetheless, Section 17.4 of the IA now provides for mitigation if the cumulative impact of the land disposition would have a significant adverse effect on a species.

## C. FUNDING

**Summary:** WDFW asked if DNR will move funds around to cover budget shortfalls and asked for more details on how adequate funding for the HCP will be provided. WEC questioned whether DNR can make the assurance that funding to implement the HCP will be available. One individul asked what happens in the event DNR is not funded by the State Legislature.

**Response:** Under Section 10 of the ESA, one criterion for the issuance of an ITP is that adequate funding for the plan be provided. The Implementation Agreement contains a provision which would allow the Services to suspend the permit should insufficient funding be provided to implement the HCP. To issue an ITP, the Services must be assured the applicant will adequately fund implementation of the proposed HCP.

## D. PHASE-IN IMPLEMENTATION

**Summary:** Bogle & Gates (a consultant to Washington State University) stated that the paucity of long-term management activities specified under the plan, combined with the absence of meaningful time frames for such action, make it almost impossible for decision makers to assess the environmental impacts of the HCP. A local organization stated that for the plan to succeed, the decision making structure must be designed such that scientists and other ecosystem managers have significant authority in making harvest and management decisions and that this process should be clearly delineated in the documents.

**Response:** The plan does contain a number of provisions for future plans to be developed once data is obtained. Although the exact nature of the provisions which will result cannot be stated, the Service believes that by maintaining the ability to participate in the development of these plans, it maintains the ability to ensure the best available data is used in a responsible manner to develop sound conservation strategies. Likewise, DNR will ensure that the development of these strategies will be consistent with its trust responsibilities. By postponing components of the planning process both DNR and the Services are ensuring that commitments will not be made until effective and efficient strategies can be developed, which should benefit the trust and wildlife species.

## E. LIABILITY

**Summary:** The Sierra Club and Society for Conservation Biology commented violations could be blamed on an agent and that DNR would not be held liable. Another environmental group stated the penalty for DNR "violating" the HCP is too weak.

**Response:** Section 16.3 of the IA provides that DNR shall not be liable for the unauthorized acts of agents, contractors, licensees, etc. As for penalties for "violation" of the HCP, all applicable statutory and regulatory penalties remain in effect, including the Services' ability to suspend or revoke the permit.

## F. PERMIT ENFORCEMENT, SUSPENSION, OR REVOCATION

**Summary:** Five environmental organizations and one individual commented on this subject. Black Hills Audubon Chapter wrote that the agreement must be enforceable. Washington Wilderness Coalition and WEC wrote that the ITP should be conditioned on fulfilling monitoring requirements. Society for Conservation Biology wrote that the permit should be suspended for violations of the agreement. Finally, Rivers Council questioned how the agreement will be enforced. An individual requested increased public involvement in enforcement.

**Response:** Nothing in the process of issuing an ITP abrogates the duty of the Services to enforce the ESA. Permit enforcement will be carried out as a matter of programmatic responsibility and through the use of compliance monitoring, site inspection, remote sensing and aerial imagery, and other emerging techniques. Violations of the agreement can result in suspension or revocation of the permit and as otherwise provided in federal permitting regulations. Nothing in the proposal prevents interested members of the public from apprising the Services of compliance issues.

## G. UNLISTED-SPECIES AGREEMENT

**Summary:** The Services and DNR received 14 comments, including four from individuals, discussing the proposed unlisted species agreement. NWIFC commented the process for adding unlisted species is "disturbing" and "unfair" and needs to be changed. NWIFC suggested delaying addition of newly listed species until critical habitat is designated and a recovery plan for each newly listed species is finalized. Point No Point Treaty Council wrote that DNR should bear the burden of proving the HCP adequately addresses the needs of newly listed species. The Council also wrote, that DNR should bear the burden of proving that extraordinary circumstances do not exist (as opposed to the allocation of the burden to the Service of proving that extraordinary circumstances do exist). Sierra Club Cascade Chapter, Rivers Council of Washington, and two individuals wrote that no permit should be allowed for species not listed in the HCP or for which little is known. The Mountaineers, Northwest Ecosystem Alliance, Environmental Resource Center, and two individuals asserted DNR must be made responsible for further mitigation if it becomes necessary. Washington Wilderness Coalition commented the HCP should afford more protection to candidate species.

**Response:** The Services respectfully disagree that presently unlisted species that become listed during the permit term should be eligible for addition to the permit only after a recovery plan and designation of critical habitat for that species are completed. There is no basis in the ESA for this suggestion. The Services note, for example, that there is no current recovery plan for the owl, the murrelet has only a draft recovery plan, and no critical habitat has been designated for grizzlies, wolves, eagles, or falcons. None of these currently listed species would be eligible for coverage in an Incidental Take Permit under the commentor's suggestion. The unlisted species process proposed in the underlying agreement was analyzed in the DEIS and revisited in this document. Those provisions capture an agreement that was subject to extensive negotiation and refining so that it best implemented the intent of Congress as embodied in the ESA, as stated in H.R. CONF. REP. No. 835, 97 Cong, 2d Sess, 30 (1982) and as restated by the Departments of the Interior and Commerce in the No Surprises Policy of August 1994.

The HCP proposes a habitat-based aproach to conservation for all species, including those species that are currently unknown. The primary assumption of the unlisted species conservation strategy is that if adequate amounts of habitat of sufficient quality are provided, these species will persist. The question is whether the combination of the described protective measures, natural diversity within the habitats on DNR-managed lands, and the diversity of treatments to be implemented under the HCP would provide a sufficient amount of habitat. The Service will provide further discussion of the HCP

effects and mitigation in its Section 10 findings document prior to a decision on permit issuance or approval of the Implemention Agreement.

## H. DEPARTMENT OF THE INTERIOR and DEPARTMENT OF COMMERCE ASSURANCES POLICY

**Summary:** Two individuals commented that DNR should bear the burden of meeting stricter future ESA regulations. One individual commented DNR should bear the burden of funding further protection if it becomes necessary. WEC asserts that Section 12 of the IA violates the ESA and constitution.

**Response:** When Congress amended the ESA to include Section 10, they intended that the Federal Government give long-term assurances to landowners that engage the Section 10 process (H.R. CONF. REP. No. 835, 97 Cong, 2d Sess, 30 (1982). Congress expressed its intent that landowners operating under an approved plan be assured that the landowner not be required to provide further mitigation in the form of compensation or other lands except under extraordinary circumstances (see comment category Extraordinary Circumstances on p. 3-157 in this section). The Interior and Commerce Departments recently reiterated this commitment to landowner assurances in the so-called "No Surprises Policy" (USDI/USDC, 1994). In the No Surprises policy, the Secretaries provided that the government would bear the burden of proving that circumstances have arisen necessitating a revisiting of the mitigation measures in a previously approved plan. The present agreement faithfully integrates this policy. Should extraordinary circumstances arise and no other source of the necessary mitigation be available, the Services will indeed be able to request further mitigation from DNR. As to comments regarding the IA, please see above. The IA has since been redrafted.

## I. LEVEL OF CERTAINTY/UNCERTAINTY

**Summary:** The Services received eight comments, including two from individuals, generally addressing certainty. Washington Hardwoods Commission and Green Crow (a forest products company) commented on harvest level certainty. The Washington Wilderness Coalition, Sierra Club Cascades Chapter, and Rivers Council of Washington criticized the apparent imbalance between certainty for harvest levels and certainty for resource protection. Bogle & Gates (a consultant toWashington State University) asserted the DEIS and draft HCP are overwhelmingly uncertain to enable decision making. Two individuals wrote the Services should err in favor of resource protection.

**Response:** Certainty is a value that all parties to the Section 10 process seek for their respective interests. The Services are aware of the appearance that one resource may appear to gain a higher level of certainty than another, such as the appearance that an HCP proponent receives more certainty than the species for which they are seeking a permit to take. Appearances aside, certainty in the Section 10 process is necessarily a two-way street. As presented in the DEIS, greater certainty is derived for fish and wildlife resources as well as timber management under the proposal than would occur without it. This is especially true for presently unlisted species dependent on habitats on DNR-managed land that would not receive any beneficial or prescriptive attention under the No Action alternative, but would under the HCP because of the range of habitats that are addressed. For response to harvest certainty, please see Harvest Levels topic.

## 1. Unforeseen Circumstances

**Summary:** Ten commentors, including four individuals, provided comments on unforeseen circumstances. National Audubon Society, Sierra Club Cascades Chapter, The Mountaineers, WEC, and one individual all suggested DNR should be required to provide more mitigation if unforeseen circumstances arise. One individual asked what happens in the event DNR is not funded by the State Legislature. Three other individuals wrote that the process for increasing mitigation should be made easier.

**Response:** ESA implementing regulations provide that a proposed conservation plan must specify "[w]hat steps the applicant will take to monitor, minimize and mitigate such impacts, the funding that will be available to implement such steps, and the procedures to be used to deal with unforeseen circumstances..." (50 CFR 17.22(b)(1)(iii)(B) and 50 CFR 17.32(b)(1)(iii)(C)(2)). In addition, before issuing the permit, the Service must find, among other things, that "the applicant will ensure that...procedures to deal with unforeseen circumstances will be provided..." (50 CFR 17.22(b)(2)(iii) and 50 CFR 17.32(b)(2)(iii)). Unforeseen Circumstances have been defined as circumstances that may change over time, generating pressure to reconsider the mitigation commitments in an HCP (USDI and USDC 1994 -- No Surprises Policy). (See Appendix 6 of this document for a reproduction of the No Surprises Policy.)

The HCP provides procedures to deal with Unforeseen Circumstances. First, many components of the HCP rely on adaptive planning in response to research and monitoring. As such, the HCP is intended to minimize the possibility of unforeseen circumstances arising. Second, in enacting Section 10(a)(1)(B) of the ESA, Congress intended that permittees receive long-term assurances that terms of an approved plan would be adhered to by the federal government and that further mitigation requirements would only be imposed in accord with terms of the approved plan. Reiterating this intent, the Secretaries of the Interior and Commerce established the "No Surprises" policy entitled "Assuring Certainty for Private Landowners in Endangered Species Act Habitat Conservation Planning" to provide guidance in negotiating unforeseen circumstances provisions in HCPs. Consistent with this policy the Services may initiate Unforeseen Circumstances Consultation regarding the underlying circumstances.

In the event DNR has not appropriated sufficient funding to implement the HCP, the Services, under the Implementation Agreement, may suspend or revoke the permit.

## 2. Extraordinary Circumstances

**Summary:** Nine commentors, including three individuals, wrote regarding extraordinary circumstances. WDFW asked whether finding extraordinary circumstances affects Section 24.3 of the IA. NWIFC commented that the IA was drafted to preclude the Services' ability to invoke extraordinary circumstances. The Point No Point Treaty Council wrote that DNR should have to fund further mitigation, even under extraordinary circumstances. Washington Wilderness

Coalition wrote that DNR should have to adapt management to account for new information. WEC wrote that there is a lack of consequences for a finding of extraordinary circumstances, especially regarding unlisted species; that IA Section 24.3 makes no sense because, by definition, mitigation for unforeseen circumstances (sic) will involve additional or different land use restrictions; and that in effect, the provisions of Sections 23 and 24 of the IA define any land use restriction beyond those provided for in the HCP as a regulatory taking.

**Response:** Several writers based their comments regarding extraordinary circumstances on the draft IA circulated with the review package. The draft IA was prepared by DNR counsel without negotiation and revision prior to publication and therefore did not capture the extraordinary circumstances concept as the Services have been implementing it with other landowners operating under HCPs in this region.

As alluded to above, Congress intended for HCP proponents to receive the government's assurance that the terms of an approved agreement would be upheld except where doing so would lead to significant negative effects on the affected species' population. The IA was redrafted to capture this intent, and the changes appear in Appendix 4 of this document.

## J. CONTINGENCIES

**Summary:** The Services received 17 comments on contingencies, including six from individuals. Nearly all comments on this topic reflected a similar concern. In summary, the concern was the HCP lacked any possibility for improvement through time to deal with any number of contingencies such as species delisting, failure of the protection strategy, and incorporation of new information.

**Response:** The HCP contains a number of provisions to allow change. First, there are places where flexibility has been incorporated into the HCP. In addition, either party may propose an amendment at any time. Adaptive-management provisions allow certain components of the HCP to be upgraded whenever necessary as a result of information that was unavailable previously or which indicates that the mitigation objectives are not being met. Also, the Service may require a redistribution of mitigation in the case of extraordinary circumstances. Similarly, DNR may propose an amendment if a species is downlisted or new information presents opportunities for more effective mitigation at a lower cost.

### 1. Level of Flexibility

**Summary:** WDFW, City of Port Angeles, and the Port of Port Angeles commented that flexibility needs to be incorporated into the HCP in order to adapt management actions resulting from research and experimentation.

**Response:** The flexibility sought by the commentors already exists in the HCP. For example, details regarding flexiblility may be found in the draft HCP in Chapter V and those portions of Chapter IV covering owls, murrelets, riparian areas, and other

resources. As to adaptive management, see the heading Adaptive-Management Techniques in this section on the following page.

### 2. Amendments

**Summary:** WEC suggested HCP amendments be attended to by a Supplemental Environmental Impact Statement and a 60-day public comment period. In public hearing, the Environmental Resource Center asserted that the HCP is unrealistic in not allowing other species to come under HCP protection for the next 100 years.

**Response:** Each amendment would be assessed as to whether it warranted treatment for public review purposes under NEPA. The Services will consider a variety of factors in making that decision and, if NEPA is warranted, will decide on the appropriate forum for such review (categorical exclusion, Environmental Assessment, or Environmental Impact Statement). For instance, minor changes in the way mitigation is provided that do not alter the amount or effectiveness of mitigation nor the amount of take may not require public review. With regard to the Environmental Resource Center's response, the Service believes this commentor is suggesting that newly listed species should be granted additional protection, where necessary, to ensure they are adequately addressed. Prior to adding a newly listed species to the permit, the Service would complete a Section 7 consultation. Depending on the outcome of that consultation, and other responsibilities of the Services, additional conditions may be necessary in order for that species to be added to the permit.

### 3. Adaptive-Management Techniques

**Summary:** The USEPA commented that more information was needed concerning proposed adaptive-management techniques and programmatic monitoring. WDFW, Point No Point Treaty Council, and the City of Port Angeles asked if there is a mechanism to incorporate new research into current practices. Washington DOE commented that Alternative B would be adequate if an adaptive-management techique mechanism is in place. The Squaxin Island Tribe, NWIFC, Whidbey and Black Hills Audubon, Sierra Club Cascade Chapter, Puget Sound Chapter of the Society for Conservation Biology, and three individuals commented that the HCP should require incorporation of new information from monitoring into management practices. The Wildlife Society mentioned the need for credible monitoring. Tahoma Audubon Society suggested establishing a Scientific Advisory Board to review and implement research findings.

**Response:** The HCP includes provisions for adaptive management in a number of areas that are defined in the Implementation Agreement. The riparian management strategy provides specific mechanisms that would include Service participation in developing site-specific treatments, input into the monitoring that would be used as feedback for adaptive-management purposes, and objectives to be met as mitigation. The northern spotted owl habitat definitions would also be subject to adaptive management and would be updated as new information became available.

## K. TERMINATION CLAUSE

**Summary:** The Hoh Tribe and NWIFC expressed similar comments regarding the possible need for DNR to continue complying with the HCP to adequately mitigate for past incidental take, should DNR terminate early. NWIFC and one individual commented that the language does not clearly define additional mitigation requirements in the event of early termination as described in the IA. Washington State Association of Counties supports the 30-day opt-out provision. Seven individuals and WEC, Washington Wilderness Coalition, and another group wrote that the terms should apply equally to both parties. Green Crow wrote that post-termination mitigation requirements would be so costly that termination is not a viable possibility. Several individuals criticized the ability of DNR to terminate on 30-days notice.

**Response:** Section 27.0 of the IA provides for potential mitigation in the event of termination. As to those comments regarding perceived unfairness of the terms of the agreement, as discussed above, the IA was prepared by DNR and published with the HCP without review and revision by the Services. Negotiation of the underlying agreement has resulted in a redraft of the IA. At this time, it is premature to predict the cost of any continuing mitigation requirement that might be incurred by DNR if it terminates early; there is not a basis for making any such prediction.

## IX. RELATIONSHIPS TO OTHER LAND MANAGEMENT

**Summary:** WDFW requested that DNR consider WDFW ownerships similar to Federal designations (Congressional Reserves, LSRs, MLSRs, AMAs) where spotted owls are targeted in WDFW land-management plans. At the Seattle public hearing, an individual representing WEC discussed three reasons why it is inappropriate to compare DNR's HCP with private landowners' HCPs: (1) DNR can not sacrifice future income for present income, private landowners can; (2) DNR manages a much larger area than any private land owner and therefore has a greater responsibility to ensure that cumulative effects are not riskier to species; and, (3) DNR has a responsibility to be on the "cutting edge" of scientific forestry. The Washington State Association of Counties provided a preliminary determination that the draft HCP was compatible with local planning goals and objectives. The conservation group American Rivers stated their concern that implementation of the HCP would affect the success of their watershed restoration efforts and requested larger riparian buffers. One individual noted the committments of the HCP, when added to the current regulations of the Olympic National Park, Olympic National Forest, Coastal Marine Sanctuary, Scenic Coastal Corridor, and the Proposed Straits Marine Sanctuary, would over-regulate the residents of the Olympic Peninsula. Another individual asked DNR not to consider bio-region approaches; adding adjacent state lands to federal no-management lands only exacerbates the problems of fire, disease, pest, and economic loss. One individual remarked how flying over or driving through Washington illustrated the amount of timber harvest and lack of replanting across the landscape. One commentor expressed his belief that DNR-managed lands should be managed to provide ecological protection for water, fish, recreation, and wildlife since private lands cannot or will not provide them. Another individual felt that in order to influence private landowners to propose HCPs of their own, DNR's HCP should include stronger mitigation measures and eventually serve as a model plan.

**Response:** WDFW does not maintain control over the surface rights on all their lands. The timber rights to much of the lands in question are held by private parties and, as such, no gaurantee of continued maintenance for owls is provided. DNR may be different than other nonfederal entities, but they clearly are a nonfederal entity and are appropriately treated as such in regard to the proposed HCP. The Service and DNR acknowledge the preliminary determination made by the Washington State Association of Counties. The Service is not familiar with the American Rivers' watershed restoration project, but it believes DNR's HCP riparian management measures should significantly contribute to the restoration of healthy aquatic and riparian systems. Regarding over-regulation on the Olympic Peninsula, the Services note that DNR has voluntarily applied for an ITP in an effort to reduce the regulatory burden associated with current and future listed species and associated constraints on management. The HCP should provide DNR with greater latitude in management of its resources. Additionally, few of the lands covered by the HCP will be unavailable for management. DNR maintains the ability to manage its lands in response to the occurrence or threat of such catastrophic events. The Service agrees that the Washington landscape has been heavily impacted by logging. However, in most places, it is not a result of lack of replanting. Replanting is mandated by State regulations, has been a common practice for a number of years and the potential for natural reforestation is very high. Some areas not properly replanted did revert to alder as a result of past harvest actions. The major factor is the length of time required for a clear-cut to develop into a mature stand of conifer. The Service also notes the difficulty in detecting replanting attempts from an airplane or car. The Service agrees that DNR has a responsibility to protect the natural resources listed by the commentor; however, the Service also believes this is a responsibility of other nonfederal landowners.

## A. RELATIONSHIP TO MANAGEMENT ON FEDERAL LANDS

**Summary:** The Tulalip Tribes commented DNR should not rely on federal lands and management practices to protect spotted owls and other species. Skamania County inquired if they can receive HCP "credit" for timber land transferred to the U.S. Government under the Columbia River Gorge National Scenic Area Act. The Port of Port Angeles noted that past harvest limits were arbitrarily excessive, but if DNR were to consider the owl sites on federal lands, DNR could increase harvest levels over time. Bogle & Gates (a consultant to Washington State University) commented that DNR is not compelled to provide habitat because the habitat on federal lands has not yet reached its maximum potential. The Puget Sound Chapter of the Society for Conservation Biology noted DNR could better arrange potential owl habitat to support populations on federal lands by reducing the edge-to-area ratio. The Northwest Biodiversity Center commented that DNR has the responsibility of assuring the survival of many invertebrates because DNR-managed lands are located at relatively low elevations (compared to U.S. Forest Service or National Park forest lands), forest invertebrate faunas typically are more diverse in the lowlands, and a much smaller percentage of late successional forest remains at low elevations. NCASI questioned the assumption that having combined federal/state owl cluster areas with more than 25 pairs would provide more assurance against extinction than supporting owl clusters with 5-10 pairs. Two individuals commented that the passage of the Timber Salvage Rider increased DNR's responsibilities to preserve spotted owl habitat. One individual stated federal lands are enough for habitat protection and DNR-managed lands are not needed for habitat

protection. Conversely, another individual stated DNR's HCP should stand on it own merits and not rely on federal lands. A conservation biology student noted that connectivity to link similar habitat types on federal and private lands is essential.

**Response:** The Service notes, from a biological standpoint, that ownership matters less than whether the appropriate level of conservation is provided. Where sufficient conservation is provided on federal lands, it may not be required on nonfederal lands. Unfortunately, this is seldom the case. Even under the President's Northwest Forest Plan, many areas designated as Late Successional Reserve have been heavily impacted by past logging. Some LSRs will take decades to recover. Much of the federal land occurs at high elevations and, therefore, cannot substitute for the lower-elevation nonfederal habitats.

The focus of DNR's owl strategy is to support the President's Northwest Forest Plan's effort to conserve owls. The intent is to focus conservation where it is both most needed and most effective so as to derive the most conservation benefit with the least impact to DNR's trustees. Regarding the comment from Bogle & Gates (a consultant to Washington State University), the Service notes that this is the very reason the nonfederal lands are needed until federal habitats can be provided in sufficient amount. The owl strategy of maintaining 500-acre patches within a landscape providing 50 percent of the land as foraging habitat was designed specifically to reduce the effects of fragmentation. At landscape levels of 50 percent or more, patches tend to become larger and more connected (Lehmkuhl and Raphael 1993). Most available scientific literature suggests that owl clusters of 20 or more pairs are needed to support viable populations.

While several timber sales have been authorized by Section 2001 of the 1995 Rescissions Act (P.L. 104-19), the Services do not believe that the biological integrity of the President's Northwest Forest Plan has been significantly compromised as a result. The President's Northwest Forest Plan calls for an extensive system of Late-Successional Reserves, protection of riparian reserves, the maintenance of dispersal habitat throughout federal lands, and a monitoring program aimed at ensuring the effectiveness and validity of the plan.

Timber sales harvested pursuant to P.L. 104-19 are not expected to seriously affect the role of the President's Northwest Forest Plan as the foundation for conserving late-successional forest species. The majority of the timber sales released by Section 2001(k) of P.L. 104-19 were located in Oregon. Most of the 2001(k) sales that occurred in Washington were previously consulted on under the Endangered Species Act for spotted owls and, from the owl's perspective, were considered harvested when the Service completed Section 7 consultation for spotted owls under the President's Northwest Forest Plan. Therefore, harvest of the 2001(k) sales in Washington has caused few impacts to northern spotted owls that were not previously considered by the Service.

HCPs are most functional when they complement the other conservation efforts being conducted. The President's Northwest Forest Plan is the foundation upon which many other plans have been built. It is impossible for other land-management plans, including DNR's, to stand on their own merit. If federal lands no longer provided conservation

benefits for many species, such as the northern spotted owl, DNR-managed lands could not prevent the extinction of the owl. However, this does not mean that many DNR-managed lands are not indispensible for the continued maintenance of owl clusters. The Service agrees with the comment regarding the need for connectivity.

### B. FEDERAL LANDS TAKE BURDEN

**Summary:** The SDS Lumber Company discussed their findings that the amount of habitat on federal lands has been underestimated and that a proper analysis of federal lands should be completed prior to determining the level of protection on nonfederal lands.

**Response:** The Service notes that it has received similar comments specific to the Klickitat region in other areas. While in some places habitat amounts may be underestimated, in others they are overestimated. Much existing habitat will also remain or become unusable due to its isolated location on the landscape. The Service is carefully assessing the necessary contributions of habitat on nonfederal lands across the state.

### C. LANDSCAPE-ASSESSMENT PROCESSES (WSA, BASELINES, THRESHOLDS)

**Summary:** Washington DOE expressed their intent to work with DNR to develop TMDL priorities for impaired streams along the coastal area of the OESF.

**Response:** For the purposes of simplifying the analysis, two assumptions were used by DNR in the HCP to calculate the distribution of salmonids within six planning units. These general assumptions are appropriate, given the purpose of the analysis; the results are presented in Tables III.11, 12, and 13 of the draft HCP. The stated intention was to display the magnitude of the potential impact that DNR forest management may have on salmonids. Other assumptions would not likely change the overall percentages. The HCP is a process which addresses many of the same concerns as the TMDL process under the Clean Water Act. The HCP is not designed to provide exemption from the Clean Water Act; however, the Services believe HCPs in general provide an excellent foundation upon which to build. In most cases, TMDL concerns should be able to be resolved with a minimum of additional effort. The Service appreciates the intent of Washington DOE.

## X. THIRD-PARTY INVOLVEMENT

### A. TREATY RIGHTS AND THE FEDERAL TRUST RESPONSIBILITY

**Summary:** The Muckleshoot Indian Tribe, NWIFC, Point No Point Treaty Council, Squaxin Island Tribe, Tulalip Tribes, and theYakama Indian Nation all provided comments on the federal government's Trust Responsibility to Indian Tribes regarding certain resources. Similar comments were provided by each of the commentors regarding the responsibility of the federal government to consider the effects of any proposal on resources to which the Tribes have certain rights preserved in treaty. Individually, the Tribes and NWIFC asserted that because their rights regarding resources such as salmon are preserved by Treaty rights, and since the proposed action may affect the amount of such resources available to the Tribes, ESA Section 10 permit issuance criteria are superseded by treaty rights. In this regard, the Squaxin Island Tribe wrote that their comments were being provided per their treaty rights,

not in consideration of the ESA. The Squaxin Island Tribe wrote that the HCP must protect treaty resources. Point No Point Treaty Council wrote that DNR also has a duty to uphold the treaty-protected rights of the Tribes. The Muckleshoot Indian Tribe and NWIFC wrote that the EIS must consider and analyze the effects of the HCP on treaty resources. The Tulalip Tribes requested documentation that the HCP will be consistent with the general trust responsibilities to the Tribes as described in Secretarial Order No 3175, issued by the Secretary of the Interior.

**Response:** The Services acknowledge the government's Trust Responsibility to the Tribes regarding treaty-protected resources that are affected by the proposed action. The Services have considered the effects of the proposed action on all species addressed in the HCP. Included in the comparison of effects to those species is the comparative analysis of effects to those species that are also covered by treaty rights. The analyses of these species/resources of concern to the tribes, therefore, appear in Chapter 4, Sections 4.2, 4.3, 4.4, 4.5, 4.8, 4.9 and 4.11 of the DEIS.

The Services believe that the proposed HCP would increase the overall amount of protection these resources would receive compared to proceeding under present Forest Practices Rules, as would occur in the absence of implementing the proposed HCP. For example, the proposed HCP provides for larger buffers in areas that influence factors that contribute to fully functioning riparian areas and, hence, fish habitat. Again, these areas get much greater protection under the proposed action than the protection they would receive without the HCP. Current state regulations would provide smaller buffers on fish-bearing streams and little if any buffering of perennial or intermittent streams. Furthermore, the measures proposed under the HCP that would have beneficial effects on fish habitat quality would begin upon approval of the HCP, rather than waiting until, such time as federal regulations are promulgated in response to a listing decision.

Nothing in the proposed HCP, IA, or ITP is intended to limit the Services' responsibilities to Native Americans. Consistent with Secretarial Order No. 3175, dated November 8, 1993, and the President's May 4, 1994 memorandum regarding Government-to-Government Relations with Native American Tribal Governments, the Services have consulted, and are continuing to consult, with the affected Tribes regarding this issue.

The Services acknowledge, but disagree with, the comment made by some Tribal reviewers and their representatives that the responsibilities of the federal government owed to Indian Tribes under the federal Trust Doctrine supersede Section 10 issuance criteria. The HCP process and the federal government's trust responsibilities to the Tribes are compatible. Although an ITP authorizes take, an HCP would not be approved that does not adequately minimize and mitigate the effects of the potential take. Accordingly, and as mentioned above, the effects analysis concerning the trust resources mentioned has been conducted, and the Services believe, based on that analysis, that the resources would be beneficially affected. The Services have discussed their rationale for this impression, with the interested Tribes and their representatives at the June 12, 1996 consultation that occurred at NWIFC. The Services are obligated to document certain findings when their actions are negatively affecting Treaty rights. In this instance, the Services' action is expected to result in improved conditions for salmon and is not expected to negatively affect this Treaty resource.

## B. TRUST RESPONSIBILITY TO TRIBES (in section 3.3 only)

## XI. TRUST BENEFICIARIES

**Summary:** A state representative, the Squaxin Island Tribe, the Yakama Indian Nation, Bogle & Gates (a consultant to Washington State University), a Clallam County commissioner, a Metropolitan King County Council member, a Skamania County elected official, the Washington State Association of Counties, the City of Port Angeles, the Washington State office of the National Audubon Society, the Washington State chapter of the League of Women Voters, WEC, The Mountaineers, the Northwest Forestry Association, the Washington Contract Loggers Association, one local environmental organization, a lumber company, and 24 individuals made general comments pertaining to trust beneficiaries and DNR's fiduciary responsibilities.

Seven commentors supported the conservation efforts of the HCP, saying: management should simultaneously benefit the trust beneficiaries and wildlife; the HCP seems to provide predictability and sustainability in revenues; the HCP would double one county's income; DNR-managed forests as a funding source are the best way to safeguard the environment; undivided loyalty to trust beneficiaries does not excuse the state from following the law; and the HCP is the only course that complies with the trust mandate. Thirteen commentors wanted more conservation, with comments that included: (1) Omitting east-side aquatic resources will hinder DNR's ability to meet trust obligations; (2) Find other alternatives to funding schools; (3) Conservation should take precedence; (4) Don't destroy the forests to fund schools; (5) It is short-sighted to maximize short-term revenue, which would bring production down eventually, thereby violating the trust mandate; (6) Conscientious management will ensure productivity for the trusts; (7) Trust obligation is not limited to the current generation; (8) The trust mandate should not be misinterpreted too narrowly and in a short-term context; (9) Loss of a healthy ecosystem would lead to a decline in DNR's ability to provide funding to state schools; and, (10) DNR-managed lands are not for special interest groups but to support all equally, benefitting wildlife as well as beneficiaries. Five commentors wanted less conservation, with comments that included: (1) There are no roadblocks to timber management; (2) Wildlife conservation should not subjugate legislated objectives; (3) The HCP is a grave injustice to the beneficiaries; (4) The HCP fails to meet the trust mandate and the "paramount duty" provision of state law; (5) The only job of trust lands is to produce income; and, (6) The HCP emphasizes recovery of endangered species over trust responsibilities.

Commentors raised several concerns, including: (1) Wanting assurance that the county assets are managed in the best interests of the county citizens; (2) Suggesting each county should be treated as a separate trust; (3) DNR has a wider public interest than just being responsible to the beneficiaries; (4) Public assets of natural resources cannot be obliterated to benefit trusts; (5) Manage for both wildlife and the trusts; (6) The trusts can benefit from wise stewardship; (7) Disappointment that the University of Washington is opposed; (8) No non-sustainable short-term plans; and, (9) Consider what is best for the trusts. One commentor called for additional economic analysis and provided examples to consider. Four commentors called for other sources of support for the beneficiaries. Questions raised by commentors included: Are

Alternatives B and C too expensive? and, Would the Board of Natural Resources be part of any changes?

**Response:** DNR's HCP is expected to increase certainty, stability, and flexibility in trust land management and conservation of wildlife habitat by providing greater certainty regarding federal wildlife regulations, greater stability in harvest levels and resulting revenues, and greater flexibility in operations. The section titled Trust Duties in Chapter II of the draft HCP provides more detail on DNR's trust mandate and how the HCP would allow the department to better meet its trust responsibilities. Finding other funding sources for the trust beneficiaries is beyond the scope of this project. The Board of Natural Resources will be involved in changes to the HCP from the draft to the final. If the HCP is approved and adopted, the Board would remain involved in the implementation process at a policy level, according to their legislated responsibilities. DNR does not believe Alternative B to be expensive, given today's costs of owl and murrelet surveys. Additionally, Alternative B will reduce the risk of violating the Endangered Species Act and will provide protections if additional species are listed in the future.

## A. MAXIMUM BENEFIT FOR TRUST

**Summary:** The Squaxin Island Tribe, the Washington State Association of Counties, the Port of Port Angeles, the Washington Hardwoods Commission, WEC, the Northwest Forestry Association, three timber companies, one local forest commodity organization, and two individuals commented on the maximum benefit for the trusts.

Three commentors called for more conservation, saying (in essence): (1) It would be cheaper to have no harvest in the areas designated as minimal harvest in the riparian management zone; (2) It is short-sighted and irresponsible to advocate maximizing revenue; and, (3) Trust lands should be managed to benefit equally present and long-term recipients of proceeds. Four commentors called for less conservation, with two saying riparian management zones should maximize revenues to beneficiaries. One commentor said the goal for spotted owls in the OESF is greater than federal requirements, which violates trust responsibilities, and another commentor said the difference between current practice and what is proposed for riparian areas has a direct bearing on the stumpage value available to the trusts. Five commentors raised concerns such as: (1) Maximum income should be balanced between long and short term; (2) The certainty the HCP offers is that trust revenue will be lost; (3) DNR is mandated to produce the most substantial support possible over the long term (two commentors); and, (4) Trust beneficiaries should have public interest at heart enough to not take positions just for short-term profit. One commentor stated that although DNR's mandate is to maximize revenue to trust beneficiaries and not to protect the hardwoods industry, hardwoods represent sizeable income to the beneficiaries.

**Response:** Chapters I and II of the draft HCP discuss DNR's trust responsibilities as trust manager, including a discussion of providing the most substantial support possible over the long term, undivided loyalty, prudent management, as well as the need to follow laws that have general applicability, including the Endangered Species Act.

## B. OBLIGATION TO FUTURE GENERATIONS

**Summary:** The Port of Port Angeles, WEC, the Washington Wilderness Coalition, the Washington chapter of the League of Women Voters, three local environmental organizations, an independent forester, another local organization, and 12 individuals commented on the obligation to future generations.

One commentor supported the conservation plan, saying it benefits long-term productivity. Eight commentors call for more conservation, saying: (1) DNR cannot satisfy its fiduciary responsibilities unless it manages the lands in ways that maintain healthy, productive forests for future beneficiaries; (2) Our children will judge whether we conserved enough today; (3) Endangered species need to be preserved for future generations; (4) DNR is obligated to present and future generations to protect biodiversity and ecological functions; (5) DNR and the Board of Natural Resources need to remember that trust obligations are for not only the present, but the future as well; (6) Managing in a more ecologically sound manner will allow DNR to better fulfill its legal responsibilities to present and future beneficiaries (two commentors); and, (7) A perpetual trust demands intergenerational equity. Concerns raised by commentors include: (1) If future trust recipients are to benefit, experimentation and scientific data must be used to the benefit and not detriment of the trust; (2) A 100-year commitment does not manage the lands for future generations; (3) Revenue must be assured in perpetuity; (4) The long-term sustainability of trust lands are at stake; (5) Maintain productive, hardy forests into the future; (6) Need to put more emphasis on future uses, not just short-term immediate use; and, (7) will the HCP ensure hardwood forest productivity for future generations? Two commentors said the lands are managed for present and future beneficiaries. Another said not to favor either present or future beneficiaries. A fourth commentor said the trust mandate is prudent, ecological management to preserve the trust for future beneficiaries. A fifth commentor said the trust lands were established to provide revenue for education of children. One commentor was pleased that the HCP cover letter acknowledged the necessity of protecting the long-term health of the forest and the ecosystem in order to preserve the productivity of the trusts in perpetuity.

**Response:** The HCP will allow increased flexibility in management operations and will keep options open for future sources of income from trust lands. To preserve future options, DNR must avoid actions that are likely to have a negative impact on long-term productivity of trust lands. These were important considerations for DNR as a manager of perpetual trusts. Implementation of the HCP, no matter how long the commitment, will allow for changes as new information is learned that can benefit future generations.

## C. PRUDENT PERSON DOCTRINE

**Summary:** A state representative, a Metropolitan King County Council member, a Skamania County elected official, the City of Port Angeles, the Port of Port Angeles, the Washington chapter of the National Audubon Society, WEC, The Mountaineers, and nine individuals provided comments on the prudent person doctrine.

Four commentors supported the conservation plan, saying: (1) The HCP should reduce the risk for future federal listings of endangered and threatened species; (2) The HCP provides certainty to the trust land managers while benefiting the public by protecting water, fish, and wildlife; and, (3) The stated purposes and goals of the HCP were agreed to. Eight

commentors wanted more conservation, saying: (1) The prudent person doctrine includes long-term preservation of the state's forest ecosystem and endangered species (four commentors); (2) Public resources, including water, fish, and wildlife, should be protected; (3) It is not prudent to clearcut 96 percent of the forest; (4) DNR is obliged to manage the trusts in compliance with the law, including the Endangered Species Act; and, (5) The prudent manager provides additional protection to assets such as wildlife. One commentor wanted less conservation, saying the trust estate needs to be preserved. Concerns raised by commentors included: (1) The state should carefully consider the impacts of a 100-year contract with the federal government; (2) Would a prudent private trustee blend all separate trust assets into one pool and still fulfill fiduciary obligations to each of the various trust beneficiaries? (3) Public resources including water, fish, and wildlife, must be protected; (4) All applicable environmental laws must be followed; (5) In financial terms, the principal (trust lands) must be prudently managed to continue to produce interest indefinitely; and, (6) the trust mandate calls for prudent, ecological management to preserve the trust for future beneficiaries.

**Response:** The section titled Trust Duties in Chapter II of the draft HCP discusses the prudent person doctrine of trust land management and how the HCP is expected to allow DNR to better fulfill its duties as a prudent trust manager in several ways. Among these are providing greater certainty and stability in complying with the Endangered Species Act while producing substantial long-term income for trust beneficiaries, allowing more predictable timber sales levels, ensuring future productivity of trust lands, keeping options open for future sources of income from trust lands, increasing management flexibility, and reducing the risk of loss to the trusts.

## D. USE OF REGULATORY MINIMUMS

**Summary:** The Washington State Association of Counties stated that state and federal laws and policies should be met, but not exceeded.

**Response:** The HCP is an alternative method of complying with the Endangered Species Act. In addition, issuance of the ITP will reduce the risk of non-compliance.

## E. OTHER DNR AGREEMENTS

**Summary:** The Muckleshoot Indian Tribe, a Clallam County commissioner, and one individual commented on other DNR agreements. One commentor said the HCP lacks discussion of court-mandated obligations to the Treaty Tribes. Another commentor said that since the Hoh Agreement was signed in 1993, there have been no timber sales (other than thinning and salvage) in the Hoh-Clearwater block. A third commentor said DNR should no longer sell timber to companies that clearcut.

**Response:** DNR is required to adhere to state and federal laws, including laws regarding Tribal rights. This requirement will continue under the HCP. DNR's authority to enter into agreements to further the interests of the trusts is important to meeting site-specific management needs.

## F. PROJECTED HARVEST & REVENUE

**Summary:** One state representative, Bogle & Gates (a consultant to Washington State University), a Clallam County commissioner, a Stevens County commissioner, the Washington State Association of Counties, the City of Port Angeles, the Port of Port Angeles, the Washington Hardwoods Commission, the Northwest Forestry Association, the Washington Contract Loggers Association, two wood products companies, an independent forester, a local organization, and seven individuals commented on projected harvest and revenue calculations.

One commentor wanted more conservation, saying the degree of cutting could not be sustained. Another commentor wrote the DEIS lacks cost comparisons. Three said the analysis was incomplete, calling for analysis to support the projected harvest levels, and the costs were underestimated while the revenues were overestimated. Several commentors made requests for additional information, and one commentor suggested another comparison study. Two commentors did not believe the harvest projections, and one said the Olympic Experimental State Forest riparian strategies were not included. Concerns raised by commentors included: (1) meeting the projected harvest levels; (2) the necessity for more information and analysis; (3) the inadequacy of the economic analysis; and (4) the need for better analysis of impacts on hardwoods.

**Response:** The comparison of projected harvest levels and sales revenues under the HCP and the No Action alternative was outside the scope of the environmental review process. However, DNR's methods for making this comparison were reviewed by Rebecca Tuttle Baldwin, an outside independent expert in resource economics and environmental analysis, for Foster Wheeler Environmental corporation. She found the assumptions and methodology to be appropriate. A sensitivity analysis was subsequently done by these entities to provide additional information for the Board of Natural Resources, the policy-making body that will ultimately decide whether the HCP is in the interests of the trusts. In addition, Foster Wheeler performed a decision analysis that looked at the likely occurrence of future regulatory constraints that would govern DNR forest land management.

## XII. PUBLIC INVOLVEMENT

**Summary:** Five organizations and five individuals provided comments on public involvement. NWIFC has concerns that the monitoring plan does not require review or consultation by the Tribes, public or other stakeholders. A general request was made that Tribal staff be involved in development of any implementation or monitoring plan. NWIFC commented that there is no provision in the IA to provide additional public comment and review should additional species be included in the HCP. The Squaxin Tribe would like clarification of the implementation proceedings of this plan with the Tribes. GBA Forestry, Inc. asked for a formal agreement between DNR and Washington Hardwoods Commission to allow the commission to participate in future policy decisions affecting the hardwood resource. Washington Hardwoods Commission also requested the ability to provide input on implementation of the HCP. Three individuals asserted that the public should have the right to comment on any major amendments. Another person asked for public comment and peer review of the as-yet incomplete conservation plan for murrelets. One person asked for another public hearing on the HCP after the FEIS is complete, but before it is submitted for final

approval. Metropolitan King County Council thanked DNR for additional clarifications, information, and an ongoing forum for discussion.

**Response:** Public-involvement concerns regarding coordination of implementation with the Tribes will be taken up by DNR with the Tribes directly. Additionally, the Services will continue to discuss implementation with the Tribes in compliance with the Services' Trust responsibilities to the Tribes. As mentioned above, all amendments to the permit and HCP will be subject to the appropriate level of public review and involvement. The matter of subsequent agreements between DNR and private entities seeking access to policy making is outside the scope of this action and should be taken up with DNR directly. Public hearings following release of the FEIS are not required. Any future peer review will be conducted where required and according to the Services' policy on peer review. Compliments regarding the public process conducted so far, are noted.

## A. PUBLIC INPUT

**Summary:** The Squaxin Island Tribe, NWIFC, the Washington Hardwoods Commission, the Society for Conservation Biology, The Mountaineers, an independent forester, and three individuals commented on public input.

Seven commentors wanted more conservation, saying: (1) The IA should have a provision for public input on adding previously unlisted species; (2) A science advisory board should participate in periodic plan reviews to provide public access to review of monitoring and research; (3) The long-term marbled murrelet conservation strategy should go through the NEPA and/or SEPA process, including a 60-day comment period; and, (4) The public should be able to comment on future amendments to the HCP (two commentors) involving more than $500,000 in 1996 dollars in timber or nontimber values (one commentor). Concerns raised by commentors included: (1) The long-term marbled murrelet conservation strategy should go through public and/or peer review; (2) A formal agreement should establish a mechanism for the Washington Hardwoods Commission to participate; (3) The hardwoods industry questioned whether it will have input into policy and implementation; and (4) There should be another public hearing before the legislators are involved.

**Response:** Amendments will go through NEPA review, as well as SEPA review, when and if appropriate. The issue at the time will determine the level of NEPA/SEPA response and public review. However, DNR and the Services will continue their informal workings with all stakeholders. The Services will analyze all amendments beyond minor corrections and edits to determine the need for, and the appropriate level of, NEPA compliance.

## B. COORDINATION

### 1. Tribes

**Summary:** The Hoh Indian Tribe, the Lower Elwha S'Klallam Tribe, the Muckleshoot Indian Tribe, the Point No Point Treaty Council, the Squaxin Island Tribe, the Tulalip Tribes, and NWIFC provided comments on coordination with the Tribes.

Five commentors wanted more conservation, saying: (1) the Tribes expect to be consulted and participate in implementation of the HCP (four commentors), including research

proposals impacting Treaty rights and the site-specific riparian management process; (2) The Squaxin Island Tribe cannot fully support the HCP without a formal understanding as to the relationship between the Tribe and DNR; and (3) the Tulalip Tribes requested government-to-government meetings with the Services to address policy and process issues, and with the Services and DNR to resolve technical issues. Concerns raised included involvement in implementation and status reviews of the plan (two commentors) and USFWS working with the Muckleshoot Tribe to develop an implementation plan before issuing the FEIS. The Hoh Tribe stated that it understands and appreciates that its agreements with DNR will be carried out under the HCP.

**Response:** The Services will continue to coordinate with the Tribes according to the federal trust relationship previously discussed under trust responsibilities to Tribes. DNR is committed to the intent of the Washington State Centennial Accord and the department's tribal policy to consider the joint needs of the Tribes, as well as the responsibilities of the state to provide for the trust beneficiaries. DNR and the Services will also continue to participate in the long-standing Timber, Fish, and Wildlife process with the Tribes. In addition, DNR's Regions will be administering the HCP at the local level, which will allow the Tribes to work directly with the local managers.

### 2. Adjacent Land Manager Coordination

**Summary:** NCASI recommended coordinating research projects for the spotted owl in the OESF with projects across the owl's geographic range.

**Response:** DNR is involved with others in ongoing cooperative research projects. The HCP has the potential for joint research with others, including the Olympic Natural Resource Center. However, this is not a commitment or requirement of the HCP. DNR will encourage the publication of research results from projects undertaken in the OESF or elsewhere on state trust lands covered by the HCP.

## XIII. NEPA/SEPA COMMENTS

**Summary:** The USEPA commented the DEIS represents a commendable effort. The Hoh Tribe asked if SEPA would still prevail on state lands. Bogle & Gates (a consultant to Washington State University) asked if DNR would initiate the EIS process for each new plan and guideline. The Black Hills and Tahoma Audubon chapters, Northwest Ecosystem Alliance, and one individual commented NEPA should be repeated when DNR completes its long-term murrelet plan.

**Response:** The Services and DNR thank those commentors that complimented the environmental document. None of the document comprising the application affect DNR's continuing legal requirement to comply with SEPA. The DEIS was prepared to serve simultaneously as an NEPA document for the proposed action of issuing an ITP and as a programmatic SEPA document for the Board of Natural Resources proposed action of adopting an HCP to support the issuance of an ITP. An appropriate level of analysis, review, and comment will occur for all major amendments to the proposed action.

## A. RANGE OF ALTERNATIVES

**Summary:** Washington DOE and five individuals commented either Alternative B or C was acceptable. WDOE encouraged adoption of Alternative C. Two individuals asserted that modifications for greater species protection would be necessary for Alternative B to be acceptable. The Point No Point Treaty Council, Squaxin Island Tribe, Yakama Indian Nation, Rivers Council of Washington, Sierra Club Cascade Chapter, Washington Wilderness Coalition, The Mountaineers, Skagit and Whidbey Audubon chapters, and four other individuals supported Alternative C. One individual would support C only if incidental take is not allowed. Nine commentors supported Alternative A, and two individuals supported Alternative B. NWIFC commented that all alternatives should include the entire range of the northern spotted owl and an alternative proposing a transition from a zoned to an unzoned management strategy in the OESF should have been analyzed. Bogle & Gates (a consultant to Washington State University) commented at least three of the alternatives not analyzed in detail were reasonable and should have been analyzed in detail. Green Crow, a forest products company, and another individual suggested DNR use the Forest Resources Plan as an alternative. Another individual asked that all three alternatives be rejected and a new alternative presented which is in compliance with the ESA. One individual requested a comparison between Alternatives B and C. Another commentor wrote that current Forest Practice Rules and Regulations should have been analyzed as an alternative.

**Response:** The Services note all comments suggesting the choice of a preferred alternative. The Services have not identified a preferred alternative at this time. As for comments suggesting that all alternatives should address the entire range of the owl, as opposed to the presently analyzed plan area, please see responses in topics regarding the design of the plan area.

As for comments regarding the alternatives not analyzed in detail, the DEIS rigorously explores and objectively evaluates all reasonable alternatives and briefly discusses the reasons underlying the decision not to analyze certain alternatives in detail (40 CFR 1502.14 (a)). The Services are not required to analyze alternatives in detail that do not comport with the Purpose and Need stated in Chapter 1 of the DEIS. The Council on Environmental Quality (CEQ) has written, "[t]here is no need to disregard the Applicant's purposes and needs and the common sense realities of a given situation in the development of alternatives" (Federal Register, 48 FR 34263). Further, the Services adhere to the sentiments expressed by the court in Resident in Protest--I35 v. Dole, 583 F. Supp. 660-61 (D. Minn., 1984): "A reasonable alternative is one which would effectuate the purposes of the project. If an alternative does not implement the purposes of the project it certainly is not reasonable and no purpose is served by requiring a detailed discussion of its environmental effects since the alternative would never be adopted." Based on its analysis that certain alternatives considered would not effectuate the purpose and needs stated in the DEIS, DNR appropriately informed the Services it would not implement those alternatives if analyzed and selected. Using the common sense approach suggested in CEQ's guidance and in Residents, the Services and DNR eliminated certain alternatives from detailed analysis.

The suggestion that the Services analyze an alternative based on "splitting the difference" between the proposed HCP Alternative and the No Action alternative is an arbitrary suggestion in view of how the action alternatived were developed. The alternatives and HCP

prescriptions that were analyzed in detail were developed through reliance on current science and best available information applicable to habitat management in the context of commodity production. The Services must avoid arbitrariness in implementing the Section 10 process.

Aspects of the Forest Resource Plan that are currently a part of DNR management and operations under the present regime of regulations are incorporated into the description of the No Action alternative. The FPRs have been incorporated into the description of the No Action alternative to the extent that current agency forest practices guide current operations and management. However, as discussed elsewhere in this section, an alternative based entirely on implementing forest practices minimums would not have enabled issuance of the requested ITP.

All three alternatives considered "comply" with the ESA. The question of whether any of the Action proposals enables the Services to make the findings stated in ESA Section 10(a)(2)(B) has yet to be answered.

NEPA demands analysis of the "net" effects of an action proposal on the human environment. This assessment involves comparing the increment of effects between the various action proposals and the No Action alternative. As a result, the action proposals have not been compared to each other.

## B. REASONABLE ALTERNATIVES

**Summary:**,Bogle & Gates (a consultant to Washington State University) commented that DNR's definition of the No Action alternative implies that there are no other alternatives to an HCP. The Northwest Forestry Association commented that other alternatives to an HCP need to be developed and analyzed.

**Response:** Environmental documents prepared to analyze ITP issuance have generally described the No Action alternative the same way. Specifically, the No Action alternative represents the regulatory regime with which the applicant would comply in the absence of obtaining an ITP. Generally, for nonfederal forest land managers this means complying with state forestry regulations and complying with the ESA prohibition of the take of listed species. The No Action alternative presented in the DEIS is somewhat different in that DNR has been implementing its own Forest Resource Plan, rather than merely adhering to the prevailing regulatory regime. Accordingly, for DNR, "no action" has been taken to mean "no change" from the present mode of management. Since "no change" in the context of issuing an ITP comports with the definition of no action under NEPA implementing regulations and guidance, the Services utilized this definition of no action in the DEIS.

The Services respectfully disagree that the description of the No Action alternative implies that there are no alternatives to an HCP. DNR does not have to do an HCP as a means of compliance with the ESA. In the absence of acquiring an ITP and implementing an HCP, DNR could continue its present mode of operations. The No Action alternative description takes into account the regulatory environment under which DNR would have to operate without an ITP, nothing more.

## C. NO ACTION ALTERNATIVE

**Summary:** The Washington DOE recommended against selecting the No Action alternative because it does not adequately protect salmon habitat nor address amphibian needs. Bogle & Gates (a consultant to Washington State University) commented the DEIS prejudices decisionmakers against the No-Action alternative because it leads them to the conclusion that one of the action alternatives is the only reasonable choice for managing State land. Bogle & Gates also commented that the No Action alternative does not afford the trust any meaningful degree of certainty. Clallam County, Washington Hardwoods Commission, and Washington Forest Protection Association wrote that the presentation of the No Action alternative was inaccurate and/or did not present the correct baseline for analysis. The Sierra Club Cascade Chapter commented the NoAction alternative does not adequately provide for fish and wildlife, especially those requiring late successional forest conditions. One individual stated the No Action alternative represents a "known violation" of the ESA.

**Response:** The Services and DNR note Washington DOE's concern for the lack of protection for certain species in the No Action alternative. Regarding Bogle & Gates' comments, the DEIS fulfills a basic NEPA role by analyzing in detail the increment of effects to a wide range of resources between no action (not issuing an ITP, not implementing an HCP) and the two action alternatives. The document makes no assessment of the propriety of any choice for management of State lands. In fact, the Services have purposefully deferred identifying the preferred and environmentally preferred alternatives in the DEIS.

The Services acknowledge the commentor's assessment that the No Action alterative probably provides the state's land managers with the lowest degree of planning certainty of the proposals analyzed.

The No Action alternative provides the baseline NEPA demands for analysis of an HCP proposal. The action proposal is the issuance of the ITP. The No Action alternative, then, is not issuing an ITP. No HCP would be implemented and no take of listed species would be permitted. DNR would be subject to management restrictions for currently listed species and regulations promulgated after future species listings without the benefit of an agreement providing a mechanism for adding those species to the requested permit. DNR would be required to engage measures to avoid take of listed species.

The Services provisionally agree with the assessment that the No Action alternative does not adequately provide for fish and wildlife species dependent on late-successional forests. The Services are not certain what the commenter meant by a "known violation" of the ESA. The Services disagree that operating under no action would violate the ESA. As described above, and elaborated in the EIS, under the No Action alternative DNR would have to comply with individual species take prohibitions as well as other applicable forest practices rules and regulations.

## D. COMMENT PERIOD LENGTH

**Summary:** Skamania County commented the comment period was inadequate to review the DEIS, HCP, and IA. Skamania County reserved their ability to submit additional comments in the future. The Mountaineers, Wildlife Society, and Northwest Biodiversity Center, Merrill

& Ring and Northwest Forestry Association, and four individuals all suggested the period for review was too short.

**Response:** The HCP has been available for public review since March 1996. The DEIS was available for review for a 60-day period, exceeding the statutory review period length and comporting with Department of the Interior policy.

## E. ADEQUACY OF DOCUMENTS

**Summary:** The Hoh Tribe requested a comparison of the OESF proposal with current state policy. The Muckleshoot Indian Tribe requested the draft HCP and DEIS be evaluated in relation to SEPA to address site-specific issues and cumulative effects. The Tulalip Tribes stated the Tribes need more input in the DEIS. Point No Point Treaty Council asked that the DEIS evaluate treaty resources under each alternative. Clallam County Commissioner Phillip Kitchell wrote that a report by Lippke, Sessions, and Carey should be used to provide "accurate information" to the Board of Natural Resources . One commentor was impressed by the effort and thoroughness of the DEIS, another felt that the DEIS doesn't fully describe the impacts of the HCP. A third individual requested a clearer comparison of Alternatives B and C. Bogle & Gates (a consultant to Washington State University) wrote that the environmental document does not provide sufficient information to allow informed decision making by the responsible officials. Black Hills and National Audubon Societies, Rivers Council of Washington, and the Sierra Club Cascade Chapter suggested an enhanced all-species analysis. The Wildlife Society commented a population viability analysis for spotted owls affected by take is necessary. The Washington Hardwood Commission and GBA Forestry , Inc. stated that the impact to hardwood habitats and harvest rates needs to be clearly defined under each alternative.

**Response:** The No Action alternative describes that scenario in which DNR continues to operate without an ITP. The No Action alternative is intended to reflect DNR's present mode of operating. Therefore, the comparison of the OESF action proposal to the No Action alternative provides the comparison that the Hoh Tribe seeks.

The DEIS fulfills the Services' NEPA documentary responsibility as well as DNR's SEPA responsibility. Since the environmental documents are programmatic in scope, site-specific issues are not analyzed. On the other hand, cumulative effects of the proposed action (ITP issuance) are considered in the DEIS.

The issue of treaty resources is addressed under the topic heading Trust Responsibilities and Treaty Resources in this section of the FEIS. The Services caution readers that here, we are referring to the Trust Responsibility owed by the federal government to Indian Tribes regarding treaty resources.

The Services are unaware of whether the Board of Natural Resources has made use of the Lippke report. In evaluating the impacts of the proposed action on the human environment, the Services and DNR are constrained to make use of the environmental documents described in those statutes and therefore relied on the DEIS, as presented.

As for comparing Alternatives B and C, NEPA requires a presentation of net impacts of a proposed action. Net effects are described in the DEIS by comparing the action alternatives to the baseline of effects expected under the No Action alternative. Environmental documents typically compare a range of reasonable action alternatives to a no action alternative. This comparison was presented in the DEIS. Furthermore, the DEIS presents information that has been typically required for decision making by responsible officials on other HCP proposals for forested land in the Pacific Northwest.

The use of habitat-based associations to assess the effects of the proposed action on certain unlisted species follows the approach used in previous HCPs that address unlisted species. An in-depth analysis covering effects of permitting the take of owls based on jeopardy parameters (whether the proposal appreciably reduces the likelihood the species will survive and recover in the wild) is to be presented in the USFWS' Section 7 Biological Opinion. The harvest projections that were generated to conduct several of the analyses presented in the DEIS did not differentiate species.

## F. SUPPLEMENTAL EIS

**Summary:** Bogle & Gates (a consultant to Washington State University) asked whether future negotiations with federal agencies would require supplemental EISs. WEC commented that a Supplemental EIS (SEIS) should be prepared when the long-term murrelet plan is complete.

**Response:** The Services note that a SEIS shall be prepared if the agency makes substantial changes in the proposed action that are relevant to environmental concerns or there are significant new circumstances or information relevant to environmental concerns (40 CFR 1508.25). At this time, neither of these two criteria has been triggered, and no need for a SEIS has arisen to date. Negotiations regarding the HCP proposal have ensued following the receipt and review of public comment. The HCP has been finalized in accord with these discussions. Subsequently the FEIS was prepared in compliance with the agencies' responsibilities under NEPA and SEPA. As mentioned above, all major amendments will be subject to the appropriate level of analysis, review, and comment.

## G. SCIENTIFIC CREDIBILITY

**Summary:** Five organizations and two individuals provided comments on scientific credibility. The Muckleshoot Tribe commented that there is no technical basis for the separate recommendations for the OESF. NWIFC stated that much of the HCP lacks credibility. The Tulalip Tribes repeatedly questioned the scientific foundation for the technical issues on which they commented. Bogle & Gates (a consultant to Washington State University) commented that speculative, unfounded statements are not scientific and mislead the decision maker, especially regarding riparian and wetland management under the No Action alternative. WEC commented the HCP should be based on the best available science. One individual wrote the HCP is deceptive and self serving. Another individual commented the document contains numerous contradictions, distortions, and conclusions which disregard existing science.

**Response:** The OESF warrants a different approach than the other planning units because of its geologic, climatic, and experimental nature. The HCP's foundation in science began with

the creation of a science team and continued through discussion and incorporation of the best available scientific information. This approach was applied to each topic scrutinized by the Services and DNR technical staff.

### H. CUMULATIVE IMPACTS

**Summary:** WEC noted that because the HCP encompasses a large area, cumulative effects to species would be great if the HCP provides only marginal protection. WEC also wrote that, DNR, as a state agency, has a higher obligation to protect species than a private landowner. The Muckleshoot Indian Tribe wrote the analysis of salmonid impacts fails to consider impacts from other sources.

**Response:** NEPA requires the Services to analyze the cumulative effects of the proposed action. Cumulative effects are defined in NEPA regulations as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). The required analysis appears in Section 4.11 of the DEIS.

This proposal involves the issuance of a permit to allow take of species listed under the ESA. For such a permit to be issued, the applicant must propose a plan designed to adequately mitigate the effects of take. The present HCP is an example of such a plan. Mitigation is provided, not just for the species which might be taken but also for effects on many other aspects of the human environment. In this regard, the Services view implementing an adequate HCP as providing many beneficial effects, as opposed to adverse effects, on the human environment. Therefore, an HCP proponent makes little or no contribution to overall cumulative effects, especially when compared to other landowners in the vicinity that are managing to lower standards. The bottom line remains -- other landowners continue to make the same level of contribution to cumulative impacts, while the HCP proponent implements improved management, thus lowering overall cumulative effects compared to what might occur in the absence of the proposed HCP.

Concerning the assertion that DNR has a higher reponsibility to fish and wildlife conservation than other nonfederal landowners, no distinction is made in ESA Section 10 regarding the stature of the landowner when considering the criteria for permit issuance, and no such prejudice has been accorded DNR in the present process.

## XIV. APPROVAL/DISAPPROVAL

### A. SECTION 7 CONSULTATION

**Summary:** The Muckleshoot Indian Tribe stated that the HCP and DEIS are incomplete without a cumulative effects analysis that considers the relationship of DNR's HCP to other plans and actions for areas that are adjacent to DNR's HCP planning areas.

One individual expressed his belief that the Service should solicit public comments on draft biological opinions and provide public access to all documents used in all consultations. Another individual provided a detailed analysis of why the owl provisions of the draft HCP

violate section 7 of the ESA. He determined that: (1) The HCP did not use the best available scientific data; (2)The HCP and EIS did not accurately depict the "impact that would result from such taking"; (3)The HCP would appreciably reduce the likelihood of the survival and recovery of the species in the wild; (4) The HCP does not minimize or "to the maximum extent practicable" mitigate any and all impacts that may occur upon the endangered species and its critical habitat; and, (5) Other reasonable and prudent alternatives are available which would provide a greater benefit consistent with conserving the species or its critical habitat.

**Response:** This analysis will be conducted in the USFWS' Section 7 Biological Opinion for listed species. Future federal actions are not considered during Section 7 consultation. However, reasonably foreseeable federal actions are included in cumulative analyses conducted for NEPA purposes. A complete cumulative analysis was included in the DEIS.

The Services do not usually seek public input on draft biological opinions but do rely on professional judgement of its scientific experts. In addition, all documents and information used in the consultation are available to the public upon request. DNR utilized a science team composed of some of the most knowledgeable scientists in their fields and utilized their recommendations for a majority of the conservation strategies. The Services will utilize the best data available in conducting its consultation. The HCP did depict the impact that would result from such taking, but the Services will make an independant finding in this regard, as well as whether the taking would result in jeopardy. The Service notes that whether the take has been minimized and mitigated to the maximum extent practicable is a Section 10 finding and refers the reader to those responses. Similarly, the Service notes that an analysis of other alternatives is required as a component of an HCP and for NEPA purposes, but is not a Section 7 requirement unless necessary to avoid jeopardy.

### 1. Impact of Take (Also refer to Section 7 Consultation, above.)

**Summary:** WDFW proposed a take schedule to reduce the amount and impact of take of northern spotted owls. Several commentors made various assertions regarding the amount of take for owls; these varied from 81 to 187 sites.

**Response:** The Service will complete a thorough assessment of estimated take, as well as the impact of that take, for each listed species with the potential to be affected by permit issuance and HCP implementation. The Services agree that prioritizing owl sites in order of importance and scheduling take would be an effective manner to provide additional conservation at little or no cost to DNR and its trusts. The Services will continue to provide technical assistance in this regard throughout the first decade of implementation.

### 2. Critical Habitat

**Summary:** Washington State Representative Mark Schoesler, 9th District, asked for clarification of the ramifications of an HCP creating a federal nexus: Could this trigger consideration of critical habitat designations? One individual commented that because of uncertainty and lack of knowledge, more than the minimum amount of habitat necessary for species survival should be maintained for their benefit. The NWIFC stated that under the provisions of the unlisted species agreement there is no assurance that the management standards put into place by DNR pursuant to the HCP would be consistent with critical habitat designations for the newly listed species. This failure to require

amendment of management practices in light of new knowledge is especially significant when both DNR and regulatory agencies acknowledge a limited understanding of species' habitat needs. Bogle & Gates (a consultant to Washington State University) wrote that excluding critical habitat designation from the HCP area may prove unlawful. Bogle & Gates point to 16 U.S.C. § 1536(a)(4), which requires federal agencies to ensure that their actions do not result in destruction or adverse modification of critical habitat. It may prove very difficult to argue that any habitat modification under an HCP is not adverse. Consequently, subsequent exemptions of HCP lands from already designated critical habitat will be vulnerable to legal challenge. Bogle & Gates also note that the no adverse modification standard is more stringent than the jeopardy standard.

**Response:** The Service has designated critical habitat for owls and murrelets within western Washington. The adequacy of those designations was addressed at the time. For additional information regarding marbled murrelet critical habitat, refer to the May 24, 1996, Federal Register (61 FR 26225). For additional information regarding northern spotted owl critical habitat, refer to the January 15, 1992, Federal Register (57 FR 1796).

The HCP will be assessed in the Section 7 consultation for effects the HCP will have on critical habitat and critical habitat constituent elements. If the proposed HCP would result in adverse modification, the permit would not be issued and the HCP would not be implemented. However, such analysis will assess the value of habitats to be harvested or otherwise impacted as well as the conservation benefits to be derived from the HCP. Lastly, the NWIFC is correct. Once approved, the unlisted species agreement may result in a species being added to the permit based upon an HCP which is not consistent with the designation of critical habitat which might follow that future listing. However, the conservation benefits which may be derived from such unlisted species agreements may cumulatively preclude the need for future listing or designation of critical habitat. Designation of critical habitat can be based upon a number of factors which include threats to the subject habitat and economic impacts. Habitats provided under an HCP would be subject to a different (most likely lower) level of threat than other lands and might be precluded from designation from the outset.

### 3. Jeopardy Level

**Summary:** One individual commented that because of uncertainty and lack of knowledge, more than the minimum of habitat necessary for species survival should be maintained for their benefit. One commentor said the measurement standard for jeopardy should be clarified.

**Response:** The Services agree with the first commentor. Regarding the second comment, the jeopardy "standard" is clearly stated in the implementing regulations. It's applicability is more difficult to translate from a conceptual definition to specific levels of biological impact for a given species.

## B. SECTION 10 ISSUANCE CRITERIA

**Summary:** The Services received comments from two Tribal groups, three conservation organizations, and two individuals on issuance criteria. The Tulalip Tribes and Point No Point Treaty Council wrote that ITP issuance criteria are superseded by the Government's

Trust Doctrine related responsibilities regarding resources covered by treaty. The Northwest Ecosystem Alliance believed the HCP does not adequately protect listed or unlisted species and that all alternatives violate the ESA. The Washington Native Plant Society wrote that the HCP needs to consider plants in order to meet the requirement of the ESA, Section 10(a)(1)(b). The Mountaineers wrote the proposed HCP Alternative violates the ESA because it puts more than 40 percent of the known and projected spotted owl sites at risk. One commentor wrote the HCP was not in compliance with the ESA. Another individual commented recovery for threatened and endangered species is an issuance criteria.

**Response:** Incidental Take Issuance Criteria are stated in ESA Section 10(a)(2)(B) at 50 CFR 17.22(b)(2) and 50 CFR 17.32(b)(2). They are incorporated here by reference. Many of the comments provided during the public review process included assertions that the HCP proposals "violated" or at least did not meet the Issuance Criteria. A decision has yet to be made in this regard. The decision to issue a permit as requested depends inextricably on the permit applicant meeting the criteria stated. To issue an ITP, the responsible official will have to find:

- Take is incidental. (Defined as -- incidental to and not the purpose of the carrying out of an otherwise lawful activity.

- The effects of Take are minimized and mitigated to the maximum extent practicable. (The applicant would, to the maximum extent practicable, minimize and mitigate the impacts of such taking.)

- Adequate funding is assured. (The Applicant would ensure that adequate funding for the HCP would be provided. The implementing regulations add: "and procedures to deal with unforeseen circumstances would be provided." The handling of unforeseen circumstances in the present proposed action is founded on written policy of the Departments of the Interior and Commerce. Unforeseen circumstances are discussed on page 3-158.)

- There is no jeopardy. (The taking would not appreciably reduce the likelihood of the survival and recovery of the species in the wild. This is a restatement of the jeopardy sandard also found in ESA Section 7.)

- Other measures will be implemented. (The Services must be assured that other measures will be implemented.)

The Services agree that the federal government's Trust Responsibility to the Tribes requires the federal government to consider and analyze the effects on certain resources that may be impacted by the proposed action. Responses to comments on that specific topic are provided elsewhere in this appendix. Nothing in this proposed plan is intended to limit or diminish the legal obligation and responsibility of the Services as agencies of the federal government.

The Services disagree with the interpretation that the context of relations under the Federal Trust Responsibility alters the criteria on which permits are issued. The Services believe the goals of ESA Section 10 and the Trust responsibilty owed the tribes by the federal government are compatible. The Tribes should be assured, as was presented to member Tribes at the

NWIFC Conference Center on June 12, 1996, that the Services have become acutely aware of the concerns of the Tribes regarding treaty resources. In that regard, the Services will comply with their responsibility under the federal Trust Doctrine to consider the effects of this and every action proposal on treaty-covered resources and continue to consult with the Tribes on these issues.

### 1. Incidental Take

**Summary:** The Services received one comment relating to incidental take as a permit issuance criteria. The Northwest Forestry Association asked that the Sweet Home Chapter of Communities for a Greater Oregon v. Babbitt decision as it applies to take in this HCP should be included in the document.

**Response:** Incidental Take is defined as take incidental to and not the purpose of the carrying out of an otherwise lawful activity (ESA Section 10(a)(2)(B), 50 CFR 17.22(b)(2) and 17.32(b)(2)). The Sweet Home case did not address incidental take. The Sweet Home case addressed the definition of prohibited "take" as suggested in the comment. The Sweet Home case upheld the ability of the Secretary of the Interior to issue regulations, such as the one that defines take of listed species. Accordingly, the Supreme Court of the United States upheld the present definition of take as that term is defined in ESA Section 3(18) and its accompanying regulations in 50 CFR 13 and 17.

### 2. Minimize and Mitigate

**Summary:** NWIFC questioned whether DNR could terminate the agreement early without adequately mitigating take that has occurred to that point in time. Northwest Ecosystem Alliance, WEC, and one individual wrote the HCP does not satisfy this issuance criterion. Washington Wilderness Coalition commented that Alternative C represents the greatest mitigation of the impacts of taking. A local group commented that Alternative B does not offer sufficient mitigation to justify issuance of an ITP.

**Response:** The question of an HCP proponent terminating early after incurring a "mitigation debt" has been raised for other HCPs. Pursuant to the IA, early termination by DNR is subject to the permit condition requiring that any past incidental take has been sufficiently mitigated by compensation measures implemented prior to termination. While the matter may be referred to Alternative Dispute Resolution, the Services may, at any time, utilize remedies available to enforce this permit condition. Such remedies may include enforcing provisions of the HCP until the subject mitigation debt is paid. As to the suggestions that the proposal does not minimize and mitigate the effects of take to the maximum extent practicable, a determination has yet to be made. The Services will assess each species, or group of species, or habitat type, to ensure that the impacts of take are minimized and mitigated to the maximum extent practicable prior to issuing any permit or entering into any unlisted species agreement.

### 3. Funding

**Summary:** WDFW asked if DNR will move funds around to cover budget shortfalls and for more details on how adequate funding for the HCP will be provided. WEC questions whether DNR can make the assurance that funding to implement the HCP will be available.

**Response:** Funding is discussed in the Implementation Agreement. To issue an ITP, the Services must be assured the applicant will adequately fund implementation of the proposed HCP. In the event that DNR is not appropriated sufficient funds to implement the HCP, the IA provides that the Services may suspend or revoke the permit.

### 4. Jeopardy

**Summary:** One individual commented that because of uncertainty and lack of knowledge, more than the minimum of habitat necessary for species survival should be maintained for their benefit. One commentor wrote that the measurement standard for jeopardy should be clarified.

**Response:** The jeopardy standard is defined in both Section 7 and Section 10 of the ESA and restated in the response to comments on ESA Section 10 Permit Issuance Criteria topic, (Section XIV B, above). No permit will be issued for a species that would be jeopardized by the proposed action.

## C. DNR DECISION CRITERIA

**Summary:** State Representative Schoesser, the Washington State Association of Counties, Bogle & Gates (a consultant to Washington State University), Northwest Forestry Association, Washington Hardwoods Commission, The Mountaineers, two wood products companies, and five individuals commented on various aspects of the decision process. The state legislator stated that it is vitally important that questions and concerns from trust beneficiaries, elected officials, key stakeholders, and citizens are answered and abated before a final decision is made. The Washington State Association of Counties said that the HCP should meet the objectives of predictability and continuity. Bogle & Gates claimed that the Draft EIS did not provide adequate information for decision makers and was biased against Alternative A. An individual stated that the draft HCP lacked flexibility, and another individual said that the draft HCP offers certainty. A wood products company asserted that the information necessary to justify the decision, such as economic impacts to beneficiaries and benefits to fish of wider riparian buffers, is not yet available. The Washington Hardwoods Commission and another wood products company asked that other studies be considered before a decision is made. The Mountaineers suggested, given the complexity of the undertaking, it is good idea to delay approval in order to carefully consider the whole process. An individual urged that the Board of Natural Resources not to delay its decision, but to make the decision on the basis of what is known at this time. One individual expressed concern about what parties or interest groups might influence the Board in their decision.

**Response:** The decision process has been, and will continue to be, in compliance with the requirements of NEPA and SEPA and other state laws and regulations which govern decisions made by the Board of Natural Resources. Two important reasons for these laws and regulations are: (1) open disclosue and dissemination of information regarding government actions affecting public resources; and, (2) citizen participation in the decision making process. DNR and the Services have provided many means (public meetings, public hearings, solicitation of public comments, and meetings of the Board of Natural Resources) for citizens, including elected officials and stakeholders, to ask questions and state their concerns. Special requests for information have been responded to by DNR and/or the Services. DNR has already published a preliminary draft HCP, a draft HCP, and a Draft EIS, and has made other

documents available to the public at meetings of the Board. Members of DNR's HCP management team have met with trust beneficiaries and stakeholders to answer their questions and address their concerns.

DNR believes that its HCP and Implementation Agreement provide predictability, continuity, flexibility, and certainty. These qualities are the foremost reasons motiviating DNR and other land managers in Washington state to enter into contractual agreements with the Services. These qualities are important factors that the Board will consider when making its decision.

DNR and the Services do not agree that the Draft EIS did not provide adequate information for decision makers and was biased against Alternative A. All important potential environmental, economic and social effects of the alternatives were addressed in the Draft EIS. The effects of the alternatives on revenue to the trusts were reported in a separate document that was distributed at a Board meeting and is available to the public. Such a report is not appropriate for an EIS. To eliminate potential biases, whenever possible the comparision of alternatives in the Draft EIS and reports to the trusts was based on an objective quantitative analysis of the alternatives.

Admittedly, there is much that scientists do not know about the management of ecosystems. Decisions regarding the management of natural resources are often difficult and complex and often must be made with imprecise or incomplete knowledge. DNR and the Services have collected the best available relevant scientific information to develop and assess DNR's HCP. The Board is carefully considering the information presented to them.

## XV. MISCELLANEOUS COMMENTS

### A. HCP LANGUAGE, LOOPHOLES, VAGARIES, AND TYPOGRAPHICAL ERRORS

**Summary:** Bogle & Gates (a consultant to Washington State University), the Muckleshoot Indian Tribe, NWIFC, Sierra Club Cascade Chapter, Environmental Resource Center, the National Audubon Society and two chapters, the Rivers Council of Washington, and nine individuals wrote that the HCP is compromised by non-committal language and/or "loopholes." Northwest Forestry Association commented that language such as "we hypothesize" or "it is difficult to predict" needs clarification, that quantifiable estimates of silvicultural practices should be made for the OESF, and that silvicultural/operational research is necessary to achieve biological goals. NWIFC recommended rewriting the portion of Chapter V of the draft HCP regarding research. They stated the research objectives, as currently written, are vague and a bit redundant. The Clallam County Commissioner suggested replacing the words "Nolan Creek" with "Goodman Creek" in the title of the "Hoh Agreement" on page IV.115 of the draft HCP. WEC said that vague language should not count as mitigation. The Washington Forest Protection Association suggested changing the word "extraction" to "production". An individual also provided lengthy editorial comments. An individual member of the Blue Ribbon Coalition suggested the first sentence of the Public Use subsection on page IV.171 of the draft HCP, should refer to DNR management of "public lands".

**Response:** Clarifying language has been added to Chapter V of the draft HCP. Some research objectives have been reworded to provide additional clarity. Restructuring the title of the "Hoh Agreement", as the commentor suggests, is not warranted as it would be incorrect.

During the course of preparation of the FEIS, the Services and DNR have focused their attention on addressing substantive issues, but agree that typographical errors and ambiguity can create difficulties with comprehensibility of any written material. Where possible, the Services have corrected errors and provided less ambiguous language. The document writers believe the descriptions of certain lands in the document by the designations used therein is standard and does not warrant revision.

With respect to commentors suggesting commitments have been vaguely or ambiguously described in the DEIS, the Services note the HCP applicants desire certain amounts of flexiblity with respect to the commitments they make in HCPs. However, commentors should be assured that all commitments made in an HCP are contractual and compliance with these commitments are conditions for permit issuance. Accordingly, noncompliance with those commitments can result in permit suspension or revocation or any of the other remedies provided in the ESA and its implementing regulations. Finally, as to any activity described as applicable, it is entirely at the discretion of the applicant (for example, as to placement, timing, and amount of mitigation) and will not be considered by the Services in assessing the application nor in making findings under Section 10(a)(2)(B) of the ESA.

## B. STATE REGULATIONS

**Summary:** The Washington State Association of Counties, Northwest Forestry Association, Washington Forest Protection Association, Washington Hardwoods Commission, seven other representatives of the timber industry, and nine individuals presented concerns related to state regulations. The majority of comments pertained to Washington Forest Practices Rules for riparian management zones. The Washington State Association of Counties stated that one objective of the HCP should be "minimum Forest Practice Board regulations." Northwest Forestry Association suggested that Washington Forest Practices Rules be considered as an alternative. The Washington Hardwoods Commission, Washington Forest Protection Association, and several other representatives of the timber industry stated that the Forest Practices Rules provide adequate protection for fish and wildlife and requested that DNR not increase the level of protection in its HCP. Several representatives of the timber industry were concerned that the riparian conservation strategy described in the draft HCP might influence the Washington Forest Practices Rules and lead to stricter requirements for the protection of riparian areas on private land. One individual asked that funding be increased for enforcement of regulations, and another suggested that DNR switch to cooperative best management practices. Northwest Ecosystem Alliance said that the draft HCP fails to meet state requirements to "ensure the continued long-term existence, distribution and protection of listed species."

**Response:** The HCP is the principle document supporting DNR's application for incidental take permits and unlisted species agreements. The Services can issue incidental take permits and unlisted species agreements if, and only if, the HCP satisfies the criteria listed in Section 10 of the ESA. Early in the development of DNR's HCP, the Services informed DNR that an HCP Alternative premised entirely on minimum practices described in the current Washington

Forest Practices Regulations would be insufficient to enable the findings necessary for ITP issuance and unlisted species agreements.

It is the responsibility of the Washington Forest Practics Board to determine what regulations are necessary to afford protection to forest soils, fisheries, wildlife, water quantity and quality, air quality, recreation, and scenic beauty coincident with the maintenance of a viable forest products industry. Funding for the enforcement of forest practices regulations is beyond the scope of the proposed action.

## C. WASHINGTON FOREST PRACTICES RULES WATERSHED ANALYSIS

**Summary:** NCASI and the Washington Forest Protection Association were disappointed that watershed analysis was not used for the draft HCP's riparian conservation strategy. An individual asked that DNR acknowledge that watershed analysis will be performed on almost all DNR-managed lands during the course of the agreement. Bogle & Gates (a consultant to Washington State University) said that a major omission of the draft HCP and Draft EIS was a meaningful analysis of the role of Watershed Analysis under Alternative A.

**Response:** For some purposes, in particular hydrology, Washington Forest Practices Rules Watershed Analysis is thought to provide adequate protection of public resources. For other purposes, in particular wildlife conservation, the Watershed Analysis process is clearly inadequate. There is no module for wildlife in Washington Forest Practices Rules Watershed Analysis. Regardless, using Watershed Analysis for DNR's HCP was considered impractical because of the long time period necessary to complete analyses of the many WAUs that contain DNR-managed lands in the west-side planning units. For this reason, the use of Watershed Analysis was eliminated from the list of reasonable alternatives, although DNR does commit to participate in Watershed Analysis and adopt the resultant guidelines if they are more constraining that the HCP strategies. This commitment includes participation in priority watersheds identified by NMFS.

## D. HCP COMMITMENTS

**Summary:** NWIFC, Port of Port Angeles, the National Audubon Society, Sierra Club, WEC, Rivers Council of Washington, three local environmental organizations, Bogle & Gates (a consultant to Washington State University), and 59 individuals commented on the commitments of the draft HCP and/or draft IA. Fifty-one individuals used an identical form letter to comment. The most common concern was that some conservation measures in the draft HCP are compromised by such language as "practicable", "economically reasonable", and "consistent with trust obligations." Commentors used such phrases as "noncommittal", "ambiguity", "vague", "loopholes", "double-speak", and "weasel words" to express their concerns.

**Response:** Where a particular mitigation measure or management prescription is noncommittal, the Services have not relied on that measure in assessing the merits of the HCP. As reflected in the Purpose and Need statement of the draft EIS, DNR has a duty to produce the most substantial support possible over the long term for the trusts. DNR intends to follow the guidelines presented in the HCP, but realizes that inevitably management situations will arise where the guidelines are, for operational reasons, completely impracticable. This could place an unreasonable burden on DNR's management and be

contrary to its trust obligations. Therefore, for some mitigation measures or management prescriptions, DNR must insist on noncommital language to account for such situations. In order to strengthen the commitments of the HCP, the words "economically reasonable" have been replaced with the word "practicable" wherever they appear in the draft HCP.

## E. PRESIDENT'S NORTHWEST FOREST PLAN

**Summary:** American Rivers, Northwest Ecosystem Alliance, and 11 individuals recommended DNR use the standards and guidelines for Riparian Reserves contained in the President's Northwest Forest Plan for its HCP. In particular, these organizations and individuals recommended 300-foot no harvest buffers on all fish-bearing streams. Several individuals characterized the standards and guidelines of the President's Northwest Forest Plan as the minimum essential to protect the original forest ecosystem or the minimum protection as determined by the ESA. One individual said that the standards and guidelines in effect on federal lands are detrimental to the total value of forested land.

**Response:** The Services believe federal land management plans serve a different role than nonfederal land conservation plans. It is federal policy to be more conservative on federal lands. However, nonfederal lands are very important for some species and conservation must occur on these nonfederal lands as well, if some of these species are to be recovered. It is federal policy to be less conservative, and therefore assume more risk, on nonfederal lands. Thus the Section 10 HCP process allows the incidental take of threatened and endangered species, but the level of incidental take must not preclude recovery of the species addressed in the plan.

## F. PROPOSED FEDERAL RULES

**Summary:** The Muckleshoot Indian Tribe commented the FEIS should include an additional alternative which assesses the impacts that could occur if the USFWS issued a 4(d) rule relieving private landowners from northern spotted owl take restrictions.

**Response:** The Section 7 consultation report on the issuance of DNR's HCP will include an evaluation of the environmental baseline. If the 4(d) rule for nonfederal landowners is final before DNR's HCP, the effects of the 4(d) rule on the northern spotted owl will be part of the environmental baseline. Also, see responses to comments on the spotted owl on pages 3-62 through 3-105 in this section.

## G. DNR's FOREST RESOURCE PLAN

**Summary:** WDFW, NWIFC, a county commissioner, the Northwest Forestry Association, The Mountaineers, Bogle & Gates (a consultant to Washington State University), and one individual had comments related to DNR's Forest Resource Plan. WDFW asked how the HCP will affect the Forest Resource Plan goal to avoid harvesting stands that are less than 80 years old. Based on the tribal policy presented in the Forest Resource Plan, NWIFC encouraged DNR to consult with tribes when making land-management decisions and to protect treaty resources when it makes those decisions. A county commissioner claimed that DNR policies in excess of current state and federal laws, in conjunction with a Memorandum of Understanding with the Hoh Tribe, have resulted in there being no timber sales in the Hoh-Clearwater Block. The Northwest Forestry Association believes that the draft HCP does not comply with the Forest Resource Plan because the plan provides direction for how to produce

income while protecting fish, water, and wildlife, but the draft HCP only provides direction for how to protect fish, water, and wildlife and makes little pretense of connecting income production with environmental protection. They also suggested that the Forest Resource Plan be further developed for consideration as an HCP alternative. Bogle & Gates, a consultant to Washington State University, suggested that current policies in the Forest Resource Plan, in particular those addressing riparian management zones, wetlands, wildlife habitat, endangered species, landscape planning, and applied research and monitoring form the basis for an adequate HCP, and it is difficult for them to identify any clear advantage of Alternative A over Alternative B. One individual stated that the Forest Practices Rules and DNR policies provide adequate protection for fish and wildlife and requested that DNR not increase the level of protection until these rules and policies prove to be inadequate.

**Response:** The Forest Resource Plan (p. 18-19) says that in western Washington the average rotation age will be 60 years and may range from 45 years to 100 years.

DNR and the Board of Natural Resources intend for their actions to be consistent with the policies, including the tribal policy, presented in the Forest Resource Plan. In fact, the HCP is an alternative means of implementing certain policies within the plan.

DNR's draft HCP is completely consistent with DNR's Forest Resource Plan. The Forest Resource Plan is a policy document. It was approved in 1992, but has yet to be fully implemented. Implementation of the Forest Resource Plan policies requires the development of specific management guidelines. Important to understanding DNR's need for increased regulatory certainty, the Forest Resource Plan is thoroughly inadequate for issuance of an ITP or unlisted species agreement. It does not contain the degree of management guidance required by the Services for an HCP.

## H. FEMAT AND RECORD OF DECISION

**Summary:** Five individuals and two conservation organizations expressed their belief that the 1994 President's Northwest Forest Plan Record of Decision contains the minimum standards that should be used in DNR's HCP. Another three individuals specifically stated that the "no cut" buffers in the President's Northwest Forest Plan should be used in DNR's HCP. One individual pointed out that the HCP should incorporate the Forest Plan ROD for specialized forest products (poles, rails, landscape transplants, mushrooms, fruits, berries, and medicinal forest products). The Northwest Ecosystem Alliance stated that the buffers developed by the Scientific Analysis Team or some other scientifically defensible buffers that provide riparian protection should be incorporated into the HCP. One individual commented federal regulations are proving detrimental to the total value of forested lands.

**Response:** The Services note the Forest Ecoysystem Management Assessment Team (FEMAT) report and, subsequently, the issuance of the Record of Decision for the President's Northwest Forest Plan do not mandate prescriptive treatment on nonfederal lands. The President's Northwest Forest Plan Standards and guidelines were developed to address forest management on the covered federal lands. The Services do note that the timing of the release of the Scientific Analysis Team report, and its use in FEMAT, usually links it to FEMAT. The Service again notes that the HCP and associated application for an ITP are voluntary actions conducted by DNR to seek relief from restrictive regulations. The promulgation of

federal regulations and their impact on nonfederal lands within the State of Washington are beyond the scope of this project.

### I. REMARKS REGARDING DNR HISTORY

**Summary:** Several individuals criticized past DNR management for harvesting too much old-growth forest, degrading wetlands, failing to act with a long-term vision, or not properly balancing resource protection and income for the trusts. Three individuals said that DNR has harvested 96 percent of its forests. One individual said that had the HCP been done earlier, the past disruption to timber harvest might have been avoided. One individual claimed that the financial return to the trusts has decreased substantially since Jennifer Belcher became Commissioner of Public Lands.

**Response:** DNR has a duty to produce the most substantial support possible over the long term to the trusts within the context of all state and federal regulations. DNR's forest management has, to the best of its ability, always complied with all state and federal regulations. Unfortunately, regulations intended to protect public resources are often reactive to destruction that has already occurred. The reactive nature of regulations is due, in part, to a lack of accurate predictive models that explain the impacts of management on fish, wildlife, and ecosytems. Only ten years ago, scientific understanding of how regional and landscape-scale forest management affects fish and wildlife populations was only rudimentary. As we come to a fuller understanding of these complex ecological processes, we will come to strike the proper balance between the production of commodities and the protection of ecosystems. Finding ways to strike this balance is the main mission of the OESF.

To satisfy its trust obligations, DNR must manage trust lands to generate revenue while complying with all state and federal regulations. DNR has harvested a large proportion of DNR-managed lands, but not 96 percent of the forest. These commentors erroneously arrived at this number because they misinterpreted information given on p. I.2 of the draft HCP. The draft HCP states, "of the 1,580,000 acres of DNR-managed lands covered by the HCP, approximately 1,520,000 acres are in timber production." Lands in timber production, or on-base lands, have not necessarily been harvested. Figure I.1 on p. I.3 of the draft HCP shows the age distibution of forest stands on DNR-managed lands. Approximately 10 percent are older than 100 years.

A large decrease in revenue occurred shortly after the federal listing of the spotted owl as a threatened species in 1990. Other short falls in timber harvest can be attributed to the federal listing of the marbled murrelet. Income from DNR-managed lands has increased since 1992. In fact, income from DNR-managed forest lands in 1995 was one of the largest amounts ever.

## XVI. THE HCP PROCESS

### A. HABITAT CONSERVATION PLANS

**Summary:** The HCP concept is supported by State Representative Mark Schoesler, the Elwha/Clallam Tribe, the Tulalip Tribes, the Muckleshoot Indian Tribe, Skamania County, Washington State Association of Counties, National Audubon Society and six chapters, WEC, Washington Native Plant Society, League of Women Voters, Northwest Biodiversity Center, The Mountaineers, GBA Forestry, Inland Wood Specialties, Washington Hardwoods

Commission, Western Hardwoods Association, Merrill & Ring, the Washington Forest Protection Association, Port of Port Angeles, an individual member of the Blue Ribbon Coalition, and 14 other individuals. On the other hand, American Rivers, the Environmental Resource Center, a professor at the University of Montana, and eight individuals commented the HCP is granting an exemption from ESA requirements for the next 100 years. Three individuals stated their belief that incidental take should not be allowed.

**Response:** The Services acknowledge the support expressed for the HCP process. The Services' disagree that approval of an HCP constitutes an exemption from the ESA. As expressed repeatedly herein, the ESA provides for the preparation of HCPs in Section 10. The Services ability to grant permission for incidental take was authorized under the 1982 amendments to the ESA. It is beyond the scope of the presently proposed action to determine whether the authorization of incidental take should be a part of the ESA.

## B. PROPERTY RIGHTS

**Summary:** Stevens County Commissioner Anderson wrote that the HCP represents a "taking." Commissioner Anderson also commented that the ESA is a federal statute with application only in the District of Columbia and other Territories under federal jurisdiction, to the exclusion of all other lands.

**Response:** No factual or legal basis supports the notion that the HCP constitutes a "taking" of private property for a public purpose under the Fifth Amendment to the Constitution of the United States. The assertion that the ESA has no application outside of the District of Columbia or other jurisdictional protectorates of the federal government has no foundation in law or fact.

## C. THE HCP AND OTHER ASPECTS OF THE ESA

**Summary:** Stevens County Commissioner Anderson and another individual commentor asserted that the ESA is currently under review and will be modified, suggesting that this may influence the validity of the HCP. Another individual commented the HCP and DEIS are not in compliance with ESA, Section 3, among others. One individual wrote DNR is not complying with the ESA and the HCP should at minimum comply with the standards in the "1994 Forest Compromise Plan and Record of Decision." Another individual wrote there must be a better policy for protecting owls than owl circles. The Washington Native Plant Society suggested that DNR should retain protective measures for plant species that were candidates for listing in the September, 1993 Federal Register notice. One commentor warned against doing anything that would weaken the protections of the ESA.

**Response:** The Services recognize that Congress must periodically reauthorize the ESA. However, the Services disagree that any amount of controversy surrounding this legislative process might "invalidate" any proposed or completed HCP. The proposed HCP is a long-term agreement that provides assurances for its duration against the possiblity that changing regulations could adveresly impact DNR's land management. The Services note that over the duration of the requested permit, regulations are as likely to become more restrictive as less restrictive. It is this regulatory uncertainty that several other HCP proponents have proferred as underlying their need to prepare an HCP under ESA Section 10 (e.g., Murray-Pacific HCP Amendment, Weyerhaueser Millicoma, ODF Elliott State Forest, Plum Creek Timber

Company). Therefore, a nonfederal landowner gains a greater amount of certainty for its planning and management under an HCP than by waiting for the machinations of Congress.

ESA Section 3 is a definition section. The Services disagree that this HCP proposal is out of compliance with any of the definitions contained in ESA Section 3. As for the comment regarding the "Forest Compromise Plan," the Services believe the commentor was referring to the 1994 Record of Decision for the President's Northwest Forest Plan and respond that the President's Northwest Forest Plan was meant to apply to the management of federal forest land in the range of the northern spotted owl. In fact, that set of planning documents recognized that nonfederal forest land in the range of the northern spotted owl would make different contributions to habitat conservation, and the completion and approval of HCPs was part of that vision.

The Services believe that in the absence of any better proposal, the use of owl circles is the best way to track owl home ranges to avoid unauthorized take. The Services do agree that there are different possible approaches as exemplified in the President's Northwest Forest Plan (which makes use of circles) and other previously approved HCPs which address the northern spotted owl.

The Services note that because this plan is proposed as an all-species habitat-based approach, all species of plants, listed and unlisted, are addressed by the HCP where they occur in habitats that are present on DNR-managed land that is protected under the proposed plan. The Services note that nonfederal land is usually not required to have a role in contributing to the conservation of listed plants unless such is required by state law and no such Washington State law exists. Furthermore, the proposal exceeds the No Action alternative in addressing plants.

Finally, the HCP process is enabled under the ESA itself and therefore cannot undermine the ESA.

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# Section 3.3 Additional Tribal Comments

# 3.3 Additional Tribal Comments

The Services (NMFS and USFWS) have a trust responsibility to Native American Tribes and therefore considered their comments during the preparation of this FEIS. The comments of the Lummi Indian Nation, the Colville Tribe, the Skagit System Cooperative, and the Elwha Klallam Tribe are summarized and, where unique issues were raised, are responded to below. For similar comments already raised, the reader is referred to Section 3.2 of this document for the appropriate response. **(Note: the comments are presented following the same outline as section 3.2, however, only topics commented on are included.)**

## Comments relating specifically to this HCP

### I. GENERAL COMMENTS

**Summary:** The Lummi Indian Nation stated that the huge land ownership of DNR magnifies greatly the potential for failing to provide adequate oversight in an agreement that may be in place as long as half a century or more. The Elwha Klallam Tribe supported the aquatic and riparian sections of the OESF strategy. They further noted that other parts of the document appeared less convincing and, if implemented, may increase the risk of extinction to a number of species, including the northern spotted owl.

**Response:** The Services are aware of the considerable effort necessary to oversee such an agreement on 1.6 million acres. See Section 3.2 -- Compliance Monitoring. The Services also note both the support and concern expressed. The Service's believe the specific concerns are either addressed below by topic or in the corresponding topics in Section 3 of the FEIS.

### II. DESCRIPTION OF AREA

**Summary:** The Colville Confederated Tribe recommended separate HCP's be prepared specific to the different ecosystems, citing the differences between the east- and west-side forests. They believed that the section of the HCP which deals with east-side forests is not adequate to ensure the long-term viability of fish and wildlife species, ecosystem function, or long-term productivity.

**Response:** The Services agree that the HCP does not address or provide ecosystem functions on the east side. The HCP only addresses listed species on the east side of the Cascade crest; it does not address multi-species (i.e., unlisted species) and is not adequate to provide complete ecosystem functions. Coverage would not be provided in the permit for those unlisted species on the east side.

### III. ABIOTIC ISSUES

### C. WATER

**Summary:** The Lummi Indian Nation stated that the proposed HCP does not address how it will meet the requirements of the Federal Clean Water Act. The Services have a responsibility to see that requirements of this act are followed and would not sign off on the HCP without meeting the criteria of this act.

The Colville Confederated Tribe commented wide-scale fertilization of forest lands has not been evaluated in the DEIS. Fertilization would likely result in increased stream pollution similar to that in farmlands and would likely be detrimental to water quality and could be harmful to fish.

**Response:** Issuance of an incidental take permit does not diminish the responsibilities or abilities of the federal government under the Clean Water Act. The permit does not provide an exemption to the requirements of that Act. An assessment is provided in the DEIS in sections 4.2.3, 4.3.2, 4.4.2, and 4.8. With regard to fertilization, the Services believe the impacts will be relatively minor. DNR expects to fertilize 30,000 to 115,000 acres in the first decade on the west side and 4,000 to 10,000 acres on the east side. Not all stands are likely to be in a condition where fertilization is a viable option. Take resulting from this activity would be covered by the permit.

## IV. BIOTIC ISSUES

### A. FOREST HEALTH/FIRE

**Summary:** The Colville Confederated Tribe wrote there was an inadequate assessment of selective harvest policies and ther forest-health effects.

They also stated that fire as a process and maintainer of ecosystem health and function is not addressed. Additionally, the environmental impacts of wide-scale fire suppression and its effects upon long-term species viability have not been addressed at all.

**Response:** DNR's HCP only addresses listed species east of the Cascade crest. The Services note that selective harvest may aggravate or alleviate forest-health problems depending on site-specific situations, the application of the techniques, and the perspective of forest health. Addressing this issue east of the Cascade crest is beyond the scope of the HCP.

DNR's draft HCP does address forest health issues on page IV.171-172. Underburning and a host of other activities may be used to address the issues of fire, disease, and insects. The Service agrees that forest health problems which are not addressed or exacerbated may lead to the listing of additional species.

A natural fire regime is desirable, but this requires caution to reinstitute where less than natural forest conditions currently exist. This is a complex issue which is beyond the scope of the HCP.

### B. SPECIAL HABITATS

#### 8. Riparian Ecosystem Components

##### e. HYDROLOGIC MATURITY

**Summary:** The Lummi Indian Nation cited over-harvest of old growth in the Nooksack Basin and channel instability. They stated that much of the instability can be attributed to stream importation of large amounts of sediment and water in peak flow situations. They state that the HCP does not provide adequate percentages of hydrologically mature forest, which is an important tool in reducing peak flow conditions.

**Response:** See Section 3.2, III, B, 8 -- Hydrologic Maturity

### 13. Habitat-based Approach

**Summary:** The Skagit System Cooperative noted the data imbalance between owls and murrelets and all the remaining species. They stated that dedicating serious effort and funding toward acquiring data about all potentially listed species and their habitats was necessary in order to maintain habitat for those species at a level that is adequate to avoid their becoming listed. For anadromous salmonids, they indicated that the goal should be maintaining the stocks at levels adequate to provide for a viable Tribal fishing industry. They disagreed with the assumption that providing an increased level of riparian protection will fulfill the needs of salmonids and a number of other aquatic dependant species, and they stated that this assumption is not backed up by data. While the riparian proposal may help the habitats of many species, it does not address the species-specific habitats and may fall far short of what is needed by any given species. They used the tailed frog as an example of such a species and also referred to passages in the documents addressing Dunn's and Van Dyke's salamanders. They further stated "there is neither logic nor data to support the notion that the strategy does indeed protect these or for that matter the rest of the species that may be listed in the future that this DEIS is attempting to cover."

**Response:** See Section 3.2, III, B, 13 -- Habitat-based Approach. The Services believe that in order to adequately address the needs of multiple species, the habitats of those species must be conserved. The DNR HCP, developed with technical assistance from the Services, focused on habitats rather than individual species. The assumption is that the species will benefit if adequate habitats are provided. Most species are dependant on riparian or wetland habitats during some stage of their life-history. Other species, although not dependant on riparian and wetland areas, can benefit from the availability of riparian habitats.

### 14. Unique Forest Types

**Summary:** The Colville Tribe indicated that ponderosa-pine ecosystems of the west are some of the most imperilled forest types, with an estimated loss of 92-98 percent of old-growth pine forests. They stated this was primarily due to selective logging and fire suppression and noted that the HCP recommends continuation of those activities--the very practices which have caused many of the forest-health problems so prevalent today.

**Response:** The Service notes that the HCP specifies amounts of owl habitat to be maintained in certain areas. The HCP does not address which silvicultural prescriptions will be used to achieve those conditions. The Services will make

technical assistance available to DNR, if needed, to assist in selecting techniques that are compatible with improving forest health while maintaining wildlife habitats.

## D. ANIMALS

### 1. Wildlife

#### b. Birds

##### i. Sea, shore & wading birds

(A) marbled murrelets

**Summary:** The Lummi Indian Nation compared the incidental take granted to the Bureau of Indian Affairs through the Section 7 process to that proposed by DNR in the HCP. They believed that the rigorous definition of take in terms of numbers and statistical probability was lacking in the HCP. The Nation believed DNR's proposal sidesteps the issue of quantification of take. They referred to the proposal as a clear trade-off of trust responsibility for economics, which is unacceptable to the Lummi Nation.

**Response:** The focus of the murrelet strategy and assessment is based on the quality, quantity, and distribution of nesting habitat, rather than individual murrelets. See Section 3.2, III, D, 1, b. i, (A) -- Marbled Murrelets.

##### ii. Raptors

(A) spotted owls

nesting, roosting, & foraging (NRF) habitat

*amounts*

**Summary:** The Elwha Klallam Tribe noted that, while the HCP references riparian areas and unstable slopes as providing future owl habitat, riparian areas typically contain a high degree of edge (which may result in high mortality due to predation by species such as horned owls) and unstable slopes typically do not support the necessary habitat features for owls. Unstable slopes commonly contain low tree densities, low standing volumes, and deciduous species of trees and shrubs. It would appear that efforts to account for NRF areas through riparian and unstable slope areas are inappropriate.

**Response:** The commentor is correct. Narrow riparain areas alone will not provide owl habitat. Riparian areas will, however, contribute to owl habitat when they are adjacent to or surrounded by suitable habitat.

*distribution*

**Summary:** The Elwha Klallam Tribe agreed with the overall strategy of protecting available habitat adjacent to federal reserves, in spite of their concern about the permanency of the federal protection measures. They are also very concerned about the exclusion from any demographic support or dispersal roles in

both the Strait of Juan de Fuca and southwest Washington. This would appear to considerably increase the risk of local extirpation of owls on the Olympic Peninsula. The Tribe is opposed to policies which would lead to the local extinction of owls in the Straits area. The Elwha Klallam Tribe noted that the entire premise of the OESF is based on untested theories, especially that stand conditions can be manipulated over space and time to provide habitat. From a risk analysis standpoint, they believe it is prudent to protect the most important habitat in its entirety and rebuild connections to this habitat. They indicated indirectly that they, therefore, preferred an approach similar to the zoned approach.

**Response:** The Service believes it is appropriate to use the federal lands as a foundation upon which to base large-scale planning efforts. Nonfederal lands in southwest Washington and on the north coast of the peninsula were determined by analysis to be nonessential for spotted owls on the Olympic Peninsula. The OESF strategy is premised on the maintenance of 20 percent old forest and 40 percent suitable habitat in each of the 11 land scapeplanning units. The protection of the 20 percent old forest will likely occur near existing owl site centers.

**iii. Passerines**

**Summary:** The Colville Tribe commented the negative effects of wide-spread pesticide application are well documented in the literature and are implicated at least partially in the severe decline of neotropical migrants.

**Response:** The Service agrees that pesticide applications can have severe impacts. DNR has committed to retain their restrictive policies with regard to pesticide application. In addition, permit coverage for invertebrates would only be provided for aerial application upon approval of a site-specific plan by the Services.

**d. AMPHIBIANS**

**i. Frogs**

**Summary:** The Skagit System Cooperative indicated that the tailed frog may not be adequately addressed by the riparian strategy. The species prefers cold waters and has a narrow range of temperature tolerance. They cited the widespread extirpation of the tailed frog from areas presently inhabited by salmonids, and this would seem to contradict the notion that what's adequate for salmonids is adequate for other species.

**Response:** The Services believe that the protection for Types 4 and 5 streams in the HCP is adequate and these areas are the most likely to be inhabited by tailed frogs. In fact, those areas with salmon are less likely to maintain tailed frogs.

e. FISH

i. **Anadromous salmonids**

**Summary:** The Lummi Indian Nation said there is a trust responsibility for the federal agencies to work toward protection of a harvestable surplus of salmon and steelhead. The Skagit System Cooperative indicated, for anadromous salmonids, that the goal should be maintaining the stocks at levels adequate to provide for a viable Tribal fishing industry.

**Response:** The protection for fish under the HCP far exceeds the protection under current state regulations and should help achieve these goals. The Services believe that the riparain protection measures called for in the HCP will play an important role in restoring a harvestable surplus of salmonids. Riparian habitat functions are vital for a number of other species as well.

## E. ECOSYSTEM HEALTH

**Summary:**The Colville Tribe noted the lack of comprehension of the holistic nature of ecosystems and the fact that systems of living communities are inter-dependent and inter-related. They further stated that many of the ecological processes such as insect infestations, forest diseases, and fire (both low-intensity and stand-replacing) are crucial to the continued existence of the ecosystem. To circumvent or discontinue the function of these ecosystem processes has led, and will continue to lead, to high risk where outcomes (including commodity production) are almost totally unpredictable.

The Colville Tribe indicated that ecosystem impacts cannot be mitigated, but need to be addressed. They cited the increase in knowledge about ecosystem management which has recently become available and indicated what is now needed is a combination of social and institutional decision-making that will allow communication and a clear vision. They do not believe the HCP provides that vision.

**Response:** The Services agree that better understanding will facilitate planning in the future. DNR's HCP, within economic constraints, addresses ecosystem function, riparian habitats, special habitats, and the full range of forest stages on the west side of the Cascades where coverage is provided for multiple species. On the east side, only certain listed species are addressed. The Service cannot require an applicant to provide coverage for additional species, only that the covered species be adequately addressed in terms of the Section 10 issuance criteria. The Services agree that an ecosystem-based approach to addressing multiple species is a preferred management scenario with benefits to both wildlife and long-term commodity production.

# V. HUMAN ENVIRONMENT

## C. CULTURAL

**Summary:** The Lummi Indian Nation said there is a trust responsibility for the federal agencies to work toward protection of access to other species and resources for cultural use by the Nation.

**Response:** The Services recognize their trust responsibilities toward the Tribes with respect to protecting wildlife and their habitats. The Services believe the conservation strategies present in the HCP will enhance and maintain habitats important to fish and wildlife species of interest to the Tribes.

## VI. MANAGEMENT PRACTICES

### A. AMOUNT OF HARVEST

**Summary:** The Elwha Klallam Tribe expressed concerned about the expected rate of harvest of existing [owl] habitat in the short term, especially in consideration of the long "lag time" to regrow suitable [owl] habitat. They were particularly concerned about the lack of evidence to support the theory that second-growth forests can be managed to provide suitable [owl] habitat.

**Response:** The length of time to grow forests is a primary limiting factor with respect to restoring habitats. The HCP will be a benefit to wildlife species because it will enable DNR to make long-term decisions with certainty and return the forests to a healthier state where economic extraction can occur in a dynamic fashion in balance with wildlife habitats and other values.

### C. HARVEST METHODS

**Summary:** The Colville Tribe said there was an inadequate assessment of selective harvest policies and its forest-health effects.

**Response:** The Services note that selective harvest may aggravate or alleviate forest-health problems depending on site-specific situations, the application of the techniques, and the perspective of forest health. Addressing this issue on the east side of the Cascades is beyond the scope of the HCP.

### E. RIPARIAN MANAGEMENT STRATEGY

**Summary:** The Elwha Klallam Tribe noted that the riparian management strategy is well thought out and scientifically justified. The Tribe supported buffering the entire stream network (including Type 5 streams) across the landscape. They believed that the HCP will help ensure the recovery of riparian habitat and form the basis of salmonid recovery on state lands.

The Elwha Klallam Tribe requested that the management objectives be more clearly defined. Specifically, they noted that the HCP refers to "the maintenance and restoration of salmonid habitat" without defining what that means. They believed this was a critical point because approximately 70 percent of the stream miles covered by the OESF are estimated to have been converted to monotypic stands of young red alder and, as such, will require active restoration to approach the conditions found prior to management.

The Lummi Indian Nation stated that DNR has classified many Type 3 streams as Type 4, when in reality those streams were salmon-bearing streams. They recommended that

DNR retype streams to reflect reality and that the retyping be subject to tribal review and consultation.

**Response:** The Services acknowledge the value of the riparian strategy for salmonid recovery. The Services and DNR have clarified many of the issues surrounding the riparian strategy and have instituted an adaptive management approach toward riparian areas.

The Service believes that many landowners have mis-typed streams, particularly by failing to recognize fish presence in many smaller streams. The DNR will retype streams classified prior to 1992 and will treat those Type 4 streams conservatively in the interim. DNR believes that the streams typed since 1992 have been typed with a greater degree of accuracy. The draft HCP contains language (page IV.170, fifth paragraph) regarding the verification of stream types and updating the database.

## I. GROWTH & FERTILIZATION

**Summary:** The Colville Tribe commented that wide-scale fertilization of forest lands has not been evaluated in the DEIS. Fertilization would likely result in increased stream pollution similar to that found in farmlands and would likely be detrimental to water quality and could be harmful to fish.

**Response:** See response to Water Quality on page 3-10 in Section 3.2.

## J. THINNING

**Summary:** The Colville Tribe took exception to the statement that "Most forest stands in the east-side planning units are of uneven age and, therefore, do not require precommercial thinning." They believed this to be a false and misleading statement. Due to fire suppression over the last 60-90 years, stocking levels have increased dramatically and created the multi-storied stand structures common throughout the region. This has affected the water balance of these sites, caused stress in the trees, and created an insect and disease problem, as well as a catastrophic fire hazard. The change in these stands has also modified the habitats of the species endemic to the region and likely changed the distribution and abundance of species. These changes in the long run will contribute to the listing of additional species. In light of this information, precommerical thinning is a mandatory management action which should be implemented to restore these forests.

**Response:** DNR's draft HCP does address forest health issues on page IV.171-172. Underburning and a host of other activities may be used to address the issues of fire, disease, and insects. The Service agrees that forest health problems which are not addressed or exacerbated may lead to the listing of additional species.

## K. SALVAGE

**Summary:** The Colville Tribe indicated that salvage to stop disease or insect infestations in effect stops the fundamental processes which cycle nutrients that maintain and build the soil, create habitat, and form landscape patterns and stand structures upon which species depend. From an HCP perspective, salvage is only acceptable after the needs of

ecosystem processes are fulfilled. They indicated there is a conflict in the document between existing state laws and the intent of the HCP which needs to be resolved.

**Response:** The HCP was amended upon negotiation with the Services to better address the potential conflict between the HCP objectives and state laws regarding salvage (see Appendix 3 of this document). For example, salvage operations might be considered by DNR for reasons such as windthrow, fire, disease, or insect infestation. In fact, state statutes pertaining to salvage and forest health may require DNR to take certain actions. If it is determined that such activities would adversely impact the HCP conservation strategies, DNR and the Services shall identify additional mitigation that would allow the necessary activities to go forward.

## L. RESTORATION/RECLAMATION

**Summary:** The Elwha Klallam Tribe requested the management objectives be more clearly defined. Specifically, they noted that the HCP refers to "the maintenance and restoration of salmonid habitat" without defining what that means. They believe this was a critical point because approximately 70 percent of the stream miles covered by the OESF are estimated to have been converted to monotypic stands of young red alder and, as such, will require active restoration to approach the conditions found prior to management.

**Response:** The revised HCP provides a better description of objectives as described throughout Chapter IV. It does not prescibe how every action would be conducted because of site variability and the potential for new information and techniques to become available. Regarding the OESF, approximately 70 percent of the riparian areas are either alder or conifer forests younger than 30 years. It is clear that with or without restoration, it will take many decades to return to near normal conditions.

## M. ROAD MANAGEMENT

**Summary:** The Skagit System Cooperative believed the road management strategy for the rest of the HCP area (exclusive of the OESF) does not meet management and environmental concerns.

**Response:** The lack of current information regarding roads has lead the Services and DNR to an agreement whereby a road-management plan would be developed in the first dacade of the HCP which will address road location, construction, and maintenance standards, as well as landscape-level road issues such as density of open and closed roads.

## P. OTHER PRACTICES

**Summary:** The Colville Tribe was concerned about the application of pesticides for insect control to protect timber values and indicated that spraying pesticides only treats the symptoms of a problem caused by unsound resource management policies and techniques (e.g., fire suppression). The negative effects of wide-spread pesticide application are well documented in the literature and are implicated at least partially in the severe decline of neotropical migrants.

**Response:** The Services agree that pesticide applications can have severe impacts. DNR has committed to retain their restrictive policies with regard to pesticide application. In addition, permit coverage for invertebrates would only be provided for aerial application upon approval of a site-specific plan by the Services. The Services agree that the preferred solution is to address the cause of severe outbreaks rather than widely applying insecticides.

## VII. OTHER PLAN ELEMENTS

## B. RESEARCH

**Summary:** The Skagit System Cooperative said the accuracy and adequacy of data about habitat for species (other than owls and murrelets) is very suspect and may be leading to erroneous fiscal and landscape conclusions. They used the tailed frog as an example of a species which has very specific habitat needs and might not be adequately addressed even if other species had been adequately addressed. The Cooperative stated that there are no specific plans tied to the HCP for gathering and evaluating data about each of the species and conditions targeted by the HCP.

**Response:** The HCP addresses a number of important forest-mangement questions that should benefit a host of species.

### 1. OESF

**Summary:** The Elwha Klallam Tribe notes that the entire premise of the OESF is based on untested theories, especially that stand conditions can be manipulated over space and time to provide habitat. From a risk analysis standpoint, they believe it is prudent to protect the most important habitat in its entirety and rebuild connections to this habitat. They indicated indirectly that they, therefore, preferred an approach similar to the zoned approach.

The Skagit System Cooperative took exception to the unique treatment of the OESF. They cited this as an example of data inequality, but also stated that it may reflect a different agenda. They specifically cited text from the HCP which states that the western Olympic Peninsula differs from other physiographic provinces in its unique combination of soil parent materials, precipitation and soil-saturation regimes, and windthrow characteristics. They disagreed with the "perception" this gives, provided an example of another area of the state with similar characteristics, and questioned why the OESF actions would not be conducted elsewhere. They believed that the solutions proposed for the OESF are more likely to succeed than the ones proposed for the rest of the state. Among other reasons, they cited Alternative B does not require buffers on Type 5 Waters, does require wind buffers in moderate potential for windthrow areas on the windward side only, and allows minimal or low harvest beyond the first 25 feet of the buffers. The Skagit System Cooperative also commented that the differences in road-management strategies further reflect the perception that the OESF is unique. They wrote the road-management strategy for the rest of the HCP area does not meet management and environmental concerns.

**Response:** Whether the OESF is "unique" is not the issue, but whether the prescription and strategies for the OESF are appropriate. The OESF will be treated differently than other planning units. The existence of areas which share some common characteristics will mean that the knowledge obtained on the OESF will have applicability elsewhere. Also at issue is, whether the prescriptions and strategies applied in the remainder of the west-side planning units are appropriate for the range of conditions found in those areas. Although the strategies employed may be different, the desired results are similar.

## C. MONITORING/REPORTING

**Summary:** The Lummi Indian Nation wrote that the proposed monitoring is not adequate to deal with either the listed birds or the potentially listed salmon. They also criticized the monitoring as being primarily designed to allow relief in the form of relaxed mitigation.

The Elwha Klallam Tribe stated they were concerned about the lack of a strong monitoring component. They stated that this must be added and indicated this is another area for tribal cooperation. Without a monitoring component it will be very difficult to evaluate the overall success of the HCP.

The Skagit System Cooperative indicated the need for more details about the monitoring plan.

**Response:** The Services agree with the need for an adequate monitoring plan and intend to work with DNR in the development of such a plan. The Services have and will continue to coordinate with the Tribes during this process in fulfillment of the Services' Trust Responsibilities.

# VIII. IMPLEMENTATION ISSUES

## J. CONTINGENCIES

### 3. Adaptive-Management Techniques

**Summary:** The Lummi Indian Nation said there is no requirement for increased mitigation should the monitoring reveal greatly enlarged impacts on salmon or incidental takes of the listed species. They desired greater responsiveness to the results of monitoring.

**Response:** The Services note that there is greater ability to respond and adapt to changing conditions and new information in the revised HCP. This is especially evident in the riparian strategy.

## K. TERMINATION CLAUSE

**Summary:** The Lummi Indian Nation was disappointed with the provision for termination upon 30 days notice. They believed that such a provision would allow the state to make promises for mitigation in return for substantial harvest of timber and, once the harvest was complete, walk away from the agreement without meeting those promises.

**Response:** DNR would be required to mitigate for any take imbalance upon early termination. This is described in greater detail in Section 3.2 of this document and in the IA.

## IX. RELATIONSHIPS TO OTHER LAND MANAGEMENT

### A. RELATIONSHIP TO MANAGEMENT ON FEDERAL LANDS

**Summary:** The Elwha Klallam Tribe supported the strategy of providing owl habitat adjacent to federal reserves but had concerns about other areas. Specifically, the Tribe is concerned about the permanency of federal protection measures. Short-term changes in the "political landscape" have the potential to seriously undermine the carefully crafted system of federal reserves in the President's Northwest Forest Plan. The recent approval of the timber salvage rider bill is a prime example of this concern.

**Response:** The Services also believe the strategy of supporting federal reserves is sound, and likewise recognizes some of the inherent trade-offs--particularly in large landscapes which lack a federal ownership component.

While several timber sales have been authorized by Section 2001 of the 1995 Rescissions Act (P.L. 104-19), the Services do not believe that the biological integrity of the President's Northwest Forest Plan has been significantly compromised as a result. The President's Northwest Forest Plan calls for an extensive system of Late-Successional Reserves, protection of riparian reserves, the maintenance of dispersal habitat throughout federal lands, and a monitoring program aimed at ensuring the effectiveness and validity of the plan.

Timber sales harvested pursuant to P.L. 104-19 are not expected to seriously affect the role of the President's Northwest Forest Plan as the foundation for conserving late-successional forest species. The majority of the timber sales released by Section 2001(k) of P.L. 104-19 were located in Oregon. Most of the 2001(k) sales that occurred in Washington were previously consulted on under the Endangered species Act for spotted owls and, from the owl's perspective, were considered harvested when the Service completed Section 7 consultation for spotted owls on the President's Northwest Forest Plan. Therefore, harvest of the 2001(k) sales in Washington have caused few impacts to northern spotted owls that were not previously considered by the Service. Likewise, a relatively small amount of suitable murrelet habitat was harvested as a result of P.L. 104-19, and all known occupied nesting habitat was protected consistent with the standards and guidelines of the President's Northwest Forest Plan and Section 2001(k)(2) of P.L. 104-19.

## X. THIRD-PARTY INVOLVEMENT

### A. TREATY RIGHTS AND THE FEDERAL TRUST RESPONSIBILITY

**Summary:** The Lummi Indian Nation objected strongly to the process currently underway to provide federal approval of DNR's proposed HCP covering timber harvests on lands critical for the production of resources reserved to the Tribes by treaty. They

believed this to be a clear violation of the Federal Trust Responsibilities, existing court decisions, and statutory mandates to protect resources reserved for the use of the Tribes.

The Lummi Indian Nation strongly disagreed with the manner in which consultation is being carried out by the Services with reference to DNR's HCP proposal and cited the Presidential Memorandum and the Secretarial Order on this subject. Specifically, they listed determinations that must be made regarding management measures which may affect the exercise of treaty rights.

**Response:** The Services have met, and will continue to meet, their trust responsibility to Native American Tribes. The Services have acted in accordance with the Presidential Memorandum and Secretarial Order. The Services have coordinated with Tribal fisheries experts through the Northwest Indian Fisheries Commission during preparation of the draft EIS as well as throughout the negotiation period. On June 12, 1996, the Services met with a number of Tribes and their representatives to discuss trust responsibility issues in regard to DNR's HCP. The Services recognize that the HCP program is new and there is still considerable misunderstanding regarding the issues surrounding the program. The Services plan to improve the understanding by all parties and to improve the mechanisms used to coordinate with the Tribes regarding trust resources and the actions which may affect them. See Section 3.2.X.B in this document.

## B. TRUST RESPONSIBILITY TO TRIBES

**Summary:** The Lummi Indian Nation stated that each federal agency has a trust responsibility to Native American Tribes which cannot be avoided by reliance on flawed environmental studies by the state and accommodation of state interests in derogation of fiduciary duties of the federal government. Specifically, there is a trust responsibility for the federal agencies to work toward protection of a harvestable surplus of salmon and steelhead and protection of access to other species and resources for cultural use by the Nation. The HCP proposed by DNR seeks only to protect viable populations. It is totally silent on protecting harvestable surpluses.

The Skagit System Cooperative indicated, for anadromous salmonids, that the goal should be maintaining the stocks at levels adequate to provide for a viable Tribal fishing industry.

**Response:** The intent of the conservation strategies is to promote riparian function at normal levels. This should result in harvestable surpluses if other factors affecting salmonids are fully addressed in the rivers and the oceans and on other ownerships. The Services believe this HCP will benefit the salmonid resource and, as such, should benefit the Tribes.

# XI. TRUST BENEFICIARIES

## B. OBLIGATION TO FUTURE GENERATIONS

**Summary:** The Colville Tribe stated that it is necessary to align the production capability of the land to provide goods and services with the capacity of the land to produce over

time. They stated, "In essence we need to harvest the golden eggs without killing the goose."

**Response:** The Services agree with the commentor.

## XII. PUBLIC INVOLVEMENT

## B. COORDINATION

### 1. Tribes

**Summary:** The Lummi Indian Nation cited the U.S. Supreme Court in U.S. vs. Washington (1974) and related cases and said those cases provided that the Lummi Nation is a co-manager with the State of Washington and other Tribes in the Nation's usual and accustomed fishing grounds and stations. They proposed that where details of implementation are postponed for future planning or review the Nation be provided a role. They indicated that the HCP and IA failed to recognize a role for Tribal co-management and also failed to recognize the role of "the State's own primary management agency for salmon" [WDFW].

The Elwha Klallam Tribe formally requested that it be closely involved in the implementation of the HCP, including the development of the details which remain to be addressed in the future. They indicated that the monitoring plan, which still requires work, is another area for tribal cooperation.

The Skagit System Cooperative indicated that the lack of specifics with regard to implementation, monitoring, and adjusting lead one to distrust the success of the plan. The progress and changes that have taken place since the Forest Practice Rules and Regulations were first adopted 22 years ago, or for that matter since the Timber, Fish and Wildlife agreement was signed 9 years ago, should demonstrate the improvement possible in a few years in terms of understanding and management of all resources. They stated that it is irresponsible from both a scientific and a management perspective to lock into a plan as broad and vague as DNR's HCP.

**Response:** The Services began coordination with Tribal entities at an early stage in this process. The Services encourage further discussion regarding improvement of the process by which such coordination has occurred on this HCP-development process and will occur in the future. As the Services develop HCPs with future applicants and as issued permits and their respective HCPs are implemented, the Services look forward to a long and mutually beneficial relationship with the Tribes and hope to utilize their biological expertise to the benefit of the Services, the Tribes, and the resource.

## XIII. NEPA/SEPA COMMENTS

## E. ADEQUACY OF DOCUMENTS

**Summary:** The Lummi Indian Nation stated that the DEIS was severely flawed and cited the comments of other Tribes. The Colville Tribe indicated that, given the size and

technical complexity of the draft HCP and DEIS, an index would facilitate access to specific information. They also questioned whether Section 4.3 was included in the DEIS.

**Response:** Section 4.3 was included in the DEIS. The Services note the complexity of the document as well as the issues, but believe the DEIS adequately analyzed the provisions of the HCP.

## XIV. APPROVAL/DISAPPROVAL

**Summary:** The Skagit System Cooperative stated that it is irresponsible from both a scientific and a management perspective to lock into a plan as broad and vague as DNR's HCP.

**Response:** Comment noted.

## XV. MISCELLANEOUS COMMENTS

**Summary:** The Lummi Indian Nation cited the comments of other Tribes regarding the DEIS.

**Response:** Comments received from the Tribes were considered and included in this subsection. The Services note the support of the other commentors by the Lummi Indian Nation.

## I. REMARKS REGARDING DNR HISTORY

**Summary:** The Elwha Klallam Tribe said it was refreshing to see that DNR has recognized the extent of past damages that have occurred on state lands and its important role in fostering recovery across the landscape.

**Response:** Comments noted.

## XVI. THE HCP PROCESS

## A. HABITAT CONSERVATION PLANS

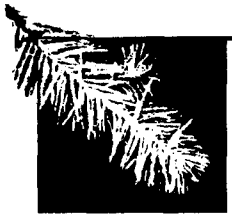
**Summary:** The Lummi Indian Nation supported the concept of habitat conservation plans.

**Response**: The Services appreciate the support and look forward to continued and improved coordination with the Nation and other Tribes.

APPENDIX

1.

# Appendix 1 - DEIS List of Commentors



# Appendix 1. DEIS List of Commentors

The public comment period for the Draft EIS began on March 22, 1996 and ended on May 23, 1996. Federal and state agencies, tribes, environmental organizations, industry, elected officials, and the public were invited to comment.

During the public comment period, 41 people testified at five public hearings held throughout the state and 174 letters were received, representing 181 individuals.

Many of the comments addressed herein are clearly directed to the HCP. To be certain that they were adequately addressed, the comments were treated as NEPA comments in this document. Those comments will be further addressed in any HCP decison documents which may be prepared as a result of this proposal.

## A. List of Commentors

### Cities, Ports, Water Districts

Mayor, City of Port Angeles, Prosper Ostrowski
Port Angeles Commission, Glenn Beckman

### Counties

Clallam County Commissioner, Phillip Kitchel
Stevens County Commissioner, J.D. Anderson
Metropolitan King County Council, Brian Derdowski
Prosecuting Attorney of Skamania County, Bradley Andersen
Washington State Association of Counties, Bill Vogler

### Environmental Organizations

American Rivers, Jennifer Wilkie
American Rivers, Lorraine Bodi
Black Hills Audubon Society, David Jennings
Environmental Resource Center, Uriah Storm
Honor the Earth Children's Circle, Marcia Mannia
Honor the Earth Children's Circle, Mariah Mannia
National Audubon Society, Tim Cullinan
Northwest Biodiversity Center, James Bergdahl
Northwest Ecosystem Alliance, Dave Werntz
Rivers Council of Washington, Joy Huber
Salmonid Foundation, Charles Voss

## Environmental Organizations (cont.)

Sierra Club, Charles Raines
Skagit Audubon Society, Elsa Gruber
Society for Conservation Biology, Jennifer Ruesink
Tahoma Audubon Society, Liz Lathrop
Tahoma Audubon Society, Judy Austin
The Mountaineers, Marcia Hanson
The Mountaineers, Dycke Kinder
The Wildlife Society, Ann Eissinger
Washington Native Plant Society, Jerry Davison
Washington Native Plant Society, Larry Hampson
Washington Wilderness Coalition, David Tilford
Washington Environmental Council, Becky Kelly
Washington Environmental Council, Bonnie Mager
Washington Environmental Council, David Mann
Washington Environmental Council, Julian Powers
Washington Environmental Council, Melanie Rowland
Whidbey Audubon Society, Thomas Campbell

## Federal Agencies

U.S. Environmental Protection Agency Geo. Impl. Unit/Region 10, Richard Parkin
U.S. Department of Agriculture, Darin Houpt

## Indian Tribes

Colville Confederated Tribes, Bill Gardiner
Elwa Clallam Tribe, Mike McHenry
Hoh Tribe, Jim Jorgensen
Muckleshoot Indian Tribe, Chantal Stevens
Northwest Indian Fisheries Commission, Janet Burcham, Bruce Davies, Eric Shott
Point No Point Treaty Council, Carol Bernthal
Squaxin Island Tribe, Jeff Dickison
Tulalip Tribe, Daryl Williams
Yakama Indian Nation, Caroll Palmer

## Industry Associations

Cascade Hardwood, Doug Princehouse
GBA Forestry Inc., Glenn Ahrens
Green Crow, Harry Bell
Inland Wood Specialties, John Gottwald
Merrill & Ring, Grant Munro
Merrill & Ring, Joseph Murray
Merrill & Ring, Glenn Wiggins
Mount Baker Plywood, Tim Shannon
NCASI, George Ice
NCASI, Larry Irwin

## Industry Associations (cont.)

Northwest Forestry Association, Bob Dick
Northwest Forestry Association, Ross Mickey
Northwest Timber Workers Resource Council, Gary Garrison
RD Behm Company, Jim Stolasyeph
SDS Lumber Company, Frank Backus
Washington Commercial Forest Action Committee, Ben Lonn
Washington Contract Loggers Association, Bill Pickell
Washington Forest Protection Association, Julie Thompson
Washington Hardwoods Commission, Paul Mccausland
Washington Hardwoods Commission, David Sweitzer
Western Hardwoods Association, Dick Behm
Western Hardwoods Association, Jack Moore

## State Agencies

Washington State Department of Ecology, Marvin Vialle
Washington State Department of Fish and Wildlife, Robert Turner

## State Legislative Delegation

House of Representatives, Mark Schoesler

## Universities

Bogle & Gates, James Johnston - Washington State University Consultant
University of Montana, Vicki Watson
University of Washington Dept. of Geological Sciences, Rolf Aalto

## Interested Individuals

Jana Allen
Kathryn Alexandra
George Andersen
Judith Austin

Victoria Bennett
Gretchen Blatz
Julia Brayshaw
Sheilagh Brown
Heather Brunelk
Matt Brunengo
Jasmine Burgett
Steve Burkett

Stacey Carr
Millie Chong
Welden and Virginia Clark
Laura Costell
Oliver Crew

Wendy Davis
Sanja Derda
Deane Drake

Robert Eggert

Kelly Feineman
Foster Fell
Charles Fisk
Lupito Flores
Dale Fortune
Adele Freeland
Mark Freeland

Brandon Galvez
Margaret Gaspari
Marcy Golde
D. Grace
Richard Grant

Claudia Haines
Diane Hall
Hansi Hals
Jay Ham
Bruce Harpham
Kevin Head
Kathleen Hedtke
K. Hoel
Walter Hoffmann
Christine Houden

Peter Idone
Bethany Ionta

Renee Jeffus

## Interested Individuals (cont.)

Robb Kaler
Doxey Kemp
James Kidd
Scott Kinghorn
Yuri Koslen
Jacob Kostecka
Jeff Kotanchick

Koalani Lagareta
Mary Anne Leblond
Charles Lennox
Sarah Levy
Thomas Lewis
Chuck Lockhart
Mike Lucero

William MacArthur
Janine Michelsons
Virginia Michelsons
Carla Miller
Jane Montgomery
Jack Moore
Margaret Moulton
Charley Moyer
Thayn Moyes

Darren Nienaber
Donald Norkoski
Helen Nowlin

Jim O'Donnell
Aaron Ostsrom

Susan Parker
Dave Parks
Julie Pearson
Anna Pedrosa
Dale and Barbara Plewman
Rob Powers

Clay Raney
Tarym Rehn
Jill Reifschneider
Sylvia and Ken Retherford
Jennifer Richards
Anne Robison
Ethan Roga
Harry Romberg
Sue Rooney

Lynn Salmon
Scott Sagor
Elizabeth Seabacher
Brenda Senturia
Robert Simeone
Ron Smith
Bill Spring
David Spring
Willy Stark
William Steele
Jeff Stewart
Janet Strong
Scott Stumbaugh
Caleb Swift

Lee Telnackj

Robert and Celia Warren
Laura Weiss
Mark Wells
Tom Westergreen
Richard Whitmore
Hannes Willroth
Adam Wilson
Shawna Wittman

Kathy Zaiser
Oliver Zibel
Susan Zwinger

## Other

ALS, Barbara Mossman
Blue Ribbon Coalition, Don Carey Jr.
League of Woman Voters, Peggy Bruton
Matt (No last name given)

APPENDIX

2.

# Appendix 2 - Distribution Lists

# Appendix 2. Distribution Lists

## Draft EIS Distribution List

### Federal

***Environmental Protection Agency***[1]
***National Marine Fisheries Service***
***National Park Service, Pacific Northwest Region***
***US Fish and Wildlife Service***
***US Forest Service, Portland***
***Olympic National Park***

### U.S. Senate

The Honorable Slade Gorton
The Honorable Patty Murray

### U. S. House of Representatives

The Honorable Norm Dicks
The Honorable Richard Hasting
The Honorable Jack Metcalf
The Honorable Linda Smith
The Honorable Rick White
The Honorable Jennifer Dunn
The Honorable Jim McDermott
The Honorable George Nethercutt
The Honorable Randy Tate

### State

***California Department of Forestry***
Central Washington University Board of Trustees
Eastern Washington University Board of Trustees
The Evergreen State College Board of Trustees
***Governor's Timber Team (Washington)***
***Maryland Forest Service***
***Oregon Department of Forestry***
University of Washington Board of Regents
Washington State Board of Education
***Washington State Department of Ecology***
***Washington State Department of Fish and Wildlife***
***Washington State Office of Archaeology and Historic Preservation***
***Washington State Parks and Recreation Commission***
Washington State University Board of Regents
Western Washington University Board of Trustees

[1] Names shown in bold and italics will received a complete set of the HCP and EIS. All others received Executive Summaries.

## State Legislators

***Senator Ann Anderson, Natural Resources Committee***
***Senator Kathleen Drew, Natural Resources Committee***
***Senator Jim Hargrove, Natural Resources Committee***
***Senator Mary Margaret Haugen, Natural Resources Committee***
Senator Valoria Loveland, Democratic Caucus Chair
Senator Dan McDonald, Republican Caucus Leader
***Senator Bob Morton, Natural Resources Committee***
Senator Irv Newhouse, Republican Caucus Floor Leader
Senator George Sellar, Republican Caucus Chair
Senator Sid Snyder, Democratic Caucus Leader
***Senator Harriet Spanel, Natural Resources Committee***
***Vic Moon, Research Analyst, Senate Natural Resources Committee***
***Cathy Baker, Fiscal Analyst, Senate Natural Resources Committee***
Representative Marlin Appelwick, Minority Leader
Representative Clyde Ballard, Speaker of the House
***Representative Bob Basich, Natural Resources Committee***
***Representative Barney Beeksma, Natural Resources Committee***
***Representative Jim Buck, Natural Resources Committee***
***Representative Ian Elliot, Natural Resources Committee***
Representative Dale Foreman, Majority Leader
***Representative Steve Fuhrman, Natural Resources Committee***
Representative Bill Grant, Minority Caucus Chair
***Representative Brian Hatfield, Natural Resources Committee***
***Representative Ken Jacobsen, Natural Resources Committee***
Representative Lynn Kessler, Minority Whip
Representative Barbara Lisk, Majority Caucus Chair
***Representative John Pennington, Natural Resources Committee***
***Representative Debbie Regala, Natural Resources Committee***
***Representative Tim Sheldon, Natural Resources Committee***
***Representative Val Stevens, Natural Resources Committee***
***Representative Brian Thomas, Natural Resources Committee***
***Representative Les Thomas, Natural Resources Committee***
***Representative Bill Thompson, Natural Resources Committee***
***Karl Herzog, Fiscal Analyst, House Capitol Budget Committee***
***Linda Byers, Research Analyst, House Natural Resources Committee***
***Nancy Stevenson, Fiscal Analyst, House Appropriations Committee***
***Bob Longman, Coordinator, House Finance Committee***

## County

Adams County Commissioners
Adams County Planning Department
Asotin County Commissioners
Asotin County Planning Department
Benton County Commissioners
Benton County Planning Department
Chelan County Commissioners
***Chelan County Planning Department***
Clallam County Commissioners
Clallam County Conservation District
***Clallam County Planning Department***
Clark County Commissioners
***Clark County Planning Department***
Columbia County Commissioners
***Columbia County Planning Department***
Cowlitz County Commissioners
Cowlitz County Planning Department
Douglas County Commissioners
Douglas County Planning Department
Ferry County Commissioners
Ferry County Planning Department
Franklin County Commissioners

## County (cont.)

Franklin County Planning Department
Garfield County Commissioners
Garfield County Planning Department
Grant County Commissioners
Grant County Planning Department
Grays Harbor County Commissioners
***Grays Harbor County Planning Department***
Island County Commissioners
***Island County Planning Department***
Jefferson County Commissioners
***Jefferson County Planning Department***
King County Council
King County Council, Surface Water Management Division
***King County Planning Department***
Kitsap County Commissioners
***Kitsap County Planning Department***
Kittitas County Commissioners
***Kittitas County Planning Department***
Klickitat County Commissioners
Klickitat County Planning Department
Lewis County Commissioners
***Lewis County Planning Department***
Lincoln County Commissioners
Lincoln County Planning Department
Mason County Commissioners
***Mason County Planning Department***
Okanogan County Commissioners
Okanogan County Planning Department
Pacific County Commissioners
***Pacific County Planning Department***
Pend Oreille County Commissioners
Pend Oreille County Planning Department
Pierce County Council
***Pierce County Planning Department***
San Juan County Commissioners
***San Juan County Planning Department***
Skagit County Commissioners
***Skagit County Planning Department***
Skamania County Commissioners
***Skamania County Planning Department***
Snohomish County Commissioners
***Snohomish County Planning Department***
Spokane County Commissioners
Spokane County Planning Department
Stevens County Commissioners
Stevens County Planning Department
Thurston County Commissioners
***Thurston County Planning Department***
Wahkiakum County Commissioners
***Wahkiakum County Planning Department***
Walla Walla County Commissioners
Walla Walla County Planning Department
Whatcom County Council
***Whatcom County Planning Department***
Whitman County Commissioners
Whitman County Planning Department
Yakima County Commissioners
Yakima County Planning Department

## Local

***Seattle Water Department***
***City of Aberdeen, Department of Planning and Economic Development***
***City of Everett, Public Works Department***
***City of Forks, Economic Development Steering Committee***
***Port of Port Angeles***

## Tribal

***Chehalis Tribe***
***Chinook Tribe***
***Cowlitz Tribe***
***Hoh Tribe***
***Jamestown S'Klallam Tribe***
Lower Elwha S'Klallam Tribe
***Lummi Nation***
***Makah Tribal Council***
***Marietta Band of Nooksack Indians***
***Muckleshoot Tribal Council***
***Nooksack Tribe***
***Northwest Indian Fisheries Commission***
***Point No Point Treaty Council***
***Port Gamble S'Klallam Tribe***
***Puyallup Tribe***
***Quileute Tribe***
***Quinault Nation***
***Samish Tribe***
***Sauk-Suiattle Tribe***
***Shoalwater Bay Tribal Council***
***Skagit Tribe***

## Tribal (Cont.)

***Skokomish Tribe***
***Snohomish Tribe***
***Stillaguamish Tribe***
***Swinomish Tribe***
***Suquamish Tribe***
***Squaxin Island Tribe***
***Tulalip Tribe***
***Upper Skagit Tribe***
***Yakama Tribe***

## Libraries

Aberdeen Timberland Library
Antioch University of Seattle Library
Battelle Seattle Research Center Library
Bellevue Community College Library
Bellingham Public Library
Brewster Public Library
Burlington Public Library
Camas Public Library
Cathlamet City Library
***Central Washington University Library***
Central Washington University, Horticulture /Forestry Library
Centralia Timberland Library
Chehalis Timberland Library
Chehalis Tribe Library
Chelan Public Library
Cheney Public Library
Chewelah Public Library
City University, Bellevue Library
Clark College Library
Clark County Law Library
Cle Elum Public Library
Columbia Basin College Library
Colville Confederated Tribes Library
Colville Public Library
Davenport Public Library
Dayton Public Library
***Eastern Washington University Library***
Edmonds Community College Library
Ellensburg Public Library
Elwha S'Klallam Tribe Library
Enumclaw Public Library
Ephrata Public Library
Everett Community College Library
***Everett Public Library***
Evergreen State College Library
Fairwood Library
Forks Memorial Library
Fort Vancouver Regional Library
Fort Vancouver Regional Library, White Salmon Branch
Fort Vancouver Regional Library, Battle Ground Branch
Fort Vancouver Regional Library, Stevenson Branch
Foster Wheeler Environmental Library
***Gonzaga University, Crosby Library***
Georgia Pacific, Bellingham Division Library
Goldendale Public Library
Government Research Assistance Library
Grand Coulee Public Library
Grandview Community Library
Grays Harbor College, John Spellman Library
Green River Community College, Holman Library
Harrington Public Library
Heritage College Library
Highline Community College Library
Hoh Tribe Library
Hoquiam Timberland Library
Issaquah Library
ITT Rayonier Research Center Library
James River Corporation, Camas Technical Center Library
Jamestown S'Klallam Tribal LibraryJefferson County Rural Library
John A. Brown Library
Kalispel Tribe Library
Kelso Public Library
Kettle Falls Public Library
***King County Library***
King County Library, North Bend Branch
Kitsap Regional Library
Kittitas Public Library
Lacey Timberland Library
Longview Public Library
Lower Columbia College, Alan Thompson Library

## Libraries (cont.)

Lummi Reservation Library
Makah Tribe Library
Mid Columbia Library
Mid Columbia Library,
West Richland Branch
***Mount Vernon Public Library***
Muckleshoot Library
Montesano Timberland Library
Natural Resources Building Library
Neill Public Library
Nisqually Tribe Library
North Central Regional Library
North Central Regional Library,
Republic Branch
North Central Regional Library,
Waterville Branch
Nooksack Tribe Library
North Seattle Community College Library
Northwest Indian Fisheries Commission
North Olympic Library, Forks Branch
North Olympic Library, Port Angeles Branch
Okanogan Public Library
Olympia Timberland Library
Olympic College Library
Omak Public Library
Othello Public Library
Pasco Public Library
Pend Oreille County Library
Peninsula College, John D. Glenn Library
Pierce College, Fort Steilacoom Library
Pierce County Library
Pomeroy Library
Port Gamble S'Klallam Tribe Library
Port Townsend Public Library
Prosser Public Library
Pullman Public Library
Puyallup Public Library
Puyallup Tribe Library
Raymond Timberland Library
Quileute Tribe Library
Quinault Indian Nation Library
Reardan Memorial Library
Renton Public Library
Richland Public Library
Ritzville Public Library
Roslyn Public Library
St. Martins College Library
San Juan Island Library
Sauk-Suiattle Tribe Library
Seattle Central College Library
Seattle Community College Library
Seattle Pacific University Library
***Seattle Public Library***
Seattle University Library
Sedro Woolley Public Library
Shoalwater Bay Community Library
Shoreline Community College,
Ray W. Howard Library
Skagit Valley College Library
Skokomish Tribe Library
Sno Isle Regional Library
Sno Isle Regional Library, Coupeville
Branch
Sno Isle Regional Library, Langley Branch
Sno Isle Regional Library, Stanwood
Branch
South Bend Timberland Library
South Puget Sound Community College
Library
South Seattle Community College Library
Spokane Community College Library
Spokane County Library
Spokane Falls Community College Library
Spokane Public Library
Spokane Tribe Library
Sprague Public Library
Squaxin Island Tribal Library
Stillaguamish Tribe Library
Suquamish Tribe Library
Swinomish Tribe Library
Tacoma Community College Library
***Tacoma Public Library***
Tri Cities University Library
Tulalip Tribe Library
Tumwater Timberland Library
University of Puget Sound,
Collins Memorial Library
University of Washington,
Allen Library
University of Washington,
College of Forest Resources
Library
***University of Washington Library,***
***Government Publications***
University of Washington, School of
Fisheries Library
Upper Skagit Tribe Library
U.S. Environmental Protection Agency,
Region 10 Library
Waitsburg Weller Public Library
Walla Walla Community College Library
Walla Walla County Library

## Libraries (cont.)

***Washington State Library***
Washington State University, Environmental Science Library
Washington State University, Department of Forestry Library
***Washington State University, Government Documents***
Wenatchee Public Library
Wenatchee Valley College Library
Western Washington University, Huxley College Library
***Western Washington University, Mabel Zoe Wilson Library***
Weyerhaeuser Corporate Library
Weyerhaeuser Forestry Library
Weyerhaeuser Technical Center Library
Whatcom Community College Library
Whatcom County Library
Whitman College, Penrose Library
Whitman County Library
Whitworth College Library
Wilbur Public Library
William G. Reed Timberland Library
Winthrop Public Library
Yakama Indian Nation Cultural Center Library
Yakima Valley Community College Library
Yakima Valley Regional Library

## Organizations

***Audubon Society (state)***
***American Rivers***
***Beak Consultants***
***Black Hills Audubon Society***
***Boise Cascade***
***Bullitt Foundation***
***Buse Timber and Sales***
***Champion International***
***Columbia Gorge Audubon***
***Council of Presidents***
***Forest Land Management Commission***
***Foster Wheeler Environmental***
***Greater Ecosystem Alliance***
***Island Foresters***
***ITT Rayonier***
***Longview Fibre***
***Mantech Environmental***
***The Mountaineers***
***Murray Pacific***
***The Nature Conservancy***
***Northwest Forestry Association***
***Olympic Peninsula Foundation***
***Parametrix, Inc.***
***Pacific Lumber and Shipping***
***People for Puget Sound***
***Plum Creek***
***Pope & Talbot***
***Puget Sound Society for Conservation Biology***
***Resources Northwest, Inc.***
***Save Our Wild Salmon***
***Seattle Audubon***
***Sierra Club***
***Simpson Timber***
***Trout Unlimited***
***Washington Association of School Administrators***
***Washington Commercial Forest Action Committee***
***Washington Environmental Council***
***Washington Forest Protection Association***
***Washington Hardwoods Commission***
***Washington State Association of Counties***
***Washington State School Directors' Association***
***Washington Trout***
***Washington Wildlife Federation***
***Washington Wilderness Coalition***
***Western Ancient Forest Campaign***
***Western Forest Industries Association***
***Wild Salmon Center***
***The Wilderness Society***
***World Wildlife Fund***
***Wind River Logging Co.***

## Individuals

*Katherine Baril*
*Bruce Barnum*
*Bob Benton*
*Colleen Berg*
*Alice Blandin*
*Cedar Blomberg*
*Jody Brower*
*Elsa Bruton*
*Lanny Carpenter*
*Tina Chan*
*Ellen Chu*
*John Clevenger, Jr.*
*Clifton Collins*
*Michael Collins*
*Lisa Dabek*
*Helen Daly*
*Jack Davis*
*Carolyn Dobbs*
*Harm Dotinga*
*Gene Dziedzic*
*Ronald Figlar Barnes*
*Jerry Franklin*
*Julie Garrison*
*Margaret Gaspari*
*Marcy Golde*
*Warren Groves*
*Tom Hamer*
*Janet Hardin*
*Kathleen Hedtke*
*Becky Herbig*
*Clayton Hobart*
*Richard Holthausen*
*James Karr*
*Jim Klinck*
*Joel Kuperberg*
*Kirk Lakey*
*Jeff Langlow*
*Darrell Linton*
*Mike Mackelwich*
*Jill Mackie*
*Larry Maechler*
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*Randall Payne*
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*Karen Peters Waldron*
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*Martin Raphael*
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*Robert Sager*
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*Randy Scott*
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*Sonjia Thompson*
*Linda Thomson*
*Neil and Milicent Turnberg*
*Brian Urbain*
*Aaron Viles*
*Paul Wagner*
*Roy Wagner*
*Jim Walton*
*Jeff White*
*Larry Williams*
*Shawna Wittman*
*Vim Wright*
*E. Zahn*
*F. R. Zimmerman*

**NOTE: Many organizations/individuals requested copies of the draft documents and Executive Summaries after publication and do not appear on the Draft EIS Distribution List. All such organization/individuals did receive draft documents and are included on the final EIS Distribution List.**

# Final EIS Distribution Plan

## Federal

Congressman Norm Dick's Office
Environmental Protection Agency
EPA Geographic Implementation Unit
National Marine Fisheries Service
National Park Service, Pacific Northwest Region
Olympic National Park
US Department of Agriculture
US Fish and Wildlife Service
US Forest Service, Portland
Olympic National Park
Wenatchee National Forest

## State

California Department of Forestry
Governor's Timber Team (Washington)
Idaho Department of Lands
Maryland Forest Service
Montana DNRC
Oregon Department of Forestry
University of Montana
University of Washington
Washington State Association of Counties
Washington State Association of School Administrators
Washington State Department of Ecology
Washington State Department of Fish and Wildlife
Washington State Office of Archaeology and Historic Preservation
Washington State Parks and Recreation Commission
Washington State School Directors' Association
Washington State University (consultant James Johnston)

## State Legislators

Senator Ann Anderson, Natural Resources Committee
Senator Kathleen Drew, Natural Resources Committee
Senator Jim Hargrove, Natural Resources Committee
Senator Mary Margaret Haugen, Natural Resources Committee
Senator Bob Morton, Natural Resources Committee
Senator Harriet Spanel, Natural Resources Committee
Vic Moon, Research Analyst, Senate Natural Resources Committee
Cathy Baker, Fiscal Analyst, Senate Natural Resources Committee
Representative Bob Basich, Natural Resources Committee
Representative Barney Beeksma, Natural Resources Committee
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Representative Ian Elliot, Natural Resources Committee
Representative Steve Fuhrman, Natural Resources Committee
Representative Brian Hatfield, Natural Resources Committee
Representative Ken Jacobsen, Natural Resources Committee
Representative John Pennington, Natural Resources Committee

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Representative Tim Sheldon, Natural Resources Committee
Representative Val Stevens, Natural Resources Committee
Representative Brian Thomas, Natural Resources Committee
Representative Les Thomas, Natural Resources Committee
Representative Bill Thompson, Natural Resources Committee
Karl Herzog, Fiscal Analyst, House Capital Budget Committee
Linda Byers, Research Analyst, House Natural Resources Committee
Nancy Stevenson, Fiscal Analyst, House Appropriations Committee
Bob Longman, Coordinator, House Finance Committee
Mark Schoesler, House of Representatives

## County

Chelan County Planning Department
Clallam County Planning Department
Clark County Planning Department
Columbia County Planning Department
Grays Harbor County Planning Department
Island County Planning Department
Jefferson County Planning Department
King County Office of Open Space
King County Planning Department
Kitsap County Planning Department
Kittitas County Planning Department
Lewis County Planning Department
Mason County Planning Department
Metropolitan King County Council
Pacific County Planning Department
Pierce County Planning Department
San Juan County Planning Department
Skagit County Planning Department
Skamania County Planning Department
Snohomish County Planning Department
Snohomish County Public Utilities District
Thurston County Planning Department
Wahkiakum County Planning Department
Whatcom County Planning Department

## Local

City of Aberdeen, Department of Planning and Economic Development
City of Everett, Public Works Department
City of Forks, Economic Development Steering Committee
Port of Port Angeles
Seattle Water Department

## Tribal

Chehalis Tribe
Chinook Tribe
Colville Tribe
Cowlitz Tribe
Hoh Tribe
Jamestown S'Klallam Tribe
Lower Elwha S'Klallam Tribe
Lummi Nation
Makah Tribe
Marietta Band of Nooksack Indians
Muckleshoot Tribal Council
Nisqually Tribe
Nooksack Tribe
NWIFC
Point No Point Treaty Council
Port Gamble S'Klallam Tribe
Puyallup Tribe
Quileute Tribe
Quinault Tribe
Samish Tribe
Sauk Suiattle Tribe
Shoalwater Bay Tribal Council
Skagit Tribe
Skokomish Tribe
Snohomish Tribe
Stilliguamish Tribe
Swinomish Tribe
Suquamish Tribe
Squaxin Island Tribe
Tulalip Tribe
Upper Skagit Tribe
Yakama Tribe

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Colorado State University Libraries
Eastern Washington University Library
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Gonzaga University, Crosby Library
King County Library
Lummi Reservation Library
Mount Vernon Public Library
Pierce County Library
Seattle Public Library
Tacoma Public Library
University of Washington Library, Government Publications
Washington State Library
Washington State University Library, Government Documents
Western Washington University, Mabel Zoe Wilson Library

## Organizations

ALS
American Rivers
Audubon Society (state)
Beak Consultants
Black Hills Audubon Society
Bloedel Timberlands
Blue Ribbon Coalition
Boise Cascade
Bullitt Foundation
Buse Timber and Sales
Center for Wildlife Conservation
Champion International
Clallam Conservation District
Columbia Gorge Audubon Committee
Council of Presidents
Daily Journal of Commerce
EASY
Environmental Resource Center
Forest Land Management Commission
Foster Wheeler Environmental
Great Western Lumber
Greater Ecosystem Alliance
Green Crow
Honor the Earth Children's Circle
Independent Forest Products Association
Inland Wood Specialties
Island Foresters
ITT Rayonier
League of Women Voters
Longview Fibre
Louisiana Pacific
Mantech Environmental
The Mountaineers
Murray Pacific Corporation
National Audubon Society
Nature Conservancy
NCASI
Northland Cable News
Northwest Biodiversity Center
Northwest Forestry Association
Northwest Timber Workers Resource Council
Olympic Peninsula Foundation
Pacific Lumber and Shipping
Parametrix
Peninsula Daily News
People for Puget Sound
Pilchuck Audubon Society
Plum Creek Timber
Pope & Talbot
Puget Sound Society for Conservation Biology
Quilcene Ancient Forest Coalition
Resources Northwest Inc.
Ridolfi Engineers
Rivers Council of Washington
Rosholt, Robertson & Tucker
Salmonid Foundation
Save Our Wild Salmon
Seattle Audubon Society

## Organizations (cont.)

Sierra Club
Simpson Timber
Skagit Audubon Society
Tahoma Audubon Society
The Wilderness Society
The Wildlife Society
Trout Unlimited
Washington Comm Forest Action Committee
Washington Contract Loggers Association
Washington Environmental Council
Washington Forest Protection Association
Washington Hardwoods Commission
Washington Native Plant Society
Washington Trout
Washington Wilderness Coalition
Washington Wildlife Federation
Western Forest Industries Association
Weyerhauser Company
Whidbey Audubon Society
Wild Salmon Center
Wind River Logging Company
World Wildlife Fund

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Jill Silver
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Rick Stewart
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Jim Stolasyeph
Urian Storm
Dan Stroh
Janet Strong
Scott Stumbaugh
Ed Summerfield
Carolyn Sundby
Alice Sutton
Paula Swedeen
Dave Sweitzer
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Larry Swift

Don Taggart
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Scott Taylor
Terry Teale
Lee Telnackj
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Toby Thaler
Steve Tharinger
Ed Thiele
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Rachel Thomas
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Julie Thompson
Les Thompson
Linda Thomson
Sonjia Thompson
David Tilford
Aaron Timss
Amy Tippery
Michelle Tirhi
Greg Tolbert
Diane Townsend
Ron Tressler
Sue Trettevik
Neil Turnberg
Milicent Turnberg
Robert Turner
Susan Turner
Ed Tuttle
Marnie Tyler

Brian Urbain

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Roy Wagner
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Dr. Tim White
David Whitehead
Shawna Whitman
Richard Whitmore
Steve Whitney
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Jennifer Wilkie
Mary Wilkost
Daryl Williams
Larry Williams
Maurice Williamson
J. Willits
Hannes Willroth
Adam Wilson
Scott Wilson
Bobby Winington
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Richard Winters
Gary Witmer
Shawna Wittman
Chuck Wittman (no address)
Steven Witzel
Keith Wolfe
Dave Wolfer
Vim Wright
Mike Wrigley
Keith Wyman

Richard Young

E. Zahn
Kathy Zaiser
Dan Zender
Oliver Zibel
F.R. Zimmerman
Craig Zora
Susan Zwinger

## Other

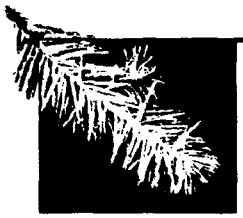
Matt (no last name given)

APPENDIX

3.

# Appendix 3 - Changes to DNR's draft Habitat Conservation Plan

# Appendix 3.1 Summary of Major Changes to the HCP in Response to Public Comment



# Appendix 3. Changes to DNR's draft Habitat Conservation Plan

## 3.1 Summary of Major Changes to the HCP in Response to Public Comment

### SPOTTED OWL STRATEGY

In planning management activities, DNR will consider any updated information provided by the USFWS on the location of spotted owl site centers in designated NRF areas.

When harvesting spotted owl habitat outside of designated NRF areas, DNR will consider recommendations of the USFWS for scheduling potential take of spotted owl site centers during the first decade of the HCP.

In the Klickitat Planning Unit, a portion of the designated NRF area has been shifted south to the middle portion of DNR's Buck Creek Block.

Some dispersal habitat area shifted from the North Puget Planning Unit to the Columbia Planning Unit and Klickitat Planning Unit.

### MARBLED MURRELET INTERIM STRATEGY

**Interim**

Outside of Southwest Washington (defined as west of Interstate 5 and south of Highways 8 and 12 from Olympia to Aberdeen), surveyed, unoccupied habitat will be released for harvest if it is not within 0.5 mile of an occupied site, and if, after harvest, at least 50 percent of the suitable marbled murrelet habitat on DNR-managed lands in the WAU would remain.

In Southwest Washington (as defined above) surveyed, unoccupied habitat will not be released for harvest unless (a) the long-term plan for the applicable planning unit has been completed, or (b) at least 12 months have passed since the initiation of negotiations of the draft long-term plan without completion of those negotiations.

Once the habitat relationship study is begun within a planning unit, the inventory survey and development of the long-term plan will follow uninterrupted; there will be no time gaps between these steps of the interim strategy.

## OTHER LISTED SPECIES

### Peregrine Falcon

Surveys will be conducted for aeries at cliffs judged to have potential for use by peregrines.

Trees will be retained along top and base of cliffs judged suitable for aeries.

## RIPARIAN STRATEGY

The riparian buffer width will be measured from the outer margin of the 100-year floodplain.

Type 4 and 5 waters classified after January 1, 1992 are assumed to be correctly classified. Type 4 and 5 waters classified prior to January 1, 1992 must either have their classification verified in the field or be assumed to be Type 3 waters.

A more complete and thorough road management strategy has been developed for the HCP. The strategy addresses road design, construction, use, maintenance, and abandonment.

All distances will be measured as horizontal distance, instead of slope distance.

## MULTISPECIES STRATEGY

### Talus

A distinction has been made between forested and nonforested talus and increased protection has been provided for nonforested talus.

### Cliffs

Increased protection of cliffs has been provided, especially for cliffs that are judged suitable for peregrine falcon aeries.

### Snags

Additional measures to retain existing large snags and green trees for the recruitment of future snags have been added to the HCP. An average of at least three snags shall be retained for each acre harvested, and, if available, snags retained will be at least 15 inches dbh and 30 ft tall. An average of at least 5 green trees will be retained for each acre harvested.

**Balds**

A conservation measure was added to protect balds. Road construction through balds shall be avoided, provided that routing of roads around balds can be accomplished in a practicable manner that is consistent with other objectives of a comprehensive landscape-based road network planning process.

**Mineral Springs**

Conservation measures were added to protect mineral springs. Management activities within 200 ft. of known mineral springs will be designed to retain adequate trees for perching and maintain berry, fruit, and mast producing trees and shrubs.

**Seeps**

Conservation measures have been added for seeps. Seeps greater than 0.25 acres will be treated as forested wetlands. That is, such features will be protected where part of an unstable hillslope. Research to study the affects on aquatic resources of forest management in around seeps and small wetlands will be included in the research program for Type 5 waters.

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# Appendix 3.2 Revisions to the Habitat Conservation Plan

## 3.2 Revisions to the Habitat Conservation Plan

Contents:
Executive Summary — No change

### I. Introduction

DNR's Habitat Conservation Plan — No change
Species Covered by the HCP — No change

### Land Covered by the HCP

**pg. I.2 - change second full paragraph:**
In Washington, the range of the northern spotted owl includes all of the western part of the state as well as lands on the east slopes of the Cascade Range. ~~DNR's habitat conservation plan covers DNR-managed trust lands within the spotted owl's range, except for those lands classified as urban or agricultural in DNR's geographic information system or leased for urban uses.~~ This HCP covers all DNR-managed forest lands within the range of the northern spotted owl, excluding those lands designated as urban or leased for commercial, industrial, or residential purposes and those lands designated as agricultural. All DNR management activities on these lands are covered. The total area of trust lands covered by the HCP is approximately 1,630,000 acres, of which all but about 50,000 acres are forested...

**pg. I.5 - change the last paragraph:**
While not subject to the HCP, DNR is given credit for the habitat contributions provided by these lands in terms of meeting the conservation objectives of the HCP. Whether these lands continue to provide ~~this~~ such contributions to the conservation objectives, and the remedy if they do not, will be discussed at each of the scheduled comprehensive reviews. (See the Implementation Agreement.) DNR's management of the Natural Area Preserves and Natural Resource Conservation Areas is not expected to increase the level of take for any species covered by the incidental take permit. DNR's management of these lands shall maintain the conservation objectives described in Chapter IV of the draft HCP. Should an unforeseen circumstance arise that increases the level of take, DNR will follow the process for making a major amendment to the HCP and ITP as outlined in the Implementation Agreement. Management of Natural Area Preserves and Natural Resource Conservation Areas is not intended to alter DNR's obligations for mitigation as set forth in this HCP.

Organization of the Planning Area — No change

### II. Planning Context

The Trust Duties — No change
The Endangered Species Act — No change

| | |
|---|---|
| Federal Plans and Rules for Recovery of the Northern Spotted Owl and Marbled Murrelet | No change |
| Other Wildlife Statutes and Regulations | No change |
| Environmental Laws | No change |
| The State Forest Practices Act | No change |
| DNR's Forest Resource Plan | No change |

## III. Biological Data for Species Covered by the HCP

| | |
|---|---|
| A. Northern Spotted Owl | No change |
| Species Ecology/Literature Review | No change |
| Spotted Owls on the Olympic Peninsula | No change |
| DNR's Survey Data | No change |
| B. Marbled Murrelet | No change |

### Species Ecology/Literature Review

**pg. III.42 - insert paragraph before subheading Mortality at Sea:**
The Service has designated critical habitat for the marbled murrelet (61 Federal Register no. 102 pp. 26255-26320). Most of this habitat designation includes lands that are to be managed as Late Successional Reserves under the President's Northwest Forest Plan (USDA and USDI 1994 a and b). Some nonfederal land has been included, the vast majority of which is DNR-managed land. Most of this land occurs in southwest Washington and on the Olympic Peninsula. The Service will conduct an assessment of the effects of the proposed HCP on designated critical habitat on DNR-managed lands in its Biological Opinion.

### DNR's Forest Habitat Relationship Studies

**pg. III.45 - insert into the first paragraph following the Definitions section:**
Observations will be made and data recorded according to procedures described in Methods for Surveying Marbled Murrelets in Forests: A Protocol for Land Management and Research (Ralph et al. 1994) and its 1995 supplement (Ralph et al. 1995b) and any subsequent updates or modifications as required by the Service.

## C. Other Federally Listed Species Within the Range of the Northern Spotted Owl

| | |
|---|---|
| Oregon Silverspot Butterfly | No change |

### Aleutian Canada Goose

**pg. III.47 - delete fourth paragraph and replace with:**
The Aleutian Canada goose (*Branta canadensis leucopareia*), a subspecies of the Canada goose, was downlisted by the federal government from endangered to threatened in 1990 (Federal Register v. 55, p. 51112). The subspecies is listed as endangered by the state. The subspecies is distinguished from the other locally ubiquitous species by a broad white

ring at the base of the neck. A major cause of the early decline of the Aleutian Canada goose was predation by foxes and other small mammals in the subspecies' nesting areas which are located on Buldir and Chagulak islands in the Aleutian Archipelago and on Kaliktagik in the Semidi Islands in Alaska. In the early 1800s, foxes were introduced onto the Aleutian Islands and neighboring islands as a fur supply, and some rodents were inadvertently introduced with the landing of ships. The winter range was not defined until the early 1970s. Wintering areas extend from Alaska to California and into parts of Japan. From less than 800 individuals in 1975, their numbers have increased to 12,000-14,000 individuals in 1994. The most recent counts indicate about 20,000 individuals. Currently the San Joaquin Valley, Northern California coast, and Sacramento Valley form the subspecies' main wintering area, but they also winter in western Oregon and southwestern Washington. They regularly stop in the Willamette Valley of Oregon in September or October. Their winter range is expanding as the population increases. The species may occur in the area covered by the HCP but only as a migrant or winter resident. Habitat used during migration or winter residency includes lakes, ponds, wetlands, grasslands, and agricultural fields. Control of foxes, use of seasonal Canada goose hunting closures to reduce incidental take, and conversion to nontoxic shot have all contributed to the recovery of the subspecies.

| | |
|---|---|
| Bald Eagle | No change |
| Peregrine Falcon | No change |
| Gray Wolf | No change |

## Grizzly Bear

**pg. III.50 - change first paragraph under heading Grizzly Bear:**
...However, these habitats alone would not be sufficient for supporting this species. Areas with little human disturbance may be preferred as habitat; ~~however, no actual analysis has been conducted in Washington to confirm this speculation (Almack et al. 1993)~~ many studies have shown the potential negative effect of human disturbance on grizzly bears (McLellan and Shackleton 1988; Kawsorn and Manley 1989; Mace and Manley 1993).

**pg. III.50 - change second paragraph under heading Grizzly Bear:**
All naturally vegetated land types are considered suitable grizzly bear habitat. Den sites of grizzly bears can be found in nearly any type of forest, but are typically in coniferous forests. Bears normally select den sites on steep slopes ~~above 5,670 feet~~ near the tree line (Almack 1986). Bears forage in many vegetation types in order to obtain sufficient plant and animal foods...

| | |
|---|---|
| Columbian White-tailed Deer | No change |
| D. Salmonids and the Riparian Ecosystem | No change |
| Introduction | No change |
| Anadromous Salmonid Life Cycle | No change |

## Bull Trout Life Cycle

**pg. III.54 - change first paragraph under "Bull Trout Life Cycle"**
The bull trout is a ~~category 1~~ candidate for federal listing. The genus Salvelinus, also known as Charr, belongs to the family Salmonidae...

| | |
|---|---|
| Salmonid Habitat Needs and the Riparian Ecosystem | No change |
| Status and Distribution | No change |

## E. Other Species of Concern in the Area Covered by the HCP

**pg. III.75 - add second paragraph:**
At the time of writing the draft HCP and the draft EIS, the USFWS used a system of classifying species that were candidates for listing as threatened or endangered into separate categories. Category 1 species were those for which the Service had sufficient information to issue a proposal for listing. Category 2 species were those for which existing information indicated that listing was possibly appropriate but sufficient data did not exist on the biological status of the species or threats to that species to warrant the issuance of a proposed rule. Both category 1 and category 2 species were considered as species of concern on the draft HCP and EIS. On February 28, 1996, the Service published an updated list of candidate species using a revised categorization system in the (Federal Register v. 61 no. 7596; USFWS 1996). Former category 1 species are now referred to simply as candidates for listing. Former category 2 species are no longer considered candidates for listing, though most of them have been retained on a list of federal species of concern (Federal Register v. 61 no. 26256 and USFWS list (1996). There are now two species in the HCP planning area that are candidate species - the spotted frog and bull trout. This appendix of the FEIS now reflects the change in federal candidate status of unlisted species of concern. Descriptions of former category 2 taxa are retained and still considered species of concern for the purposes of this HCP.

## Candidate Species for Federal Listing, State-listed Species, and Candidate Species for State Listing

## Mollusks

**pg. III.78 - change first paragraph:**
At least 120 species of mollusks occur in Washington. However, many species have yet to be described, and the distribution and habitat requirements of those that have been described are still not well understood (Frest 1993; Frest and Joannes 1993; Neitzel and Frest 1993). None of the 120 species are currently listed by either the federal or state government. ~~Four are candidates for federal listing (Federal Register v. 59, no. 58982 9028),~~ Three are federal species of concern (Federal Register v. 61 no. 7596; USFWS 1996) and numerous others are species of special concern.

**pg. III.78 - change second paragraph:**
This section is a summary of information obtained primarily from three mollusk experts: T. Burke (Washington Department of Wildlife), T. Frest (Deixis Consultants, Seattle), and A. Stock (Washington Natural Heritage Program). It addresses only the three federal ~~candidate~~ species of concern that may occur in the area covered by the HCP...

## Arthropods

**pg. III. 79 - change second full paragraph:**
Six species of arthropods that are known to occur or may occur in the HCP planning units are considered species of concern. One is federally listed (see Section C of this chapter titled Other Federally Listed Species) four are ~~candidates for~~ federal species of concern ~~listing (Federal Register v. 59, no. 219, p. 58982-9028),~~ and one is a candidate for state listing.

**pg. III.79 - change paragraph under heading Beller's Ground Beetle:**
The Beller's ground beetle (*Agonum belleri*) is a ~~candidate for~~ federal species of concern and a candidate for state listing (WDW 1993a). It occurs exclusively in eutrophic spegnum bogs of Washington, Oregon, and southwestern British Columbia (Johnson 1986; WDW 1991) that are associated with lakes below 3,280 feet in elevation, where it likely scavenges plant and animal material (Dawson 1965; WDW 1991)...

**pg. III.79 - change paragraph under heading Hatch's Click Beetle:**
Hatch's click beetle (*Eanus hatchi*) is a ~~candidate for~~ federal species of concern and a candidate for state listing (DW 1993a). Like Beller's ground beetle, Hatch's click beetle inhabits eutrophic sphagnum bogs in or near lakes at less than 3,280 feet in elevation (WDW 1991)...

**pg. III.79 - change paragraph under heading Fender's Soliperlan Stonefly:**
Fender's soliperlan stonefly (*Soliperla fenderi*) is a ~~category 2 candidate for~~ federal species of concern ~~listing~~. One specimen was collected from St. Andrews Creek in Mount Rainier National Park...

**pg. III.80 - change paragraph under heading Lynn's Clubtail:**
Lynn's clubtail (*Gomphus lynnae*) is a ~~category 2 candidate for~~ federal species of concern ~~listing~~. This species of dragonfly is known to prefer large rivers, but it has also been recorded at mountain lakes...

## Fish

**pg. III.80 - change paragraph under heading Fish:**
Four ~~federal candidate~~ species of fish considered federal species of concern (Federal Register ~~v. 59, no. 219, p. 589820-9028~~ v. 61 no. 7596; USFWS 1996), not including anadromous salmonids and bull trout, are known to occur in the HCP planning units; one of these species is also a candidate for state listing. Anadromous salmonids and bulltrout are discussed in Section D of this chapter titled Salmonids and the Riparian Ecosystem.

**pg. III.80 - change paragraph under heading River Lamprey:**
The river lamprey (*Lampetra ayresi*) is a federal ~~candidate for listing as a threatened~~ species of concern. The main threats to its continued existence are thought to be dams on mainstream rivers and habitat degradation...

**pg. III.81 - delete the heading Green Sturgeon and two related paragraphs**

**pg. III.81 - change paragraph under heading Olympic Mudminnow:**
The Olympic mudminnow (*Novumbra hubbsi*), a candidate for ~~both federal (category 2)~~ state listing in Washington, is jeopardized by its limited distribution and population isolation in drainages along the west coast of Washington, the Chehalis River, and the lower Deschutes River (Meldrim 1968; Harris 1974, Wydoski and Whitney 1979).

## Amphibians

**pg. III.81 - change last paragraph on page:**
Seven species of amphibians that occur in the area covered by the HCP are considered species of concern. ~~Five are~~ One is a candidates for federal listing (Federal Register v. 59, no. 219, p. 58982-9028), and four are federal species of concern. One of these is already listed by the state...

**pg. III.82 - change first paragraph under heading Larch Mountain Salamander:**
The Larch Mountain salamander (*Plethodon larselli*) is a ~~category 2 candidate for~~ federal ~~listing~~ species of concern; it is already listed by the state as sensitive (WDW 1992a). It was fist described a subspecies of the Van Dyke's salamander (*Plethodon vandykei*) (Burns 1954).

**pg. III.83 - change first paragraph under heading Tailed Frog:**
The tailed frog (*Ascaphus truei*) is a federal ~~candidate for listing as a threatened~~ species of concern. Its range lies between the Cascades and the Pacific coast from southwestern British Columbia to northwestern California, with a disjunct ~~portion~~ area in southeast Washington, northeast Oregon, and central Idaho (Leonard et al. 1993)...

**pg. III.84 - change first paragraph under heading Northern Red-legged Frog:**
The northern red-legged frog (*Rana aurora aurora*) is ~~currently~~ a ~~category 2 candidate for~~ federal ~~listing~~ species of concern ~~(WDW 1993a)~~. Northern red-legged frogs inhabit moist and riparian forests, typically below 2,790 feet in elevation in the Pacific Northwest (Nussbaum et al 1983; Stebbins 1985)...

**pg. III.85 - change first paragraph under heading Cascades Frog:**
The Cascades frog (*Rana cascadae*) is ~~currently~~ a ~~category 2 candidate for~~ federal ~~listing~~ species of concern ~~(WDW 1993a)~~. It is found in the Olympic Mountains and in the Cascade Range of Oregon, Washington and northern California, typically above 2,625 feet and in small bodies of water rather than in large lakes (Sype 1975; O'Hara 1981; Nussbaum et al. 1983)...

**pg. III.85 - change last paragraph on page:**
The spotted frog (*Rana pretiosa*) is currently a candidate for both federal ~~(category 1)~~ and state listing (WDW 1993a; Federal Register v. 61 no. 7596; USFWS 1996). Historically, spotted frogs ranged north to extreme southeastern Alaska, south to central Nevada and central Utah, and east to western Montana and northwestern Wyoming...

## Reptiles

**pg. III.86 - change first paragraph under heading Reptiles:**
Two species of reptiles that occur in the area covered by the HCP are considered species of concern. One is a ~~candidate for~~ federal ~~listing~~ species of concern (Federal Register ~~v. 59, no. 219, p. 58982-9028~~ v. 61 no. 7596; USFWS 1996) and is already listed by the state; the other is a candidate ~~only~~ for state listing.

**pg. III.86 - change last paragraph on page (under heading Northwestern Pond Turtle):**
The northwestern pond turtle (*Clemmys marmorata marmorata*) is currently a ~~category 2 candidate for~~ federal ~~listing~~ species of concern and is listed by the state as endangered (WDW 1993a). This species occurs at elevations from sea level to 6,000 feet from extreme southwestern British Columbia to the Sacramento Valley in California, principally west of the Sierra-Cascade crest (Bury 1970: Stebbins 1985)...

## Birds

**pg. III.88 - change first paragraph on page (under the heading Birds):**
In addition to the northern spotted owl and marbled murrelet, 15 bird species that occur in the area covered by the HCP are considered species of concern. Three of these species are federally listed and are discussed in Section C of this chapter titled Other Federally Listed Species. Five bird species are ~~candidates for~~ federal ~~listing~~ species of concern (Federal Register ~~v. 59, no. 219, p. 58982-9028~~ v. 61 no. 7596; USFWS 1996), one is already listed by the state, and seven more are candidates for listing only by the state.

**pg. III.88 - change first paragraph under heading Harlequin Duck:**
The harlequin duck (*Histrionicus histrionicus*) is a federal ~~candidate for listing as a threatened~~ species of concern ~~but~~ and is also a state game animal (WDFW 1995b). Harlequin nesting success is highly sensitive to human disturbance...

**pg. III.88 - change the paragraph under heading Northern Goshawk:**
The northern goshawk (*Accipter gentilis*) is a state (WDW 1993a) ~~and federal~~ candidate for listing as a threatened species and a federal species of concern...

**pg. III.90 - change paragraph under heading Black Tern:**
The black tern (*Chlidonias niger*), a ~~category 2 candidate for~~ federal ~~listing~~ species of concern is a common summer resident in eastern Washington and a migrant in western Washington (Wahl and Paulson 1991). It appears to migrate primarily along the coast (Haley 1984), but probably uses the Columbia River as a route from breeding areas in eastern Washington and British Columbia.

**pg. III.92 - change paragraph under heading Olive-sided Flycatcher:**
The olive-sided flycatcher *(Contopus borealis)* is a federal ~~candidate for listing as a threatened~~ species of concern. There may be evidence of a decline in the number of olive-sided flycatchers in the western United States, although data ~~is~~ are weak and the causes of this decline are uncertain (Hejl 1994; DeSante and George 1994)...

**pg. III.92 - change the paragraph under heading Little Willow Flycatcher:**
The little willow flycatcher *(Empidonax traillii brewsteri)* is a federal ~~candidate for listing as a threatened~~ species of concern. Data indicate a decline in the number of little willow flycatchers in the Pacific Northwest (Paulson 1992), althought there is uncertainty about the causes...

| | |
|---|---|
| Mammals | No change |
| F. Listed and Candidate Plants | No change |
| Non-vascular Plants and Fungi | No change |

## Vascular Plant Taxa of Concern

**pg. III.100 - delete last heading and last paragraph on page replace with:**
**FEDERAL CANDIDATE AND SPECIES OF CONCERN**
There are numerous vascular plant taxa known to occur, or suspected of presently occurring, in the area covered by the HCP that are candidates for federal listing under the Endangered Species Act or are species of concern to the U.S. Fish and Wildlife Service. These are listed in Tables III.16 and III.17. Additional information about these species can be obtained from DNR's Natural Heritage Program.

## IV. The Habitat Conservation Plan

| | |
|---|---|
| A. Minimization and Mitigation for the Northern Spotted Owl in the Five West-side and All East-side Planning Units | No change |
| Conservation Objective | No change |

### Conservation Strategy for the Five West-side Planning Units

**pg. IV.3 - last paragraph:**
Lands identified to provide demographic support and to contribute to maintaining species distribution shall be managed as NRF habitat. For the purposes of this HCP, NRF refers to habitat that is primarily high quality roosting/foraging habitat with sufficient amounts of nesting structure interspersed so that the entire area can be successfully utilized by reproducing spotted owls. See description of rationale for habitat definitions later in this section. Lands identified to facilitate dispersal shall be managed as dispersal habitat. Stand conditions for each of these habitat types are defined below. DNR-managed lands selected for NRF habitat management and dispersal habitat management are shown for each of the five west-side planning units in Maps IV.1-IV.5.

**pg. IV.4 - fifth paragraph:**
The amount of habitat on the combination of DNR NRF areas and federal reserves existing at the time timber harvest is planned for a WAU that contains designated NRF areas will be determined using the best information available. As the HCP is implemented, the amount of habitat on DNR-managed lands shall be field verified through a landscape assessment process. After initial field verification, habitat levels in WAUs containing DNR NRF management areas should be assessed every 10 years. DNR will not be required to field-verify habitat in federal reserves, but will rely on updated federal habitat inventories for lands within federal reserve status. Depending on the habitat conditions that exist at the time a WAU is entered for timber management, on of four possible scenarios would apply:

**pg. IV.6 - add new subparagraph (c):**
If more than 200 acres of sub-mature habitat occurs in the area in which this habitat serves as a buffer, *and* the WAU is over its habitat target, the amount over 200 acres can be harvested. Habitat of equal or better quality that is adjacent to a portion of the 300 acre nest patch or the remainder of the original 200 acre sub-mature buffer that will not be harvested must be immediately available to replace what is harvested - i.e., this provision cannot result in a degradation of habitat quality around the nest patch. If such harvest is planned during the breeding season, the harvest unit will be surveyed for spotted owl occupancy. Survey stations will be established such that an area 0.25 mile beyond the sale unit boundary is covered by the surveys. Four visits will be conducted in a single year at least one week apart. If a detection is made within the harvest area or within 0.25 mile of it, seasonal restrictions will apply. If no detections are made, the sale unit will be available for harvest for four years.

**pg. IV.6 - change subparagraph (c) to subparagraph (d) and change text:**
(e d) Nest habitat patches shall consist of the highest quality nesting habitat available in each 5,000-acre block and shall be identified using one of the following methods, listed in order of preference. Identification of nest habitat patches shall occur during the first year of HCP implementation. The Services will review placement of nest patches at the 1-year review.

**pg. IV.6 and IV.7 - change paragraph i:**
The location of known status 1 and 2 spotted owl site centers (sites where spotted owl pairs have been located) should be used as a starting point for delineating 300 acres of nesting habitat...All available Type A habitat should be included before Type B habitat is counted as part of a 300-acre nest patch.

**pg. IV.7 - change paragraph iii:**
...Forest stands that meet the Type A or B definitions can be counted toward the 300 acres of nesting habitat. All available Type A habitat should be included before Type B habitat is counted as part of a 300-acre nest patch.

**pg. IV.7 - change paragraph v:**
If there are no 300-acre nest patches that meet either the high-quality habitat definition or the Types A or B habitat definitions within a particular 5,000-acre block, the next highest quality 300-acre habitat patches should be identified...

**pg. IV.7 - change paragraph ~~d~~ e:**
(~~d~~e) ~~Nesting areas~~ The 300 acre nest patches shall be deferred from harvest until DNR can demonstrate the successful application of silvicultural techniques to create functional nesting habitat in managed stands...

**pg. IV.8 - replace paragraph (c) with:**
(c) DNR will submit proposed exceptions to the Service. If the Service does not agree with the proposal, a multi-agency science team, including staff specialists from DNR, the Service, and any third party scientist the Service deems appropriate, shall be convened to resolve any outstanding issues.

**pg. IV.9 - change second paragraph:**
~~If a spotted owl nest site is known to occur in a planned harvest area, seasonal harvest restrictions times to avoid the breeding season shall be observed within a 0.7 mile radius of the nest site.~~ In WAUs that are above the habitat target, DNR will avoid harvest of habitat within 0.7 mile of known nest sites during the breeding season. DNR will use any updated information on nest site locations provided by the Service.

**pg. IV.9 - change the fifth paragraph:**
When harvesting spotted owl habitat outside of designated NRF areas, DNR will consider recommendations of the USFWS for scheduling potential take of spotted owl site centers during the first decade. This will be done in order to retain sites that may have a valuable short-term contribution to the population. Otherwise, ~~T~~the provisions of the spotted owl strategy do not place any special conditions upon forest stands in WAUS that are not designated to provide habitat for the spotted owl...

**pg. IV.9 - change the paragraph under heading "Management in WAUs Not Designated to Provide Habitat for Spotted Owls":**
...If a spotted owl nest site is discovered during timber sale planning in the stand not designated to provide spotted owl habitat, seasonal harvest restrictions timed to avoid the breeding season shall be observed with a ~~0.7 mile radius of~~ 70 acre core surrounding the nest site.

**pg. IV.9 - change the first paragraph under "Salvage Operations and Activities Related to Forest Health":**
DNR's HCP conservation strategies include commitments to develop and maintain wildlife habitat (in this case, NRF habitat and dispersal habitat for the northern spotted owl) over time in designated amounts and areas. In general, such conservation commitments made in the HCP will take priority over other DNR management considerations. However, these conservation commitments may, in some cases, be inconsistent with activities DNR must consider under state statutes pertaining to salvage (RCW 79.01.795) and forest health (RCW 76.06.040) ~~may require DNR to make~~

~~decisions that may not be consistent with the habitat conservation commitments made in the HCP~~.

**pg. IV.9 - change the second paragraph under "Salvage Operations and Activities Related to Forest Health":**

~~For example,~~ salvage operations might be considered by the DNR for reasons such as windthrow, fire, disease, or insect infestation. Activities related to forest health might include risk reduction through underburning, thinning, or harvest to stop spread of disease or insect infestation.

**pg. IV. 9 - change the third paragraph under "Salvage Operations and Activities Related to Forest Health":**

When DNR determines that ~~consideration of activities inconsistent with the commitments made in the HCP is necessary, consultation~~ such potential exists, discussions shall be held with the U.S. Fish and Wildlife Service. ~~DNR shall provide the U.S. Fish and Wildlife Service with complete descriptions of the situation making consideration of such activities necessary, the activities under consideration, and the expected impacts of the activities to the situation and to the HCP conservation strategies.~~ If ~~the U.S. Fish and Wildlife Service determines~~ it is determined that such activities would adversely impact the HCP conservation strategies, DNR and the U.S. Fish and Wildlife Service shall identify additional mitigation that would allow the necessary activities to go forward.

**pg. IV.9 - add a fourth paragraph under "Salvage Operations and Activities Related to Forest Health":**

In conducting salvage activities, DNR shall, to the extent practicable:

- minimize the harvest of live trees to those necessary to access and complete the salvage activity, and
- maximize and clump the retention of large, safe, standing trees to provide future snags; and consider opportunities to retain concentration of snags and/or coarse woody debris which may benefit species such as black-backed and three-toed woodpeckers.

**pg. IV.10 - add to end of the paragraph with heading "Support of Federal Reserves":**

Proposals for such changes would be developed by DNR and submitted to the Services. A multi-agency science team may be convened to resolve questions regarding the biological basis of the proposal.

**pg. IV.10 - change the first bullet of the fourth paragraph:**

- At least 31 trees per acre are greater than or equal to 21 inches dbh with at least 15 trees, of those 31 trees, per acre greater than or equal to 31 inches dbh.

**pg. IV.12 - add to end of the paragraph with heading "Nesting Habitat":**

Proposals for such changes would be developed by DNR and submitted to the Services. A multi-agency science team may be convened to resolve questions regarding the biological basis of the proposal.

**pg. IV.15 - change the fourth paragraph:**
The recommendation for arranging nesting habitat in a 300 acre nest patch within a larger 500 acre patch of suitable habitat is based on studies that demonstrate increasing probability of spotted owl occupancy with increasing amount of habitat close to site centers and studies that show concentrated use of habitat within 0.7 mile of site centers. In a study of ~~125~~ 61 spotted owl sites on the east slope of the Cascades, Irwin and Martin (1992) ~~demonstrated that the probability of occupancy increase with the amount of suitable habitat in a 500 acre circle. Their study showed that probability of occupancy exceeded 90 percent where there was more than 300 acres of habitat within a 0.5 mile radius circle.~~ found that spotted owl sites that were occupied either one or two years of a two-year survey had an average of 252 acres (s.d. = 20) of suitable habitat within a 0.5 mile circle in managed stands and 316 acres (s.d. = 20) in a 0.5 mile circle in unmanaged stands. There was a strong statistical relationship between the amount of habitat found at sites with 0, 1, or 2 years of occupancy at 0.5, 1.0, 1.5, and 2.0 miles from the site center with the strongest relationship occurring at 0.5 mile. Data on the amount of habitat found within 0.5 mile of occupied sites was used in a logistic regression analysis to predict occupancy. Their analysis predicted a 90 percent chance of pair site occupancy when there were 300 acres of suitable habitat within 0.5 mile of a site center. This study provided predictive abilities and did not establish minimum amounts of habitat needed by owls. As stated above, this study was conducted on the east side of the Cascade Crest where owl responses to habitat quality and quantity are different from forests on the west side of the Cascade Crest. DNR believes that patches of this size, in combination with surrounding sub-mature forest will provide the necessary habitat to support nesting owls in proximity to federal lands.

**pg. IV.16 - change the first paragraph:**
...Based on this information, it is reasonable to arrange ~~high quality nesting~~ habitat in contiguous 500-acre patches (300 acres of high-quality nesting habitat and 200 acres of at least sub-mature habitat) within a 0.7-mile-radius circle.

## Conservation Strategy for the Three East-side Planning Units

**pg. IV.20 - change first paragraph after the bullets:**
~~If a spotted owl nest sit is known to occur in a planned harvest area, season harvest restrictions timed for the breeding season shall be observed within 0.7 mile radius of the nest site.~~ In WAUs that are above the habitat target, DNR will avoid harvest of habitat within 0.7 mile of known nest sites during the breeding season. DNR will consider any updated information on nest site locations provided by the Service.

**pg. IV.21 - first paragraph:**
When harvesting spotted owl habitat outside of designated NRF areas, DNR will consider recommendations of the USFWS for scheduling potential take of spotted owl site centers during the first decade. This will be done in order to retain sites that may have a valuable short-term contribution to the population. Otherwise, ~~T~~the provisions of the spotted owl strategy do not place any special conditions upon forest stands in WAUs that are not

designated to provide habitat for the spotted owl..season shall be observed within a ~~0.7 mile radius of~~ 70 acre core surrounding the nest site.

**pg. IV.21 - delete all three paragraphs under "Salvage Operations and Activities Related to Forest Health" and replace with:**

DNR's HCP conservation strategies include commitments to develop and maintain wildlife habitat (in this case, NRF habitat and dispersal habitat for the northern spotted owl) over time in designated amounts and areas. In general, such conservation commitments made in the HCP will take priority over other DNR management considerations. However, these conservation commitments may, in some cases, be inconsistent with activities DNR must consider under state statutes pertaining to salvage (RCW 79.01.795) and forest health (RCW 76.06.040).

For example, salvage operations might be considered by DNR for reasons such as windthrow, fire, disease, or insect infestation. Activities related to forest health might include risk reduction through underburning, thinning, or harvest to stop spread of disease or insect infestation.

When DNR determines that such potential exists, discussions shall be held with the U.S. Fish and Wildlife Service. If it is determined that such activities would adversely impact the HCP conservation strategies, DNR and the U.S. Fish and Wildlife Service shall identify additional mitigation that would allow the necessary activities to go forward.

In conducting salvage activities, DNR shall, to the extent practicable:

- minimize the harvest of live trees to those necessary to access and complete the salvage activity, and
- maximize and clump the retention of large, safe, standing trees to provide future snags.

| | |
|---|---|
| Rationale for the Spotted Owl Conservation Objective and Strategies | No change |
| Current Habitat and Projected Habitat Growth in Nesting, Roosting, and Foraging and Dispersal Management Areas | No change |
| Potential Benefits and Impacts to Spotted Owls | No change |
| B. Minimization and Mitigation for the Marbled Murrelet in the Five West-side and the Olympic Experimental State Forest Planning Units | No change |

## Conservation Objective

**pg. IV.39 - change the second paragraph:**

While the amount of scientific information that is available for this species has increased dramatically in recent years, it is still extremely limited. Additionally, no recovery plan ~~and no designation of critical habitat~~ for this species ~~have~~ has been adopted by the federal government, although a draft proposal~~s for both have~~ has been recently released. A final rule for critical habitat has been published. (See the discussion of these ~~draft~~ proposals in Chapter II.)

**pg. IV.40 - change Step 3:**
Following completion of the habitat relationship study in each planning unit, marginal habitat types that would be expected to contain a maximum of 5 percent of the occupied sites on DNR-managed lands within each planning unit shall be identified and made available for harvest. However, no know occupied sites will be released; they shall all be protected.

**pg. IV.40 - change Step 4:**
In each planning unit, all acreage constituting the higher quality habitat types (i.e., those not identified as available for harvest under Step 3) shall be included in an inventory survey, using Pacific Seabird or other ~~commonly accepted~~ protocol approved by the USFWS if available, to locate occupied sites. Outside of Southwest Washington [1], surveyed, unoccupied habitat will be released for harvest if it is not within 0.5 mile of an occupied site and after harvest, at least 50 percent of the suitable marbled murrelet habitat on DNR-managed lands in the WAU would remain. Within Southwest Washington[1], surveyed, unoccupied habitat will **not** be released for harvest unless (a) the long-term plan (see Step 5 below) for the applicable planning units has been completed or, (b) at least 12 months have passed since the initiation of negotiations of the draft long-term plan without completion of those negotiations. ~~Surveyed unoccupied habitat will be available for harvest if such harvest adheres to all other provisions of the HCP, Forest Practices regulations, and policies of the Board of Natural Resources.~~

**pg. IV. 40 - change Step 5:**
After Steps 1-4 are completed for each planning unit, the information obtained during these and other research efforts shall be used to develop a long-term conservation plan for marble murrelet habitat on DNR-managed HCP lands within that planning unit. The habitat relationship study, inventory survey, and development of the long-term plan will occur consecutively within each planning unit - i.e., there will be no time gaps between Steps 2, 3, and 4. Negotiation of the draft long-term conservation plan for a planning unit will commence with the Service within 12 months of completion of the inventory surveys for that planning unit. All decisions made in Steps 1-4 above shall be reviewed as part of this process. (For example, it may be that some of the marginal habitat or surveyed unoccupied habitat made available for harvest in Step 3 or Step 4 will be identified as important to protect in the long-term plan.) ~~These plans shall then be included in the HCP by amendment.~~ Once all individual planning unit plans are complete, a comprehensive review shall be conducted and modifications made if required. DNR will submit its proposal for long-term plans to the Service for approval. DNR may convene a multi-agency science team to resolve issues of disagreement over the proposal.

[1] For the purposes of the marbled murrelet strategy, Southwest Washington is defined as that portion of the Columbia Planning Unit west of Interstate 5 and that portion of the South Coast Planning Unit that is located south of Highway 8.

## Habitat Definitions

**pg. IV.42 - change first paragraph:**
...Platforms are counted only in conifer trees and only if located within the live crown. When trained staff are counting platforms for the number per acre calculation, all platforms fitting this description should be included...

## Possible Components of a Credible Long-term Conservation Strategy

**pg. IV.44 - insert new paragraph prior to heading Potential Benefits and Impacted to Marbled Murrelets:**
The long-term conservation plan developed by DNR would likely include information on the location of occupied sites, the distribution of habitat in each planning unit, current research results, landscape-level analysis and considerations, and the site-specific management plans developed by DNR. The long term plan would address such factors as developing habitat where gaps exist, developing or maintaining replacement habitat, and would protect the vast majority of occupied sites. This process should result in a comprehensive, detailed landscape-level plan that would help meet the recovery objectives of the USFWS, contribute to the conservation efforts of the President's Northwest Forest Plan, and make a significant contribution to maintaining and protecting marbled murrelet populations in western Washington over the life of the HCP.

## Potential Benefits and Impacts to Marbled Murrelets

**pg. IV.44 - add to the end of the first bullet:**
There will likely be a small impact to the population from not including potential habitat on DNR-managed lands beyond 50 miles from marine waters.

## C. Minimization and Mitigation for Other Federally Listed Species in All Planning Units

## Oregon Silverspot Butterfly

**pg. IV. 45 -new second paragraph under heading "Oregon Silverspot Butterfly":**
In addition, DNR will not harvest timber, construct roads, or apply pesticides within 0.25 mile of an individual occurrence of an Oregon silverspot butterfly, documented by WDFW. In places where DNR believes that effective conservation can be provided in a more efficient way, DNR may present to the USFWS a site-specific management plan that provides adequate protection for the species or habitat occurring at that site. If the USFWS do not approve of the plan, then a multi-agency science team will be convened. The team will evaluate the plan and determine if it is adequate, and if it is not, recommend additional measures that should be taken to make it so.

Aleutian Canada Goose — No change

## Bald Eagle

**pg. IV.46 - add to the first paragraph:**
...Under this HCP, all DNR forest management activities in the area covered by the HCP shall comply with state Forest Practices Rules and state wildlife regulations and shall be consistent with the policies set forth by the Board of Natural Resources. When developing a site management plan for bald eagle habitat pursuant to WAC 232-12-292 DNR will, where appropriate, consider perch/pilot trees and foraging areas associated with nesting sites, winter roost trees, and winter feeding concentration areas. In addition to protection of nesting trees and the immediate vicinity.

## Peregrine Falcon

**pg. IV.46 - change the last paragraph:**
...In addition, in east- and west-side planning units and the Olympic Experimental State Forest, DNR shall ~~restrict public access to DNR-managed lands within 0.5 mile of any peregrine falcon aerie, and DNR, U.S. Fish and Wildlife Service, and Washington Department of Fish and Wildlife shall keep the locations of aeries on DNR-managed lands confidential to the extent permitted by law~~ where practicable:

- review and, where necessary, manage public access to DNR-managed lands within 0.5 mile of a known peregrine falcon aerie,
- conduct field review, by staff knowledgeable of peregrine biology and requirements, of all cliffs in excess of 150', and conduct surveys for peregrine falcon aeries at cliffs judged to have likely potential for use,
- protect ledges on cliffs judged suitable for aeries,
- retain trees along the base and top of cliffs judged suitable for aeries, especially perch trees along the top of cliffs, and
- keep the location of peregrine falcon aeries on DNR-managed lands confidential to the extent permitted by law.

## Gray Wolf

**pg. IV. 47 - Insert new first paragraph under heading Gray Wolf:**
The status of the gray wolf within the proposed HCP area is unknown. However, it is likely that even if absent now, wolves will emigrate and reside in this area during the Permit period. Biologically, the fate of the wolf is linked to that of its prey, which includes large herbivores such as elk and deer, and smaller mammals such as the snowshoe hare. No "recovery areas" have yet been designated for the gray wolf in the Washington Cascades. DNR will evaluate the amount of habitat for preferred wolf prey species and prioritize areas that have a higher likelihood of providing adequate habitat for the preferred prey species.

**pg. IV.47 - change third paragraph:**

~~Additional conservation of gray wolves and their habitat will be provided by the HCP riparian and spotted owl conservation strategies and by the following specific measures for managing potential gray wolf habitat on DNR managed lands in the area covered by the HCP.~~ DNR believes that the combination of riparian and marbled murrelet strategies in western Washington, and the spotted owl strategy and improved road management plan in both western Washington and the east-side planning units will provide support to gray wolves. Additionally, DNR will attempt to avoid or minimize potential impacts to gray wolves by maintaining habitat in a condition that allows wolves and their important prey species to meet their essential biological needs by providing:

**pg. IV.47 - add new first bullet:**

- Den Site and Rendezvous Site Protection

**pg. IV.47 - change second bullet:**

- DNR, in ~~consultation~~ cooperation with the ~~Washington Department of Fish and Wildlife or~~ U.S. Fish and Wildlife Service, shall develop and implement practicable~~, economically reasonable,~~ site-specific plans to limit human disturbance within the wolf habitat management area. If the USFWS does not approve of the plans, then a multi-agency science team will be convened. The team will evaluate the plans and determine if they are adequate, and if not, recommend additional measures that should be taken to make them adequate.

**pg. IV.47 - add two additional bullets after last bullet:**

- Provisions for Prey Habitat Conditions - Habitat management for wolves is primarily directed at habitat for its prey species (USFWS 1984). The most important prey species in the HCP area are deer and elk. The species use edges between cover (older forest ) and forage habitats (stand initiation, shrub/sapling, and younger forest). The creation and maintenance of edge habitat through timber harvest activities will provide adequate habitat for wolf prey species.

- Road Management - DNR will attempt to provide more secure conditions for both prey species and wolves. Minimal contact with humans has been cited as the second most important biological necessity for wolf recovery (USFWS 1984). DNR has been involved in cooperative road closures with WDFW and the Forest Service to restrict vehicular activity to maintain or increase big game security and reduce hunting pressure. DNR will continue to participate in such cooperative activities. Ungulate fawning/calving and wintering areas are areas where wolves are most likely to occur. To the extent practicable, DNR will schedule forest management activities, including road construction and use, to occur at times of the year when wolves are least likely to be present.

## Grizzly Bear

**pg. IV.48 -insert after the first paragraph on Grizzly bears:**
The federal and State wildlife agencies believe that grizzly bears occur, at least occasionally, within the North Cascades Grizzly Bear Recovery Zone. The Recovery Zone contains in excess of 6,000,000 acres including approximately 260,000 acres of DNR-managed forest lands. Less than 100,000 acres of the DNR-managed land, representing less than 2 percent of the Recovery Zone, is included within the area covered by the proposed HCP.

The DNR-managed lands covered by the HCP and within the Recovery Zone can be described as occurring in four locations: Skagit Valley, Spada Lake, the west side of the Methow Valley, and a group of separate sections between Wenatchee and Lake Chelan and surrounded by Forest Service land. In each of these areas, the DNR-managed lands lie on the periphery of the Recovery Zone between Federal ownership and areas of human occupancy and related activity. DNR believes the best use of lands it manages is to serve as a buffer between the federal ownership, where active recovery efforts are most likely to occur, and the areas of increased public use. DNR believes that this role will be sufficiently supported by the combination of other strategies contained within the HCP.

**pg. IV.48 - change second Grizzly Bear paragraph:**
~~Additional conservation of grizzly bears and their habitat will be provided by the HCP riparian and spotted ow conservation strategies and by the following specific measures for managing potential grizzly bear habitat on DNR managed lands in the area covered by the HCP~~ DNR believes that the combination of riparian and marbled murrelet strategies in western Washington, and the spotted owl strategy and improved road management plan in both western Washington and the east-side planning units will provide support to grizzly bears. In addition, DNR proposes to provide the following site-specific measures:

**pg. IV.48 - change second bullet:**

- DNR, in ~~consultation~~ cooperation with the ~~Washington Department of Fish and Wildlife or~~ U.S. Fish and Wildlife Service, shall develop and implement practicable~~, economically reasonable,~~ site-specific plans to limit human disturbance in the grizzly bear habitat management area.

Columbian White-tailed Deer — No change

## D. Riparian Conservation Strategy for the Five West-side Planning Units

## Conservation Objectives

**pg. IV.51 - add new fifth paragraph:**
The Services are prioritizing watersheds for the conservation of salmon. DNR will consider the results of this prioritization when planning its participation in Watershed Analysis.

**pg. IV.51 and IV.52 - change last paragraph on p. 51 and first paragraph on p. 52:**
As described in Section ~~C~~ D of Chapter III titled Salmonids and the Riparian Ecosystem, salmonid habitat includes the entire riparian ecosystem, and therefore, conservation objective (1) requires maintaining or restoring the riparian ecosystem processes that determine salmonid habitat quality. Also, as described in Section ~~C~~ D of Chapter III, hydrological and geomorphological processes originating in upland areas may also affect salmonid habitat...

## Conservation Components

**pg. IV.52 - add to end of the fourth full paragraph:**
A riparian buffer 100 feet wide shall be applied to both sides of Type 4 waters. Type 4 waters classified after January 1, 1992, are assumed to be correctly classified. Type 4 waters classified prior to January 1, 1992, must either have their classification verified in the field or be assumed to be Type 3 waters. In general it is currently standard practice for DNR staff to physically examine the classification of streams within a management unit when preparing the unit for a timber sale. If an area has already been classified post 1992 and prior to the effective date of this HCP, it is likely in a management activity that is probably sold and/or harvested. Therefore, for all practical purposes, stream typing will be examined or verified in the field whether they were typed before or after 1992.

**pg. IV.52 - change sixth paragraph:**
In the field, the width of the riparian buffer shall be measured as the ~~slope~~ horizontal distance from, and perpendicular to, the outer margin of the 100 year floodplain ~~active channel margin~~. ~~For the purpose of mapping and accounting, the width of the riparian buffer will be reported as horizontal distance.~~

**pg. IV.52 - delete entire last paragraph and replace with:**
Average buffer widths are given in Table IV.7. as average horizontal distances measured outward from the outer margin of the 100-year floodplain on either side of the stream. The 100-year floodplain is the valley-bottom area adjoining the stream channel that is constructed by the stream under the present climatic regime and overflowed at times of very high discharge (i.e., flooding associated with storms of a 100-year recurrence interval; Dunne, T., and L.B. Leopold. 1987). One-hundred-year floodplains commonly are delineated by the Federal Emergency Management Agency (FEMA) on Flood Insurance Rate Maps (FIRM) for each county of the state. The 100-year floodplain includes meandering, braided (i.e., multiple channel braids), and avulsion channels, as well as side channels that transport water from one part of a mainstream channel to another. Avulsion channels are portions of mainstream and side channels that have been abandoned temporarily by lateral displacement of the channel network elsewhere on the floodplain but are expected to be reoccupied when the network migrates back across the valley bottom.

The 100-year floodplain, which often encompasses the channel-migration zone, frequently occupies a several-hundred-foot wide section of the valley bottom on low-gradient, alluvial river systems. On higher-gradient streams in moderate to steep terrain,

the 100-year floodplain typically coincides with the active channel margin or extends only a few feet beyond the active (e.g., the high-water mark). The active channel consists of the wetted area and bed or bank surfaces exposed during low flows, as well as portions of the valley bottom nearest the channel that are inundated during typical flood events (i.e. comparable to the two-year recurring flood). Active channel margins commonly are identified in the field by piles of accumulated flood debris, overbank sediment deposits, streamside vegetation altered or damaged by channel flows, bank scour, and the absence of aquatic biota (e.g., algae) normally found in slack-water channels. In the five west-side planning units and the OESF, DNR manages only a few hundred acres on 100-year floodplains of the major river systems. Most floodplain acreage is privately owned or federally managed. FEMA maps indicate that most 100-year floodplains are associated with Type 1 and 2 water. Collectively, Type 1 and 2 waters represent less than 5 percent of stream miles on DNR-managed lands. Hence, the impact to DNR management associated with using the 100-year floodplain as the inner margin of riparian management zones is relatively negligible.

**pg. IV.54 - delete bullets (1) through (4) at top of page and add new paragraph:**
If Type 4 and 5 waters without fish become fishbearing upon removal of obstructions, they will be reviewed for proper typing. Type 4 or 5 waters documented to contain fish that are proposed or candidates for federal listing or federal species of concern will be treated as Type 3 waters, if appropriate.

**pg. IV.54 - change second paragraph:**
All Type 5 waters that flow through an area with a high risk of mass wasting shall be protected as described in the subsection below... In addition, during this interim 10-year period, a research program shall be initiated to study the effects of forest management along Type 5 waters ~~on aquatic resources~~ located on stable slopes. At the end of the 10 years, a long-term conservation strategy for forest management along Type 5 waters shall be developed and incorporated into this HCP as part of the adaptive management component of this HCP.

**pg. IV.54 - insert new paragraph prior to heading "Wind Buffers":**
Type 5 waters classified after January 1, 1992 are assumed to be correctly classified. Type 5 waters classified prior to January 1, 1992, will either have their classification verified in the field or be assumed to be Type 3 waters.

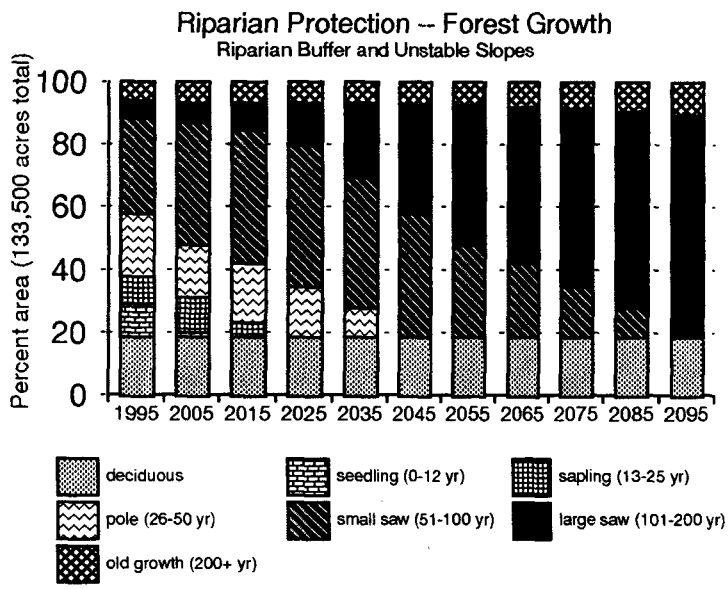
**pg. IV.54 - change subparagraph (1) at bottom of page:**
(1) No timber harvest shall occur within the first 25 feet (~~slope~~ horizontal distance) from the outer margin of the 100 year floodplain.

**pg. IV.55 - change subparagraph (2) at top of page:**
(2) The next 75 feet of the riparian buffer shall be a "minimal-harvest" area. Activities occurring between 25 and 100 feet (~~slope~~ horizontal distance) from the ~~active channel~~ 100 year floodplain must not appreciably reduce stream shading, the ability of the buffer to intercept sediment, or the capacity of the buffer to contribute detrital nutrients and large woody debris...

**pg. IV.55 and 56 - delete last three paragraphs on pg. IV.55 and the first paragraph on pg. IV.56, and replace with:**

To accommodate the greater flexibility afforded by managing riparian areas on a site-specific basis and the uncertainties surrounding the results of these activities conducted over time, an adaptive-management process will be used to specify management activities within riparian-management areas. Mechanisms used to achieve conservation objectives will vary as new information becomes available.

DNR believes that this strategy will lead, over time, to an age-class distribution within the riparian zones as depicted by the following graph:




Methods for making site-specific, forest-management decisions in the riparian mangement zones and wind buffers will be described in DNR's implementation guidelines. These guidelines will be developed by DNR and provided to the Services for their review prior to being implemented. These guidelines will, at a minimum:

a. Describe in detail the conservation objectives. These objectives will include desired outcomes for such items as maintaining bank stability, water temperature, shade, and natural sedimentation rates; retention of large trees and snags necessary to support viable populations of riparian wildlife and recruit future snags, coarse woody debris (downed logs on land), and large woody debris (in-stream logs); and maintaining the natural capacity of these areas to provide

diversity including overstory composition, understory composition, detritus inputs, and natural pool frequencies.

b. Define terminology, activities, and prescriptions. For example, single-tree removal may be defined in terms of distance between removed trees and years between entries and may vary by site. It is expected that additional considerations such as lean of the tree, distance from stream bank, size, soundness, and abundance of other mature conifer would be factors considered during a site-specific analysis. The implementation procedures will provide guidance on how to incorporate those types of considerations. Similarly, the implementation procedures may describe how considerations of the rooting zone may extend the 25-foot no-harvest area on a site-specific basis using canopy diameters or other such indicators. Terms such as restoration, single-tree removal, minimal harvest, low harvest, etc. would be defined for each component of the riparian management zones and wind buffers. Prescriptions for placement of yarding corridors and other such activities would also be included.

c. Detail the monitoring methods to be used in the feedback process for adaptive management designed to ensure the riparian-management zones and wind buffers are adequately providing the desired characteristics (e.g., LWD, stream stability, water temperature, snag densities, etc.); and

d. Describe the training to be provided to agency staff.

These procedures will be developed by DNR and presented to the Services within 12 months of the signing of the HCP documents. If the Services do not agree with the procedures developed by DNR, a multi-agency science team will be convened to review the sufficiency of the procedures. Timber harvesting conducted within the riparian management zones and wind buffers prior to agreement on the proposed agency procedures will be subject to the following limitations:

a. Within the 25-foot "no harvest" zone, only commonly accepted restoration activities may occur; and,

b. Within the "minimal harvest zone," "low harvest zone," and "wind buffer," partial harvests may occur that remove no more than 10% of the conifer volume and/or 20% of the hardwood volume per rotation.

However, if 3 months have passed since the Services have received procedures developed by DNR and the agencies have been unable to reach agreement on their sufficiency, DNR may increase timber harvest within the riparian management zones and wind buffers with the following limits:

a. Within the 25-foot "no harvest" zone, only commonly accepted restoration activities may occur;

b. Within the "minimal harvest zone," single tree or partial harvests may occur that remove up to 10% of the volume;

c. Within the "low harvest zone," partial harvests may occur that remove up to 25% of the volume; and,

d. Within the "wind buffer," partial harvests may occur that remove up to 50% of the volume.

**pg. IV. 56 - change the second paragraph:**

~~No harvest shall occur on hillslopes with a high risk of mass wasting.~~ Unstable hillslopes will be identified through field reconnaissance or identified with slope geomorphology models (e.g., Shaw and Johnson 1995) and verified through field reconnaissance with qualified staff... A method for delineating on a site-specific basis the portions of hillslopes with a high risk of mass wasting will be described in agency procedures to be developed for this HCP. Where slope stability models are less accurate (i.e., Southwest Washington), DNR will also rely on additional information, such as soil types databases.

**pg. IV.56 - change the second bullet:**

- a site-specific assessment of alternatives to new road construction (e.g., yarding systems) and the use of such alternatives where ~~they are economically reasonable~~ practicable and consistent with conservation objectives;

**pg. IV.56 - add the following to the end of the section on "Road Network Management":**

**Background**

Impacts from roads have been indicated as important potential influences on many species of wildlife and fish and their habitats. For example, elk use closed roads as travel corridors (Ward 1976). Also, both elk and deer use of habitat increases with increasing distance from open roads (Lyon and Jensen 1980; Lyon 1979; Perry and Overly 1977).

Grizzly bears generally avoid roads and associated human disturbance, and the Grizzly Bear Recovery Plan recognizes road management as the single most important tool to manage and maintain suitable grizzly habitat (USDI 1993).

Wolf dens and rendezvous sites are often characterized by distance from human activity, and the Rocky Mountain Wolf Recovery Plan states, "Habitat for wolves is an adequate supply of vulnerable prey (ideally in an area with minimal opportunity for exploitation of wolves by humans)" (USDI 1987).

The WDFW Draft Bull Trout/Dolly Varden Management and Recovery Plan (1992) recommends closing roads permitting public access to spawning areas or access that facilitates poaching. Additional riparian impacts include increased sedimentation from road runoff and increased rates of slope failure caused by improperly constructed or poorly maintained roads (Murphy 1995.).

The effects that roads have on the environment are influenced by what happens during the six distinct phases of road development: planning, design, construction, use, maintenance, and abandonment.

The planning phase determines road location across a landscape and has the single most significant impact on road density and road net configuration. In general, road spacing is determined by an economic balance between environmentally sound road transportation costs and environmentally sound yarding costs. At the site level, road spacing is controlled by topography that controls landing locations which are ultimately connected by a road network. Unstable slopes, wetlands, sensitive habitat, and other environmental issues are best addressed at this early stage as the location of a road will likely change very little once the control points are established.

The design phase ensures that a road will be built from one control point to another with sufficient width, usable grades, proper alignment, use of non-erosive surfacing material, adequate water drainage features, and stable cut-and-fill slopes.

Compliance with construction standards ensures that the road is built to the design specifications and ensures that the construction techniques minimize the amount of sediment moving from the road prism. If not carefully controlled, the construction phase can represent a significant percentage of the life cycle contribution of road sediment.

Forest roads are designed to handle designed traffic at some level of normal operations (road use). Roads are not typically designed to handle excessive loads or high volume traffic during very wet weather or during the thawing cycle associated with cold weather. Uncontrolled traffic can generate the largest percentage of the life cycle contribution of road sediment.

Maintenance operations attempt to keep the road at the designed level of performance. Maintenance primarily deals with keeping drainage structures functional and keeping the running surface usable. Maintenance cannot solve problems associated with a bad location, improper design, poor construction, or misuse.

Abandonment is an alternative to maintenance when the cost of maintaining any road segment is greater than the benefits of keeping the road open and environmentally sound.

## DNR's Current Road Management Strategy

Current direction for the DNR's road construction and maintenance program comes from Forest Practices regulations (Chapter 222-24 WAC) and the 1992 Forest Resource Plan.

The objectives of DNR's current road management program are to:

1. minimize further road related degradation of riparian, aquatic, and identified species habitat,
2. plan, design, construct, use, and maintain a road system that serves DNR's management needs, and
3. remove unnecessary road segments from the road net.

Planning. In general, DNR plans for high lead (800 foot optimum average yarding distance) yarding systems on land with slopes above 40 percent, and ground based systems (1000 foot average yarding distance) below that. This together with topography results in typical road densities between 0.5 to 6.0 miles per square mile.

Design. DNR's design specifications meet or exceed Forest Practices regulations and hydraulic code requirements. Current road design standards call for 100-year flood design levels for water crossing structures, abutments of bridges to be outside the ordinary high water mark of streams, 18 inch minimum cross drain culverts, 12 foot running surfaces with 12 percent adverse and 18 percent favorable grades, and 60 foot minimum curve radius. Backslopes are designed according to soil type and meet or exceed the recommended angles required by Forest Practices regulations. Most Regions require that all roads on land with slopes greater than 40 percent be full bench construction with endhaul of excavated material when slopes exceed 55 percent or when within 100 feet of Type 1, 2 or 3 waters and wetlands. DNR also has minimum requirements for rock hardness and soluble degradation to reduce the amount of surface erosion generated from traffic.

Construction. DNR's road construction specifications meet or exceed the Forest Practices minimums. DNR requires compaction of fills in 2-foot layers, prohibits any woody debris from being incorporated into the fills, and often requires that the subgrade surface be compacted and graded prior to surface application. DNR prohibits construction during inclement weather and generally restricts construction to the dryer summer months.

Road Use. DNR currently allows all-season use of roads except for log truck traffic which may be restricted during periods of freeze-thaw cycles. DNR occasionally closes roads in agreement with the Washington Department of Fish and Wildlife for the purpose of game management. DNR also has occasional road closures related to fire control.

Maintenance. DNR road maintenance specifications meet or exceed the Forest Practices minimums. Road maintenance activities focus on four main activities: Timber sales, forest management, fire control access, and recreation. All roads are maintained to meet Forest Practices environmental and forest road safety standards. Each type of road has a different driveability standard that is linked to the type of vehicle used for each activity.

Abandonment. When a road segment is determined to be too expensive to maintain, or is no longer needed, it is stabilized and abandoned. DNR is currently building more road per year than it is abandoning. While the number of miles of road per section is getting lower, the need to keep roads open longer coupled with the need to access additional acreage means the road network keeps growing. The need to keep roads open longer is driven by new environmentally sensitive approaches to harvesting, such as partial cutting and staggered settings. These silvicultural techniques dictate the need for multiple entries into a stand over the long term.

## DNR's HCP Road Management Strategy

In 1994, an analysis of the transportation information contained in the DNR GIS system showed that the average density of roads in the 9 HCP planning units ranged from 1.69 to 3.29 miles per square mile although road density varies greatly within each planning unit.

The options available to the DNR to reduce the mass wasting and surface erosion impacts to streams primarily focus on the amount and location of problem roads that are currently unnecessary and on how well necessary roads are managed. Road management can best be addressed with improved design, construction compliance, control of use, and maintenance management. Potential problems can be best addressed during a landscape level planning phase.

DNR will initially focus on improvements in the more sensitive areas of a landscape with priority given to locations on steep slopes with unstable soils and high precipitation, and locations within 100 feet of Type 1, 2, and 3 waters and wetlands.

Planning. DNR will ensure that planning processes specifically include the consideration of longer yarding capacity systems whenever faced with placing roads in unstable areas. The alternatives generated during the planning process will be reviewed by an interdisciplinary team of foresters, scientists, and engineers who will evaluate the environmental, silvicultural, public use, and economic benefits and costs of these alternatives and recommend harvest strategies for these sensitive areas. Alternate locations for new roads will be considered in more sensitive areas where other slope-parallel roads exist. The selection process will emphasize the overall goals of the HCP.

In considering road densities, it is assumed that the current emphasis on small staggered settings with greenup requirements, and partial cut silvicultural systems designed to achieve environmental objectives will continue. These systems will, by their nature, result in more extensive road systems which will be active for longer periods of time. While expansion is inevitable as new areas are accessed, DNR's goal will be to reduce the additional amount of new roads needed through careful planning and control the overall size of the network by effective abandonment.

Design.

1. In unstable areas DNR will consider options such as:
   - a. road designs by professional engineers,
   - b. narrower running surfaces,
   - c. less steep cut and fill slopes,
   - d. more comprehensive slope revegetation/stabilization systems,
   - e. designed slope retaining structures,
   - f. larger and more frequent cross drains,
   - g. full bench on all roads located on 40 percent or greater side slopes,
   - h. endhaul of waste on all sideslopes greater than 55 percent,
   - i. subgrade and surfacing matrix enhancers (fabric, lime, concrete),
   - j. outsloping where appropriate,
   - k. permeable fills to stabilize sub-grades, and

l. other techniques for road-benching, including sliver-fills, back casting, and multi-benching.

2. When within 100 feet of Type 1, 2, or 3 waters or wetlands DNR will consider options such as:
   a. higher quality rock surfacing specifications or the use of surfacing binders such as asphalt or lining sulfonate,
   b. more comprehensive cut and fill slope revegetation/stabilization systems,
   c. design of culverts and bridges for debris capacity as well as 100-year flood hydraulic criteria, and
   d. placing sediment traps to avoid delivery of surface erosion into stream crossings, particularly at sites of through-cuts.

Construction.

1. In unstable areas DNR will consider options such as:
   a. slope stake design and compliance on road construction on 55 percent sideslopes,
   b. thorough compaction of subgrade,
   c. prohibition of woody debris from all fills,
   d. compact fills on slopes between 40 percent and 55 percent in 6 inch lifts with compacting machines designed for that purpose,
   e. control of road construction shutdowns using moisture content indicators,
   f. controlled blasting, (e.g., pre-splitting) in order to avoid triggering landslides, especially during wet conditions, and
   g. employing a backhoe rather than dozer to reduce ground-disturbance.

2. When within 100 feet of Type 1, 2, or 3 waters or wetlands DNR will consider options such as:
   a. thorough compaction of subgrade,
   b. filter barriers downslope of construction,
   c. full diversion of flowing waters during culvert installation,
   d. silt filter devices at outlets of cross drains,
   e. shut down of construction during inclement weather, and
   f. limiting the extent of exposed soils adjacent to a watercourse.

3. Reconstruction of necessary roads on unstable soils will be given high priority.

Road Use.

1. In unstable areas DNR will consider options such as closing roads to log truck traffic during high rainfalls.
2. When within 100 feet of Type 1, 2, or 3 waters or wetlands DNR will consider options such as:
   a. closing roads to log truck traffic during high rainfalls,
   b. placing limits on volume hauled per day on marginal road segments,
   c. restricting hauling on some road systems to low pressure tire hauling vehicles (Central Tire Inflation),

d. closing temporarily inactive road segments with gates, and
e. silt filter devices at outlets of cross drains.

Maintenance.

1. In unstable areas DNR will consider options such as:
   a. road stabilization techniques that reduce the size of the road prism,
   b. stabilizing and armoring cut and fill slopes, and
   c. more frequent ditch and drainage structure maintenance,
2. When within 100 feet of Type 1, 2, or 3 waters or wetlands DNR will consider options such as:
   a. paving or lignin sulfonate surfacing stabilizers,
   b. more frequent ditch and surface maintenance, and
   c. resurfacing projects.

Abandonment. The DNR will become more aggressive in abandoning unneeded unstable roads and will increase the level of integrating abandonment of short use spurs in conjunction with timber sale activities.

**pg. IV.57 - add to the end of the third bullet:**
(e.g., because land is in mines, farms, or housing developments). In such situations an interdisciplinary team of scientists will be convened to develop a prescription for DNR-managed land within the drainage basin and economic considerations will be included in their deliberations.

**pg. IV.58 - change the end of the second paragraph:**
Wetlands...In the field, the width of the wetlands buffer shall be measured as the ~~slope~~ horizontal distance from, and perpendicular to, the edge of the wetland. ~~For purposes of mapping and accounting, the width of the riparian buffer will be reported as horizontal distances.~~ Seeps and wetlands smaller than 0.25 acre will be afforded the same protection as Type 5 waters. That is, such features will be protected where part of an unstable hillslope. Research to study the effects on aquatic resources of forest management in and around seeps and small wetlands will be included in research program for Type 5 waters.

**pg. IV.58 - change the last paragraph:**
Forestry operations in wetlands and wetland buffers shall be in accordance with DNR's policy of no overall net loss of wetland function. Forest management in forested wetlands and in buffers of nonforested wetlands will minimize entries into these areas and utilize practices that minimize disturbance, such as directional felling of timber away from wetlands and equipment that cause minimal soil disturbance (e.g., tractors with low pressure tires). If ground disturbance caused by forest management activities alters the natural surface or subsurface drainage of a wetland, then restoration of the natural drainage shall be required...

Rationale for the Conservation Components — No change
Effects of the Riparian Conservation Strategy on Salmonid Habitat — No change

## E. Olympic Experimental State Forest Planning Unit

### Integrated Approach to Production and Conservation

**pg. IV.70 - delete subparagraph (4) and replace with:**
(4) To learn to integrate older forest ecosystem values and their functions with commercial forest activities using, as a working hypothesis, that landscapes managed for a fairly even apportionment of forest cover among stands in all stages of development, from stand initiation to old growth (Oliver and Larson 1990) will support desirable levels of both commodities and ecosystem functions.

### Conservation Strategy for the Northern Spotted Owl in the Olympic Experimental State Forest

**pg. IV.77 - change the fourth paragraph:**
...See Table IV.5. ~~It is likely that the best estimates of potential habitat are intermediate between those, based on stands more than 50 and 70 years old.~~ These estimates of the abundance of potential habitat based on stand age are not perfect. For example, some stands not much older than 100 years would be classified as sub-mature habitat based on their structure and composition, just as some 75 year-old stands with a substantial component of older trees would be classified as old-forest habitat. But it is likely that estimates of the abundance of old-forest habitat are relatively unbiased, that is, some stands estimated to be old-forest habitat are really sub-mature and some stands estimated to be sub-mature are really old-forest. Similarly, estimates of the abundance of sub-mature habitat are likely to be relatively unbiased. However, the abundance of young-forest marginal habitat is likely overestimated based on the abundance of stands currently over 50 years old. The structure and composition of some of these stands are such that they would offer too few opportunities for foraging and roosting to be classified as young-forest marginal habitat. It is likely that the current abundance of young-forest marginal habitat is some proportion of the abundance of forest stands between 51 and 70 years of age and that proportion varies among landscape planning units with stand-level and landscape-level features that are unique within landscapes. Currently, potential spotted owl habitat[6] probably does not constitute much more than 40 percent of any landscape planning unit, although old-forest habitat appears to be at or above the 20 percent threshold in ~~five~~ several landscape planning units (Table IV.5).

[6]In discussions regarding northern spotted owls and the OESF, the term "potential spotted owl habitat is used to generally characterize forest stands that, because of their structure and composition, are similar to those described as young- or old-growth forest spotted owl habitat by Hanson et al. (1993). The adjective "potential" is used to acknowledge that not all such stands will actually be used (become habitat) by owls, for a variety of reasons including that they occur in landscapes dominated by clearcuts and young plantations and are thus incapable of supporting owls. (Note: All footnote numbers in this chapter would increase by one.)

**pg. IV.85 - change the footnotes to Table IV.6:**
[2]Non-habitat is ~~estimated as~~ assumed to be either a) untreated stands 50 years old or younger, or b) stands ~~older than 70~~ that were 71 years old or older ~~that were treated with~~

~~a partial harvest not more than 10 years previously~~ when they were partially-harvested within the past 10 years.

[3]Young-forest marginal habitat is estimated ~~as stands 50-70~~ to be either a) untreated stands 51-70 years old, or b) stands ~~older than 70 years that were treated with a partial harvest 11-30 years previously~~ that were 71 years old or older when they were partially-harvested within the past 11-30 years.

[4]Sub-mature habitat is estimated ~~as stands 71-100~~ to be either a) untreated stands 71-100 years old, or b) stands ~~older than 70 years that were treated with a partial harvest 31-50 years previously~~ that were 71 years old or older when they were partially-harvested within the past 31-50 years.

[5]Old-forest habitat is estimated as ~~stands 101~~ to be either a) untreated stands 101 years old or older, or b) stands ~~older than 70 years that were treated with a partial harvest 51 or more years previously~~ that were 71 years old or older when they were partially-harvested over 51 years ago.

**pg. IV.86 - change last paragraph:**
(4) Harvests of available young- and old-forest habitat will be evenly distributed over the duration of the restoration phase~~, i.e., over the first 40 to 60 years of the HCP~~. Available habitat will be calculated for each landscape planning unit, and harvests of that habitat will be scheduled and conducted so that they are evenly distributed by decade over the duration of the restoration phase of the HCP.

**pg. IV.87 - insert new first paragraph:**
(5) Harvests of available young- and old-forest habitat will be scheduled in consideration of the value of individual owl sites to conservation, research, and validation monitoring in the OESF. DNR will consider the recommendations of USFWS when scheduling these harvests during the first decade of the HCP.

**pg. IV.87 - renumber first subparagraph on page (5) to (6):**

## Riparian Conservation Strategy for the Olympic Experimental State Forest

**pg. IV.97 and 98 - delete the entire last paragraph on pg. 97 and the text on pg. 98 through the end of the paragraph beginning with "Active channel margins..." and replace with:**
Average buffer widths are given in Table IV.7. as average horizontal distances measured outward from the outer margin of the 100-year floodplain on either side of the stream. The 100-year floodplain is the valley-bottom area adjoining the stream channel that is constructed by the stream under the present climatic regime and overflowed at times of very high discharge (i.e., flooding associated with storms of a 100-year recurrence interval; Dunne, T., and L.B. Leopold. 1987). One-hundred-year floodplains commonly are delineated by the Federal Emergency Management Agency (FEMA) on Flood Insurance Rate Maps (FIRM) for each county of the state. The 100-year floodplain

includes meandering, braided (i.e., multiple channel braids), and avulsion channels, as well as side channels that transport water from one part of a mainstream channel to another. Avulsion channels are portions of mainstream and side channels that have been abandoned temporarily by lateral displacement of the channel network elsewhere on the floodplain but are expected to be reoccupied when the network migrates back across the valley bottom.

The 100-year floodplain, which often encompasses the channel-migration zone, frequently occupies a several-hundred-foot wide section of the valley bottom on low-gradient, alluvial river systems. On higher-gradient streams in moderate to steep terrain, the 100-year floodplain typically coincides with the active channel margin or extends only a few feet beyond the active (e.g., the high-water mark). The active channel consists of the wetted area and bed or bank surfaces exposed during low flows, as well as portions of the valley bottom nearest the channel that are inundated during typical flood events (i.e. comparable to the two-year recurring flood). Active channel margins commonly are identified in the field by piles of accumulated flood debris, overbank sediment deposits, streamside vegetation altered or damaged by channel flows, bank scour, and the absence of aquatic biota (e.g., alea) normally found in slack-water channels. In the five west-side planning units and the OESF, DNR manages only a few hundred acres on 100-year floodplains of the major river systems. Most floodplain acreage is privately owned or federally managed. FEMA maps indicate that most 100-year floodplains are associated with Type 1 and 2 water. Collectively, Type 1 and 2 waters represent less than 5 percent of stream miles on DNR-managed lands. Hence, the impact to DNR management associated with using the 100-year floodplain as the inner margin of riparian management zones is relatively negligible.

**pg. IV.99 - change the last paragraph on the page:**
There are no available quantitative models or databases that specify which Type channels require buffer protection...In addition, streams listed as Type 9 (unclassified) or streams not in DNR's hydrology databases will be treated similarly. Type 4 or 5 streams documented to contain fish that are proposed or candidates for federal listing will be treated as Type 3 waters. Type 5 channels with a potential for delivering water, wood, sediment, nutrients, and energy to the channel network will be protected from the active channel margin outward tot he topographic break in slop on either side of the channel, as well as upstream to the channel initiation point and downstream to the channel confluence. (See Figure IV.9).

**pg. IV.99, and 104 - change the last paragraph on pg. 99 (that continues on pg. 104):**
Figures IV.10, IV.11, and IV.12 demonstrate ~~the~~ one of several potential scenarios for the adjustment of riparian-buffer widths to meet site conditions. These buffer configurations are based on mass-wasting inventories and field assessments of physical and ecological riparian conditions. Figure IV.10 shows the application of the expected average interior-core and exterior buffer widths to a segment of the Clallam River and its tributaries. Figure IV.11 compares the expected average riparian buffer widths for the same area and buffers designed solely on the basis of mass-wasting inventories. Figure IV.12 shows ~~the~~ one potential example of a buffer configuration that would include mass-wasting sites and

meet riparian conservation objectives for maintaining physical and ecological functions of the riparian system.

**pg. IV.103 - change the title of Figure IV.12:**
Application of expected average riparian buffer widths adjusted for mass-wasting sites for a segment of the Clallam River and its tributaries: one potential scenario

**pg. IV.104 - change the last paragraph:**
Widths for the exterior buffers were estimated by qualitatively evaluating historical patterns of windthrow resulting from average winter storms in the OESF (discussed in the Draft EIS that accompanies this HCP) and by reviewing the limited information available from local wind-buffer trials. As a starting hypothesis, the average width of exterior buffers will be 150 feet for Type 1 through 3 streams and 50 feet for Type 4 and 5 streams (Table IV.8), measured in ~~slope~~ horizontal distances laterally from the outer edge of the interior-core buffer on either side of the stream...

**pg. IV.105 - change Table IV.8: Proposed average widths of exterior riparian buffers in the Olympic Experimental State Forest:**

**pg. IV.105 - change bullet (1):**
(1) Standard procedure: To achieve the objective of wind-firm riparian forest, wind buffers will be placed on all riparian segments for which stand wind-firmness cannot be documented by historical information, windthrow modeling (e.g., Tang 1995), or other scientific means. Thirty-three percent or less, by volume, of the riparian trees in the designated exterior buffer may be removed for commercial purposes (i.e., excluding pre-commercial thinning and restoration activities) per rotation, until research is available supporting more frequent entry. This percentage corresponds to the lightest intensity partial harvest currently used in the Experimental Forest to produce forest stands that are robust and diverse, both structurally and compositionally...

**pg. IV.106 - add bullets (6) through (8) under subheading Comprehensive Road-Maintenance Plans:**

(6) minimize active road density

(7) prioritize roads for decommissioning, upgrading, and maintaining

(8) identify fish blockages caused by stream crossings and prioritize their retrofitting or removal

**pg. IV.109 - change bullet (top of page) (1):**
(1) the monitoring method ~~titled~~ described in Standard Methodology for Conducting Watershed Analysis ~~currently being developed for the state forest Practices Board~~ (~~WFPA 1994~~ WFPB 1995b);

**pg. IV.110 - change third paragraph:**
Although the riparian conservation buffers have been established on the basis of physical arguments, DNR expects that these buffers will contribute to the maintenance and

recovery of ecological habitat complexity in aquatic and riparian systems. This hypothesis derives from the current understanding of the dynamics and processes of these systems. For that reason, research and monitoring can improve scientific knowledge and management practices in the Experimental Forest.

**pg. IV.110 - add to end of the last paragraph:**
...Estimated site potential tree heights for the Experimental Forest are: for Types 1 and 2 streams, 108 feet for a 50-year growing period, 155 feet for a 100-year period, and 168 feet for a 120-year period; and for Types 3 through 5 streams, 105 feet for a 50-year growing period, 153 feet for a 100-year period, and 165 feet for a 120-year period. Field measurements (McDade et al. 1990) indicate that buffer widths equal to approximately 60 percent of the average tree height will provide 90 percent of the natural level of instream large woody debris. Extrapolating from these results, a buffer width equal to approximately the 100-year site potential tree height, which is more than 60 percent of the 200-year site potential tree height (i.e., 60 percent of an old-growth tree height), should provide more than 90 percent of the natural level of instream large woody debris.

**pg. IV.114 - change last paragraph:**
Prior to landscape planning in each of the 11 landscape planning units in the Experimental Forest, watershed conditions will be evaluated and monitored through a 12-step watershed assessment procedure (described later). Results from assessments of physical and biological conditions obtained from the regulatory watershed-analysis process (WFPB 1994) will be used where possible, in lieu of those assessments required in the 12-step process. Therefore, following the implementation of the OESF, preliminary assessments and management activities will occur before landscape planning in most landscape planning units.

**pg. IV.115 - change second paragraph:**
....The agency may wish to sponsor a regulatory watershed analysis in lieu of some or all parts of the 12-step process. Given the watershed concerns in the OESF, however, DNR likely will go beyond the state Forest Practices Board (WFPB 1994) methods in order to account for issues not addressed in the Forest Practices Board Manual...

**pg. IV.117 - change bullet (3):**
(3) Conduct preliminary assessment of physical and biological watershed conditions. Use results from the regulatory watershed-analysis process, where available. Table IV.11 lists the components of this assessments, some or all of which might be included in the analysis. Methods and guidelines would be established in agency procedures developed for the OESF...

**pg. IV.119 - change last sentence:**
Management activities in the interior-core buffers, or forested wetland and their buffers, would exclude herbicide release and new road construction in riparian areas unless, in the case of riparian buffers, stream crossings are essential ~~and herbicide release~~. Roads in wetlands or their buffers will require on-site and in-kind...

**pg. IV.120 - change first bullet:**

- partial cuts of 33 percent or less by volume, per rotation, aggregated or dispersed, depending on the operational objectives for maintaining wind-firm stands;

## Multispecies Conservation Strategy for Unlisted Species in the Olympic Experimental State Forest

**pg. IV.124 - change the fourth paragraph:**

The habitats most critical for the conservation of unlisted species on DNR-managed lands in the OESF contain elements of late successional coniferous forest, riparian areas and wetlands, or both...Thus, special conservation measures for talus fields, caves, cliffs, large snags, and large, structurally unique trees may be important to these species..

**pg. IV.129 - change sixth paragraph:**

Conservation measures for large snags and large, structurally unique trees (described in the discussion of uncommon habitats in Section F of this chapter titled Multispecies Conservation Strategy in the Five West-side Planning Units) will retain ~~habitat for nesting and roosting~~ structural elements required by pileated woodpeckers for nesting and roosting. Additional conservation measures for snags (also described in Section F of this chapter) will increase the density of snags, and consequently, opportunities for foraging.

Consistent with RCW 77.16.120, trees or snags that are known to contain active pileated woodpecker nests will not be harvested. In addition, trees or snags that are known to have been used by pileated woodpeckers for nesting will not be harvested. Green tree and snag retention are subject to the safety standards of the Department of Labor and Industries (WAC 296-54).

## F. Multispecies Conservation Strategy for Unlisted Species in the Five West-side Planning Units

### Introduction

**pg. IV.134 - change first paragraph:**

...Therefore, in places where DNR believes that effective conservation can be provided in a more efficient way, DNR through ~~consultation~~ cooperation with ~~the Washington Department of Fish and Wildlife or~~ the U.S. Fish and Wildlife Service, may develop a site-specific management plan that provides adequate protection for the species or habitat occurring at that site. When a management plan approved by ~~the Washington Department of Fish and Wildlife or~~ the U.S. Fish and Wildlife Service is in place, the special management prescriptions and/or additional mitigation specified in this HCP shall be waived.

**pg. IV.134 - add to the end of the first full paragraph:**

If, however, DNR discovers some active nesting, denning, or roosting sites in the course of forest management activities, or through voluntary surveys, or such sites are documented by the Washington Department of Fish and Wildlife on DNR-managed

lands, DNR shall provide the special protection described in the subsection titled Species by Species Conservation. At the time a new species is proposed for listing, and a written request to add that species to the permit is made by DNR, DNR will evaluate and consider additional protection measures such as seasonal restrictions and protection of nesting/denning sites.

## Conservation Objectives

**pg. IV.134 - change second full paragraph:**
Within the five west-side planning units, ~~63~~ 53 animal species are considered species of concern because information indicates they face some risk of extinction: nine are federally listed, ~~33 are federal candidates,~~ two, including the bull trout, are federal candidates, 22 are federal species of concern, two are listed by the state but have no special federal status, 11 are state candidates with no special federal status, ~~and bull trout~~ and seven species of anadromous salmonids have been or are under review by the federal government for listing.

**pg. IV.134 - change last paragraph on IV.134 and first three bullets on pg. IV.135:**
DNR had identified three conservation objectives for its multispecies strategy on DNR-managed lands in the five west-side planning units to provide habitat that:

(1) ~~to provide habitat that~~ helps maintain the geographic distribution of unlisted species that have small annual or breeding-season home range areas ~~(less than approximately 1 square mile)~~;

(2) ~~to provide habitat that~~ contributes to demographic support of populations of unlisted species with large home ranges ~~(greater than approximately 1 square mile)~~ on federal forest reserves (National Parks, National Forest Wilderness Areas, National Forest Late Successional Reserves, etc.); and

(3) ~~to provide habitat that~~ can facilitate the dispersal of these wide-ranging species among federal forest reserves.

Conservation Strategy — No change

## Benefits of the Species-specific Strategies to Unlisted Species

**pg. IV.139 - change the last sentence of the second paragraph:**
The conservation strategies for salmonids and marbled murrelets should serve to reduce the risk of extinction for many unlisted species, in particular those that have small home ranges and depend on riparian/wetland ecosystems or late successional forests...The conservation measures for talus fields, caves, cliffs, oak woodlands, large snags, and ~~very large old~~ large, structurally unique trees described later in this section are intended to provide habitat for these species.

## Protection of Uncommon Habitats

**pg. IV.139 - change the first paragraph under this heading:**
The conservation strategies for salmonids, spotted owls, and marbled murrelets protect habitat for many unlisted species particularly those associated with late successional forests or riparian ecosystems...These measures specifically address talus, caves, cliffs, oak woodlands, large snags, and ~~very large old~~ large, structurally unique trees. The protection of talus, caves, cliffs, and oak woodlands is important because once altered or destroyed, these habitats are difficult to restore or recreate. ~~Very large old trees~~ Large snags and large, structurally unique trees are essential habitat elements that are generally scarce in managed forests.

**pg. IV.140 - change the fourth paragraph:**
The conservation objectives for the talus habitat are to maintain its physical integrity and minimize microclimatic change. To meet these objectives, avoid conflict with the conservation of salmonid habitat, and promote cost effective forest management, naturally occurring talus fields ~~that are 1 acre or larger~~ shall be protected as follows:

**pg. IV.140 and 141 - delete all four bullets at the bottom of page 140 and the first bullet on page 141 and replace with:**
Nonforested Talus - defined as exposed talus with 30 percent or less canopy closure

- No timber harvest will occur in talus fields greater than or equal to 1 acre.
- No timber harvest will occur in talus fields greater than 1/4 acre in spotted owl NRF and dispersal habitat management areas in the Columbia Planning Unit, except for the western half of the Siouxon and 2 isolated sections near Highway 12 where no timber harvest will occur in talus fields greater than 1 acre.
- A 100 ft wide timber buffer will be applied around talus fields identified above. The buffer will be measured from the edge of the nonforested talus field, i.e. where canopy closure first exceeds 30 percent.
- Timber harvest in the buffer must retain at least 60 percent canopy closure. Any yarding within the buffer will protect the integrity of the talus field.

Forested Talus - defined as exposed talus with greater than 30 percent canopy closure

- Timber harvest may remove not more than 1/3 of standing timber volume each harvest rotation from forested talus not located in talus buffers.

Nonforested and Forested Talus

- Road construction through talus fields and buffers will be avoided, provided that the routing of roads will be accomplished in a practicable and

economically feasible manner, that is consistent with other objectives of a comprehensive landscaped-based road network planning process.

- The mining of rock from talus fields and buffers for road construction will be avoided, provided construction materials can be acquired in a practicable manner, consistent with other objectives of a comprehensive road network planning process.

If a functional relationship between relative density and canopy closure can be demonstrated, then relative density can be substituted for canopy closure in the above definitions of talus.

**pg. IV.141 - change the third paragraph under CAVES:**
The Washington Department of Fish and Wildlife definition of a cave is extraordinarily broad, and it is unlikely that all geomorphological features that fit this definition are important to wildlife. Under this HCP, when a cave is found, DNR shall determine, in ~~consultation~~ cooperation with ~~the Washington Department of Fish and Wildlife or~~ the U.S. Fish and Wildlife Service, whether it is important to wildlife habitat, and only those caves identified as important habitat shall be protected. The conservation objectives for such caves are to:

**pg. IV.141 - change subparagraph (3):**
(3) minimize human disturbance to bat hibernacula, and maternity colonies.

**pg. IV.142 - change the first bullet on page:**
- Roads shall not be constructed within 0.25 mile of a cave entrance, provided that the routing of roads around caves can be accomplished in a practicable ~~and economically reasonable~~ manner, consistent with other objectives of a comprehensive landscape-based road network planning process.

**pg. IV.142 - change the second bullet on page:**
- Where surface activities may disturb a cave passage, roads shall not be constructed within 300 feet of the cave passage, provided that the routing of roads around caves can be accomplished in a practicable ~~and economically reasonable~~ manner, consistent with other objectives of a comprehensive landscape-based road network planning process.

**pg. IV.142 - change the fourth bullet:**
- The location of caves will be kept confidential by DNR, ~~the U.S. Fish and Wildlife Service, and the Washington Department of Fish and Wildlife~~ to the extent permitted by law.

**pg. IV.142 - change the third paragraph under CLIFFS:**
The conservation objectives for cliff habitat are to minimize disturbance to geomorphic features and to protect species that inhabit cliffs. However, few management practices have been specifically developed for cliffs in managed forests. Therefore, management

prescriptions to meet these objectives shall be developed on a site-specific basis with consideration given to the following:

- During planning for harvest activities around cliffs greater than 25 tall and below 5,000 feet in elevation, DNR shall evaluate the cliff to determine if use by wildlife is likely (for example, are fissures/overhangs suitable for bats present, are ledges/perch trees suitable for nesting raptors present, etc.) and, if so, provide adequate protection measures including, but not limited to:
  a. protection of integrity of cliffs judged suitable and likely for wildlife use (for example, during felling/yarding, logs should not be allowed to disturb cliff face),
  b. retention of trees on cliff benches and along the base and top of cliffs judged suitable for nesting raptors, especially perch trees along the top of cliffs,
  c. avoidance of damage to significant cavities, fissures, and ledges

- All cliffs in excess of 150 feet in height will be evaluated for peregrine falcon use as described elsewhere in this HCP (see Minimization and Mitigation for Other Federally Listed Species in All Planning Units)

- All cliffs with known peregrine falcon aeries will be protected according to Forest Practice regulations and the commitments contained in this HCP for peregrines (see Minimization and Mitigation for Other Federally Listed Species in All Planning Units).

**pg. IV.142 - change the last paragraph under the heading Cliffs:**
The mining of rock from cliffs for road construction shall be avoided, provided construction materials can be acquired in a practicable ~~and economically reasonable~~ manner, and is consistent with other objectives of a comprehensive landscape-based road-network planning process.

**pg. IV.143 - change first paragraph:**
...In the area covered by the HCP, DNR manages about 4,000 acres of oak woodland (i.e., where oak is the primary tree species) and an additional 7,000 acres of mostly ponderosa pine stands in which oak is a significant associate ~~(DNR GIS 1995)~~ (i.e., where oak is a secondary or tertiary tree species), but only about 500 acres of oak woodland are in the five west-side planning units (DNR GIS 1995).

**pg. IV.143 - change the first bullet in the fifth paragraph:**
Oak woodlands shall be managed as follows:

- Partial harvest may occur in oak woodlands. Such harvest will:
  - retain all very large dominant oaks (greater than 20 inches dbh);
  - maintain 25 to 50 percent canopy cover~~, which include shrubs~~;
  - remove encroaching conifers, except western white pine; and

- retain standing dead and dying oak trees.

**pg. IV.143 - change the third bullet in the fifth paragraph:**

- Road construction through oak woodlands shall be avoided, provided that the routing of roads around oak woodlands can be accomplished in a practicable ~~and economically reasonable~~ manner, consistent with other objectives of a comprehensive landscape-based road network planning process.

**pg. IV.144 - change the first four bullets in the fourth paragraph:**

DNR shall conserve the habitat elements provided by large, structurally unique trees as follows:

- ~~At least two live trees shall be retained for each acre harvested.~~

- When selecting trees for retention, a preference shall be shown for large trees with structural characteristics important to wildlife, or those considered to be old-growth remnants.

- At least ~~half of the trees~~ 1 tree per acre selected for retention shall belong to the largest diameter ~~size classes~~ class of living trees in the ~~harvest~~ management unit before harvest (by 2-inch increments). At least 1 other tree per acre shall belong to the dominant crown class.

- The trees selected for retention will be left in the harvest unit where practicable, and may be clumped to improve wildlife habitat, protect trees from severe weather, or facilitate operational efficiency, but where practicable, the density of clumps may not be less than 1 clump per 5 acres.

**pg. IV.144 - add new heading and paragraph at bottom of page:**

**SNAGS**

DNR shall conserve the habitat elements provided by large snags as follows:

- At least three snags shall be retained for each acre harvested, on average. DNR will try to leave all snags where safe and practical.

- If available, snags retained will be at least 15 inches dbh and 30 ft tall. DNR will try to leave all snags where safe and practical.

- Priority for retention will be given to large hollow snags, hard snags with bark, and snags that are at least 20 inches dbh and 40 feet tall.

- At least five live trees shall retained permanently for each acre harvested, on average. Two of these trees will be as described in the section on large, structurally unique trees. The other three trees per acre will belong to the dominant, codominant, or intermediate crown classes, and, when available, will have at least one-third of their height in live crown.

- Priority for retention will be given to tree species which have a propensity to develop cavities (e.g., maple), but the stand tree species diversity after harvest should be generally representative of the tree species diversity prior to harvest.

- If fewer than three snags per acre are available prior to harvest, or if fewer than three snags can be left because of safety concerns, additional live trees will be retained so that the total number of stems per acre retained after harvest is, on average, at least 8 per acre. If additional live trees belong to the co-dominant or intermediate crown classes, and when available, will have at least one-third of their height in live crown. If intermediate crown-class trees are retained, shade-tolerant species with at least 1/3 of height in live crown will be selected.

- Snags and trees selected for retention within the harvest units may be clumped to improve wildlife habitat, protect trees from severe weather, or facilitate operational efficiency, but where practicable, the density of clumps may not be less than one clump per five acres.

- Snags and trees selected for retention will pose no hazard to workers during harvest operations per safety standards of the Washington Department of Labor and Industries (WAC 296-54 WAC).

**pg. IV.144 - and second new heading and paragraph at bottom of page:**
**BALDS**
Road construction through balds shall be avoided, provided that the routing of roads around balds can be accomplished in a practicable manner and is consistent with other objectives of a comprehensive landscape-based road network planning process.

**pg. IV.144 - add third new heading and paragraph at bottom of page:**
**MINERAL SPRINGS**
Mineral springs provide important resources for certain animal species, e.g., the band-tailed pigeon (*Columbia fasciata*). To prevent or reduce adverse impacts to this landscape feature and the wildlife species associated with it, DNR will cooperate with the U.S. Fish and Wildlife Service in planning management activities within 200 feet of known mineral springs. Such activities will be designed to (1) retain adequate trees for perching, and (2) maintain berry, fruit, and mast producing shrubs and trees, particularly in openings near mineral springs. Trees harvested near mineral springs will be felled away from the spring. DNR will avoid crossing mineral springs with yarding equipment

and will prohibit the crossing of mineral springs by ground-based logging equipment. Residual large green trees and snags within 25 ft of mineral springs will be left, and either clumped or scattered depending upon operational feasibility. In addition, DNR will continue to minimize the use of herbicides as directed by Forest Resource Plan Policy No. 33.

| | |
|---|---|
| Species by Species Conservation for Unlisted Species of Concern | No change |
| Mollusks | No change |
| Arthropods | No change |

## Fish

**pg. IV.146 - change the bullets (2) and (3) and add a fourth to the first paragraph:**
(2) protecting lakes and ponds classifies as Types 1, 2, and 3 waters; ~~and~~

(3) protecting Types 1, 2, 3, and 4 rivers and streams; and

(4) treating Type 4 and 5 waters documented to contain fish that are proposed candidates for federal listing as Type 3 waters, if appropriate.

| | |
|---|---|
| Amphibians | No change |
| Reptiles | No change |

## Birds

**pg. IV.151 - change fifth paragraph:**
Large, structurally unique trees and large hollow snags will be protected as described previously in the subsection titled Protection of Uncommon Habitats...

**pg. IV.152 - insert between forth and fifth paragraphs:**
Conservation measures for large snags and large, structurally unique trees will retain structural elements required by pileated woodpeckers for nesting and roosting. Additional conservation measures for snags will increase the density of snags, and consequently, opportunities for foraging.

**pg. IV.152 - change fifth paragraph:**
~~In addition,~~ Consistent with RCW 77.16.120, trees or snags that are known to contain active pileated woodpecker nests will not be harvested. In addition, trees or snags that are known to have been used by pileated woodpeckers for nesting will not be harvested. Green tree and snag retention are subject to the safety standards of the Department of Labor and Industries (WAC 296-54).

**pg. IV.153 - delete the first paragraph entirely and replace with:**
Conservation measures for large snags and large, structurally unique trees will retain structural elements required by purple martins for nesting.

**pg. IV.153 - change the third paragraph:**
Even-aged forest management throughout the five west-side planning units will continue to provide openings suitable for breeding, foraging, and resting habitat. ~~Snags will be retained according to state Forest Practices Rules. Under WAC 222-30-020 (11), three wildlife reserve trees (typically snags) are left for each acre harvested in western Washington. The wildlife reserve trees must be 10 or more feet in height and 12 or more inches dbh. These minimum sizes do not guarantee that wildlife trees suitable for western bluebirds will be retained. The retention of large, structurally unique trees, as described previously in the subsection titled Protection of Uncommon Habitats, will provide a source for large snags~~. Conservation measures for large snags and large, structurally unique trees will retain structural elements required by western bluebirds for nesting.)

## Mammals

**pg. IV.153 - change the last sentence on page:**
Talus fields, cliffs, and caves will be protected as described previously in the subsection titled Protection of Uncommon Habitats, and DNR will also protect large, structurally unique trees and large snags as described in the same subsection.

**pg. IV.155 - insert a new paragraph before Additional Mitigation:**
Conservation measures for large snags and large, structurally unique trees will retain structural elements required by fishers for denning and resting.

**pg. IV.155 and 156 - delete the last paragraph on page 155 and the first paragraph on 156 and replace with:**
In addition, under WAC 222-16-080 of the state Forest Practices Rules, the Forest Practices Board may adopt rules pertaining to management activities which impact western gray squirrels. These rules would provide further protection of the species' critical wildlife habitat.

## Summary of Habitat Types Provided on DNR-managed Forest Lands in the Five West-side Planning Units

**pg. IV.159 - change the heading at the top of the page:**
**HABITATS PROVIDED ON DNR-MANAGED LANDS ~~NOT SUBJECT TO SPECIFIC HCP REQUIREMENTS~~**

**pg. IV.159 - delete first paragraph subheading and replace paragraph with:**
After a natural disturbance, such as fire, a stand regenerates and develops through a succession of seral stages. Managed forests follow a similar pattern of succession following clearcut timber harvest. A variety of wildlife habitats on DNR-managed lands will occur in the different seral stages (Brown 1985) described below:

**pg. IV.159 - change last paragraph on page:**
Table IV.13 lists ~~examples of representative species that could use the types of habitat expected to be provided under the HCP on DNR-managed lands in the five west-side planning units~~ the types of habitat expected to be provided under the HCP on DNR-managed lands in the five west-side planning units. Examples of representative species that might use that habitat type, management activities that may be conducted, potential negative impacts that may result from the management activities, and benefits expected to accrue from the HCP are given for each habitat type. Additional details regarding the management activities are included in Section H (Forest Land Management Activities) of this chapter.

**pg. IV.162 - add the following heading and paragraph after Table IV.13:**
### Provision of a Range of Forest Types Across the HCP Landscape

DNR management activities that will occur under the HCP will ensure a range of forest types in adequate amounts to provide for multi-species conservation across the landscape covered by the HCP. DNR has modeled the age-class distribution that will likely result from expected management under the HCP and existing policies. Results from this modeling have been used to develop a table (see Table IV.14) of expected percentages of each of several forest habitat/structural types, using age-class as a surrogate, that would likely exist 100 years following implementation of such management.

**pg IV.163-167 - delete this section entirely and replace with:**
## G. Conservation Assessments for Federally Listed Plant Species, Candidate Plant Species, and Plant Species of Concern

In general, the federally listed and proposed endangered and threatened plant taxa described below have very limited ranges and narrow habitat requirements and are restricted to very small areas. Because of these factors, it is anticipated that they can be effectively managed while meeting other land-management objectives. DNR maintains a database on these species, including both site-specific and species-specific information,

that will be useful in locating and protecting known sites and potential habitat. However, no comprehensive inventories of these species exist for DNR-managed lands.

## Federally Listed Plant Species

Brief statements about each species are provided below; additional information can be obtained from either the U.S. Fish and Wildlife Service Endangered Species office in Olympia or DNR's Natural Heritage Program.

### *ARENARIA PALUDICOLA*

Swamp sandwort was historically known to occur in "swamps near Tacoma" but has not been seen or collected in Washington since the late 1800s. Reports from several other western Washington locations have been determined to be misidentifications. However, additional inventory in Washington is needed, primarily in wetlands within the Puget Lowlands. The only known extant site in the world is found in a brackish wetland in California. However, this species could occur in wetlands near the Pacific Coast, Willapa Bay, or Puget Sound. The HCP for the west-side planning units and the OESF would likely provide better protection of this species' habitat because of their better overall wetland and riparian protections.

### *HOWELLIA AQUATILIS*

Water howellia is an aquatic annual generally found in vernal ponds or portions of ponds in which there is a significant seasonal draw down of the water level. All known ponds have a deciduous tree component around their perimeters; most have conifers as well. The species is currently known to occur in Washington, Idaho, and Montana. In Washington, it has been found in Clark, Pierce and Spokane Counties. Historically it was also known to occur in Thurston and Mason Counties, as well as in Oregon and California. There has been no inventory of water howellia on DNR-managed lands, but if water howellia does occur in the planning area, then the HCP would reduce adverse effects because it offers better overall wetlands protection.

### *LOMATIUM BRADSHAWII*

Bradshaw's lomatium was thought to be endemic to the Willamette Valley in Oregon until 1994, when it was discovered in Clark County, Washington. The one site in Washington is a seasonally flooded wetland dominated by grasses, sedges and rushes. As far as is now known within the HCP planning area, this species is restricted to wetlands in flood-plain habitats at low elevations in the Columbia Planning Unit. Although not known to occur on DNR-managed lands, some DNR-managed lands may provide potential habitat. The HCP provides better protection of this species' habitat because of its better overall wetland and riparian protections. The OESF would have no effect, as the species is not known or expected to occur in the planning unit.

### *SIDALCEA NELSONIANA*

Nelson's checkermallow was also thought to be restricted to Oregon until relatively recently. There are known sites in Cowlitz and Lewis Counties, Washington. These sites are in low elevation, moist meadows within the South Coast and Columbia HCP planning units. These sites may qualify as wetlands. There is a limited amount of DNR-managed land that contains suitable habitat. There is expected to be no change regarding the

effects of management on this species due to its restriction to open, moist meadow habitats.

## Plant Species Proposed for Federal Listing

### *CASTILLEJA LEVISECTA*

Golden paintbrush occurs from Thurston County northward to Vancouver Island. Historically it was also known to occur in the Willamette Valley in Oregon and in Clark County, Washington. The species is restricted to grasslands and areas dominated by a mixture of grasses and shrubs. Although this species occurs in grasslands, it could be affected by timber harvest through road building, yarding, or decking logs on adjacent grasslands. Where conifers invade *C. levisecta* habitat, the removal of trees is beneficial to the species. There are only 10 known sites with *C. levisecta* in the world, eight of which are in Washington and one of these is a DNR-managed natural area preserve. All sites are quite small in area and are subject to a variety of threats, the most serious of which is the invasion by a mixture of Douglas-fir, Scot's broom, blackberries, and roses. It is not known to occur, nor is it expected to occur within the OESF. There is little to no DNR-managed land adjacent to sites that harbor this species. The HCP is not expected to have any effect on this species.

## Federal Candidate Plant Species

There is one vascular plant species that is a candidate for listing (as of February 1996) under the federal ESA which is known to occur, or is reasonably suspected of occurring, within the HCP planning area. Additional information about this species can be obtained from DNR's Natural Heritage Program.

### *SIDALCEA OREGANA* VAR. *CALVA*

This taxon is restricted to the Chelan Planning Unit. It may occur on DNR-managed forest land. It can occur along small riparian areas and some of the sites would qualify as wetlands. The HCP can be expected to provide better protection due to the overall better riparian zone and wetlands protections. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

## Plant Species of Concern

There are a number of vascular plant taxa that are species of concern to the U.S. Fish and Wildlife Service (as of February 1996) which are known to occur, or are reasonably suspected of occurring, within the HCP planning area. Additional information about these species can be obtained from DNR's Natural Heritage Program.

### *ABRONIA UMBELLATA* SSP. *ACUTALATA*

This taxon is thought to be extirpated from the state of Washington. The historic locations were coastal sand dunes. Timber management under the HCP and OESF would have no effect.

### *ARTEMISIA CAMPESTRIS* SSP. *BOREALIS* VAR. *WORMSKIOLDII*

This taxon is restricted to areas immediately adjacent to the Columbia River in Grant and Klickitat Counties. The areas do not support conifers and are far enough removed from DNR forest management that management activities are not likely to have any impact.

### *ASTER CURTUS*

This taxon is restricted to grassland habitats in the lowlands of the Puget trough. It may occur in grasslands adjacent to DNR-managed forest land. It is not known nor expected to occur on the OESF. Because the plant is generally restricted to nonforested habitats, the HCP and the OESF are expected to have little effect on this species.

### *ASTRAGALUS AUSTRALIS* VAR. *OLYMPICUS*

This taxon is restricted to relatively high elevations in the northeastern portion of the Olympic Peninsula. It is only known to occur in the Olympic National Park and Olympic National Forest.

### *ASTRAGALUS PULSIFERAE* VAR. *SUKSDORFII*

In Washington, this taxon is restricted to the Klickitat Planning Unit and occurs in somewhat open ponderosa pine stands with a relatively sparse understory. One known site of *A. pulsiferae* is on DNR-managed land designated as a Dispersal habitat management area. Higher harvest levels may provide better habitat protection for this taxon than lower harvest levels. However, increased harvest levels may not be a recommended method for enhancing the habitat for this taxon; prescribed burns, or allowing natural fires to burn, would likely be a preferable method. The OESF would have no effect, as the taxon is not known or expected to occur on the OESF.

### *ASTRAGALUS SINUATUS*

This taxon does not occur within the HCP planning area. It is restricted to a very small range east of the planning area in Chelan County

### *BOTRYCHIUM ASCENDENS*

This taxon appears to have a fairly broad ecological amplitude and wide geographic range. However, there is insufficient information available regarding its response to timber harvest activities to evaluate the HCP and its effects.

### *CALOCHORTUS LONGEBARBATUS* VAR. *LONGEBARBATUS*

In Washington, this taxon is restricted to the Klickitat Planning Unit. It could occur on DNR-managed lands. It occurs primarily in open grasslands, but occasionally extends into open forest stands. Within the Yakama Indian Reservation, it can be found within harvested units and along roadway openings. Although this taxon could benefit from timber harvest in areas adjacent to meadow openings, it is anticipated that there will be no change regarding the effects of management on this species. The OESF will have no effect since the taxon is not known or expected to occur on the OESF.

### *CASTILLEJA CRYPTANTHA*

This taxon does not occur and is not expected to occur, on DNR-managed lands within the HCP planning area. It is restricted to subalpine and alpine meadows around the northern perimeter of Mt. Rainier.

### *CIMICIFUGA ELATA*

This taxon occurs in DNR Dispersal management areas and potentially within NRF management areas. The taxon occurs within the North Coast, Straits, South Puget, South Coast, and Columbia planning units. The HCP is expected to be beneficial due to the lower timber harvest levels in NRF and Dispersal management areas. The OESF would have no effect, since the taxon is not known or expected to occur on the OESF.

### *CORYDALIS AQUAE-GELIDAE*

This taxon occurs primarily along Types 3 through 5 waters, including small seeps, and is restricted to the Columbia Planning Unit. It could occur on DNR-managed lands. The HCP is expected to provide better protection due to the overall better riparian zone protections.

### *CYPRIPEDIUM FASCICULATUM*

This taxon occurs within a variety of coniferous stands within the Klickitat, Yakima, and Chelan planning units. It could occur on DNR-managed lands. There is insufficient information available regarding this species' response to timber harvest activities to evaluate the HCP and its effects.

### *DELPHINIUM LEUCOPHAEUM*

This taxon is essentially a grassland species and is restricted to the South Coast Planning Unit. It could occur on DNR-managed lands. The HCP is expected to have no effect on this species. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

### *DELPHINIUM VIRIDESCENS*

This taxon is restricted to the Chelan and Yakima planning units. It may occur on DNR-managed lands. It can occur along small riparian areas and some of the sites would qualify as wetlands. The HCP can be expected to provide better protection due to the overall better riparian zone and wetlands protections. The OESF is expected to have no effect since the taxon is not known or expected to occur on the OESF.

### *DODECATHEON AUSTROFRIGIDUM*

In Washington, this taxon is currently known only to occur in the Mt. Colonel Bob Wilderness Area of the Olympic National Forest. However, in Oregon it is known to occur in lower elevation riparian areas. The HCP and the OESF would presumably provide better protection due to overall better riparian zone protections.

### *ERIGERON HOWELLII*

In Washington, this taxon is restricted to the Columbia Planning Unit. It generally occurs in open areas. Canopy removal is not expected to have a negative impact, but ground-disturbing activity might. There is insufficient information to analyze how the HCP

would affect this species. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

### *ERIGERON OREGANUS*

In Washington, this taxon is restricted to the Columbia Planning Unit. It occurs within owl dispersal habitat; however, it is found primarily on exposed rock. Canopy removal will not generally have a negative impact. There is probably no change regarding the effects of management on this species. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

### *FILIPENDULA OCCIDENTALIS*

In Washington, this taxon is restricted to river and creek banks in southwest Washington, in the Columbia and South Coast HCP planning units. Some DNR-managed land is relatively close to known sites for this taxon. It is expected that the HCP could provide more protection because of its better riparian protections. The deferrals and protections for the marbled murrelet provided by the HCP could also benefit this species. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

### *HACKELIA VENUSTA*

This taxon is restricted to the Chelan Planning Unit. All known sites are on USFS lands. Some DNR-managed land occurs within the range of this species. Canopy removal would not have a negative impact and in fact might be beneficial. However, ground-disturbing activities could have a negative impact. At present, there is insufficient data to analyze the HCP and its potential effects on this species.

### *LATHYRUS TORREYI*

This taxon was thought to be extirpated from the state of Washington. The historic locations were scattered in Clark and Pierce Counties. The only extant site is at McChord Air Force Base, where it inhabits a mature conifer stand with an open understory. Timber management on DNR-managed lands under the HCP and OESF is unlikely to have an adverse effect.

### *LOMATIUM SUKSDORFII*

In Washington, this taxon is restricted to the Klickitat Planning Unit. It may occur on DNR-managed lands. It can occur within riparian areas, but it is not restricted to such areas. It occurs on slopes that may support scattered individual conifers, on the edges of conifer stands, or in stand openings. There is likely no change regarding the effects of management on this species. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

### *LOMATIUM TUBEROSUM*

This taxon is restricted to talus slopes, mostly in nonforested areas, although there can be trees adjacent to the talus. Conservation measures for talus slopes will benefit this species. Within the HCP planning area, this taxon is known only to occur within the Yakima Planning Unit.

### *LUPINUS SULPHUREUS* VAR. *KINCAIDII*

This taxon is essentially a grassland species and, in Washington, is restricted to the South Coast Planning Unit. It is unlikely to occur on DNR-managed lands. The HCP is expected to have no effect on this species. The OESF is expected to have no effect since the taxon is not known or expected to occur on the OESF.

### *MECONELLA OREGANA*

This taxon occurs in grasslands, sometimes adjacent to forested areas, although generally in somewhat savannah-like conditions. It is expected that there would no change regarding the effects of management on this species. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

### *MIMULUS JUNGERMANNIOIDES*

This taxon was historically known to occur in the Klickitat Planning Unit, but is currently thought to be extirpated from the state of Washington. It is restricted to seepage areas in exposed basalt. It is unlikely to occur on DNR-managed lands. The HCP is not expected to have any impact on this taxon. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

### *PENSTEMON BARRETTIAE*

This taxon occurs primarily on exposed basalt in Washington and is known to occur only in the Klickitat Planning Unit. It may occur on DNR-managed lands. It may occur within riparian areas, although it is not restricted to riparian areas. There is expected to be no change regarding the effects of management on this species. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

### *PETROPHYTUM CINERASCENS*

This taxon is within the very eastern edge of the Chelan Planning Unit. In fact, it is restricted to rock outcrops adjacent to the Columbia River.

### *RANUNCULUS RECONDITUS*

This taxon is known to occur in Klickitat County, but not within the HCP planning area.

### *RORIPPA COLUMBIAE*

This taxon is restricted to the immediate shores of the Columbia River and islands in the Columbia River along the Hanford Reach and in Skamania County. No DNR-managed lands are known to harbor this species and timber management under the HCP is not expected to have an impact.

### *SILENE SEELYI*

This taxon is restricted to cracks in exposed rock in a small portion of the Chelan, and maybe the Yakima, planning units. Although it is not known to occur on DNR-managed lands, some DNR-managed lands are in close proximity to known locations for this species. The species is probably not affected to any great degree by canopy removal. It is expected that there would be no change regarding the effects of management on this species.

### *SISYRINCHIUM SARMENTOSUM*

In Washington, this taxon is restricted to the Klickitat Planning Unit. It may occur on DNR-managed lands. It occurs in moist meadows and small forest openings, and it may be occur in riparian and/or wetland areas. The HCP can be expected to provide better protection due to the better riparian and wetland protections. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

### *SULLIVANTIA OREGANA*

In Washington, this taxon is known to occur only in the Columbia Planning Unit and occurs within waterfall spray zones and seepage areas. A site with *S. oregana* is located in a DNR-managed natural area preserve, and other sites may occur in DNR-managed parcels adjacent to the preserve. The HCP is expected to provide better protection because of its better riparian and wetland protections The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

### *TAUSCHIA HOOVERI*

This taxon is restricted to lithosolic, nonforested habitats. It is known to occur on DNR-managed land. It occurs mostly east of the HCP planning area, although some sites are within the Yakima and perhaps the Klickitat planning units.

### *TRIFOLIUM THOMPSONII*

This taxon is known to occur only in the Chelan Planning Unit. It is a grassland species, but it also occurs on the edge of forest stands. Fire is important in maintaining its habitat. This species is known to occur on DNR-managed lands. There is expected to be no change regarding the effects of management on this species. The OESF would have no effect since the taxon is not known or expected to occur on the OESF.

## H. Forest Land Management Activities

## Introduction

**pg. IV.169 - change third paragraph:**

The ranges of activity level (summarized in Table IV.~~14~~ 15 at the end of this section) are based upon (1) historical levels, (2) estimates of activity required to achieve conservation objectives in the harvest simulator model, (3) evaluation of current criteria for selecting potential forest stands for various silvicultural treatments, and (4) estimates from DNR Regions of the level of activity that could occur operationally over the next decade...

**pg. IV.170 - delete entire fifth paragraph**

## Activities Common to All Planning Units

**pg. IV.171 - add to the first paragraph on pg: 171:**

...The rate of land transactions will be influenced by opportunity and funding. (See the Implementation Agreement.) Land transactions are not expected to increase the level of take for any species covered by the incidental take permit. DNR commits to maintaining the conservation objectives described in Chapter IV of the HCP in the course of its land

disposition program, as outlined in the Implementation Agreement. In the event that a land disposition increases the level of take, or if land disposed of by DNR does not remain subject to the HCP and the cumulative impact of the disposition would have a significant adverse effect on a particular species, DNR will follow the process for making a major amendment to the HCP and the ITP as outlined in the Implementation Agreement. The land transaction program is not intended to alter DNR's obligations for mitigation as set forth in this HCP.

**pg. IV.171 - change paragraph under heading Nontimber Resources and add:**
...DNR markets nontimber resources that include but are not limited to road use permits, sand and gravel sales, sales of special forest products such as boughs and brush, prospecting leases and mining contracts, oil and gas leases, grazing permits and leases, electronic site leases, and other special permits, licenses, sales, and leases. ~~(See the Implementation Agreement.)~~ At the 1996 level of these activities, no take, or insignificant (i.e., *de minimis*) take is occurring. Beginning no later than January 1, 1999, new/renewed permits, contracts, or leases for such activities will include the commitments of the HCP, such that they will not increase the level of take beyond a *de minimis* level. The level of impact resulting from these activities will be reviewed by DNR and the Services during the annual meetings as described in subsection 16.2b of the Implementation Agreement. DNR will monitor the level of such activities and provide this information to the Services prior to their annual meetings.

Many nontimber resource activities are subject to review under SEPA (WAC 197-11). Except for those actions that are categorically exempt (WAC 197-11-800), other government agencies and interested parties are notified of proposed actions as required by SEPA. As a matter of course, DNR notifies the Department of Fish and Wildlife, Department of Ecology, and the appropriate county and tribal governments. Government agencies and interested parties are notified by issuing either a determination of nonsignificance, a mitigated determination of nonsignificance, a public scoping notice, or a draft IS. Agencies and interested parties can comment on and appeal the findings of the SEPA determination.

Current DNR nontimber resource uses are described, including the current level of each activity, below:

**Rights of way** - Policy No. 26 of the Forest Resource Plan addresses granting public rights of way. It says:

> "The department will grant rights of way to private individuals or entities when there is an opportunity for enhancing trust assets and when detriments are offset."

Easements for rights of way are granted for roads, powerlines, and pipelines. During the 9-year period between 1983 and 1991, approximately 2,100 rights-of-way were issued. These involved approximately 105 miles of new road construction and removed approximately 2,500 acres from timber production. Typically, these roads are part of the same road network used for forest management and would be subject to the same conservation measures for design, construction, use, maintenance, and abandonment

described in the HCP. Large powerline and pipeline rights of way are subject to review under SEPA.

DNR has adopted the following SEPA policy for granting rights of way (WAC 332-41-665):

> "Recognizing that construction and/or reconstruction under upland right of way grants can create adverse impacts to the elements of the environment, it is the policy of the department to condition grants where necessary:
>
> (i) to protect all surface resources including but not limited to soil and water, through authorized right of way operation on public lands, and to cause rehabilitation or reestablishment on a continuing basis the vegetative cover, soil stability, and water condition appropriate to intended subsequent use of the area;
>
> (ii) to meet air quality standards; and
>
> (iii) to protect recreational and special use areas under lease by requiring mitigating action."

**Special Forest Products** - Policy No. 8 of the Forest Resource Plan addresses special forest products. It says:

> "The department will encourage and promote the sale of special forest products where appropriate and will market them in a manner consistent with the overall policies of this plan."

western greens (salal, beargrass, huckleberry, rushes, ferns, mosses) - Currently there are approximately 65 leases covering 30,000 acres (average 460 acres/lease) and 240 one-year individual, nonexclusive permits for designated blocks of DNR-managed land. Over the term of the HCP, it is expected that individual permits will slightly increase and the amount of leased acreage will decrease. The long-term decrease in leased acreage is projected from the current trend in decreasing U.S. share of the international market in floral greens. Collection of branches from salal, evergreen huckleberry, and ferns is a self-limiting process because only part of foliage of any plant meets commercial quality standards. Thus, harvesting practices result in retention of most of the plant, and consequently a photosynthetic base for the regeneration of new foliage (USFS 1995). No significant environmental damage has been observed as a result of DNR leases, though no formal assessment has been conducted. The long-term ecological effects of floral green collection are unknown. Monitoring of such activities would allow for adjustment of lease conditions should adverse environmental impacts be documented. Collection of moss has potential negative environmental impacts (FEMAT 1993). Collection of moss from DNR-managed lands is not currently a large program. Should this situation change, however, some monitoring of effects of moss collection and/or regulation of moss collection may be needed. Leases for brush picking are categorically exempt from SEPA review (WAC 197-11-800). Actions or activities that are categorically exempt are those that would not normally have significant adverse environmental impacts. An action or activity that is categorically exempt may be subject to review under SEPA if it occurs in an environmentally sensitive area. For example, a categorically exempt action occurring in a wetland or in an area with a state listed species may be subject to review under SEPA.

Christmas greens (cut noble fir, silver fir, white pine, red cedar, and Douglas fir boughs) - There are 14 current 1- to 3-year sales involving 9,000 acres total and 3, 10-year leases

involving 3,000 acres total. Additionally, small volumes under $1,000 in value and involving less than 1,000 acres are permitted to approximately 15 individuals or small companies per year. A determination of nonsignificance was issued under SEPA for the collection of Christmas greens.

mushrooms - No commercial harvesting is allowed. Recreational harvesting is allowed with restrictions on quantity. Recreational harvest is limited to 3 gallons per person per day of a single species and no more than 9 gallons per person per day total. Compliance is not currently monitored and some commercial-scale harvest may be occurring on DNR-managed lands. Most mushroom harvesting on DNR-managed lands occurs in the South Puget Sound planning unit, with some occurring on the Olympic Peninsula and in the western portion of the Klickitat Planning Unit. Individual commercial permits are currently under consideration. Over the term of the HCP, it is expected that harvest from the wild will increase. It is likely that access to lands for mushroom collection will diminish due to road closures. Mushroom collection does not appear to occur very distant from roads. Most edible mushrooms are the fruiting bodies of ectomycorrhizal fungi, which play important roles in forest ecosystem processes, including providing forage for northern flying squirrels, which are an important prey item of spotted owls. The long-term ecological effects of mushroom collection are unknown (FEMAT 1993). No environmental impact assessment of mushroom collection has been conducted specifically on DNR-managed lands. It is thought that the highest potential for negative damage to the resource could come from disruptive collection methods such as raking (USFS 1995). This type of collection method has not been widely observed on DNR-managed lands. Monitoring of mushroom collection levels and utilization of any relevant research on the ecological effects of mushroom harvesting would assist in HCP implementation.

Christmas trees - There are currently 5 leases to grow Christmas trees on DNR-managed lands covering less than 600 acres. All current leases expire within the next 8 years. It is not expected that this program will expand in the future, and may be eliminated altogether due to lack of market demand. Leases for Christmas tree harvesting are categorically exempt from SEPA review (WAC 197-11-800).

medicinals - DNR is not involved in any medicinal research or management at this time. There are 1 to 2 small-value annual permits (for example, cascara bark).

firewood - The Revised Code of Washington (RCW 76.20) requires that DNR offer firewood, up to 6 cords per person per year, for free and authorizes direct sales and bid/auction sales. In most Regions, demand for free personal use firewood is greater than supply. The Regions make available what they can and there is no estimate available for the amount of material removed or the acreage involved. Wood collected as personal use firewood is generally down logs located near roads or landings. Over the course of the HCP, it is expected that firewood removal will decrease because of more restrictions on woodstove use in urban areas and concerns for wildlife and biomass loss. At present, licenses or approvals for firewood removal are categorically exempt from SEPA review (WAC 197-11-800).

**Valuable Material Sales**- Sand and gravel sales are handled under sale contracts. Current contracts cover approximately 30 to 40 acres each and total less than 1,000 acres. Most commercial contracts do not apply to forested areas. However, 15 to 20 commercial contracts are in forested areas, including some smaller pits that are primarily for DNR use but from which occasional loads are sold to other forest land managers. If the sand or gravel material is sold, then the activity is subject to review under SEPA, and the purchaser is responsible for obtaining all necessary permits. DNR has adopted a SEPA policy for surface mining (WAC 332-41-665), described below, that applies to sand and gravel mines which are subject to SEPA.

Water quality in the vicinity of sand and gravel mines is protected through the National Pollutant Discharge Elimination System Permit Program (WAC 173-220). The Department of Ecology administers this program and issues NPDES permits only to facilities that can meet the surface and groundwater standards described in WAC 173-201A and WAC 173-200, respectively.

The purchaser must file a plan of operations that is reviewed by the DNR administrative Region. Under the HCP, the plan of operations would be reviewed to ensure compliance with the commitments of the HCP. Exploration holes drilled on DNR-managed land in search of sand and gravel deposits are plugged and the site restored. For example, if the site was used for timber production before exploration, then, where feasible, the site is restored for continued timber production. The reclamation of surface mines, excluding those used for on-site forest road construction or maintenance, is regulated by the Surface Mining Act (RCW 78.44), which is enforced by DNR.

**Prospecting Leases/Mining Contracts** - A mineral prospecting lease permits the lessee to prospect for metallic and industrial (nonmetallic) minerals. The lease must be converted to a mining contract before mine development or operations commence. There are 13 existing leases in the HCP Planning Area. Most prospecting leases are 500 to 600 acres. Activities conducted under mineral prospecting leases are exempt from SEPA, unless it is determined that a specific activity needs to undergo a SEPA review. The lessee is responsible for obtaining all necessary permits, although there are limited permits required for exploration. Before any surface disturbing work is conducted on a leased area, the lessee must file a plan of operations that is reviewed by the DNR administrative Region. Under the HCP, the plan of operations would be reviewed to ensure compliance with the commitments of the HCP. Exploration holes drilled on DNR-managed land in search of mineral deposits are plugged and the site restored. Roads may be constructed during mineral exploration. Typically, these roads are part of the same road network used for forest management and would be subject to the same conservation measures for design, construction, use, maintenance, and abandonment described in the HCP.

There are 17 mining contracts in the HCP Planning Area, but there are no active open-pit metallic or open-pit industrial mineral mines or underground mines on DNR-managed land. The only activity occuring under these contracts is exploration. Conversion of a mineral prospecting lease to a mining contract requires a phased review under SEPA. This review is phased since the location and scope of future activities is not known. An

EIS may be required if large-scale mining is contemplated. DNR has adopted the following SEPA policy for surface mining (WAC 332-41-665):

> "To provide that the usefulness, productivity, and scenic values of all lands and waters involved in surface mining within the state will receive the greatest practical degree of protection and restoration, the following aspects of surface mining will be conditioned:
>
> (i) proposed practices to protect adjacent surface resources;
>
> (ii) specifications for surface gradient restoration to a surface suitable for the proposed subsequent use of the land after reclamation is completed, and proposed method of accomplishment;
>
> (iii) matter and type of revegetation or other surface treatment of disturbed areas;
>
> (iv) method of prevention or elimination of conditions that will create a public nuisance, endanger public safety, damage property, or be hazardous to vegetative, animal, fish, or human life in or adjacent to the area;
>
> (v) method of control of contaminants and disposal of surface mining refuse;
>
> (vi) method of diverting surface waters around the disturbed area;
>
> (vii) method of restoration of stream channels and stream banks to a condition minimizing erosion and siltation and other pollution."

Any mining activities would comply with the commitments of the HCP.

Water quality in the vicinity of underground and open pit mines is protected through the National Pollutant Discharge Elimination System Permit Program (WAC 173-220). The Department of Ecology administers this program and issues NPDES permits only to facilities that can meet the surface and groundwater standards described in WAC 173-201A and WAC 173-200, respectively.

Metals mining and milling is regulated by the Metals Mining and Milling Operations Act (RCW 78.56), which is mainly enforced by the Department of Ecology. An EIS is required for any proposed metal mining and milling operation. Any tailings facility must be designed to prevent the release of pollution and a waste rock management plan that emphasizes pollution prevention must be approved by the Department of Ecology (RCW 78.56.100). In Washington, there is a moratorium on the use of heap leach extraction processes and a prohibition on *in situ* extraction processes (RCW 78.56.160).

Another type of mining that could occur on DNR-managed forest land over the term of the HCP is placer mining. There are no commercial placer mines on DNR-managed forest lands, nor are there any commercial placer prospecting leases or mining contracts. But, recreational placer mining is growing in popularity. Recreational prospecting permits are issued by DNR (RCW 79.01.651). DNR establishes the rules for the location, equipment, methods, and other appropriate permit conditions of recreational prospecting on DNR-managed lands. Commercial placer prospectors and miners must obtain a hydraulic project approval permit from the Department of Fish and Wildlife (WAC 220-110), a NPDES permit from the Department of Ecology, a permit from the U.S. Army Corps of Engineers, and the action is subject to review under SEPA.

**Oil and Gas Leases** - There are approximately 77 existing leases and most are in the Puget Sound lowlands. Some are small leases but most leases cover full legal sections. The total acreage affected by all oil and gas leases is approximately 20,000 to 25,000 acres. Much oil and gas exploration is accomplished through a process known as "thumping." Thumping is the measurement of siesmolgocial tremors caused by the dropping of extremely large weights or the detonation of explosives. Exploration may also be acomplished through drilling. The on-site operations of exploratory wells can generally be contained in 5 acres or less. Historically, surface disturbance on these sites has been minimal. Only two wells have been drilled on DNR-managed land. One of these wells is currently being used for active exploration, and the other well has been abandoned and plugged. No oil or gas is currently produced on DNR-managed land. In fact, no oil or gas is currently produced in the state of Washington. All oil and gas leases go through a phased review under SEPA before the parcel is auctioned.

Potential adverse impacts of exploration and extraction on air and water are regulated by the Department of Ecology. Water quality in the vicinity of underground and open pit mines is protected through the National Pollutant Discharge Elimination System Permit Program (WAC 173-220). The Department of Ecology administers this program and issues individual permits only to facilities that can meet the surface and groundwater standards described in WAC 173-201A and WAC 173-200, respectively.

Oil and gas wells are regulated through the Oil and Gas Conservation Act (78.52) which is enforced by DNR. Sufficient safeguards to minimize hazards of pollution of all surface and ground waters is required. If acceptable safeguards cannot be provided, then a drilling permit is is not issued (RCW 78.52.125). Exploration holes drilled in search of oil or gas deposits must be plugged in a manner as to prevent the pollution of fresh water supplies (RCW 78.52.150). DNR would also require that the site be restored. For example, if the site was used for timber production before exploration, then, where feasible, the site would be restored for continued timber production.

Because the location and scope of eventual activities are not known, the initial SEPA review does not include details (for example, the management of riparian zones), but subsequent phased reviews would occur if and when additional activities are planned, and the depth of the review would depend on the activities planned. Before any surface disturbing work is conducted on a leased area, the lessee must file a plan of operations that is reviewed by the DNR administrative Region. Under the HCP, the activities would be reviewed to ensure compliance with the commitments of the HCP. Roads may be constructed during oil and exploration or extraction. Typically, these roads are part of the same road network used for forest management and would be subject to the same conservation measures for design, construction, use, maintenance, and abandonment described in the HCP. Oil or gas produced at a well site may be transported by truck or by pipeline. Pipeline construction is also subject to SEPA review.

**Grazing Permits** - There are approximately 15 permit and 6 leased ranges located in Yakima and Klickitat counties (approximately 100,000 acres) and the Methow valley (approximately 5,000 acres). Grazing occurs only on DNR-managed lands east of the Cascade crest where DNR is not applying for unlisted species agreements.

**Electronic Site Leases** - There are 427 leases with 100 sites, totaling 106 acres, currently extant. Hence, electronic sites average only about 1 acre in size. Approximately 80 percent of the sites are on non-forested mountain tops and the remaining 20 percent are on second-growth highway corridors. Roads are constructed to access electronic sites, but these roads are part of the same road network used for forest management and would be subject to the same conservation measures for design, construction, use, maintenance, and abandonment described in the HCP. Occasional disturbance to wildlife may occur during periodic visits for maintenance and improvements. On DNR-managed lands the impacts of electronic site leases relative to the impacts of timber management are *de minimus*.

**Recreational Sites** - Policy No. 29 of the Forest Resource Plan addresses recreation on state forest lands. It says:

> "The department will allow recreation on state forest land when compatible with the objectives of the Forest Resource Plan. As part of its efforts, the department will continue to comply with the Statewide Comprehensive Outdoor Recreation Plan."

There are approximately 150 total sites, most affecting less than 20 acres, and 2 to 3 large (300 to 600 acres), leased sites. Acreage by DNR administrative Region is Olympic = 141 acres, Central = 696 acres, South Puget Sound = 315 acres, Southwest = 159 acres, Northwest = 515 acres, Northeast =783, and Southeast = 630 acres. Total area of recreational sites is 3,239 acres. Many, if not most, recreational sites have been built in riparian areas. Under the HCP, future development of recreation sites would adhere to the riparian conservation strategy (HCP Chapter IV.D). Recreational activities conducted in DNR-managed forests include hiking, biking, horseback riding, skiing, ORV use (e.g., motorcycles, snowmobiles, 4-wheel drive trucks), and camping. Some trails, including those used by ORVs, are located within riparian areas. DNR is concerned about damage to aquatic resources caused by recreational activity in high use areas, and has undertaken a program in the Tahuya State Forest to develop and monitor measures that will mitigate these impacts. In general, on DNR-managed lands the impacts of recreational activity relative to the impacts of timber management are *de minimus*.

## Activities in the East-side Planning Units

**pg. IV.172 - add to end of the second paragraph:**

...However, current insect populations indicate it is reasonable to expect between 2,000 and 15,000 acres of treatment in the east-side planning units during the first decade. Appropriate treatment might include site-specific application of insecticides. At some of these sites the application of insecticides could result in the incidental take of federally listed invertebrate species. Such activities shall be covered under the incidental take permit except for aerial application of pesticides, which shall be covered upon the Service's approval of a site-specific plan presented by DNR. If the Service disapproves such a plan, or if Service approval of such a plan is not forthcoming within 30 days of the Service's receipt of the plan, a multi-agency science team may be convened to resolve questions regarding the biological basis of the Service's decision.

## Activities in the Five West-side Planning Units

**pg. IV.175 - add to end of the fourth paragraph:**
...Should unforeseen attacks by forest defoliators occur, they might require appropriate treatment to be determined at that time. Such appropriate treatment might include site-specific application of insecticides. At some of these sites the application of insecticides could result in the incidental take of federally listed invertebrate species. Such activities shall be covered under the incidental take permit except for aerial application of pesticides, which shall be covered upon the Service's approval of a site-specific plan presented by DNR. If the Service disapproves such a plan, or if Service approval of such a plan is not forthcoming within 30 days of the Service's receipt of the plan, a multi-agency science team may be convened to resolve questions regarding the biological basis of the Service's decision.

**pg. IV.178 - change second full paragraph on page and separate into two paragraphs:**
Various methods can be used to control competing vegetation. Site-specific conditions and management objectives are considered when choosing a control method. Forest Resource Plan Policy No. 33 tacitly directs DNR to minimize the use of herbicides. The policy directs DNR to weigh the effectiveness of herbicide use against likely adverse effects on public water supplies, public health, fish health, and fish and wildlife habitat. The strategy for minimizing herbicide use presented in Policy No. 33 (1992) is a conservation measure which is part of DNR's HCP.

Hand slashing or cutting of unwanted vegetation , ground or aerial application of herbicide, and combinations of these methods may be used...

## Activities in the Olympic Experimental State Forest Planning Unit

**pg. IV.181 - change last paragraph on page:**
Due to the experimental nature of the OESF, it is difficult to quantify potential management activities. However, based on current inventory, the conservation strategies, and potential harvest opportunities, one can reasonably expect approximate ranges described in Table IV.~~14~~ 15 at the end of this section...

# V. Plan Implementation

## Monitoring

**pg. V.1 - change last paragraph:**
...Such monitoring will be primarily accomplished through ~~reporting methods that rely upon DNR's geographic information system and the use of remote sensing data and will likely involve little field data collection. Limited field work may be necessary to evaluate these methods.~~ DNR's planning and tracking, and geographic information systems. Statistically valid sampling of management activities will be conducted to evaluate the reliability of information stored in these databases.

**pg. V.1 - insert subheadings and text before Monitoring heading:**

## Funding

DNR shall submit to the Washington State Legislature, on at least a biennial basis, an agency operating and capital budget for asset management that will be adequate to fulfill DNR's obligations under the HCP, ITP, and IA. Failure by DNR to ensure that adequate funding is provided to implement the HCP shall be grounds for suspension or partial suspension of the ITP.

## Transition Activities

Timber sales prepared by DNR normally require approximately 24 months of preparation between the planning of the sale and its eventual auction. The HCP conservation strategies call for certain actions to occur (for example, the designation of the 300-acre spotted owl nest patches) and certain materials be prepared (for example, implementation guidelines for riparian areas) in the first year after approval. Additionally, once implementation guidelines are completed, training will be required for DNR staff. For these reasons, following approval of the HCP and issuance of the ITP, a transition period will be required. Timber sales in the DNR "pipeline" at the time of approval of the HCP will continue to be brought forward by DNR through the end of calendar year 1998, provided such sales are consistent with spotted owl survey agreements in effect between DNR and the USFWS. Such sales will not include known occupied marbled murrelet sites or unsurveyed, suitable marbled murrelet habitat. Because of current DNR actions such as spotted owl survey efforts and the deferral of sale of marbled murrelet habitat, it is believed that take of any listed species will be limited to non-existent. Mitigation for any such take has been included in the conservation strategies contained within the HCP.

**pg. V.2 - change second paragraph:**

Validation monitoring, which will occur only within the OESF Planning Unit, will document spotted owl and marbled murrelet use of areas managed to provide nesting habitat, and salmonid use of streams crossing DNR-managed lands. For spotted owls and marbled murrelets, ~~v~~Validation monitoring will rely upon surveys to detect changes in site occupancy, numbers and locations of breeding pairs, and reproduction, as appropriate for each species. For salmonids, validation monitoring will employ surveys to detect changes in the productivity of spawning adults and salmon-habitat relationships. As an additional objective for the OESF, validation monitoring reflects the emphasis on experimentation that defines the OESF...

**pg. V.2 - change third paragraph:**

...Implementation and effectiveness monitoring will be carried out for all of these major strategies. ~~In addition, validation monitoring will be carried out for spotted owl and marbled murrelet nesting habitat in the OESF. However, validation monitoring will not be undertaken for other conservation strategies.~~ The spotted owl conservation strategy, current spotted owl and marbled murrelet habitat, and current riparian ecosystem conditions are not uniform across planning units. Effectiveness monitoring will necessarily be tailored to the conservation strategy and habitat or ecosystem conditions in each planning unit.

**pg. V.2 - add to the beginning of the fourth paragraph:**
Validation monitoring will be carried out for spotted owl nesting habitat, marbled murrelet nesting habitat, and salmonid habitat in the OESF. Validation monitoring will not be undertaken for the other conservation strategies or in other planning units. ~~Nor will v~~Validation monitoring will not be undertaken for spotted owl dispersal habitat. ~~Because t~~ The OESF spotted owl conservation strategy does not draw the management distinction between NRF habitat and dispersal habitat that prevails in other HCP planning units~~, this issue does not pertain there~~. In the other planning units, an evaluation of the cause-and-effect relationship between conditions on DNR-managed lands and the ability of juvenile spotted owls to disperse successfully across the landscape would be difficult to design, expensive to implement, and impractical to undertake, given the distribution of DNR-managed lands...

**pg. V.2 - last paragraph:**
Validation monitoring for salmonid habitat will be focused to detect changes in the productivity of spawning adults and salmon-habitat relationships, parameters that are not affected by marine conditions and downstream fisheries ~~will not be undertaken for riparian/salmonid habitat~~. This will involve estimating numbers of spawning adults and numbers of recruits, (i.e., out migrating smolts or rearing juveniles), and surveying different stream habitat types and conditions to determine fish numbers, species composition, and densities. Validation monitoring for salmonid habitat will be conducted in an appropriate watershed unit comprised primarily of DNR-managed lands, to minimize the potential influences of management activities not under DNR's control. ~~Attempts to evaluate cause-and-effect relationships between conditions on DNR-managed lands and salmonid populations would be confounded by the watershed-level effects of a wide range of forestry and non-forestry activities involving other jurisdictions, and by at-sea effects including salmon fisheries. Resources for monitoring the HCP's success in providing riparian/salmonid habitat will be better directed at in-stream and bank conditions, and riparian forest conditions throughout the west-side HCP planning units. Data needed to "validate" the model underlying the OESF riparian conservation strategy will be colleted as part of effectiveness monitoring or through research.~~ Validation monitoring will not be conducted for any other, non-salmonid fish species, or for wildlife species (other than spotted owls and marbled murrelets) influenced by the riparian/salmonid conservation strategy.

**pg. V.3 - change first full paragraph:**
Effectiveness and validation monitoring need not be undertaken while the interim murrelet conservation strategy is in effect. Although lower quality habitat types that support up to 5 percent of the total murrelet use of DNR-managed lands within each of the five west-side and the OESF planning units may be harvested under the interim strategy, DNR will not alter or manage the ~~95 percent~~ higher quality murrelet nesting habitat which supports 95 percent of potentially occupied sites during this period...

**pg. V.3 - add new paragraph prior to heading "Monitoring Procedures":**
DNR recognizes the substantial financial commitment that the HCP monitoring program entails. DNR will provide adequate funding for monitoring to the extent that DNR is given the flexibility to make such budget decisions. DNR shall request funds from the

Legislature to cover the costs of the monitoring program. The exact funding level may vary from year to year, depending on actions of the Legislature.

**pg. V.3 - change last paragraph:**
...Monitoring procedures will be prepared by ~~DNR in consultation with the U.S. Fish and Wildlife Service~~ a team of scientists from DNR, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. Implementation, effectiveness, and validation monitoring procedures will be completed and reviewed before forest management activities consistent with a conservation strategy are first undertaken. Tables V.2 and V.3 outline some of the environmental variables that will be measured as part of effectiveness monitoring for the spotted owl and riparian conservation strategies, respectively.

## Research

**pg. V.5 - change both bullets and add a third bullet under subheading Priority 2 - Riparian:**

- Determine how to harvest timber and meet conservation objectives within riparian ~~buffers~~ areas.

- Determine how to harvest timber and meet conservation objectives on hillslopes with high mass-wasting potential without triggering land slides and causing adverse effects to fish habitat.

- Determine the best approach to growing healthy riparian buffers while managing the buffer for economic return.

**pg. V.6 - change the first bullet on page:**

- Determine whether it is possible to harvest timber at or near breeding sites and meet conservation objectives.

**pg. V.6 - delete last bullet on page and make a sentence:**
Other research topics may arise as the HCP is implemented and new knowledge is obtained.

| | |
|---|---|
| Reporting | No change |
| VI. Alternatives to the Habitat Conservation Plan that Would Avoid Take | No change |
| No Action/No Change (Current Practices) | No change |
| No Harvest/No Take | No change |
| A Appendix | No change |
| Geographic Analysis | No change |

## B Appendix
## Draft Implementation Agreement (Under separate cover)

(Note: The complete revised Implementation Agreement is published as final is Appendix 4 of the Final EIS.)

## References

Chapter I Literature Cited — No change
Chapter II Literature Cited — No change

## Chapter III Literature Cited

**Add to the reference list:**

Kasworn, W. F., and T. L. Manley. 1989. Road and trail influences on grizzly bears and black bears in northwest Montana. Int. Conf. Bear Res. and Manage. v. 8, p. 79-84.

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## Chapter IV Literature Cited

**Add to the reference list:**

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Lyon, L. J. 1979. Habitat effectiveness for elk as influenced by roads and cover. Journal of Forestry. v. 77, no. 10, p. 658-660.

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**pg. 47 - delete from reference list:**

~~Washington Department of Natural Resources, Olympic Region. 1995. Clallam River landscape plan. Washington Department of Natural Resources, Olympic Region, Forks, WA. 86 p.~~

| | |
|---|---|
| Chapter V Literature Cited | No change |
| Unpublished References | No change |
| Personal Communications | No change |
| Glossary | No change |

## Tables

| | | |
|---|---|---|
| I.1 | DNR-managed HCP lands by dominant size class and area for uneven-aged stands | No change |
| I.2 | Acreage by ownerships in the area covered by the HCP | No change |
| I.3 | Vegetative zones in the area covered by the HCP | No change |
| I.4 | Major features and acreage of DNR-managed lands by planning unit and planning area | No change |
| III.1 | Estimates of forest cover types on lands of different ownerships in the Olympic Experimental State Forest area, July 1991 | No change |
| III.2 | Northern spotted owl site centers on or affecting DNR-managed lands as of the end of the 1995 survey season | No change |
| III.3 | Characteristics of nest stands used by the marbled murrelet | No change |
| III.4 | Characteristics of nest trees used by the marbled murrelet | No change |
| III.5 | Old-growth, large-saw, and small-saw forests below 3,500 feet and less than 66 miles from marine waters, by ownership | No change |
| III.6 | Allocation of survey areas in each planning unit, by habitat type and distance from marine waters | No change |
| III.7 | Prescribed number of visits for each survey area for both years of the DNR marbled murrelet forest habitat relationships studies | No change |
| III.8 | Federally listed wildlife, their state status, and their potential occurrence in HCP planning units | No change |
| III.9 | Life cycles of western Washington anadromous salmonids in freshwater, by species and run | No change |
| III.10 | Status of salmonid stocks in the five west-side planning units and the Olympic Experimental State Forest | No change |
| III.11 | Percent of DNR-managed forest land west of the Cascade crest in Watershed Analysis Units that contain salmonids | No change |
| III.12 | Estimated miles of fishbearing streams on DNR-managed lands west of the Cascade crest | No change |
| III.13 | Percent of total land area west of the Cascade crest that impacts salmonids and is managed by DNR | No change |

## pg. III.75 - change Table III.14

## Table III.14 Other species of concern, by federal and state status and their potential occurrences in the HCP planning units

Federal candidate, category 1 - Substantial data support listing the species as endangered or threatened; listing proposals are either under way or delayed.

Federal candidate, category 2 - Data point to listing species but not conclusively; additional data are being collected.

Under state status, S = state; E = endangered; T = threatened; C = candidate; M = monitor; G = game; Sen = sensitive.
OESF = Olympic Experimental State Forest.

| | | Planning Unit | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | **State status** | **Klickitat** | **Columbia** | **South Coast** | **South Puget** | **Yakima** | **Chelan** | **North Puget** | **Straits** | **OESF** |
| **Federal candidate ~~- category 1~~** | | | | | | | | | | |
| spotted frog | SC | X | X | | X | X | X | X | | |
| **Federal ~~candidate - category 2~~ species of concern** | | | | | | | | | | |
| Newcomb's littorine snail | SM | | | X | | | | | | |
| California floater | — | X | X | | | X | X | | | |
| great Columbia River spire snail | SC | X | X | | | | | | | |
| Beller's ground beetle | SC | | | | X | | | X | | |
| Hatch's click beetle | SC | | | | X | | | X | | |
| Fender's soliperlan stonefly | — | | X | | X | | | | | |
| ~~Lynn's clubtail~~ | — | ~~X~~ | | | | ~~X~~ | | | | |
| river lamprey | — | | X | X | X | | | X | X | X |
| Pacific lamprey | — | X | X | X | X | | | X | X | X |
| ~~green sturgeon~~ | — | | ~~X~~ | ~~X~~ | | | | | | |
| ~~Olympic mudminnow~~ | ~~SC~~ | | ~~X~~ | ~~X~~ | ~~X~~ | | | | ~~X~~ | X |
| Larch Mountain salamander | SSen | X | X | | | | | | | |
| tailed frog | SM | X | X | X | X | X | X | X | X | X |
| ~~northern red-legged frog~~ | — | | ~~X~~ | ~~X~~ | ~~X~~ | | | ~~X~~ | ~~X~~ | ~~X~~ |
| Cascades frog | — | X | X | | X | X | | X | X | X |

## Table III.14 Other species of concern, by federal and state status and their potential occurrences in the HCP planning units *(continued)*

| Species | State status | Planning Unit: Klickitat | Columbia | South Coast | South Puget | Yakima | Chelan | North Puget | Straits | OESF |
|---|---|---|---|---|---|---|---|---|---|---|
| **Federal ~~candidate - category 2~~ species of concern** *(continued)* | | | | | | | | | | |
| northwestern pond turtle | SE | X | X | | X | | | X | | |
| ~~Harlequin duck~~ | ~~SG~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ |
| northern goshawk | SC | X | X | X | X | X | X | X | X | X |
| black tern | SM | X | ~~X~~ | ~~X~~ | ~~X~~ | X | X | ~~X~~ | | |
| olive-sided flycatcher | — | X | X | X | X | X | X | X | X | X |
| ~~little willow flycatcher~~ | — | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ |
| long-eared myotis | SM | X | X | X | X | X | X | X | X | X |
| fringed myotis | SM | X | X | | | X | | | | |
| long-legged myotis | SM | X | X | X | X | X | X | X | X | X |
| small-footed myotis | SM | X | X | | | X | | | | |
| ~~Yuma myotis~~ | — | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ | ~~X~~ |
| ~~spotted bat~~ | — | ~~X~~ | | | | ~~X~~ | ~~X~~ | | | |
| Townsend's big-eared bat | SC | X | X | X | X | X | X | X | X | X |
| Pacific fisher | SC | | X | X | X | X | X | X | X | X |
| California wolverine | SM | | X | | X | X | X | X | | |
| lynx | ST | | | | | | X | | | |
| California bighorn sheep | SG | | | | | X | X | | | |
| **State-listed, no federal status** | | | | | | | | | | |
| sandhill crane | SE | X | X | | | | | | | |
| western gray squirrel | ST | X | | | X | X | X | | | |

## Table III.14 Other species of concern, by federal and state status and their potential occurrences in the HCP planning units *(continued)*

| Species | State status | Planning Unit: Klickitat | Columbia | South Coast | South Puget | Yakima | Chelan | North Puget | Straits | OESF |
|---|---|---|---|---|---|---|---|---|---|---|
| **State candidate, no federal status** | | | | | | | | | | |
| green sturgeon | — | | X | X | | | | | | |
| long-horned leaf beetle | SC | | | | | | | X | | |
| Dunn's salamander | SC | | | X | | | | | | |
| Van Dyke's salamander | SC | | X | X | X | | | | X | X |
| California mountain kingsnake | SC | X | X | | | | | | | |
| common loon | SC | | | X | X | | X | X | X | X |
| golden eagle | SC | X | X | X | X | X | X | X | X | X |
| Vaux's swift | SC | X | X | X | X | X | X | X | X | X |
| Lewis' woodpecker | SC | X | X | X | X | X | X | X | X | |
| pileated woodpecker | SC | X | X | X | X | X | X | X | X | X |
| purple martin | SC | X | X | X | X | | | X | X | |
| western bluebird | SC | X | X | X | X | X | X | X | X | |
| **Other sensitive species** | | | | | | | | | | |
| Lynn's clubtail | — | X | | | | X | | | | |
| Olympic mudminnow | SC | | X | X | X | | | | X | |
| northern red-legged frog | — | | X | X | X | | | X | X | X |
| Harlequin duck | SG | X | X | X | X | X | X | X | X | X |
| little willow flycatcher | — | X | X | X | X | X | X | X | X | X |
| Yuma myotis | — | X | X | X | X | X | X | X | X | X |

III.15 Federally listed and proposed vascular plant taxa in the area covered by the HCP — No change

**pg. III-101 and III-102 - create a new Table III.16**

**Table III.16: Federal candidate vascular plant taxa in the area covered by the HCP**

NHP = Natural Heritage Program; POEX = possibly extinct or extirpated; E = endangered; T = threatened; S = sensitive; OESF = Olympic Experimental State Forest; WW = western Washington; EW = eastern Washington within the range of the northern spotted owl.

| Scientific name | NHP status | HCP planning areas | Geographic area and/or habitat |
|---|---|---|---|
| *Sidalcea oregana var.calva* | E | EW | Wenatchee Mountains; meadow and forest |

**pg. III-101 and III-102 - renumber, rename, and change Table III.16:**

**Table III.~~16~~17: ~~Federal candidate~~ Federal species of concern vascular plant taxa in the area covered by the HCP**

**delete two species, add three new species and one footnote:**

| Scientific name | HCP status | HCP planning area | Geographic area and/or habitat |
|---|---|---|---|
| *Astragalus australis* var. *olympicus* | T | WW | NE Olympic Mts. talus/scree |
| *Castilleja cryptantha* | S | WW | Mt. Rainier moist meadows |
| *Lathyrus torreyi* | --** | WW | Clark, Pierce counties mixed conifer forest |
| ~~*Poa unilateralis*~~ | ~~T~~ | ~~WW~~ | ~~Pacific County, ocean bluffs~~ |
| ~~*Sidalcea organa* var. *Calva**~~ | ~~E~~ | ~~EW~~ | ~~Wenatchee Mountains; exposed rock~~ |

** The NHP status of Lathyrus torriyi was undetermined as of August 1996. It was thought to be possibly extirpated until a population was discovered on McChord Air Force Base in 1994

IV.1 Spotted owl nest tree characteristics in western Washington — No change

IV.2 Spotted owl nest stand characteristics in western Washington — No change

IV.3 Recommended method for estimating habitat quality for spotted owls using tree- and stand-level indices of mistletoe infection — No change

IV.4 Summaries of current spotted owl habitat conditions by planning unit — No change

**pg IV.78 - change the fourth column of Table IV.5:**

## Table IV.5: Two estimates of the current abundance of potential spotted owl habitat in proposed landscape planning units of the Olympic Experimental State Forest

| Old Forest[3] inv./TM |
|---|
| 3/9 |
| ~~2~~ 3/14 |
| 14/14 |
| ~~4~~ 5/23 |
| ~~25~~ 27/27 |
| ~~19~~ 21/18 |
| 22/23 |
| ~~16~~ 18/13 |
| ~~26~~ 30/25 |
| ~~13~~ 16/16 |
| ~~22~~ 23/16 |

IV.6 An estimate of the future abundance of potential spotted owl habitat in proposed landscape planning units of the Olympic Experimental State Forest and the forest at large based on one set of harvest regimes — No change

**pg. IV.98 - change Table IV.7**

## IV.7 Expected average widths of interior-core riparian buffers in the Olympic Experimental State Forest

Buffer widths will be determined on a site-specific basis using the proposed 12-step watershed assessment procedure (see text) and might vary locally with landform characteristics. Average widths are not expected to vary significantly, however, because these values are derived from a statistical analysis of buffer protection previously applied to about 55 percent of DNR-managed lands in the OESF. (See text for discussion.) Widths are expressed for each stream type as average ~~slope~~ horizontal distances measured outward from the ~~active channel margin~~ 100-year floodplain on either side of the stream.

| Stream type | Width of riparian interior-core buffer (~~slope~~ horizontal distances, rounded to the nearest 10 feet ) |
|---|---|
| 1 | 150 |
| 2 | 150 |
| 3 | 100 |
| 4 | 100 |
| 5 | width necessary to protect identifiable channels and unstable ground (see text) |

**pg. IV.105 - change Table IV.8:**

## Table IV.8: Proposed average widths of exterior riparian buffers in the Olympic Experimental State Forest

Widths are expressed as average ~~slope~~ horizontal distances measured outward from the interior-core buffer on either side of the stream. Widths are proposed as a working hypothesis and are based on local knowledge of windthrow behavior. Buffer widths and design will be evaluated through experiments in buffer design in the OESF. Buffers will be applied where necessary (see text).

| Stream type | Width of riparian exterior buffer (~~slope~~ horizontal distances, rounded to the nearest 10 feet ) |
|---|---|
| 1 | 150 |
| 2 | 150 |
| 3 | 150 |
| 4 | 50 |
| 5 | 50 |

IV.9 Proposed protection of forested and nonforested wetlands in the Olympic Experimental State Forest — No change

## pg. IV.111 - change Table IV.10

**Table IV.10: Comparison of average riparian buffer widths expected as a result of applying the Olympic Experimental State Forest riparian conservation strategy and buffer widths proposed in the literature for several key watershed parameters**

Buffer widths are given as average ~~slope~~ horizontal distances (or range of averages) outward from the active channel margin.

| Key watershed parameter | Buffer width by stream type - proposed for the OESF | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Mass wasting | 150 ft<br>all Type 1 streams will be protected | 150 ft<br>all Type 2 streams will be protected | 100 ft<br>all Type 3 streams will be protected | 100 ft<br>all Type 4 streams will be protected | 0-500+ ft; depends on size of contribution area[1] and amount of unstable ground[2] |
| Mass wasting and windthrow combined | 150 ft inner, 150 ft outer[3] | 150 ft inner, 150 ft outer[3] | 100 ft inner, 150 ft outer[3] | 100 ft inner, 50 ft outer[3] | variable inner, 50 ft outer[3] |

| Key watershed parameter | Buffer width by stream type - proposed in the literature[4] | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Coarse-woody-debris recruitment[5] | 108-168 ft | 108-168 ft | 105-153 ft | 105-153 ft | 105-153 ft |
| Stream shade availability[5] | 108-168 ft | 108-168 ft | 105-153 ft | 105-153 ft | 105-153 ft |
| Riparian forest microclimate[6] | 300 ft | 300 ft | 250 ft for >5-ft-wide channels | 125 ft | |
| Channel bank stability | Commensurate with mass-wasting buffer protection on stream channels. | | | | |
| Lateral channel migration | Commensurate with combined mass-wasting and windthrow protection on stream channels. | | | | |
| Water quality[5] | 108-168 ft | 108-168 ft | 105-153 ft | 105-153 ft | 105-153 ft |
| Water quantity | Unknown. Objectives of proposed buffers are to help moderate peak-flow discharges related to removal of vegetation (e.g., harvest) by ensuring hydrologic maturity of forests, as per Washington Forest Practices Board (1994). | | | | |
| Windthrow | Unknown. Objectives of proposed buffers are to enhance stand wind-firmness by decreasing tree height/diameter ratios, fetch distances in adjacent harvest units, and edge effect. | | | | |
| Surface and road erosion | Variable, depending on site conditions. Objectives are to minimize erosion through implementation and comprehensive road-maintenance plans for each landscape unit (see text). | | | | |

[1]"Contribution area" refers to upslope channel heads, bedrock hollows, unchannelized valleys, and topographic depressions; see discussion of OESF Type 5 drainages in the Draft EIS that accompanies this HCP.

[2]Refer to discussion of Type 5 drainages in the Draft EIS that accompanies this HCP.

[3]Exterior (wind) buffer, where harvest and management activities are allowed. On Type 5 streams, exterior buffers will only be applied as necessary where there are interior-core buffers. See text.

[4]See discussion in this section of the text for citations of current literature.

[5]Buffer widths are based on available literature citing one site potential tree height for each stream type as the ecologically appropriate measure; see

| | | |
|---|---|---|
| IV.11 | Components of a preliminary assessment of physical and biological watershed conditions for the 12-step watershed assessment procedure for the Olympic Experimental State Forest | No change |
| IV.12 | Number of acres and percent of land base projected in the Olympic Experimental State Forest riparian interior-core buffer, exterior buffer, and combined (total) buffer, by forest age class | No change |

**pg. IV.160-162 - delete Table IV.13 entirely and replace with:**

**Table IV.13: Habitats and representative wildlife species covered by this HCP for the west-side planning units**

(Source: Brown 1985 Thomas et al. (1993), Parsons et al. (1991) and Pyle (1989).

| Type of habitat | Representative species that can use these habitat types |
|---|---|
| Spotted owl high quality nesting habitat | dusky shrew, long-eared myotis, northern flying squirrel, Pacific fisher, wood duck, northern goshawk, barred owl, pileated woodpecker, olive-sided flycatcher, northern spotted owl, hoary bat, bushy-tailed woodrat, red tree vole, harlequin duck, marbled murrelet, Vaux's swift, red-breasted nuthatch, Dunn's salamander, Larch Mountain salamander, Van Dyke's salamander, tailed frog, pine white butterfly, Johnson's hairstreak butterfly, *Acalypta saudersi* (a lace bug), *Cychrus tuberculatus* (a carabid beetle), *Lobosoma horridum* (a weevil), *Omus dejeani* (a tiger beetle) |
| Spotted owl sub-mature habitat | dusky shrew, long-legged myotis, northern flying squirrel, Pacific fisher, wood duck, hairy woodpecker, northern goshawk, barred owl, olive-sided flycatcher, northern spotted owl, hoary bat, bushy-tailed woodrat, red tree vole, red-breasted nuthatch, Dunn's salamander, northwestern salamander, Van Dyke's salamander, tailed frog, northern alligator lizard, pine white butterfly, coral hairstreak butterfly, California hairstreak butterfly, *Cychrus tuberculatus* (a carabid beetle), *Lobosoma horridum* (a weevil), *Omus dejeani* (a tiger beetle) |
| Spotted owl dispersal habitat | Douglas' squirrel, sharp-shinned hawk, Swainson's thrush, evening grosbeak, dusky shrew, northern spotted owl, long-legged myotis, mountain beaver, creeping vole, bobcat, elk, Vaux's swift, orange-crowned vireo, northern alligator lizard, rubber boa, long-toed salamander, *Cychrus tuberculatus* |

**Table IV.13: Habitats and representative wildlife species covered by this HCP for the west-side planning units (continued)**

| Type of habitat | Representative species that can use these habitat types |
|---|---|
| Spotted owl dispersal habitat *(continued)* | (a carabid beetle), *Lobosoma horridum* (a weevil), *Omus dejeani* (a tiger beetle) |
| Marbled murrelet habitat | dusky shrew, long-legged myotis, northern flying squirrel, Pacific fisher, wood duck, northern goshawk, barred owl, hairy woodpecker, Oliver-sided flycatcher, marbled murrelet, hoary bat, bushy-tailed woodrat, red tree vole, harlequin duck, Vaux's swift, red-breasted nuthatch, Dunn's salamander, Larch Mountain salamander, Van Dyke's salamander, tailed frog, pine white butterfly, Johnson's hairstreak butterfly, *Acalypta saudersi* (a lace bug), *Cychrus tuberculatus* (a carabid beetle), *Lobosoma horridum* (a weevil), *Omus dejeani* (a tiger beetle) |
| Conifer-dominated riparian ecosystems | long-legged myotis, Pacific fisher, mink, wood duck, sharp-shinned hawk, ruffed grouse, olive-sided flycatcher, purple martin, Dunn's salamander, Van Dyke's salamander, salamander, tailed frog, dusky shrew, Trowbridge's shrew, southern red-backed vole, river otter, Barrow's goldeneye, band-tailed pigeon, long-eared owl, red-breasted sapsucker, hermit thrush, evening grosbeak, Cascade frog, bull trout, coho salmon, steelhead salmon, mayflies, stoneflies, caddisflies, midges, arborvitae hairstreak butterfly |
| Hardwood-dominated riparian ecosystems | long-legged myotis, mink, wood duck, purple martin, northwestern pond turtle, common garter snake, Dunn's salamander, northern red-legged frog, ruffed grouse, dusky shrew, shrew mole, yellowpine chimunk, river otter, Barrow's goldeneye, Cooper's hawk, band-tailed pigeon, downy woodpecker, black-headed grosbeak, Olympic salamander, Olympic mudminnow, mayflies, stoneflies, caddisflies, dreamy duskywing butterfly, western tiger swallowtail |

## Table IV.13: Habitats and representative wildlife species covered by this HCP for the west-side planning units (continued)

| Type of habitat | Representative species that can use these habitat types |
|---|---|
| Nonforested wetland | northern harrier, common snipe, northwestern pond turtle, northern red-legged frog, spotted frog, Beller's ground beetle, long-horned leaf beetle, Hatch's click beetle, mallard, mink, dusky shrew, Pacific shrew, coast mole, Yuma myotis, long-tailed vole, American bittern, little willow flycatcher, common loon, sandhill crane, black tern, coho salmon, Olympic mudminnow, dragonflies, damselflies, sonora skipper butterfly |
| Forested wetland | long-legged myotis, Pacific fisher, ruffed grouse, sharp-shinned hawk, barred owl, olive-sided flycatcher, purple martin, Van Dyke's salamander, northern red-legged frog, mink, spotted frog, dusky shrew, water shrew, bushy-tailed woodrat, common merganser, band-tailed pigeon, northern saw-whet owl, red-breasted sapsucker, western toad, dragonflies, flies, cad-disflies, pale tiger swallowtail butterfly |
| Cliffs | fringed myotis, long-legged myotis, Yuma myotis, mountain goat, peregrine falcon, turkey vulture, black swift, cliff swallow, western fence lizard, bushy-tailed woodrat, golden eagle, wasps, shorttailed black swallowtail butterfly |
| Caves | Townsend's big-eared bat, fringed myotis, long-legged myotis, Yuma myotis, coyote, California wolverine, mountain lion, bobcat, black swift, Larch Mountain salamander, crickets |
| Oak woodland | western gray squirrel, Lewis' woodpecker, California mountain kingsnake, Propertius' duskywing butterfly, Oregon green hairstreak butterfly |
| Talus | Cascade golden-mantled ground squirrel, mountain goat, Pacific fisher, California wolverine, bobcat, white-tailed ptarmigan, common nighthawk, rosy finch, western fence lizard, Larch Mountain salamander, Dunn's salamander, Van Dyke's salamander, wolf spiders, jumping spiders, small-footed myotis |

**Table IV.13: Habitats and representative wildlife species covered by this HCP for the west-side planning units (continued)**

| Type of habitat | Representative species that can use these habitat types |
|---|---|
| Grass/forb forest stage | coast mole, vagrant shrew, Townsend's vole, coyote, long-tailed weasel, black-tailed deer, common nighthawk, white-crowned sparrow, northwestern garter snake, western fence lizard, northwestern salamander, western bluebird, wolf spiders, grasshoppers, mariposa copper butterfly, silvery blue butterfly, Blackmore's blue butterfly, western meadow fritillary butterfly, *Oncocnemis dunbari* (a moth), *Formica neorufibarbis* (an ant) |
| Shrub forest stage | coast mole, Townsend's vole, mountain beaver, coyote, long-tailed weasel, black-tailed deer, common nighthawk, blue grouse, rufous hummingbird, hermit thrush, white-crowned sparrow, rufous-sided towhee, northwestern garter snake, western fence lizard, northwestern salamander, western bluebird, Pacuvius' duskywing butterfly, satyr anglewing butterfly |
| Open sapling/pole forest stage | coast mole, Douglas' squirrel, mountain beaver, black-tailed deer, long-tailed weasel, coyote, blue grouse, rufous hummingbird, American robin, hermit thrush, rufous-sided towhee, western fence lizard, western bluebird, Phoebus parnassian butterfly, golden hairstreak butterfly, western tailed blue butterfly, bobcat, snowshoe hare |
| Closed sapling/pole/sawtimber forest stage | Douglas' squirrel, sharp-shinned hawk, Swainson's thrush, evening grosbeak, dusky shrew, long-legged myotis, mountain beaver, creeping vole, bobcat, elk, Vaux's swift, orange-crowned vireo, northern alligator lizard, rubber boa, long-toed salamander, *Cychrus tuber-culatus* (a carabid beetle), *Lobosoma horridum* (a weevil), *Omus dejeani* (a tiger beetle) |

## Table IV.13: Habitats and representative wildlife species covered by this HCP for the west-side planning units (continued)

| Type of habitat | Representative species that can use these habitat types |
|---|---|
| Large sawtimber forest stage | dusky shrew, long-legged myotis, northern flying squirrel, Pacific fisher, wood duck, hairy woodpecker, northern goshawk, barred owl, olive-sided flycatcher, hoary bat, bushy-tailed woodrat, red tree vole, red-breasted nuthatch, Dunn's salamander, northwestern salamander, Van Dyke's salamander, tailed frog, northern alligator lizard, coral hairstreak butterfly, pine white butterfly, California hairstreak butterfly, *Cychrus tuberculatus* (a carabid beetle), *Lobosoma horridum* (a weevil), *Omus dejeani* (a tiger beetle) |
| Old-growth forest stage | Johnson's hairstreak butterfly, pine white butterfly, *Acalypta saudersi* (a lace bug), *Cychrus tuberculatus* (a carabid beetle), *Lobosoma horridum* (a weevil), *Omus dejeani* (a tiger beetle); and see list for spotted owl high quality nesting habitat |

pg. IV.162 - add a new Table IV.14:

**IV.14 DNR HCP Stand Structure Objectives at Year 100 (in percent of land area)**

| Stand Stage[1] | West-side Planning Units Excluding the OESF | OESF Planning Unit |
|---|---|---|
| Open (0-10 Years) | 5-10 | 5-15 |
| Regeneration (10-20 years) | 5-15 | 5-15 |
| Pole (20-40 years) | 15-25 | 5-15 |
| Closed (40-70 years) | 25-35 | 5-15 |
| Complex (at least 70 years) | 25-35 | 60-70 |
| Fully Functional | (At least 150 years) | (At least 200 years) |
| (Subset of Complex) | 10-15 | 10-15 |

[1]Stand stages are defines as:

Open- earliest seral stage; overstory has been removed; dominated by herbs and shrubs with some young conifer and deciduous trees present.

Regeneration-shrubs and saplings; branches beginning to intertwine; dense canopies from ground-level upwards.

Pole - early stages of stem exclusion; stems closely spaced and numerous; little understory; limited self-pruning; and insufficient canopy lift to allow larger birds to penetrate.

Closed - have undergone some stem exclusion and competition mortality; have achieved some canopy lift from self-pruning; have well-developed, deep canopies; and lacking complex structural characteristics of older types.

Complex - stocked with large trees with a variety of diameters and heights evident; mortality within the stand (or residual trees, snags, and logs) provides cavities in standing snags, downed logs, deformities in standing live trees; large horizontal branches; and a complex canopy with conifer establishment occurring under opening in the canopy.

Fully Functional - a subset of complex forests but more mature and structurally complex.

[2]Age-classes shown are a surrogate for stand structure. If and when it can be shown that appropriate structure can be obtained at a different age, different age classes may be used.

Assumptions used in the modeling included policies from the Forest Resource Plan and are described in Appendix 5 of this document. The FRP states that the goal for average rotation age for west-side conifer dominated forests will be 60 years. At present, DNR expects to continue this policy and information regarding the average rotation age will be provided to the Services at scheduled inter-agency reviews of the HCP. However, as long as DNR can show that reaching the stand structure objectives is likely, other rotation ages may be used. Additionally, DNR maintains the flexibility to harvest specific stands at an earlier age to address specific silvicultural situations (for example, a 30- to 35-year old stand that was not thinned at an appropriate age may be more quickly converted into a healthy, productive stand by clear-cutting the stand and "starting over").

Subsequent to the modeling exercise, DNR and the Services negotiated a 70-year term for this agreement, with provisions for up to 3, 10-year extensions (see IA). Such extensions could occur at DNR's option if commitments of the HCP are met at year 70, or at the Service's option if commitments have not been met at year 70. Currently no projections are available for the forest structure expected at year 70. However, during the first year following approval of the HCP, additional modeling will be conducted by DNR by decade and the resulting projections provided to the Service at or by the first annual review. These decadal projections will be used by the DNR as part of its monitoring process.

The projections for year 70 will be a part of the Service's evaluation of whether DNR has met the commitments of the HCP at year 70. In that evaluation the Service will also review DNR's progress in meeting the conservation objectives included in Chapter IV of the HCP. The DNR HCP provides for the conservation of both listed and unlisted species. Detailed, specific conservation measures are described elsewhere in this chapter for for the northern spotted owl and a long-term strategy will be developed for the marbled murrelet with additional important, but more limited, measures described for certain other listed species. Conservation measures affecting the unlisted species include those undertaken for listed species and additional measures described for certain important habitat types. However, the most important conservation measures affecting unlisted species are those associated with the HCP riparian conservation strategy.

Of the HCP's three primary conservation components (spotted owl conservation strategy, marbled murrelet conservation strategy, and riparian conservation strategy), one, that for the marbled murrelet, is interim in nature. A long-term strategy will not be developed for a number of years. Because of this, an adequate and appropriate means of evaluating commitments for the marbled murrelet at year 70 cannot be described at this time except in terms of compliance with the strategy described in the HCP.

The riparian conservation strategy will be implemented in the five west-side planning units and the OESF. DNR's compliance and effectiveness monitoring plan for riparian areas should provide sufficient information for the Service to determine whether commitments in this area have been met at year 70.

The spotted owl conservation strategy sets specific goals for developing/maintaining NRF and dispersal habitat in specific amounts and locations (by WAU). Approximately 200,000 acres are designated for a NRF habitat role and 125,000 of those acres (62.5%) are in WAUs that are already at or above the goals set in the HCP. The conditions in the remaining WAUs, those that are not currently at or above the goal, will be reviewed by the Service at year 70, as part of the evaluation of whether the DNR has met its obligations under the HCP.

As described above, the 70 year term should be sufficient for all species based upon the anticipated response of the habitats to implementation of the HCP. Riparian areas and uncommon/special habitats (e.g., talus, caves, wetlands) are expected to improve as wildlife habitat over the life of the permit. Older stand structures (i.e., Structurally Complex Forest and Fully Functional Forest) increase or remain constant when

comparing the current conditions with those anticipated at the end of the permit period. Healthy riparian systems, mature forest with structure, and uncommon/special habitats comprise the major concerns regarding adequacy of habitats. Younger forests (less than 40-70 years) will continue to be provided as a result of timber management. In addition, the long-term plan for murrelets will be developed in consideration of the 70-year permit term to ensure its adequacy. Finally, as mentioned above in this section, the Services will review DNR's progress in meeting the conservation objectives and will have the option for approving an extension of the HCP in the event the conservation objectives are not met.

**pg. IV.182 - renumber Table IV.14:**

**IV.~~14~~ 15 Estimated amount of forest land management activities on DNR-managed lands in the area covered by the HCP during the first decade of the HCP**

**pg. IV.183 - renumber Table IV.15:**

**IV.~~15~~ 16 Estimated amount of habitat on DNR-managed lands in the area covered by the HCP at the end of the first decade of the HCP**

**pg. V.3 - change Table V.1:**

**Table V.I: Outline of the HCP monitoring program**

| | HCP habitat goals | | | |
|---|---|---|---|---|
| **Monitoring objective** | **Spotted owl nesting, roosting, foraging habitat** | **Spotted owl dispersal habitat** | **Marbled murrelet nesting habitat[1]** | **Riparian/salmonid habitat** |
| Implementation | All planning units | All planning units | Five west-side planning units and the OESF | Five west-side planning units and the OESF |
| Effectiveness | All planning units | All planning units | Five west-side planning units and the OESF | Five west-side planning units and the OESF |
| Validation | OESF Planning Unit only | | OESF Planning Unit only | OESF Planning Unit only (salmonid habitat only) |

[1]Only implementation monitoring will be done during the interim conservation strategy for the marbled murrelet. See text.

pg. V.3 - add two new tables:

**Table V.2: Environmental variables to be measured in effectiveness monitoring for the Spotted Owl Conservation Strategy**

| Environmental Variables | |
|---|---|
| **Spotted owl nesting, roosting, and foraging habitat** | **Spotted owl dispersal habitat** |
| density of nesting structures<br>snag density<br>snag diameter<br>distribution | |
| tree density<br>tree species composition<br>tree diameter distribution canopy closure<br>canopy height<br>woody debris ground cover<br>prey density | |

**Table V.3: Environmental variables to be measured in effectiveness monitoring for the Riparian Conservation Strategy**

| Salmonid Habitat Element | Environmental Variables |
|---|---|
| Large Woody Debris | linear density<br>size category<br>tree species<br>shape of form<br>decay category<br>location category<br>poolforming function |
| Channel characteristics | bankfull width<br>bankfull depth<br>stream gradient<br>total water surface area<br>pool maximum depth<br>pool residual depth<br>pool location<br>pool frequency |
| Sediments | percent fine sediment in spawning gravel |

| Salmonid Habitat Element | Environmental Variables |
|---|---|
| Riparian Forest | stand age<br>stand species composition<br>canopy closure |

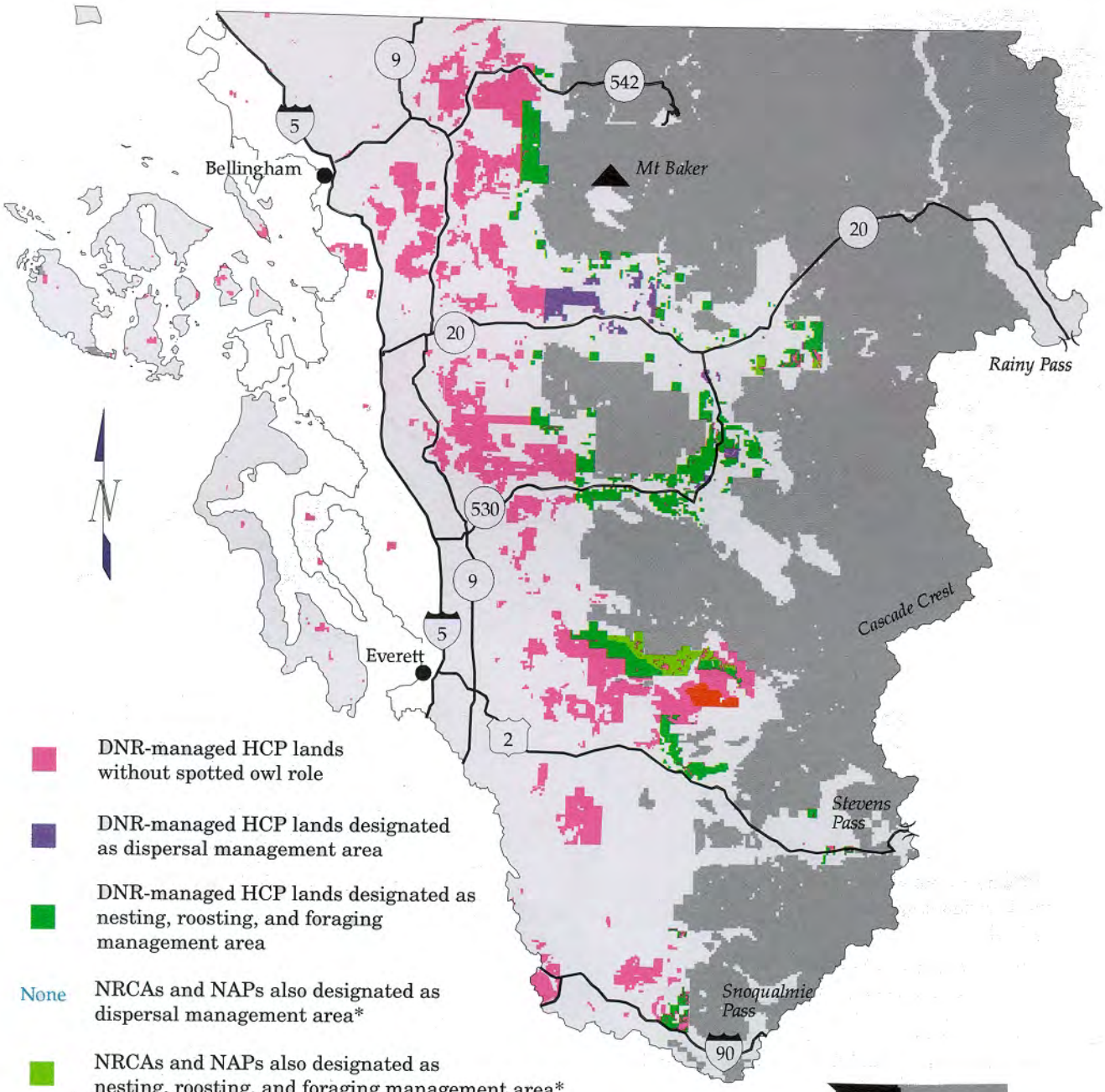
**Figures**



**Maps**

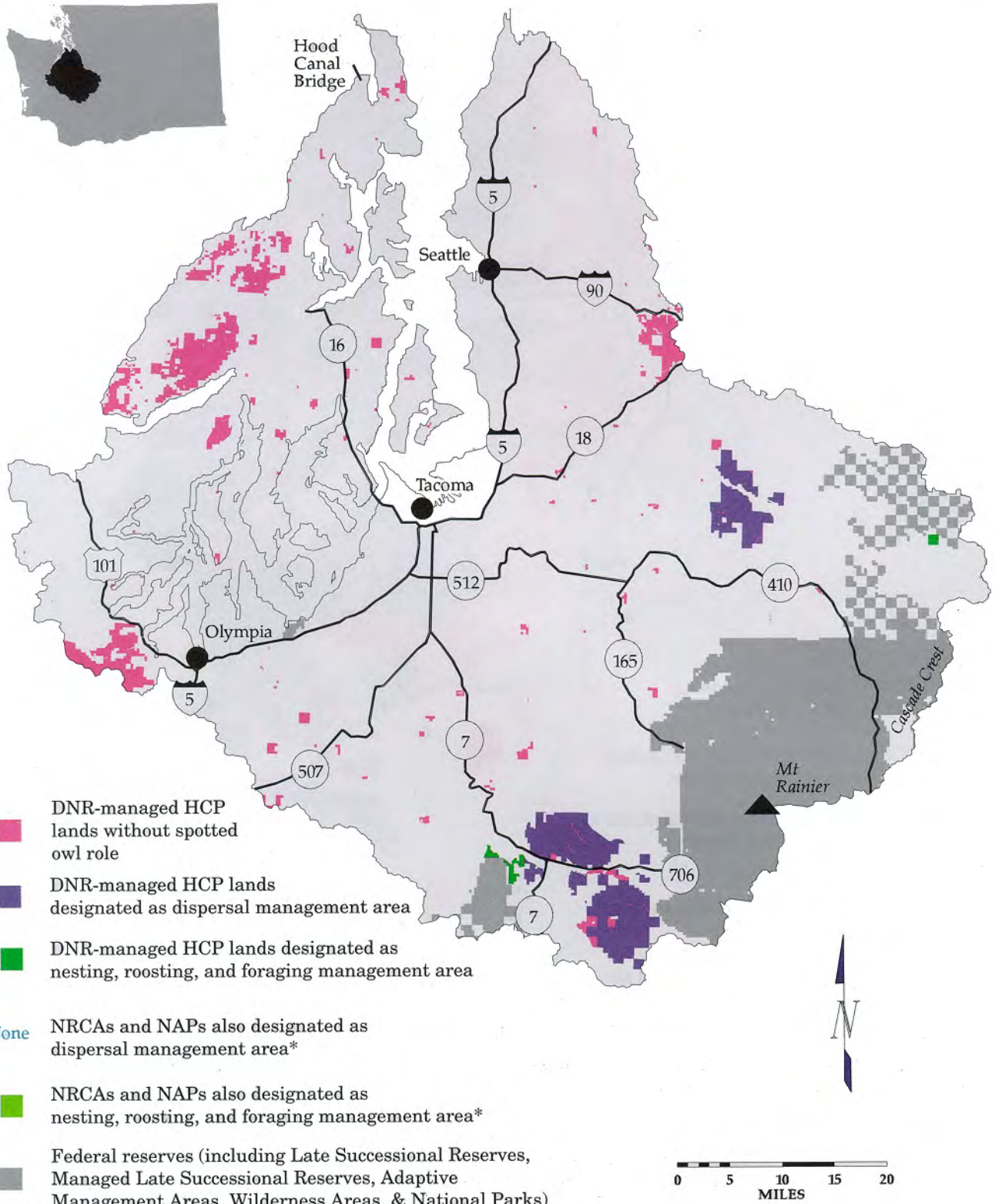
| | | |
|---|---|---|
| I.6 | South Puget Planning Unit | No change |
| I.7 | Columbia Planning Unit | No change |
| I.8 | Straits Planning Unit | No change |
| I.9 | South Coast Planning Unit | No change |
| I.10 | Klickitat Planning Unit | No change |
| I.11 | Yakima Planning Unit | No change |
| I.12 | Chelan Planning Unit | No change |
| I.13 | The Olympic Experimental State Forest Planning Unit | No change |
| II.1 | DNR-managed trust lands in the area covered by the HCP | No change |
| III.1 | Physiographic provinces of the northern spotted owl | No change |
| III.2 | Range of the marbled murrelet and population sizes along the Pacific coast | No change |
| IV.4 | Role of DNR-managed lands in providing mitigation for the northern spotted owl in the Straits Planning Unit | No change |
| IV.5 | Role of DNR-managed lands in providing mitigation for the northern spotted owl in the South Coast Planning Unit | No change |
| IV.7 | Role of DNR-managed lands in providing mitigation for the northern spotted owl in the Yakima Planning Unit | No change |
| IV.8 | Role of DNR-managed lands in providing mitigation for the northern spotted owl in the Chelan Planning Unit | No change |
| IV.9 | Preliminary boundaries for landscape planning units in the Olympic Experimental State Forest | No change |

## Map IV.1: Role of DNR-managed lands in providing mitigation for the northern spotted owl in the North Puget Planning Unit



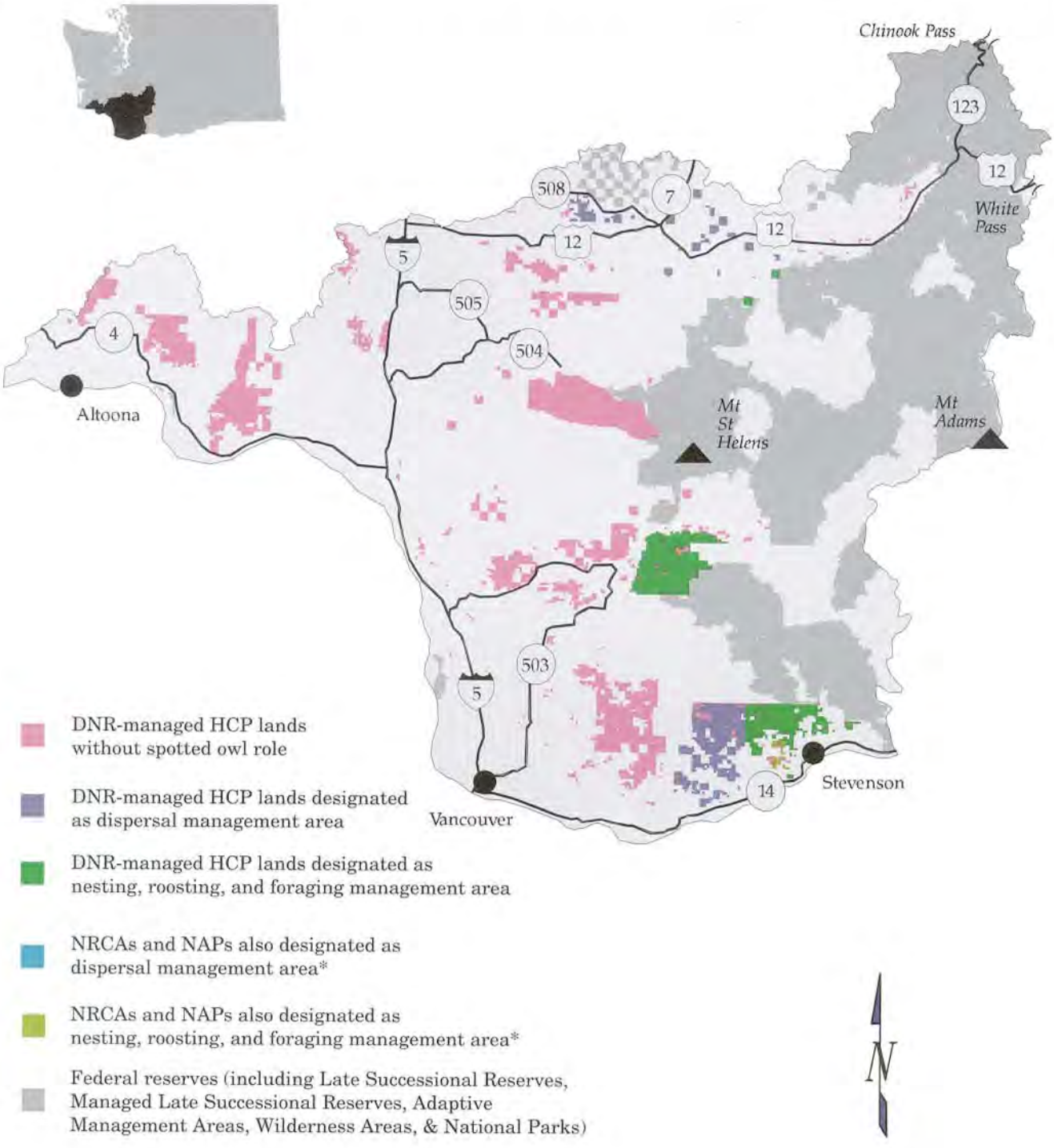

RMS 7/22/96 (Source: DNR Geographic Information System, April 1995)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves:
See section in Chapter I titled Land Covered by the HCP.

## Map IV.2: Role of DNR-managed lands in providing mitigation for the northern spotted owl in the South Puget Planning Unit




RMS 7/22/96 (Source: DNR Geographic Information System, April 1995)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves: See section in Chapter I titled Land Covered by the HCP.

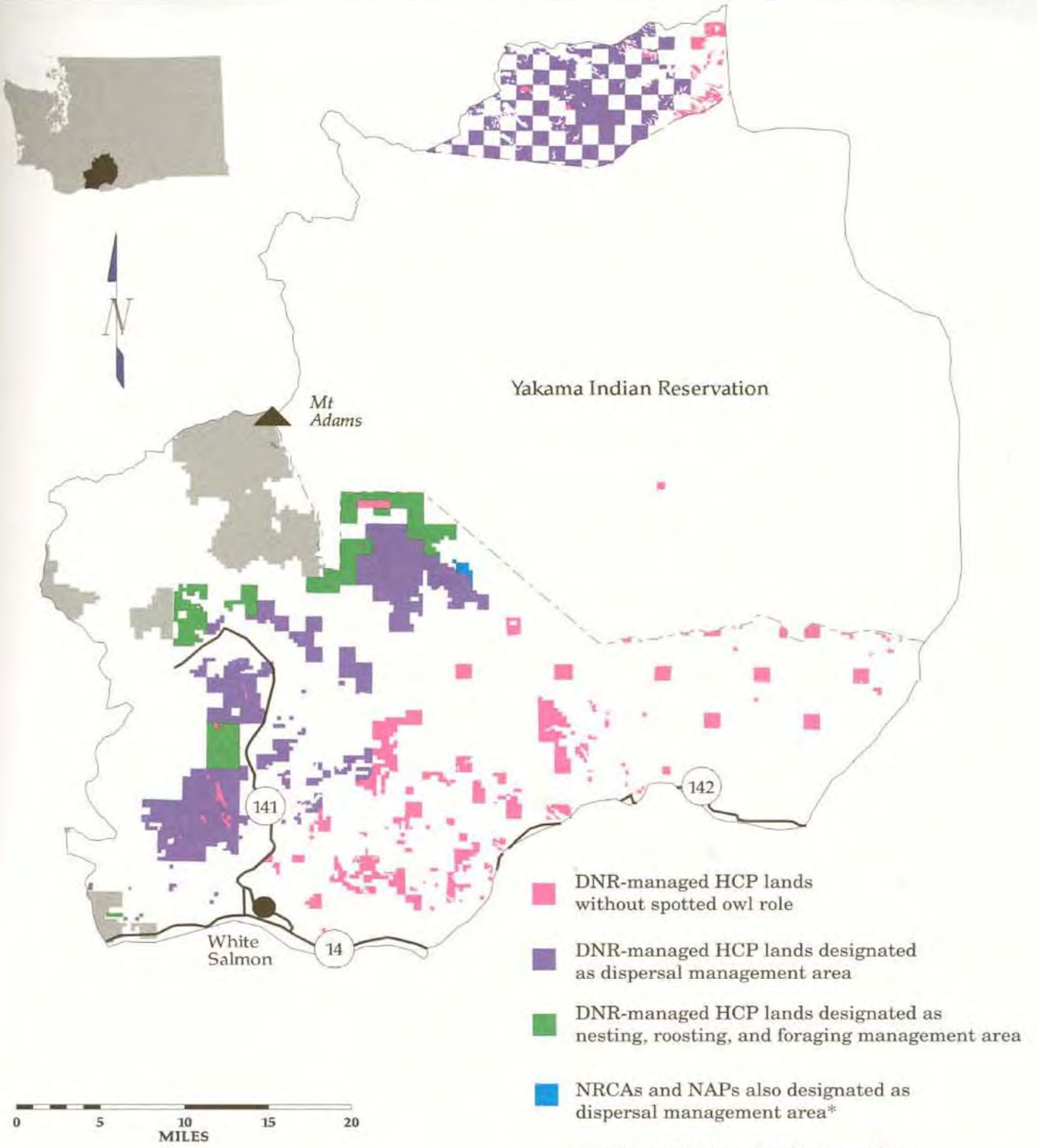
## Map IV.3: Role of DNR-managed lands in providing mitigation for the northern spotted owl in the Columbia Planning Unit




RMS 7/22/96 (Source: DNR Geographic Information System, April 1995)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves: See section in Chapter I titled Land Covered by the HCP.

| | | |
|---|---|---|
| IV.4 | Role of DNR-managed lands in providing mitigation for the northern spotted owl in the Straits Planning Unit | No change |
| IV.5 | Role of DNR-managed lands in providing mitigation for the northern spotted owl in the South Coast Planning Unit | No change |

# Map IV.6: Role of DNR-managed lands in providing mitigation for the northern spotted owl in the Klickitat Planning Unit



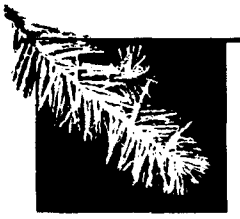

RMS 7/22/96 (Source: DNR Geographic Information System, April 1995)
This map is for planning purposes only.
*Natural Resource Conservation Areas and Natural Area Preserves: See section in Chapter I titled Land Covered by the HCP.

| | | |
|---|---|---|
| IV.7 | Role of DNR-managed lands in providing mitigation for the northern spotted owl in the Yakima Planning Unit | No change |
| IV.8 | Role of DNR-managed lands in providing mitigation for the northern spotted owl in the Chelan Planning Unit | No change |
| IV.9 | Preliminary boundaries for landscape planning units in the Olympic Experimental State Forest | No change |

APPENDIX

4.

# Appendix 4 - Implementation Agreement



# Appendix 4. Implementation Agreeement

## IMPLEMENTATION AGREEMENT FOR THE WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES HABITAT CONSERVATION PLAN

**THIS AGREEMENT** is made and entered into as of the ___ day of_____, 1996, by and between the Secretary of the Interior acting through the United States Department of the Interior, as represented by the UNITED STATES FISH AND WILDLIFE SERVICE ("USFWS"), an agency of the federal government, the Secretary of Commerce acting through the NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION as represented by the NATIONAL MARINE FISHERIES SERVICE ("NMFS"), an agency of the federal government, and the WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, ("DNR"), an agency of the State of Washington, which includes the WASHINGTON STATE BOARD OF NATURAL RESOURCES ("BOARD").

## BACKGROUND

**1.0** DNR manages approximately 2.1 million acres of forest lands within the State of Washington.

**2.0** Approximately 1.6 million acres of DNR-managed forest lands are within the range of the Northern Spotted Owl (*Strix occidentalis caurina*), ("the Owl").

**3.0** The Marbled Murrelet (*Brachyramphus marmoratus*), Bald Eagle (*Haliaeetus leucocephalus*), Grizzly Bear (*Ursus arctos*), Gray Wolf (*Canis lupus*), Peregrine Falcon (*Falco peregrinus*), Columbian White-tailed Deer (*Odocoileus virginianus leucurus*), Aleutian Canada Goose (*Branta canadenis leucopareia*), and Oregon Silverspot Butterfly (*Speyeria zerene hippolyta*) (hereafter known collectively as "other federally listed species") occur or may occur on the PERMIT LANDS.

**4.0** The aforementioned species are listed as threatened or endangered under the Federal Endangered Species Act, 16 U.S.C. § 1531, *et seq.*, ("ESA"), and any taking, as that term is used in the ESA, of these species is prohibited, except as permitted by the ESA.

**5.0** Incidental takings in accordance with an Incidental Take Permit ("ITP") issued by the SERVICES in conjunction with approval of a Habitat Conservation Plan ("HCP") are authorized by the ESA.

**6.0** DNR, with technical assistance from the SERVICES and others, has prepared an HCP for the Owl and other species that may use the types of habitat that occur on the PERMIT LANDS.

**7.0** DNR has applied to have the ITP include the Owl and other federally listed species that may currently use the types of habitats that occur on PERMIT LANDS; and to have the ITP, as amended from time to time, include every species that becomes listed after the effective date of this Implementation Agreement ("Agreement") and that may now or hereafter use the types of habitats that occur within the five Westside Planning Units of the PERMIT LANDS and the Olympic Experimental State Forest (OESF).

**8.0** The SERVICES require an Implementation Agreement to be signed by all PARTIES associated with issuance of an ITP for a long-term HCP.

**9.0** The purposes of this Agreement are to obtain an approved HCP and ITP covering DNR-management activities on the PERMIT LANDS; to implement the HCP; to commit the PARTIES to fulfill and faithfully perform their respective obligations, responsibilities, and tasks to the extent consistent with their respective authorities; to identify remedies and recourse should any of the PARTIES fail to perform such obligations, responsibilities, and tasks; and to provide for regulatory relief, stability, and species conservation.

**10.0** The SERVICES have given full consideration to the HCP and this Agreement and found them to meet the requirements for issuance of an ITP under the ESA.

**11.0** DNR has given full consideration to the HCP, its alternatives, the ITP, and this Agreement and found the HCP, the ITP, and this Agreement to be in the best interest of each of the trusts.

**NOW, THEREFORE,** in consideration of the mutual covenants and conditions contained below, the PARTIES agree as follows:

## AGREEMENT

**12.0 Definitions.** The terms of the HCP, and this Agreement shall be interpreted as supplementary to each other, but in the event of any direct contradiction between the terms of the HCP and this Agreement, the terms of this Agreement shall control. Terms capitalized in this document shall have the meanings set forth in this section.

**12.1** The terms "PARTY" and "PARTIES" shall mean one or all of the following: the Secretary of the Interior acting through the United States Department of the Interior, as represented by the USFWS, the Secretary of Commerce acting through the National Oceanic

and Atmospheric Administration, as represented by NMFS, and DNR, including the BOARD.

**12.2** The terms "SERVICE" and "SERVICES" shall mean the USFWS and/or the NMFS acting on behalf of their respective Secretaries.

**12.3** The terms "ITP" and "PERMIT" shall mean an incidental take permit issued to DNR pursuant to Section 10(a) of the ESA to authorize any incidental take of listed species which may result from otherwise lawful DNR-management activities on PERMIT LANDS, which are conducted in accordance with the HCP and this Agreement.

**12.4** The term "PERMIT LANDS" shall mean the lands covered by the ITP and HCP, as referred to in section 15.1 of this Agreement.

**12.5** The term "HCP" shall mean the Habitat Conservation Plan prepared by DNR, and as amended.

**12.6** The term "SPECIES ADDRESSED IN THE HCP" includes all species currently listed as threatened or endangered that may use the types of habitat found on the PERMIT LANDS, and all species hereafter listed as threatened or endangered that may use the types of habitat found within the five Westside Planning Units and the OESF. These species include species listed under the ESA or afforded similar status or protection by federal law or regulation applicable to or affecting the PERMIT LANDS during the term of the HCP.

**12.7** The term "DAYS" shall mean calendar days.

**12.8** The term "COMPLIANCE" shall mean substantial compliance with the commitments of the HCP, ITP, and this Agreement.

**12.9** The terms "DEMONSTRATES" and "DEMONSTRATING" shall mean to establish the existence of a condition or development by use of the best scientific and/or commercial data available.

**12.10** The term "PEER REVIEWED" shall mean that consistent with section B(1) of the Interagency Cooperative Policy for Peer Review in Endangered Species Activities (59 Fed. Reg. 34,270), the SERVICES will provide for peer review of the scientific data on which the agencies base any finding requiring peer review in this Agreement to ensure that any such findings are based on the best scientific and commercial data available. The SERVICES will request peer review so that the reviews will be completed within seventy-five (75) DAYS of DNR's request. In the event peer review of such data is not available in time to enable the SERVICES to meet their obligations established by statute, regulation, or this Agreement, the required finding or decision based on such data will be effective, but will be reconsidered by the SERVICES as soon as that information becomes available.

**13.0 Incorporation by Reference.** The HCP is intended to be, and by this reference is, incorporated herein.

**14.0 Responsibilities of the PARTIES.** The PARTIES agree to be bound by and to the commitments of the HCP, the ITP, and this Agreement, subject to amendment, renewal, or termination as provided herein.

## 15.0 PERMIT LANDS.

**15.1** PERMIT LANDS Description. Contained in Map I.1 of the HCP, and incorporated herein by reference, are Geographic Information Systems (GIS) data describing the PERMIT LANDS subject to the HCP, the ITP, and this Agreement. Said lands are referred to in the HCP, the ITP, and this Agreement variously as the "DNR-managed lands in the area covered by the HCP," "PERMIT LANDS," the "DNR forest lands," the "DNR-managed lands," the "lands within the planning units," and other similar terms. All such terms, unless otherwise indicated, used in the HCP, the ITP, or this Agreement refer to those lands identified in Map I.1 of the HCP as "DNR-managed HCP lands."

**15.2** Natural Area Preserves and Natural Resource Conservation Areas. DNR manages approximately 45,000 acres of Natural Area Preserves ("NAPs") and Natural Resource Conservation Areas ("NRCAs") that lie within the range of the Owl. Approximately 14,765 acres of these lands have been designated as important for achieving the commitments of the HCP. It is expected that the designated lands will continue to provide this habitat in the future and this habitat will count as mitigation so long as such habitat remains present. DNR will notify the SERVICES if the designated lands, or a portion thereof, will no longer be managed consistent with the commitments of the HCP. While not subject to the commitments of the HCP or this Agreement, so long as they are managed consistent with the commitments of the HCP, the SERVICES will give DNR credit for the habitat provided by the designated lands in terms of meeting the commitments assigned to DNR in the HCP, the ITP, and this Agreement. Whether the designated lands continue to provide this habitat, and the mitigation if they do not, will be considered by the SERVICES at the time the SERVICES are notified by DNR that the designated lands will no longer be managed consistent with the commitments of the HCP. Take incidental to DNR-management activities on the designated lands is authorized by the ITP so long as such take is in COMPLIANCE with the HCP, the ITP, and this Agreement.

## 16.0 Forest Product Sales and Other Management Activities Other Than Land Sales, Purchases, and Exchanges.

**16.1** Management Activities Subject to this Agreement. DNR has an active management program for its PERMIT LANDS, including but not limited to forest practices, forest product sales, other valuable material sales, licenses, permits, leases, rights-of-way, and public uses. So long as the SERVICES have not suspended or revoked the ITP under section 26.0 of this Agreement or DNR has not terminated the ITP under section 27.0, the ITP will authorize any incidental take otherwise prohibited by the ESA which may result from otherwise lawful DNR-management activities that are conducted in accordance with the HCP and this Agreement.

**16.2** Management Activities in Progress or Under Way.

a. Timber Sales. DNR will incorporate the relevant commitments of the HCP into all timber sales sold on or after January 1, 1999. DNR may, but is not required to, incorporate the commitments of the HCP into timber sales sold prior to January 1, 1999.

b. Nontimber Resource Activities. Excepting designations and leases under subsection 25.3.a(2) of this Agreement, DNR will incorporate the relevant commitments of the HCP into all nontimber resource transactional documents pertaining to PERMIT LANDS including, but not limited to, leases, licenses, permits, contracts, and sales, executed on or after January 1, 1999. DNR may, but is not required to, incorporate the commitments of the HCP into nontimber resource transactional documents pertaining to PERMIT LANDS including, but not limited to, leases, licenses, permits, contracts, and sales, executed prior to January 1, 1999. As leases, licenses, contracts, and permits of PERMIT LANDS are renewed, DNR shall alter such leases, licenses, contracts, and permits, to the extent permitted by law, to ensure compatibility with the commitments of the HCP. The level of nontimber resource activity and associated take, if any, of SPECIES ADDRESSED IN THE HCP will be reviewed annually in conjunction with the annual meeting under subsection 17.2 of this Agreement. The annual review meetings will be used by the PARTIES to ensure that any expansion in the level of DNR's nontimber resource activities, as described in Chapter IV of the HCP, that occur on PERMIT LANDS do not result in increased incidental take of SPECIES ADDRESSED IN THE HCP. If increased incidental take will result, DNR will initiate the amendment process under subsection 25.3(b)-(c) of this Agreement. At the annual meeting, DNR will provide the SERVICES with the results of the nontimber resource monitoring efforts as described in the HCP.

**16.3** Severability. Management activities on DNR lands are often accomplished through an agent, lessee, licensee, contractor, permittee, right-of-way grantee, or purchaser. Take incidental to otherwise lawful activities of these entities is authorized by the ITP so long as such take is authorized by DNR and is in COMPLIANCE with the HCP, the ITP, and this Agreement. A violation of the ITP by an agent, lessee, licensee, contractor, permittee, right-of-way grantee, or purchaser, which was not authorized by DNR, shall not result in the suspension, revocation, or termination of the ITP, nor shall it affect other benefits, rights, or privileges under the ITP, except as to that agent, lessee, licensee, contractor, permittee, right-of-way grantee, or purchaser.

**17.0 Land Transfers, Purchases, Sales, and Exchanges.** DNR has an active program of land acquisition and disposition, including but not limited to land transfers, sales, purchases, and exchanges. This program includes intergrant transactions. The HCP provides for continuation of this program.

**17.1** Conservation Objectives of the HCP. The HCP and this Agreement recognize that it is necessary for DNR to continue to pursue an active land disposition program. In carrying out such an active land disposition program, DNR commits to maintaining the conservation objectives described in Chapter IV of the HCP in the course of its land disposition program. DNR may dispose of PERMIT LANDS, including PERMIT LANDS within any Watershed Administrative Unit ("WAU"), or any quarter-township in eastern

Washington, even though such a disposition is not in accord with the habitat goals for a particular WAU, or quarter-township, so long as the conservation objectives described in Chapter IV of the HCP are maintained. Annual and other meetings held under section 17.2 will address whether disposition of PERMIT LANDS would have a significant adverse effect on the conservation objectives described in Chapter IV of the HCP.

**17.2** Notification and Annual Review of Land Transactions. The PARTIES will hold annual meetings in December of each year, unless otherwise mutually agreed upon by the PARTIES, to review proposed and completed land transactions involving PERMIT LANDS. At such meetings, DNR will notify the SERVICES in writing of any known proposed land transfers, purchases, sales, or exchanges expected to occur within the upcoming year involving PERMIT LANDS. A follow up meeting will be held within sixty (60) DAYS after the annual meeting, if needed. Additional meetings may be convened on a more frequent basis or incorporated into the scheduled comprehensive reviews contemplated under section 21.0 with the mutual consent of the PARTIES. DNR will mail to the SERVICES preliminary transactional documents at the time such documents are mailed to the BOARD for all land transactions involving PERMIT LANDS that were not discussed during the annual meetings. DNR will also mail the closing documents to the SERVICES within thirty (30) DAYS of closing for all transactions involving PERMIT LANDS. Neither SERVICE, however, shall have the power to veto any land transaction. DNR will amend annually, or more frequently if it desires, the HCP pursuant to section 25.3 of this Agreement to reflect lands added to or removed from the PERMIT LANDS. In no event will DNR conduct management activities that will result in take on lands that will be added to the ITP prior to amendment of the HCP.

**17.3** Land Acquisition by Transfer, Purchase, or Exchange. The PARTIES shall, upon request by DNR, add lands acquired by transfer, purchase, or exchange within the range of the Owl to the HCP, ITP, and this Agreement. DNR will incorporate the relevant commitments of the HCP into the management of these new PERMIT LANDS. No additional mitigation will be required unless the management of these new PERMIT LANDS increases take beyond the level authorized in the ITP. If the management of these new PERMIT LANDS increases take beyond the level authorized in the ITP, then any additional mitigation will be determined through amendment of the HCP based on mutual agreement among the PARTIES. DNR, at its sole discretion, may at any time add acquired lands to the WAU or quarter-township base referred to in Chapter IV of the HCP, but is not required to do so. So long as land DNR seeks to add to the HCP in accordance with this paragraph does not increase the level of take, it shall be the subject of a minor amendment to the HCP pursuant to section 25.3 and shall thereafter be PERMIT LANDS.

**17.4** Land Disposition by Transfer, Sale, or Exchange. DNR, at its sole discretion, may voluntarily dispose of PERMIT LANDS by transfer, sale, or exchange. DNR, at its sole discretion, may require that the recipient of the disposed land commit to managing the disposed land in accordance with the HCP and this Agreement. DNR is not required by the HCP, the ITP, or this Agreement to require continuation of the commitments of the HCP or this Agreement on the disposed land. If DNR sells or exchanges DNR-managed lands, NAPs, or NRCAs, and the acquiring entity commits in writing to the SERVICES that the lands disposed by DNR will be managed in a manner which maintains the commitments of

the HCP, DNR will continue to be given credit for such lands for the purpose of determining whether DNR is in COMPLIANCE with the HCP, the ITP, and this Agreement. If land disposed of by DNR does not remain subject to the provisions of the HCP, and the cumulative impact of the land disposition would have a significant adverse effect on the affected species, the PARTIES, based on the best scientific and commercial data available at the time, shall amend the HCP, this Agreement, and the ITP to provide replacement mitigation for the affected species pursuant to the standards and processes outlined in the extraordinary circumstances provisions of section 24 herein.

**17.5** Federal Condemnation. In the event of condemnation of DNR-managed lands, NAPs, or NRCAs by the federal government, the PARTIES shall not be required to replace mitigation lost due to condemnation. The PARTIES' obligations relating to the condemned lands under the HCP and this Agreement shall be terminated.

**17.6** Rights and Authorities Preserved. Except as otherwise specifically provided in this Agreement, nothing herein contained shall be deemed to restrict the rights, privileges, and powers of the State of Washington or DNR to manage the use of, or exercise all of the rights incident to, land ownership associated with the PERMIT LANDS. Nothing herein contained shall be interpreted to restrict the authority of the SERVICES to administer the ITP with respect to the PERMIT LANDS in accordance with this Agreement and the ESA.

**18.0 Funding.** DNR shall submit to the Washington State Legislature, on at least a biennial basis, an agency operating and capital budget for asset management that will be adequate to fulfill DNR's obligations under the HCP, ITP, and this Agreement. Failure by DNR to ensure adequate funding is provided to implement the HCP shall be grounds for suspension or partial suspension of the ITP.

The SERVICES shall include in their annual budget requests sufficient funds to fulfill their respective obligations under the HCP, ITP, and this Agreement.

**19.0 Duration.**

**19.1** Term of PERMIT. The HCP, ITP, and this Agreement shall remain in full force and effect for a period of seventy (70) years from the effective date, or until revocation under section 26.0 or termination under section 27.0 of this Agreement, whichever occurs sooner. Amendments to the HCP, the ITP, or this Agreement shall be in full force and remain in effect for the then remaining term of this Agreement or until revocation under section 26.0 or termination under section 27.0 of this Agreement, whichever occurs sooner.

**19.2** PERMIT Renewal. Unless revoked under section 26.0 or terminated under section 27.0 of this Agreement, DNR may renew the PERMIT, HCP, and this Agreement on the existing terms or other mutually agreeable terms three (3) times for a period of up to ten (10) years per renewal, provided:

(a) DNR is in COMPLIANCE with the HCP and this Agreement;

(b) the PARTIES have met approximately three (3) years prior to the scheduled PERMIT or renewal period expiration date to discuss the renewal of the PERMIT, HCP, and this Agreement, and DNR provides the SERVICES with at least eighteen (18) months notice of its intent to renew the PERMIT;

(c) DNR finds that renewal of the PERMIT, HCP, and this Agreement would be in the best interest of each of the trusts; and

(d) the sum of the original PERMIT term and any continuation or renewal periods does not exceed one hundred (100) years.

**19.3** PERMIT Continuation. Unless revoked under section 26.0 or terminated under section 27.0 of this Agreement, the SERVICES may require DNR to continue implementing the HCP, PERMIT, and this Agreement for up to three (3) periods of up to ten (10) years apiece, provided that:

(a) at the end of the original PERMIT term or the continuation periods under this subsection, the SERVICES DEMONSTRATE that DNR has failed to achieve its commitments under the HCP as described in Chapter IV of the HCP;

(b) the PARTIES have met approximately three (3) years prior to the scheduled expiration date to discuss the potential for continuation or renewal of the HCP, PERMIT, and this Agreement, and the SERVICES provide DNR with at least eighteen (18) months notice of their intent to require continuation of the HCP, PERMIT, and this Agreement; and

(c) the sum of the original PERMIT term and any continuation or renewal periods does not exceed one hundred (100) years.

**20.0 Reporting and Inspections.** DNR will provide the SERVICES with two (2) copies of each report described in Chapter V of the HCP, at the addresses designated by the SERVICES, and any readily available existing information requested by either SERVICE to verify the information contained in such reports. Either SERVICE may inspect PERMIT LANDS in accordance with its then applicable regulations. Except as provided in its regulations, the inspecting SERVICE will notify DNR thirty (30) DAYS prior to the date they intend to make such inspections and allow DNR representatives to accompany SERVICE personnel when making inspections. To assist DNR in meeting its obligations under this Agreement, the SERVICE will brief DNR in writing on the factual information learned during any inspection within thirty (30) DAYS of such inspection, except as provided in its regulations.

**21.0 Comprehensive Reviews.** The PARTIES to this Agreement will conduct periodic reviews of the HCP, the ITP, and this Agreement, consulting with one another in good faith to identify any amendments that might more effectively and economically mitigate any incidental take. The PARTIES shall conduct comprehensive reviews within one month of the first, fifth, and tenth, anniversaries of the effective date and every tenth anniversary

thereafter for the full term that this Agreement is in effect. Upon mutual agreement of all the PARTIES, additional reviews may be scheduled at any time.

## 22.0 Adequacy and Certainty.

**22.1** Assurances. The HCP provides habitat conservation for all SPECIES ADDRESSED IN THE HCP, while providing regulatory relief, certainty, flexibility, and stability for DNR. Specifically, the conservation strategies afforded all habitat types, and the species specific measures of the HCP and this Agreement, adequately provide for all SPECIES ADDRESSED IN THE HCP and contain measurable criteria for the biological success of the HCP. Unless the SERVICES have suspended or revoked the ITP under section 26.0 of this Agreement or have not added a newly listed species to the PERMIT under subsection 25.1(b) of this Agreement, DNR is assured by this Agreement that any incidental taking of a SPECIES ADDRESSED IN THE HCP in the course of its otherwise lawful management activities will be authorized under the ESA. The SERVICES are assured by this Agreement that the incidental taking authorized by the ITP is consistent with the conservation of the species under the ESA.

**22.2** Findings by the SERVICES. Based upon the best scientific and commercial data available and after careful consideration of all comments received, the SERVICES have found that with respect to all SPECIES ADDRESSED IN THE HCP:

(a) that any take on PERMIT LANDS under the HCP will be incidental;

(b) the impacts of any incidental take under the HCP will, to the maximum extent practicable, be minimized and mitigated;

(c) that DNR will ensure that adequate funding for the HCP will be provided in accordance with this Agreement and the HCP;

(d) that any taking of a SPECIES ADDRESSED IN THE HCP will not appreciably reduce the likelihood of the survival and recovery of such species in the wild; and

(e) that other measures and assurances required by the SERVICES as being necessary or appropriate for the purposes of the HCP are met.

## 23.0 Unforeseen Circumstances.

**23.1** Unforeseen Circumstances Consultation. In the event of unforeseen circumstances arising in connection with the HCP, the ITP, or this Agreement, the appropriate SERVICE may request consultation with DNR regarding those circumstances and may suggest modifications to the commitments of the HCP, the ITP, or this Agreement. DNR shall consult with the SERVICE to explore whether there is a mutually acceptable means for adjusting the commitments of the HCP, the ITP, and this Agreement that maintains the interests of all PARTIES. If the cost of a mutually acceptable adjustment would be significant to DNR, then the PARTIES must strive to find further or different

voluntary adjustments that would avoid or minimize the cost to DNR. The SERVICES shall not seek from DNR without its consent a commitment of additional land or financial undertaking beyond the level of mitigation which is provided under the commitments of the HCP, the ITP, and this Agreement.

**23.2** Findings of Unforeseen Circumstances. The SERVICES shall have the burden of DEMONSTRATING that unforeseen circumstances have arisen. If DNR, after consultation and in its sole discretion, does not agree voluntarily to implement the requested changes, then the SERVICE must look to section 24.0 regarding extraordinary circumstances if it wishes to continue to pursue changes, and must satisfy the provisions of section 24.0 regarding such desired changes. The SERVICES agree that so long as DNR is in COMPLIANCE with its commitments under the HCP, ITP, and this Agreement, they will not impose on DNR any nonconsensual additional land-use restrictions, financial obligations, or any other form of additional mitigation for any SPECIES ADDRESSED IN THE HCP except under extraordinary circumstances as addressed in section 24.0.

## 24.0 Extraordinary Circumstances.

**24.1** Extraordinary Circumstances Defined. Additional mitigation requirements shall not be imposed upon DNR without its consent provided DNR is in COMPLIANCE with the HCP, the ITP, and this Agreement, and the HCP is properly functioning, except under extraordinary circumstances. Extraordinary circumstances shall mean that continued DNR-management activities in accordance with the HCP, the ITP, and this Agreement would result in a substantial and material adverse change in the status of a species that was not foreseen on the effective date of this Agreement which can be remedied by additional or different mitigation measures on the PERMIT LANDS. The SERVICES shall have the burden of DEMONSTRATING that extraordinary circumstances exist.

**24.2** Findings of Extraordinary Circumstances. Findings of extraordinary circumstances must be clearly documented in writing and based upon reliable, PEER REVIEWED technical information regarding the status and habitat requirements of the affected species. Furthermore, in deciding whether any extraordinary circumstances exist with respect to a particular SPECIES ADDRESSED IN THE HCP, which might warrant additional mitigation, the SERVICES shall consider, but not be limited to the following factors:

(a) the size of the current range of the affected species;

(b) the percentage of range adversely affected by the HCP;

(c) the percentage of range conserved by the HCP;

(d) the ecological significance of that portion of the range affected by the HCP;

(e) the level of knowledge about the affected species and the degree of specificity of the species conservation program under the HCP;

(f) whether the HCP was originally designed to provide an overall net benefit to the affected species and contained measurable criteria for assessing the biological success of the HCP; and

(g) whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the particular species in the wild.

Upon a finding of extraordinary circumstances, the SERVICES will have ninety (90) days to determine any additional mitigation necessary, during which time DNR will use its best efforts to avoid a substantial and material adverse change in the status of the affected species. If the SERVICES are unable to achieve appropriate additional mitigation, the SERVICES shall work with DNR to find the least disruptive method of continuing DNR-management activities.

**24.3** Effect of Additional Mitigation Measures on the HCP. Any additional mitigation measures approved under this section shall change the original terms of the HCP only to the minimum extent necessary and shall be limited to modifications on the PERMIT LANDS, and any additional mitigation requirements under this Agreement shall not involve additional financial commitments by DNR or land use restrictions on DNR without its express written consent. The SERVICES may seek additional funding for mitigation from other sources.

**24.4** SERVICES Free to Take Independent Action. Nothing in this Agreement shall be construed to limit or constrain either SERVICE from carrying out lawful additional mitigation actions at their own cost with respect to the protection of any listed species, or endeavoring to provide mitigation by means of other resources or financial assistance to DNR to the fullest extent possible in accordance with law and available appropriations.

**24.5** Adaptive Management. Adaptive management provides for ongoing modifications of management practices to respond to new information and scientific developments. The monitoring and research provisions of the HCP are in part designed to identify modifications to existing management practices. The following adaptive management practices shall be implemented by DNR as reasonably necessary to respond to the following changes of circumstances and are not subject to subsections 23.1, 23.2, 24.1, 24.2, and 24.3:

(a) the best available scientific and commercial data indicate that an increase in the percentage of ground cover of dead and down wood is required for the support of the Owl in the definition of sub-mature habitat in Chapter IV section A of the HCP, provided DNR's responsibility shall be limited to 15 percent ground cover averaged over a stand;

(b) the best available scientific and commercial data indicate that the model used to delineate mass wasting on a site-specific basis under

Chapter IV section D of the HCP can be reasonably improved to increase its accuracy;

(c) the best available scientific and commercial data indicate that the landscape-based road network management process described in Chapter IV section D of the HCP can be reasonably and practically improved, considering both the costs and benefits of implementing the improvement;

(d) the necessity for continued provision of nest patches has changed as a result of conducting research to determine the biological feasibility of using silvicultural techniques to create spotted owl nesting habitat;

(e) with specific reference to the marbled murrelet, the habitat definitions will be refined for each planning unit as a result of DNR's habitat relationships study;

(f) with specific reference to the marbled murrelet, the interim conservation strategy will be replaced with a long-term management plan upon completion of the inventory survey phase;

(g) management activities allowed within the riparian management zones will be refined within the first decade of the HCP;

(h) wind buffer management is refined as this priority research item is addressed;

(i) a long-term conservation strategy for forest management along Type 5 Waters is developed and incorporated into the HCP at the end of the first ten years of the HCP; and

(j) prescriptions resulting from a completed watershed analysis call for additional measures than those specified in the HCP.

All other adaptive management strategies are subject to subsections 23.1, 23.2, 24.1, 24.2, 24.3, and 24.4.

## 25.0 Amendments and Modifications.

**25.1** PERMIT Amendments and Modifications. The ITP may be amended or modified as follows:

a. General Amendments to the ITP. The ITP can be amended or modified in accordance with SERVICE regulations as provided in this Agreement. If the federal regulations that govern PERMIT amendment have been modified from those codified at 50 C.F.R §§ 13.23, 220.11, 222.25, and 222.26, as of the effective date of this Agreement, the modified regulations will apply only to the extent the modifications are required by

subsequent enactment of the Congress or court order, or upon a determination by DNR that application of the modifications is in the best interests of the relevant trusts.

b. New Listings. The ITP for the Owl and other federally listed species that may currently use the types of habitats that occur on the PERMIT LANDS will be issued contemporaneously with the signing of this Agreement. In the future, the SERVICES shall add to the ITP, within sixty (60) DAYS of receipt by the appropriate SERVICE of a written request by DNR, each species that may use the types of habitats that occur within the five West Side Planning Units and the OESF that is listed as a threatened or endangered species during the term of this Agreement at the level of take requested by DNR and supported by the HCP without requiring additional mitigation, unless, within the specified sixty-day period, the SERVICE DEMONSTRATES that extraordinary circumstances under section 24.0 exist. If such extraordinary circumstances are found to exist, the SERVICE shall provide the appropriate additional mitigation or other amendments in a timely manner and amend the ITP to include the affected species if appropriated funds are available. If appropriated funds are not available, the SERVICES shall use all lawful means, including soliciting nongovernmental sources of funds and other alternative methods of mitigation or amendment, to endeavor to achieve the appropriate additional mitigation and amend the ITP to cover the particular species.

**25.2** Amendments to the Agreement. This Agreement may be amended only with the written consent of each of the PARTIES.

**25.3** HCP Amendments. The HCP may be amended as follows:

a. Minor HCP Amendments.

(1) The following types of minor amendments may be made to the HCP without notification, provided that the conservation objectives of the HCP are being maintained, there is no increase in the level of incidental take, and appropriate mitigation is provided. Amendments allowable under this subsection include the following:

(a) land acquisition and disposition as described in section 17.0, which provides for periodic notice and review of DNR land transactions involving PERMIT LANDS;

(b) corrections of typographic and grammatical errors and similar editing errors, which do not change the intended meaning of the HCP; and

(c) corrections to any maps, GIS data, or exhibits to reflect previously approved changes in the HCP or other new information.

(2) So long as appropriate mitigation is provided, the alteration of an HCP commitment or commitments, the formal designation of urban lands pursuant to state law, and the leasing of PERMIT LANDS for commercial, residential, or industrial purposes, or the implementation of one or more of the adaptive management strategies described in Chapter IV of the HCP or subsection 24.5 of this Agreement, that does not increase the level

of take authorized by the ITP is a minor amendment effective sixty (60) DAYS after the SERVICES receive written notice from DNR, unless the appropriate SERVICE responds in writing with specific concerns during the sixty-day notification period.

b. Major HCP Amendments. For other amendments of the HCP, including those amendments that would increase the level of take, proposed by DNR, DNR shall provide a written description of the proposed amendment, the effects of the proposal on the HCP, and any alternative ways in which the objectives of the proposal might be achieved. The proposed amendments shall become effective upon written approval by the appropriate SERVICE. The SERVICE shall approve or disapprove the proposed amendment within 180 DAYS after receipt of the DNR proposal.

c. HCP Amendments and the ITP. HCP amendments that will result in an increased level of incidental take will require amendment to the ITP under subsection 25.1.a of this Agreement. HCP amendments that do not increase the level of incidental take will not require amendment to the ITP under subsection 25.1.a of this Agreement so long as appropriate mitigation is provided.

**26.0 ITP Suspension or Revocation.** The SERVICES maintain the right to suspend or revoke the ITP in accordance with federal law and this Agreement. The SERVICES agree, however, that so long as DNR is in COMPLIANCE with the HCP, the ITP, and this Agreement, they will not suspend or revoke the ITP, or otherwise sanction DNR except to the extent that the sanction, suspension, or revocation of the ITP is required by applicable federal law or the terms of this Agreement. Any revocation of the ITP, in whole or in part, automatically terminates the relevant commitments of the HCP and this Agreement, and subjects activities no longer covered by the ITP to all applicable provisions of the ESA and SERVICE regulations relating to the taking of a listed species. If federal regulations should be modified from those codified at 50 C.F.R. §§ 13.26-13.29, and/or § 222.27, as of the effective date of this Agreement, the modified regulations will apply only to the extent the modifications are required by subsequent enactment of the Congress or court order, or upon a determination by DNR that application of the modifications is in the best interests of the relevant trusts.

**27.0 Termination and Mitigation after Termination.**

**27.1** Generally. DNR reserves the right to terminate for any reason the HCP and this Agreement with thirty (30) DAYS written notice to the SERVICES. For listed species, the written termination notice shall contain a statement describing the species taken, the level of take, and the species mitigation provided prior to termination. DNR management activities not resulting in incidental take may continue after termination. Unlisted species are treated in subsection 27.5. The PARTIES agree that DNR may terminate the HCP and this Agreement in whole, or in part.

**27.2** Effect of Termination. Subject to the provisions of this section and subsection 29.1 of this Agreement, any termination of the HCP and this Agreement, in whole or in part by DNR under section 27, automatically terminates the relevant commitments of the HCP, the ITP and this Agreement, except as otherwise provided in this section 27, and subjects

activities no longer covered by the ITP to all applicable provisions of the ESA and SERVICE regulations relating to the taking of a listed species.

**27.3** Mitigation After Termination for listed species. Subject to the provisions of subsection 29.1, if the HCP and this Agreement are terminated by DNR, in whole or in part, the appropriate SERVICE may require DNR to mitigate any incidental take of a listed species affected by the termination that occurred during the term of the HCP and this Agreement to the effective date of the termination. Such mitigation may require DNR to continue relevant mitigation measures of the HCP as to some or all of the PERMIT LANDS for some or all of the period which would have been covered by the HCP and this Agreement. The SERVICES shall not extend mitigation requirements to non-PERMIT LANDS, nor shall mitigation requirements be extended beyond the term of this Agreement. Mitigation requirements, if any, shall not exceed the difference between mitigation already provided under the HCP and that required by the HCP for listed species at the time of termination. Unlisted species are treated in subsection 27.5.

**27.4** Delisting of a Species. In the event that a species is delisted under the ESA, the commitments of the HCP and this Agreement regarding such species shall be terminated. Mitigation measures designed primarily to benefit the delisted species need not be continued after delisting due to another species unless the appropriate SERVICE DEMONSTRATES that failure to continue those measures would not maintain the conservation objectives of the HCP for the other species, or DNR determines that continuation of such measures is in the best interest of the relevant trusts. The SERVICES shall have the burden of DEMONSTRATING that failure to continue the measures in question would not maintain the conservation objectives of the HCP for another species.

**27.5** Unlisted Species. The PARTIES agree that DNR may terminate, in whole or in part, the commitments of the HCP and this Agreement regarding unlisted species upon seventy-five (75) DAYS written notice to the SERVICES. Termination of the commitments of the HCP with regard to an unlisted species relieves the SERVICES from their obligations under subsection 25.1.b to add the species to the ITP if it becomes listed.

Within said seventy-five (75) DAYS the SERVICES shall notify DNR in writing if they will require any mitigation as a result of such termination and, if so, the mitigation to be required. In order to require any mitigation after termination, the SERVICES shall DEMONSTRATE that termination would result in a substantial and material adverse change in the biological status of the affected species. Said DEMONSTRATION shall be based upon reliable, PEER REVIEWED technical information as to the species affected by the proposed termination.

To DEMONSTRATE whether the termination might warrant mitigation after termination and what mitigation might be required, the SERVICES shall consider, but not be limited to, the following factors:

(a) the size of the current range of the affected species;

(b) the percentage of range adversely affected by the termination of the HCP;

(c) the percentage of range conserved by the HCP;

(d) the ecological significance of that portion of the range affected and conserved by the HCP;

(e) the level of knowledge about the affected species and the mitigation provided to the species under the HCP; and

(f) whether the HCP was originally designed to provide an overall net benefit to the affected species.

During the said seventy-five (75) DAYS, DNR will use its best efforts to avoid a substantial and material adverse change in the status of the affected unlisted species. If the PARTIES are unable to agree on the necessity for or the amount of such mitigation, the SERVICES and DNR shall work to resolve any such dispute by using the interagency science team and non-binding mediation provisions under subsection 29.4 prior to final determination. The SERVICES shall not extend mitigation requirements to non-PERMIT LANDS, nor shall mitigation requirements be extended beyond the term of this Agreement. Requirements for such mitigation, if any, shall not exceed the difference between mitigation already provided under the HCP and that required by the HCP for unlisted species at the time of termination.

After the PARTIES mutually agree on a final determination of the potential mitigation to be provided after termination, if any, as to an unlisted species, DNR shall send final notice of such termination, or withdraw the notice of termination. Final notice of termination for an unlisted species shall be effective thirty (30) DAYS after written notice to the SERVICES.

**28.0 Authority, Remedies and Enforcement.** Each of the PARTIES to this Agreement shall have all remedies available in equity or at law to enforce the commitments of the HCP, the ITP, and this Agreement including specific performance. No PARTY shall be liable for damages to any other PARTY or person for any breach of this Agreement, any performance or failure to perform a mandatory or discretionary obligation imposed by this Agreement, or any other cause of action arising from this Agreement. The HCP, this Agreement, and the ITP shall be interpreted and administered in accordance with the ESA. Nothing contained in this Agreement is intended to unlawfully limit the authority or responsibility of the United States government or DNR to invoke penalties or otherwise fulfill their respective responsibilities as public agencies in accordance with law.

**29.0 Informal Dispute Resolution Procedures.**

**29.1** Termination of the PERMIT. A SERVICE receiving a termination notice under section 27.0 of this Agreement shall notify DNR within sixty (60) DAYS after receipt of the notice if it disagrees with the statement of take or mitigation contained therein. Failure by a SERVICE to disagree with the statement of take or mitigation within sixty (60) DAYS shall constitute agreement with and approval of the statement. If the PARTIES cannot agree on the statement of take, or on necessary mitigation, if any, within sixty (60) DAYS after

receiving the notice of disagreement, the PARTIES shall endeavor in good faith to resolve their disagreement through nonbinding mediation.

**29.2** In the Event of a Possible Violation. If either SERVICE has reason to believe that DNR may have violated the commitments of the HCP, the ITP, or this Agreement, written notice must be provided to DNR regarding the specific provisions which may have been violated and the mitigation that the responsible federal agency proposes to correct the alleged violation. DNR will have sixty (60) DAYS from the date of receipt of notice, or such longer period of time as may be mutually agreed upon, to respond. If the PARTIES cannot agree on the violation or necessary mitigation within thirty (30) DAYS after receiving DNR's response, the PARTIES shall endeavor in good faith to resolve their disagreement through nonbinding mediation.

**29.3** Minor HCP Amendments Under Subsection 25.3.a(2). In the event that DNR receives timely notice from the appropriate SERVICE regarding a proposed minor HCP amendment under subsection 25.3.a(2), the proposed minor amendment shall not be effective and the PARTIES shall have thirty (30) DAYS from DNR's receipt of the notice within which to reach mutual agreement through discussion. DNR may convene an interagency science team to provide technical assistance on the disputed issue. If the issue is not resolved within the thirty (30) DAY time period, the PARTIES shall endeavor in good faith to resolve their disagreement through nonbinding mediation, unless an extension is mutually agreed upon by all PARTIES.

**29.4** Scheduled Reviews. In the event that a dispute arises at one of the scheduled reviews under section 17.0 of this Agreement, the PARTIES shall have thirty (30) DAYS from receipt of the notice of disagreement to reach mutual agreement through discussion. DNR may convene an interagency science team to provide technical assistance on the disputed issue. If the issue is not resolved within the thirty (30) DAY time period, the PARTIES shall endeavor in good faith to resolve their disagreement through nonbinding mediation, unless an extension is mutually agreed upon by all PARTIES. For land transactions not discussed at the scheduled reviews referenced above, the PARTIES shall endeavor to reach mutual agreement through discussion; the convening of an interagency science team by DNR or other dispute resolution procedures described above will not occur until a scheduled review, absent mutual consent of the PARTIES.

**29.5** Other Disputes. In the event of other significant disputes involving the HCP, the ITP, or this Agreement, any PARTY shall provide the other PARTIES with a written notice of disagreement. Within thirty (30) DAYS of receiving the notice of disagreement, the PARTIES shall endeavor in good faith to resolve the dispute through nonbinding mediation.

**29.6** Termination of Mediation. Nothing in this Agreement shall prevent any PARTY from terminating nonbinding mediation at any time and seeking any remedy or enforcement procedure available by law or regulation.

## 30.0 General Provisions.

**30.1** No Partnership. Except as otherwise expressly set forth herein, neither the commitments of the HCP, the ITP, nor this Agreement shall make or be deemed to make any PARTY to this Agreement the agent for or the partner of any other PARTY.

**30.2** Not a Covenant Running With the Land. Neither the HCP, ITP, or this Agreement shall be construed to establish a covenant that runs with the land.

**30.3** Severability. If any of the commitments of the HCP, the ITP, or this Agreement are found to be invalid or unenforceable, or this Agreement is terminated in part, all other commitments shall remain in effect to the extent they can be reasonably applied in the absence of such invalid, unenforceable, or terminated commitment or commitments.

**30.4** Congressional Officials Not to Benefit. No member of or delegate to Congress shall be entitled to any share or part of this Agreement, or to any benefit that may arise from it.

**30.5** Availability of Funds. Implementation and ongoing adherence to the HCP and this Agreement by all PARTIES shall be subject to the availability of appropriated funds. Failure by DNR to ensure adequate funding to implement the HCP shall be grounds for suspension or partial suspension of the ITP.

**30.6** No Third Party Contract Beneficiaries. The commitments of the HCP, the ITP, and this Agreement are not intended to create, and do not create, any third-party beneficiary interest herein in the public or in any member thereof, nor shall it authorize anyone not a PARTY to this Agreement to maintain a suit based in whole or in part on any provision of this Agreement, the HCP, or ITP. The rights of the public under the ESA are set forth in 16 U.S.C. §1540(g) and nothing in this Agreement expands or otherwise alters the rights of citizens thereunder.

**30.7** Counterparts. This Agreement may be executed in counterparts with each copy constituting an original. A complete original of this Agreement shall be maintained in the official records of each of the PARTIES hereto.

**30.8** Entire Agreement. This Agreement supersedes any and all other agreements, either oral or in writing, among the PARTIES hereto with respect to the subject matter hereof, and contains all of the covenants and agreements among them with respect to said matters except for The 1979 Cooperative Agreement for Endangered Plants and The Agreement for Establishment and Operation of the Washington Cooperative Fish and Wildlife Research Unit. Further, each PARTY to this Agreement acknowledges that no representation, inducement, promise, or agreement has been made by another PARTY or anyone acting on behalf of another PARTY that is not embodied herein.

**30.9** Contents Not Binding in Other Litigation. The contents of the HCP, ITP, and this Agreement shall not be construed as statements against interest or admissions and are not binding in litigation except in matters related to enforcement by the PARTIES of the

HCP, ITP, and this Agreement. In addition, DNR reserves the right to assert that its activities do not require an ITP.

**31.0 Notices.** The names, addresses, and telephone and facsimile numbers of the designated representatives may be changed at any time by written notice to the other PARTIES. Notices under this Agreement will be deemed received when delivered personally, on electronic confirmation that a facsimile message has been received at the "FAX" number most recently provided by the recipient representative, or five (5) DAYS after deposit in the United States mail, certified and postage prepaid, return receipt requested and addressed as above.

**32.0 Designated Representatives.** Each PARTY to this Agreement will designate a representative through whom notices under this Agreement shall originate and to whom notices under this Agreement shall be directed. The initial designated representatives are:

for DNR:

Department of Natural Resources
Administrator
Washington State Department of
Natural Resources
1111 Washington Street SE
P.O. Box 47000
Olympia, Washington 98504-7000
Telephone: (360) 902-1000
FAX: (360) 902-1796

for NMFS:

Regional Administrator
National Marine Fisheries Service
7600 Sand Point Way, N.E.
Seattle, Washington 98115-0070
Telephone: 206-526-6150
FAX: 206-526-6426

for USFWS:

Assistant Regional Director
U.S. Fish and Wildlife Service
911 N.E. 11th Avenue
Portland, OR 97232-4181
Telephone: (503) 231-6159
FAX: (503) 872-2771

IN WITNESS WHEREOF, THE PARTIES HERETO have executed this Implementation Agreement to be in effect as of the date last signed below.

WASHINGTON DEPARTMENT OF NATURAL RESOURCES
including THE BOARD OF NATURAL RESOURCES:

By_____ Approved as to Form Only:

Title_____ _____

Date_____ by_____
Assistant Attorney General

THE SECRETARY OF THE INTERIOR as represented
by the U.S. FISH AND WILDLIFE SERVICE:

By_____

Title_____

Date_____

THE SECRETARY OF COMMERCE as represented by
THE NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
through the NATIONAL MARINE FISHERIES SERVICE:

By_____

Title_____

Date_____

# Comparison of HCP Implementation Agreements

(Selected Provisions)

| ISSUE | WDNR | PLUM CREEK | MURRAY PACIFIC | OREGON |
|---|---|---|---|---|
| **Species covered** | §12.6: **All species currently listed** under the ESA found within the range of the spotted owl, and **all species hereafter listed** that are found within the five westside planning units and the OESF. | §2.9: "Permit Species" (**spotted owl, marbled murrelet, grizzly bear, and gray wolf**) are subject to incidental take;<br><br>§2.12: "Plan Species" other presently **unlisted vertebrate species** subject to an unlisted species agreement. If a plan species were listed the permit could be amended. | II.I: Permit covers **all currently listed species** within permit area; **species listed under the ESA after effective date** added to permit within 60 days of MP request unless jeopardy found based on several extraordinary circumstances factors. | **Spotted owl and marbled murrelet only; no unlisted species** |
| **Activities covered by Agreement** | §16.1: "forest practices, forest product sales, other valuable material sales, licenses, permits, leases, rights-of-way, and public uses."<br><br>§16.2: HCP commitments must be incorporated into all transaction documents by 1/1/99. | §1.1: "commercial timber production with some minor collateral uses such as rock quarries and electronic transmission sites." | II.I: "commercial forest management" | II.B: "lawful land use activity" |

| ISSUE | WDNR | PLUM CREEK | MURRAY PACIFIC | OREGON |
|---|---|---|---|---|
| **Land Transfers** | §17.1: DNR commits to maintaining the conservation objectives found in Chap.IV of the HCP; for riparian and uncommon habitats, DNR will maintain objectives on undisposed habitat areas within 5 westside units and OESF.<br><br>§17.2: **Parties will review proposed and completed land transactions on an annual basis**; DNR will provide Services with closing documents within 30 days of closing; **Services do not have power to veto any land transaction.**<br><br>(cont.) | (see next page)<br><br>(cont.) | II.O: **Agreement constitutes a covenant running with the land; binding upon all successors.** | II.M: **State must give 90 days written notice to Services.** Must include: description of land; whether new owner will become party to HCP; statement of take; mitigation to offset take; and necessary changes to mitigation to offset effect of conveyance.<br>II.S.(3): Either party may request mediation if unable to reach agreement on mitigation to offset the effect of the conveyance; **Service may use any legal remedy or enforcement if necessary to protect endangered or threatened species.** |

| ISSUE | WDNR | PLUM CREEK | MURRAY PACIFIC | OREGON |
|---|---|---|---|---|
| **Land Transfers (Cont.)** | §17.3: **Service will add land to HCP upon DNR request**; DNR will incorporate commitments of HCP into management of lands; so long as land DNR seeks to add does not increase the level of take, it will be considered a minor amendment.<br><br>§17.4: **DNR may dispose of lands at its discretion; DNR is not required to continue HCP commitments on disposed land**; if no longer subject to HCP, Services may suspend permit where land disposition conflicts with HCP conservation objectives. | §7.3.2(b): **May add lands within Planning Area to HCP unless Service finds that doing so would result in additional incidental take** not analyzed in the HCP.<br><br>§7.3.2(d): May sell or exchange lands within Project Area provided: **lands sold/exchanged will be managed consistent w/the HCP objectives**; parcels of land less than 640 acres may be sold provided cumulative total of transactions does not exceed 5% of acreage covered by permit; total of all transactions in any township does not exceed 1,920 acres. | | |
| **Land Transfers -Condemnation** | §17.5: In the event of condemnation, all HCP obligations to the condemned land are terminated. | §7.3.2(c): Exchange with Feds will remove lands from permit; services may review to ensure no compromise to HCP. | | |

10/25/96

| ISSUE | WDNR | PLUM CREEK | MURRAY PACIFIC | OREGON |
|---|---|---|---|---|
| **Term of Permit** | §19.0: **70 years** fixed initial maximum term **(subject to 30 day termination clause).** Option of Services to require continuation for up to 30 additional years if DNR is not in compliance with HCP; if in compliance, DNR may renew at its option for **up to 30 additional years.** | §4.0: **50 years and a Phase II extension (additional 50 years).** | II.E: **100 years** | II.G: **60 years** |

| ISSUE | WDNR | PLUM CREEK | MURRAY PACIFIC | OREGON |
|---|---|---|---|---|
| **Unforeseen Circumstances** | §23.1: Parties shall consult in the event of unforeseen circumstances to explore mutually agreeable means for adjusting the HCP commitments; the **Services shall not seek w/o DNR consent additional land or financial undertaking beyond level of mitigation provided in HCP.**<br><br>§23.2; Services have burden of demonstrating that unforeseen circumstances exist; cannot impose nonconsensual land-use restrictions or financial obligations except under extraordinary circumstances. | §2.17 (definition): "change in circumstances or information that might give rise to the need to revise a [HCP] . . . . The listing of any Plan Species or the designation of critical habitat are not unforeseen circumstances."<br><br>§§8.0(a)&(b): Services find that requirements of the "No Surprises Policy" have been met by agreement; **Services will not seek further mitigation from PC to address unforeseen circumstances so long as PC is in compliance with the HCP.** | II.J: If additional mitigation measures are necessary and MP is in compliance with the HCP, MP does not have the primary obligation to provide such mitigation; good faith consultation to find mutually acceptable means of adjusting terms; **Services shall not seek commitment of additional land or financial obligation from MP beyond level provided in HCP.** | II.K: Limitation on further mitigation - "**except as otherwise provided by law or the term of this agreement, no further mitigation or compensation for the Owl or Murrelet will be required of the State** within the Forest during the term of this Agreement." |

| ISSUE | WDNR | PLUM CREEK | MURRAY PACIFIC | OREGON |
|---|---|---|---|---|
| **Extraordinary Circumstances** | §24.1: Extraordinary circumstances shall mean that continued DNR-management activities would result in a substantial and material adverse change in the status of a species that was not foreseen as of the effective date.<br><br>§24.2: Findings of extraordinary circumstances.<br><br>§24.3: **Additional mitigation resulting from extraordinary circumstances will change the terms of the HCP only to the extent necessary and will occur only on permit lands.**<br><br>§24.4: Services are free to take independent action at their own expense or effort. | §§8.0(c)&(d): Services' burden to demonstrate that extraordinary circumstances exist based upon peer reviewed data; factors that Services must consider are outlined; if additional mitigation is required, such mitigation shall be provided on federal land to the maximum extent possible; **any additional mitigation required of PC will not include additional compensation or apply to harvest lands w/o PC consent.**<br><br>Peer review of basis for findings is to be completed within 30 days. | II.K: Definition: "the best scientific and commercial data available demonstrates that continued operation of the tree farm by [MP] in accordance with the amended HCP . . .would result in a major adverse impact to a species that was not foreseen on the effective date . . . and would result in the appreciable reduction of the likelihood of the species' survival and recovery in the wild. . . . " The Services have the burden of demonstrating that extraordinary circumstances exist.<br><br>Services are free to take independent action at their own expense or effort, including reasonable compensation to MP. | See limit on further mitigation outlined under Unforeseen Circumstances section. |

| ISSUE | WDNR | PLUM CREEK | MURRAY PACIFIC | OREGON |
|---|---|---|---|---|
| **Adaptive Management** | §24.5: Ten specific issues outlined in detail to respond to new information and scientific developments. | §7.3.3: Section 5.4 of the HCP provides for adaptive management activities across project area. | | |
| **Termination of the Permit** | §27.1: **DNR has right to terminate in whole or in part with 30 days notice.**<br><br>§27.2: Termination by DNR terminates the relevant commitments of the HCP and IA.<br><br>§27.3: Following termination, **DNR may be required to mitigate for take that occurred during the term of the permit. Services cannot extend mitigation to non-permit lands, nor beyond the term of the agreement.** | §11.0: **Any party may terminate in accordance with regulations in force on the date of termination**; PC reserves right to terminate in accordance with regulations in effect at the time of permit issuance; **PC must provide 90 days written notice of termination; mitigation for take prior to termination is required**; termination of the permit as to a particular species also terminates relevant provisions of the HCP and IA; **any party may terminate the HCP/IA for an unlisted species.** | | II.N: **Either party may terminate with 30 days written notice; mitigation will be provided for the take that has occurred.** |

| ISSUE | WDNR | PLUM CREEK | MURRAY PACIFIC | OREGON |
|---|---|---|---|---|
| **Termination (Cont.)** | §27.4: If a species is delisted, the commitments of the HCP and IA regarding such species shall be terminated unless the Services demonstrate that failure to continue such measures would not maintain the conservation objectives as to another listed species.<br><br>§27.5: **DNR may terminate, in whole or in part, the HCP commitments as to an unlisted species upon 30 days notice.** | | | |

| ISSUE | WDNR | PLUM CREEK | MURRAY PACIFIC | OREGON |
|---|---|---|---|---|
| **General Provisions** | §30.0:<br>- agreement does not form a partnership<br>**- HCP is not a covenant running with the land**<br>**- agreement is severable**<br>- Congressional officials not to benefit<br>- dependent on availability of funds<br>- no third party beneficiaries<br>- agreement constitutes entire agreement<br>- not binding in other litigation | §16.0:<br>- no third party beneficiaries<br>- agreement constitutes entire agreement<br>**- agreement is severable**<br>**- agreement does not limit authority of the Services to fulfill responsibilities under ESA**<br>- implementation of the HCP and IA by the Services is subject to the availability of funds | - no third party beneficiaries<br>- venue<br>- inspections<br>**- Permit is binding on all successors and assigns**<br>**- agreement is covenant running with the land** | - no third party beneficiaries<br>**- severability** |

APPENDIX

5.

# Appendix 5 - Economic Information

# Appendix 5. Economic Information

## Harvest Projections and Economic Analysis

Appendix 5 provides background information regarding the process used by DNR in formulating harvest projections and conducting economic analysis of the proposed HCP. Results of this analysis formed the basis for the economic analysis conducted by the Service and included in the DEIS and modified in this FEIS. Material in this appendix is from two sources. First, text from a "Fact Sheet" prepared in May 1996 by DNR is reproduced for reference. Second, pages 30 through 36 from a report, *Background and Analytical Framework for the Proposed Draft Habitat Conservation Plan*, prepared by DNR for the Board of Natural Resources in October 1996 is included.

## Economic Analysis Procedure for DNR's Habitat Conservation Plan

A habitat conservation plan (HCP) is a long-term land management plan authorized under the Endangered Species Act to conserve threatened and endangered species. For the Washington Department of Natural Resources (DNR), it means a comprehensive plan for state trust lands within the range of the northern spotted owl, that will allow timber harvesting and other management activities while emphasizing species conservation and ecosystem health as the basis for prudent trust management.

### Overview of Analysis

DNR developed a sustainable harvest simulation program that was used in western Washington to forecast timber production capacity for each option of the proposed HCP conservation strategies. Simulations were designed to produce a "nondeclining even-flow" of timber. That is, timber is produced at a constant level until timber stocking levels allow an increase in harvest volume that can be sustained without a decline in the future.

The simulation looked at least 200 years into the future, time enough to assure that simulated harvests were unlikely to deplete the timber inventory to such an extent that timber production would have to be reduced in the future. Management activities and timber growth were simulated for 10-year periods.

Although the process aimed at calculating a sustainable level of timber harvest, it was not a sustainable harvest calculation as specified in the Forest Resource Plan, which sets forth DNR's current policies for managing forest resources. The Forest Resource Plan calls for

separate sustainable harvest calculations for each of several groups of trust land. However, with the number of HCP options that had to be analyzed, there would have been an inordinate number of simulator runs needed to calculate results under the Forest Resource Plan specification. Instead, the harvest simulation was run for each option in each HCP planning unit.

This approach to timber harvest calculation provided a satisfactory basis for comparing HCP alternatives in western Washington, even though the numbers would not be exactly the same as those produced by the calculation for the Forest Resource Plan.

Eastern Washington forest inventory data currently available did not support a sustainable harvest simulation. Instead, the eastern Washington analysis started with the sustainable harvest volume determined before protection of spotted owl habitat affected the amount of timber available. That volume was adjusted by estimating the proportion of land on which spotted owl habitat would be protected and the proportional impact on timber yields of protecting habitat.

In order to project sales revenues for DNR-managed trust lands covered by the HCP, the projected flow of timber over 200 years into the future in both western and eastern Washington was then analyzed by determining present net worth. Present net worth is calculated by valuing, in terms of current dollars, all future income minus all future costs.

## Sustainable harvest simulator

The sustainable harvest simulator started with current forest inventory data as recorded in DNR's geographic information system. The simulator then made adjustments for planned silvicultural practices, including timber harvest, over the first 10 years and "grew" the inventory for 10 years.

The result of the first 10-year simulation formed the beginning inventory for the next 10-year period. The cycle was repeated for succeeding 10-year periods. If, at any time, the inventory showed that it would not support the simulated volume of timber harvest, the amount of harvest was reduced and the process was repeated. If, at the end of the simulation, an excessive amount of inventory was indicated, the harvest level was adjusted upward and the process was repeated. The condition of the inventory was judged by the amount of timber at harvest age or older.

When an acceptable level of ending inventory was achieved without the harvest volume declining between 10-year periods, the simulation was complete. The harvest volumes shown for each period are the amounts that the land is capable of producing.

## Growth models

The sustainable harvest simulator used growth models to "grow" the forest for each 10-year period. In western Washington the simulator used:

- For Douglas fir — DFSIM, a widely used Douglas fir growth model developed by Robert Curtis of the Olympia Forest Sciences Laboratory, USDA Forest Service

- For western hemlock — the Forestry Canada western hemlock growth model developed by James Flewelling

- For red alder — DNR empirical yield functions developed by Charles Chambers

### Outside review of DNR's analysis

DNR's methods for deriving the projected harvest levels and sales revenues were reviewed by an outside independent expert in resource economics and environmental analysis, who found the assumptions and methodology to be appropriate. A sensitivity analysis was subsequently done by the outside resource economist to provide additional information for the Board of Natural Resources, the policy-making body that will ultimately decide whether to adopt the HCP. In addition, a consulting firm performed a decision analysis that looked at the likely occurrence of future regulatory constraints that would govern DNR forest land management.

## Harvest Volume and Financial Analysis

### Introduction

DNR uses present net worth (PNW) analysis to demonstrate the economic value of the No Action and the HCP options. Economic analyses commonly use PNW as a tool in evaluating which alternative to select as financially preferable. PNW is calculated by valuing, in terms of 1995 dollars, all future income minus all future costs.

The calculation of Present Net Worth involves several steps. The land base within the boundaries of the northern spotted owl range in identified. Non-forest lands are excluded from the analysis as are off-base forest lands, such as genetic reserves, Natural Area Preserves and Natural Resource Conservation Areas.

The data within the starting land base include information about the age class of the trees, current and projected volume per acre by site class, expected management regime, the proximity to recently harvested lands, roads, streams, slope, unique habitat or landscape features, etc. These items reflect legal, regulatory and operational constraints on contemporary land mangers. These data are further categorized by trust and region.

After establishing the starting land base, the No Action and the HCP options can be evaluated. The No Action option includes adjustments based on riparian management, limitations due to managing for the northern spotted owl, i.e. owl circles, the marbled murrelet, and other factors reflecting the full implementation of the 1992 Forest Resources Plan. For the HCP option a similar process is followed using alternative assumptions regarding riparian buffer widths, unstable slope constraints, protection for special habitat areas, harvesting constrains within designated nesting, roosting, foraging habitat and dispersal habitat, etc.

Once the data for each alternative are incorporated into the computer, a simulation can be performed to calculate the expected harvest for each trust and in total. The output comes in the form of estimated harvest level by decade over the next 20 decades.

## Assumptions

Table 3 summarizes the assumptions used in determining the PNW and the estimated harvests, including management assumptions used on the OESF. The OESF is described to demonstrate the differences in management measures, which differ from the other lands due to the emphasis in the OESF on experimentation.

The model used to calculate future harvests uses existing policy; harvests are calculated for ten year time periods with the model seeking the highest harvest allowable without declining from one decade to another. In order to determine the value, during the harvest calculations the cost and timing of the management activities are projected. Based on knowledge of current costs and stumpage prices and assumptions of increase in future cost and prices, the present net value of the harvest is determined. (In the analysis costs and prices increased at 1% per year above inflation. A discount rate of 5% was used to calculate the present value of future costs and revenues.)

## Table 1: Draft Habitat Conservation Plan Assumptions Riparian Strategy

| No Action | HCP Option | OESF No Change | OESF Option |
|---|---|---|---|
| **Unstable Slopes** | | | |
| No timber harvest on areas identified by geomorphological model as "most susceptible to mass wasting". | No timber harvest on areas identified by geomorphological model as "most susceptible to mass wasting". | No timber harvest on areas identified by geomorphological model as "most susceptible to mass wasting". | No timber harvest on areas identified by geomorphological model as "most susceptible to mass wasting". |
| **Upgraded Type 4 Streams** | | | |
| Assume that the 45% of Type 4 streams will be upgraded to Type 3. | Assume that the 45% of Type 4 streams will be upgraded to Type 3. | Not applicable. | Not applicable. |
| **Unclassified (Type 9) Streams** | | | |
| Untyped (Type 9) stream reaches between typed stream reaches are of the same type as the downstream reach.<br><br>All other untyped (Type 9) streams are Type 5. | Untyped (Type 9) stream reaches between typed stream reaches are of the same type as the downstream reach.<br><br>All other untyped (Type 9) streams are Type 5. | Untyped (Type 9) stream reaches between typed stream reaches are of the same type as the downstream reach.<br><br>All other untyped (Type 9) streams are Type 5. | Untyped (Type 9) stream reaches between typed stream reaches are of the same type as the downstream reach.<br><br>All other untyped (Type 9) streams are Type 5. |

| No Action | HCP Option | OESF No Change | OESF Option |
|---|---|---|---|
| **RIPARIAN PROTECTED AREA**<br>**Width of Riparian Protected Area** | | | |
| Water Type / Width (Feet)<br>1 196<br>2 196<br>3 85<br>4 55<br>5 0 | Width (feet)<br>Water Type / Stream Buffer / Wind Buffer<br>1 150 100<br>2 150 100<br>3 150 50<br>4 100 0<br>5 0 0<br>*80% of Type 1 and 2 streams, and 40% of Type 3 streams need wind buffers | Water Type / Wind (feet)<br>1 150<br>2 150<br>3 100<br>4 100<br>5 100 | Width (feet)<br>Water Type / Int. Core / Ext. Buffer<br>1 150 150<br>2 150 150<br>3 150 150<br>4 100 50<br>5 100 50 |
| **Timber Harvest in Riparian Protected Area** | | | |
| No timber removed or timber management activity. | 7% of conifer and 18% of alder will be harvested from riparian buffers and wind buffers at each entry. | No timber removed or timber management activity. | No timber harvest in the interior core<br><br>30% partial timber harvest in external buffers. |
| **WETLANDS**<br>**Width of Wetland Buffers** | | | |
| Wetland Size (acres) / Buffer Width (feet)<br>0.25-1 100<br>>1 150 | Wetland Size (acres) / Buffer Width (feet)<br>0.25-1 100<br>>1 150 | Wetland Size (acres) / Buffer Width (feet)<br>0.25-1 100<br>>1 150 | Wetland Size (acres) / Buffer Width (feet)<br>0.25-1 100<br>>1 150 |
| **Timber Harvest in Wetlands and Wetland Buffers** | | | |
| Remove 40% of volume at each entry | Remove 40% of volume at each entry | Remove 40% of volume at each entry | Remove 40% of volume at each entry |

| No Action | HCP Option | OESF No Change | OESF Option |
|---|---|---|---|
| **HYDROLOGIC MATURITY/RAIN ON SNOW** | | | |
| Harvest calculations need not be concerned with hydrologic maturity | Hydrologic maturity can be attained on at least 2/3 of DNR-managed lands within the rain on snow zone in 1000 acre basins when following current silvicultural practices of timber harvest is delayed until age 75 years. | Harvest calculations need not be concerned with hydrologic maturity | No provision for hydrologic maturity |

## Assumptions for Riparian Strategy

### ALL OPTIONS

Assume that requirements for wildlife reserve trees, including additional trees provided under DNR policy, are met as follows:

- Associated with riparian areas and wetlands - No reduction factor for yields is required.
- Not associated with riparian areas and wetlands - Reduce yields by 5%.

### MARBLED MURRELET HABITAT

NO ACTION

There would be no timber harvest on 2/3 of the stands with the following characteristics:

- Within 52 miles of salt water; and,
- At least eight conifer trees per acre which are at least 32 inched DBH.

HCP OPTION

There would be no timber harvest on 1/3 of the stands with the following characteristics:

- Within 50 miles of salt water, and,
- At least eight conifer trees per acre which are at least 32 inches DBH.

## Table 2: Draft Habitat Conservation Plan Assumptions for Spotted Owl Strategy

| NO ACTION | HCP OPTION | OESF ALTERNATIVE |
|---|---|---|
| **NUMBER OF OWL CIRCLES** - An additional 46 spotted owls not yet located will be located on state land.<br><br>**ADDITIONAL HABITAT FOR OWLS IN CIRCLES WITH LESS THAN 40% HABITAT** - All the non-habitat forest land located in a circle that is below 40% requirement for habitat will be managed so that no additional forest land will become habitat.<br><br>**OWL CIRCLES INCLUDING DNR AND PRIVATE OWNERSHIP** - When a circle is located on both DNR and private land, the private landowner will have removed all habitat, leaving DNR trust land to supply 100% of the required habitat in the circle. | **Entire HCP Area**<br><br>No timber harvest from NRF habitat devoted to providing the target amount.<br><br>Area selected to provide target amount of NRF for a watershed administrative unit can move around within the WAU.<br><br>**Western Washington**<br><br>300-acre nesting areas are off base permanently.<br><br>No new nesting habitat will be created.<br><br>The 200-acre buffers will have the same impact on timber harvest as 200 acres of NRF habitat in addition to the target amount.<br><br>**HABITAT DEFINITIONS**<br><br>High quality nesting habitat is currently unattainable.<br><br>The snag requirement is the limiting factor in providing sub-mature habitat.<br><br>Sub-mature habitat can be achieved at age 70. | **Definitions:**<br><br>**Old forest** - At least 100 years old.<br><br>**Spotted Owl Habitat** - At least 70 years old, including old forest.<br><br>**Transition Period** - The transition period lasts until stands on at least 40% of the state forest land in each landscape planning unit are at least 70 years old. Stands which are off base for riparian areas and marbled murrelet habitat count towards the 40% threshold. During the transition period the forest will be managed to meet the following standards:<br><br>Maintain 20% of each landscape planning unit in old forest.<br><br>Stands initially 31 to 99 years old are subject to final harvest when they reach harvest age. |

| NO ACTION | HCP OPTION | OESF ALTERNATIVE |
|---|---|---|
| (continued)<br><br>**OWL CIRCLES INCLUDING DNR AND FEDERAL OWNERSHIP** - When a circle is located on both DNR and federal land, the DNR land will supply required habitat only when the federal land doesn't supply the habitat.<br><br>**OWL CIRCLES OVERLAP ON DNR LANDS** - When 2 or more circles overlap, habitat enclosed by both circles will be counted as part of each circle's 40%. | (continued)<br><br>20% of merchantable volume will be left on the ground at each commercial thinning operation and 25% at each regeneration harvest to meet the down wood requirement for sub-mature habitat.<br><br>The tree size requirement is the limiting condition for dispersal habitat.<br><br>The size requirement for dispersal habitat can be achieved at age 40.<br><br>10% of merchantable volume will be left on the ground at each commercial thinning and 5% at each regeneration harvest to meet the down wood requirement for dispersal habitat.<br><br>**Eastern Washington**<br><br>Timber harvest for risk reduction will not affect sustainable harvest levels.<br><br>Salvage logging will not affect sustainable harvest levels. | (continued)<br><br>Commercial thinnings may be taken in these stands which are age 30 or younger at the time the plan is adopted. Final harvest may be taken in those stands as long as it does not delay reaching the 40% spotted owl habitat threshold or the 20% old forest threshold.<br><br>**After Transition** - When stands on at least 40% of the state forest land in each landscape planning unit are at least 70 years old:<br><br>Maintain in each landscape planning unit a minimum of 20% in old forest and 40% in spotted owl habitat.<br><br>Stands off base for riparian areas and marbled murrelet habitat count toward the 20% and 40% thresholds. |

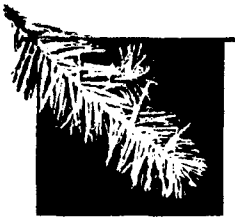
| HCP UNIT 2 | | CONIFER GROWTH | | | MINIMAL HARVEST AREA and UNSTABLE SLOPES | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AGE CLASS | 1995 | 2005 | 2015 | 2025 | 2035 | 2045 | 2055 | 2065 | 2075 | 2085 | 2095 |
| deciduous | 2183.46 | 2183.46 | 2183.46 | 2183.46 | 2183.46 | 2183.46 | 2183.46 | 2183.46 | 2183.46 | 2183.46 | 2183.46 |
| seedling | 1045.353 | 191.9593 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| sapling | 504.8333 | 981.729 | 479.8983 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| pole | 1303.543 | 797.8217 | 1232.895 | 1387.58 | 959.7967 | 0 | 0 | 0 | 0 | 0 | 0 |
| small saw | 5173.09 | 5492.697 | 5161.28 | 4481.753 | 3553.2 | 2853.73 | 1971.51 | 1712.793 | 1387.58 | 959.7967 | 0 |
| large saw | 802.2133 | 1304.267 | 1882.58 | 2887.32 | 4243.657 | 5898.863 | 6758.29 | 7010.357 | 7304.733 | 7576.217 | 8026.82 |
| old growth | 77.82333 | 138.3833 | 150.2033 | 150.2033 | 150.2033 | 154.2633 | 177.0567 | 183.7067 | 214.5433 | 370.8433 | 880.0367 |
| | 11090.32 | | | | | | | | | | 8906.857 |
| | 9.927597 | | | | | | | | | | |
| | | CONIFER | GROWTH | | | STREAM-SIDE BUFFER and UNSTABLE SLOPES | | | | | |
| deciduous | 2910.36 | 2910.36 | 2910.36 | 2910.36 | 2910.36 | 2910.36 | 2910.36 | 2910.36 | 2910.36 | 2910.36 | 2910.36 |
| seedling | 1258.672 | 230.798 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| sapling | 602.378 | 1184.897 | 576.995 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| pole | 1506.31 | 918.735 | 1467.705 | 1677.4 | 1153.99 | 0 | 0 | 0 | 0 | 0 | 0 |
| small saw | 5910.88 | 6300.62 | 5937.19 | 5143.42 | 4088.72 | 3367.36 | 2334.43 | 2044.7 | 1677.4 | 1153.99 | 0 |
| large saw | 929.63 | 1484.1 | 2125.44 | 3286.51 | 4864.62 | 6735.91 | 7739 | 8022.08 | 8350.69 | 8688.52 | 9278.24 |
| old growth | 87.28 | 176 | 187.82 | 187.82 | 187.82 | 191.88 | 221.72 | 228.37 | 267.06 | 452.64 | 1016.91 |
| | 12478.61 | | | | | | | | | | 10295.15 |
| | 11.17034 | | | | | | | | | | |

| HCP UNIT 2 | | CONIFER GROWTH | | | USTABLE SLOPES | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| deciduous | 729.66 | 729.66 | 729.66 | 729.66 | 729.66 | 729.66 | 729.66 | 729.66 | 729.66 | 729.66 | 729.66 |
| seedling | 618.716 | 114.282 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| sapling | 309.744 | 575.393 | 285.705 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| pole | 898.01 | 555.995 | 763.275 | 807.94 | 571.41 | 0 | 0 | 0 | 0 | 0 | 0 |
| small saw | 3697.51 | 3876.85 | 3609.46 | 3158.42 | 2482.16 | 1826.47 | 1245.67 | 1048.98 | 807.94 | 571.41 | 0 |
| large saw | 547.38 | 944.6 | 1396.86 | 2088.94 | 3001.73 | 4224.77 | 4796.87 | 4986.91 | 5212.82 | 5351.61 | 5523.98 |
| old growth | 58.91 | 63.15 | 74.97 | 74.97 | 74.97 | 79.03 | 87.73 | 94.38 | 109.51 | 207.25 | 606.29 |
| | 6859.93 | | | | | | | | | | 6130.27 |

APPENDIX

6.

# Appendix 6 - No Surprises Policy



# Appendix 6. No Surprises Policy

The following is a reproduction of the U.S. Department of the Interior's and U.S. Department of Commerce's 1994 No Surprises Policy.

08/09/94

## NO SURPRISES

## ASSURING CERTAINTY FOR PRIVATE LANDOWNERS IN ENDANGERED SPECIES ACT HABITAT CONSERVATION PLANNING

*"The Committee intends that the Secretary may utilize this prevision [on HCPs] to approve conservation plans which provide long-term commitments regarding the conservation of listed as well as unlisted species and long-term assurances to the proponent of the conservation plan that the terms of the plan will be adhered to and that further mitigation requirements will only be imposed in accordance with the terms of the plan. In the event that an unlisted species addressed in an approved conservation plan is subsequently listed pursuant to the Act, no further mitigation requirements should be imposed if the conservation plan addressed the conservation of the species and its habitat as if the species were listed pursuant to the Act."*

*"It is also recognized that circumstances and information may change over time and that the original plan might need to be revised. To address this situation the Committee expects that any plan approved for a long-term permit will contain a procedure by which the parties will deal with unforeseen circumstances."*

*H. Rep. No. 835, 97th Cong., 2nd Sess. 30-31 (1982)*

## PURPOSE:

The purpose of this policy is to provide assurances to non-federal landowners participating in Endangered Species Act Habitat Conservation Planning (HCP) that no additional land restrictions or financial compensation will be required for species adequately covered by a properly functioning HCP in light of unforeseen or extraordinary circumstances.

## SUPPLEMENTARY INFORMATION:

The HCP process promotes endangered species conservation and habitat protection within the context of land use or development. Ideally, HCPs contribute to the long-term conservation of federally listed and unlisted species, while providing predictability and economic stability for non-federal landowners.

Species receive a variety of benefits under a properly functioning HCP. Private financial resources supplement limited federal funding, essential habitat areas are often preserved, and comprehensive conservation programs are developed and promptly implemented. Although landowners must ultimately demonstrate that a species has been covered adequately under an HCP, the major benefit from the HCP process from the perspective of the development community is certainty. In exchange for adherence to long-term conservation commitments, an HCP permittee is provided assurance that development may move forward despite the incidental taking of protected species.

Significant development projects often take many years to complete, therefore adequate assurances must be made to the financial and developmental communities that an HCP permit will remain valid for the life of the project. In authorizing the HCP process, Congress recognized that permits of 30 years or more may be necessary to trigger long-term private sector funding and land use commitments for species conservation. Congress also recognized that circumstances may change over time, generating pressure to reconsider the mitigation commitments in an HCP agreement. Often referred to as "unforeseen" or extraordinary circumstances, Congress intended that additional mitigation requirements not be imposed upon an HCP permittee who has fully implemented his or her conservation commitments except as may be provided for under the terms of the HCP itself.

## POLICY:

In negotiating "unforseen circumstances" provisions for HCPs, the FWS shall not require the commitment of additional land or financial compensation beyond the level of mitigation which was otherwise adequately provided for a species under the terms of a properly functioning HCP. Moreover, FWS shall not seek any other form of additional mitigation from an HCP permittee except under extraordinary circumstances.

A. General Assurances Provided to Landowners

* If additional mitigation measures are subsequently deemed necessary to provide for the conservation of a species that was otherwise adequately covered under the terms of a properly functioning HCP, the primary obligation for such measures shall not rest with the HCP permittee.

* FWS shall not seek additional mitigation for a species from an HCP permittee where the terms of a properly functioning HCP agreement were designed to provide an overall net benefit for that particular species and contained measurable criteria for the biological success of the HCP which have been or are being met.

* If extraordinary circumstances warrant the requirement of additional mitigation from an HCP permittee who is in compliance with the HCP's obligations, such mitigation shall limit changes to the original terms of the HCP to the maximum extent possible and shall be limited to modifications within Conserved Habitat areas or to the HCP's operating conservation program for the affected species. Additional mitigation requirements shall not involve the payment of additional compensation or apply to parcels or land available for development under the original terms of the HCP without the consent of the HCP permittee.

B. Determination of Extraordinary Circumstances

* FWS shall have the burden of demonstrating that such extraordinary circumstances exist, using the best scientific and commercial data available. FWS findings must be clearly documented and based upon reliable technical information regarding the status and habitat requirements of the affected species.

* In deciding whether any extraordinary circumstances exist which might warrant requiring additional mitigation from an HCP permittee, the FWS shall consider, but not be limited to, the following factors:

  - the size of the current range of the affected species
  - the percentage of range adversely affected by the HCP
  - the percentage of range conserved by the HCP
  - the ecological significance of that portion of the range affected by an HCP
  - the level of knowledge about the affected species and the degree of specificity of the species' conservation program under the HCP
  - whether the HCP was originally designed to provide an overall net benefit to the affected species and contained measurable criteria for assessing the biological success of the HCP
  - whether failure to adopt additional conservation measures would appreciable reduce the likelihood of survival and recovery of the affected species in the wild

C. Additional Conservation Authority

* Nothing in this policy shall be construed to limit or constrain FWS or any other governmental agency from taking any additional actions at its own cost with respect to the conservation or enhancement of a species which is included under an HCP.