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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

Conservation Objective

DNR's conservation objective for the northern spotted owl is to provide habitat that makes a significant contribution to demographic support, maintenance of species distribution, and facilitation of dispersal. Demographic support refers to the contribution of individual territorial spotted owls or clusters of spotted owl sites to the stability and viability of the entire population (Hanson et al. 1993 p. 11). Maintenance of species distribution refers to supporting the continued presence of the spotted owl population in as much of its historic range as possible (Thomas et al. 1990 p. 23; USDI 1992 p. 56). Dispersal is the movement of juvenile, subadult, and adult animals (in this case, spotted owls) from one sub-population to another. For juvenile spotted owls, dispersal is the process of leaving the natal territory to establish a new territory (Thomas et al. 1990 p. 303).

This conservation objective applies to the five west-side planning units and all three east-side planning units. The Olympic Experimental State Forest has different conservation objectives because of its unique mission of learning how to integrate forest production activities and conservation across the landscape. (See Section E in this chapter on the Olympic Experimental State Forest for a discussion of its conservation objectives and strategy for the northern spotted owl. See the section in Chapter I titled Organization of the Planning Area for a discussion of why the Olympic Experimental State Forest is unique.)

Due to differences in the habitat ecology of the spotted owl in western Washington and eastern Washington, the conservation strategies for each side of the Cascades are described separately. The intent of the spotted owl conservation strategy for for the five west-side planning units is twofold. First, the strategy is intended to provide nesting, roosting, and foraging (NRF) habitat and dispersal habitat in strategic areas in order to achieve the conservation objective of providing habitat for demographic support, maintenance of species distribution, and dispersal. Second, in areas designed to provide NRF habitat, the strategy is intended to create a landscape in which active forest management plays a role in the development and maintenance of the structural characteristics that constitute such habitat. To accomplish this, the strategy is composed of a research phase, a transition phase, and an integrated management phase.

The research phase is designed to develop a more precise description of functional spotted owl nesting habitat at the stand level, to develop silvicultural techniques to create such habitat, and to acquire a better understanding of what constitutes a sufficient distribution of nesting structure at the landscape level. Because such information is currently not available,

patches of old forest with a high degree of structural complexity (i.e., forest types known to support nesting spotted owls) will be retained in an unmanaged state during the research phase. These nesting patches, which total approximately 20,000 acres, will exist within the larger spotted owl habitat landscape that will be managed to provide high quality roosting and foraging functions. (See below for a detailed description of the strategy.) Based on current understanding of spotted owl habitat, forest that provides structure for roosting and foraging functions is somewhat less structurally complex than forest that provides the actual nesting component of NRF habitat. The strategy will operate on the hypothesis that active forest management techniques can be applied to develop and maintain roosting and foraging habitat from the outset of the HCP. This hypothesis also applies to the creation and maintenance of dispersal habitat. These assertions will be tested as part of the monitoring component of the HCP. (See the section titled Monitoring in Chapter V for more discussion of this.)

The transition phase is envisioned as the middle phase of the HCP in which results of the research described above are applied within spotted owl habitat areas. During this period, the goal is to begin moving away from a landscape in which old-forest nesting habitat patches are unmanaged to a landscape in which management can be used to create and maintain nesting structure in a distribution that research shows is appropriate. This will be a period of transition because active monitoring will be needed to ensure successful application of research results and to modify silvicultural techniques for local conditions. The end of the transition phase will be marked by DNR's confidence in its ability to provide adequate nesting habitat without maintaining unmanaged nesting habitat patches.

The integrated management phase is the final period of the HCP in which knowledge gained through research, application of this knowledge to larger areas, and monitoring have moved forest management to a point where commercial timber harvest and maintenance of functional spotted owl nesting habitat coexist throughout spotted owl management areas.

The intent of the spotted owl conservation strategy for DNR-managed lands east of the Cascade crest is the same as for the west side. However, on the east slope of the Cascades, spotted owls appear to be able to nest in landscapes in which active management occurs. For eastern Washington, the strategy will start with the assertion that DNR can manage spotted owl NRF habitat. Again, this hypothesis will be tested as part of the monitoring component of the HCP.

Regional and site-specific conservation objectives — i.e., where does the need exist to provide demographic support, contribute to maintenance of species distribution, and provide dispersal linkages; and where do the opportunities exist for DNR-managed lands to contribute habitat to the provision of these functions — have been identified on the basis of data from each planning unit. The specifics of each spotted owl conservation strategy (west-side and east-side) are described separately. The components of the strategy are outlined first, followed by habitat definitions and the basis for those definitions. The section concludes with a discussion of the rationale used to develop the conservation objective and the strategies, a look at current and projected habitat, and a summary of potential benefits and impacts of the strategies to the species.

Conservation Strategy for the Five West-side Planning Units

The west-side and east-side conservation strategies for the northern spotted owl consist of four main components: identification of DNR-managed lands most important to spotted owl conservation; determination of habitat goals for areas established to provide NRF habitat; guidelines for management activities allowed in NRF habitat areas; and guidelines for provision of dispersal habitat. The specifics for the east-side strategy are detailed later; below, each component for the west-side strategy is described in detail. This strategy provides mitigation for the entire approximately 1,180,000 acres of DNR-managed lands covered by the HCP in the five west-side planning units.

IDENTIFICATION OF DNR-MANAGED LANDS MOST IMPORTANT TO SPOTTED OWL CONSERVATION

In order to determine the potential role in spotted owl conservation that could be played by DNR-managed lands within each planning unit, questions were considered, such as presence of habitat, forest type, distribution and pattern of DNR-managed lands with respect to other DNR-managed parcels and other landowners, proximity of DNR-managed lands to federal reserves and existing spotted owl clusters, biological status of the spotted owl population and existing threats in each planning unit, and the regional role of each planning unit for supporting spotted owl conservation in the state. Management recommendations from previous spotted owl conservation planning efforts (USDI 1992; Hanson et al. 1993; FEMAT 1993) were also taken into consideration. Based on the answers to these questions, an assessment of the role of DNR-managed lands for spotted owl conservation was made. DNR-managed lands fell into one of the following categories:

- important for demographic support;
- important to maintain species distribution;
- important for dispersal;
- not important for spotted owl conservation; or
- management for spotted owl habitat on DNR-managed lands alone would not make a significant contribution to owl conservation.

DNR-managed lands that emerged as important for demographic support were those that are intermingled with federal lands designated in the President's Forest Plan (see the section of Chapter II titled Federal Plans and Rules for a discussion of the President's Forest Plan) as Congressional Reserves, Late successional Reserves, Managed Late successional Reserves, or Adaptive Management Areas, as well as those that fall within 2 miles of these reserve designations. Two miles represents the radius of a circle that most closely approximates the median spotted owl home range size in the western Cascades (Hanson et al. 1993). In addition, some DNR-managed lands farther than 2 miles from federal reserves in the Columbia Planning Unit were determined to be important for both maintaining species distribution and demographic support. DNR-managed lands that fell between large federal reserves were determined to be important for dispersal.

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.

Approximately 1.6 million acres of DNR-managed lands are covered by the HCP. The five west-side planning units contain approximately 1,180,000 acres of DNR-managed lands. NRF management areas encompass approximately 202,000 acres of DNR-managed lands. NRF areas in the five west-side planning units encompass approximately 163,000 acres. Dispersal management areas encompass approximately 200,000 acres of DNR-managed lands, 116,000 acres of which occur in the five west-side planning units. The provisions of the strategy (described next) will result in the maintenance of at least 50 percent of the forested lands within NRF and dispersal areas in the appropriate habitat type at any one time. Thus, the target conditions will be to maintain at least 101,000 acres of nesting, roosting, and foraging habitat and 100,000 acres of dispersal habitat at any one time in total for both the west- and east-side planning units.

DNR-managed lands that were determined not to have the potential to make a significant contribution to spotted owl conservation are those that are farther than 2 miles from federal reserves and in areas where there are currently no large clusters of spotted owls and little or no habitat, or that are not in key linkage areas where dispersal habitat or support of nonfederal spotted owl sites was needed. In some areas where federal reserves are absent, DNR did not designate specific NRF management areas. In one planning unit where federal reserves are present, DNR did not designate NRF management areas because it was determined that even DNR-managed lands adjacent to the reserves would most likely not make a significant contribution to demographic support of the spotted owl population. (See explanation in the discussion of rationale later in this section.)

DETERMINATION OF NRF HABITAT GOALS ON A LANDSCAPE SCALE FOR LANDS IDENTIFIED FOR A NRF HABITAT ROLE

In areas designated to provide NRF habitat, DNR shall provide a target condition of at least 50 percent of its managed lands measured within each Watershed Administrative Unit (Watershed Administrative Unit has been defined by DNR in cooperation with other agencies, tribes and the public and averages between 10,000 and 50,000 acres in size) as NRF habitat.

Criteria for determining the target amount of habitat for DNR NRF areas in each WAU are discussed below.

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:

(a) If the amount of existing NRF habitat in a WAU is equal to or greater than 50 percent of the total area of federal reserves plus DNR-designated NRF areas, then DNR will maintain 50 percent of its designated NRF lands in the WAU as NRF habitat.

(b) If DNR-designated NRF areas by themselves contain less than 50 percent habitat, DNR will develop new habitat up to 50 percent of the area of those lands, regardless of the amount of current habitat on federal reserves plus DNR-designated NRF areas in the WAU.

(c) If the amount of current habitat in the WAU is less than 50 percent of the total area of federal reserves plus DNR-designated NRF areas, and DNR-designated NRF areas by themselves contain greater than 50 percent habitat, DNR will maintain an amount of habitat that is equal to the current amount. For example, if the WAU condition (federal reserves plus DNR-designated NRF areas) were 30 percent habitat, but 65 percent of DNR-managed lands in designated NRF areas were habitat, then DNR would maintain 65 percent of its managed lands in the designated NRF area as NRF habitat.

(d) If there are no federal reserves in a WAU in which DNR-designated NRF areas occur, DNR will maintain 50 percent of its lands designated as NRF management areas in NRF habitat.

In some places the boundary of a WAU divides a DNR-designated NRF area such that a smaller designated NRF area is created in a WAU with no other designated NRF areas (or disjunct from other NRF areas) and no federal reserves. For the purposes of calculating habitat targets and for management, such "orphaned" parcels can be grouped with DNR-designated NRF areas in the adjacent WAU that contains the larger area of designated parcels.

Under scenarios (a), (b), and (d), harvest of habitat can take place in WAUs where there is greater than 50 percent habitat on DNR-managed lands in designated NRF areas. Harvesting shall be designed to leave a specified level of nesting structure in the landscape. The amount, structural criteria, and configuration of nesting habitat are described below.

In places where DNR-managed lands are ecologically incapable of developing or maintaining 50 percent NRF habitat due to poor soils, high elevation, forest type, or other natural factors, the maximum coverage of habitat that those lands can support shall be maintained. For example, if DNR NRF areas within a WAU are only capable of growing 35 percent habitat due to poor soils, then DNR will maintain 35 percent habitat in that WAU throughout the term of the HCP.

MANAGEMENT OF FOREST STANDS WITHIN NRF HABITAT AREAS

During the research phase of the HCP, forest management activities within DNR-designated NRF areas will likely take place in four situations:

(1) in existing NRF habitat that counts toward the target amount for a WAU;

(2) in forest stands that are not yet habitat but are managed with the intent of developing habitat;

(3) in forest stands that are identified for harvest when the WAU has exceeded the target amount of NRF habitat; and

(4) in forest stands that do not count toward the target amount of NRF habitat.

The standards described here apply to the research phase only. New standards shall be developed for the transition and integrated management phases, the content of which will depend on the results of those efforts. New standards shall ensure adequate provision of nesting habitat. The following standards apply to the appropriate situation.

Management in DNR NRF habitat that counts towards the target amount of habitat in a WAU

Management can take place within this type of habitat as long as two conditions are met: adequate nesting habitat remains in the landscape, and forests that are managed for commercial wood production outside nesting habitat areas remain as sub-mature (Hanson et al. 1993; see habitat definitions below) or higher quality habitat after management activities have taken place. The specifics of each condition are as follows.

PROVISION OF NESTING HABITAT

(a) For the North Puget and Columbia planning units, nesting habitat (defined below) shall be provided in two 300-acre nesting patches per approximately 5,000 acres of DNR-designated NRF areas. In the South Puget Planning Unit, one 300-acre patch of nesting habitat shall be provided in the DNR-designated NRF area located directly north of the Mineral Block, and one 300-acre patch shall be located in section 16 of T 20 N, R 11 E; this designation accounts for low acreage of and wide separation between designated NRF areas in the South Puget Planning Unit. Based on a preliminary computer simulation of nest patch placement, there will be 68 nest patches encompassing a total of 20,400 acres[1].

(b) The 300 acres of nesting habitat shall occur within a larger contiguous 500-acre patch, the remaining 200 acres of which shall be composed of sub-mature or higher quality habitat (Hanson et al. 1993; see habitat definitions below). The entire 500-acre patch shall be contained entirely within a circle of 0.7-mile radius. Where 200 acres of sub-mature habitat are not available within the specified arrangement, the next highest quality habitat should be identified. If such a case occurs and there are no known active spotted owl nest sites in the vicinity (see iii below), silvicultural techniques may be applied to speed the development of sub-mature characteristics.

In cases where there are fewer than 1,000 acres of DNR-designated NRF in the WAU in which a nesting patch is located, DNR is obligated to provide only 50 percent total NRF habitat in the WAU. For example, a 640-acre section is the only DNR-designated NRF parcel in a WAU. A 300-acre patch of nesting habitat would constitute 47 percent of the 50 percent requirement in the WAU. DNR would not have to provide an additional 200 acres of sub-mature habitat. The priority in such cases is the establishment and protection of 300 acres of nesting habitat.

(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

[1]Given the spatial distribution of NRF areas, the number of nests patches will likely be slightly higher than results from a strict division of 163,000 acres by 5,000 acres (multiplied by 2) in order to achieve optimal distribution of nest patches.

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.

(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 U.S. Fish and Wildlife Service and National Marine Fisheries Service will review placement of nest patches at the 1-year review.

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. When this option is used, habitat that meets the high-quality nesting habitat definition (see subsection titled Habitat Definitions) should be used as the first field screen. If habitat does not meet this definition, the Types A and B habitat definitions should be used next. All available Type A habitat should be included before Type B habitat is counted as part of a 300-acre nest patch.

ii. Where known spotted owl pair sites do not exist within a 5,000-acre block, habitat patches should be identified using the structural characteristics listed in the "high quality nesting habitat" definition described below. DNR forest inventory data can be used to identify these structural characteristics where the inventory data are available.

iii. Where inventory data are not available, existing field-typed habitat data that utilize DNR's Types A, B, and C typing system can be used. 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.

iv. If data sources described above do not provide information to locate all the requisite nest habitat patches, DNR age-class data can be used as a starting point to locate potential habitat patches. The oldest forest stands in any particular 5,000-acre block are most likely to contain the structural characteristics of nesting habitat. Location and quality of habitat patches initially identified by this method shall be field-verified. Again, the high-quality nesting habitat definition should be used as the first field screen. If there is no habitat within a particular 5,000-acre block that meets this definition, then the Type A and Type B definitions shall be used next, with Type A habitat to be counted before Type B habitat is counted.

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. If the application of silvicultural techniques to such patches would speed the development of nesting structure where it is currently lacking, these activities are permitted, as long as they occur farther than 0.7 mile from any known spotted owl sites.

(e) 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. During the research phase of this HCP, DNR shall conduct the research necessary to determine what constitutes adequate nest structure at both the stand and landscape levels and conduct silvicultural experiments that attempt to create adequate nesting structure. Research may be conducted in cooperation with other landowners and managers. When DNR begins actively managing nestinghabitat stands, the target condition of the landscape shall be consistent with the results of the research described earlier. Development of new management standards for spotted owl nest habitat shall be done in consultation with the USFWS.

MANAGEMENT OF SUB-MATURE HABITAT THAT IS NOT DESIGNATED AS NESTING HABITAT

(a) If any harvest activity occurs in habitat that meets or exceeds the sub-mature definition, no more than 5 percent of the habitat on DNR-designated NRF lands in a WAU can undergo harvest activity in a two-year period. When any additional harvest is planned for habitat in the WAU, the stand or stands which constituted the first 5 percent in which harvest activities took place shall be assessed to ensure that sub-mature habitat characteristics remain. If these characteristics are present, an additional 5 percent of the habitat can be harvested.

(b) If characteristics of sub-mature habitat are not present after management activities have been conducted, no additional NRF habitat may be treated in that WAU until sub-mature quality is attained. In addition, subsequent silvicultural treatments should be modified so that forest stands are not reduced below sub-mature quality for more than two years.

(c) DNR will submit proposed exceptions to the U.S. Fish and Wildlife Service. If the U.S. Fish and Wildlife Service does not agree with the proposal, a multi-agency science team, including staff specialists from DNR, the U.S. Fish and Wildlife Service, and any third party scientist the U.S. Fish and Wildlife Service deems appropriate, shall be convened to resolve any outstanding issues.

Management in DNR NRF habitat in WAUs that contain less than 50 percent NRF habitat

Management can take place in this type of habitat as long as NRF habitat remains after management activities are complete. The standards described in paragraphs (a), (b), and (c) above apply to management within sub-mature habitat in WAUs that are below the target amount of habitat.

Management of stands that are not yet NRF habitat can take place only if management activities do not increase the amount of time that would be

required for the target amount of NRF goal to be attained if all the stands in that WAU were left unmanaged.

Management in DNR NRF habitat in WAUs that contain more than the target amount of NRF habitat

Management can take place in this type of habitat if such management does not lower the total amount of NRF habitat below the target amount and does not reduce the amount and distribution of nesting habitat described earlier. Landscape-specific arrangements of habitat that meet the life-needs of the spotted owl will be determined during the landscape assessment process that is used to implement the HCP. Harvest of habitat that is in excess of the target amount for a WAU should be done in the context of a landscape assessment process. This process may consider the following factors:

- Larger patches of habitat constitute higher quality spotted owl habitat than smaller patches, thus limiting fragmentation of large, contiguous habitat patches is desirable.
- Habitat patches that are contiguous with large habitat patches on federal land have more habitat value than smaller or disjunct patches.
- Older forest may constitute higher quality habitat than younger forest that still meets the habitat definition.
- Planning harvest in excess habitat away from known spotted owl nest sites first and near the vicinity of known nest sites last would minimize impact to the spotted owl population.

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 U.S. Fish and Wildlife Service.

Management of DNR forest stands that do not count toward the target amount of NRF habitat in a WAU

Management can occur in these areas in WAUs that are at or above the target amount of NRF habitat as long as all activities adhere to all other provisions of the HCP and do not lower the total amount of NRF habitat below the target amount and do not reduce the amount and distribution of nesting habitat described earlier. If a spotted owl nest site is discovered during timber sale planning, seasonal harvest restrictions timed to avoid the breeding season shall be observed within a 0.7-mile radius of the nest site.

PROVISION OF DISPERSAL HABITAT

Dispersal habitat shall be maintained on 50 percent of DNR-managed lands selected for a dispersal habitat role. The stand characteristics of dispersal habitat are described in the habitat definition section below. The 50 percent goal shall be measured in DNR-designated dispersal areas on a WAU basis.

MANAGEMENT IN WAUs NOT DESIGNATED TO PROVIDE HABITAT FOR SPOTTED OWLS

When harvesting spotted owl habitat outside of designated NRF areas, DNR will consider recommendations of the the U.S. Fish and Wildlife Service 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, the provi-

sions 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. All other provisions of the HCP shall still apply, as shall Forest Practices regulations that do not pertain specifically to spotted owls as well as relevant policies of the Board of Natural Resources. If a spotted owl nest site is discovered during timber sale planning in a stand not designated to provide spotted owl habitat, seasonal harvest restrictions timed to avoid the breeding season shall be observed with a 70-acre core surrounding the nest site.

OTHER MANAGEMENT CONSIDERATIONS

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).

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.

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;
- 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.

Support of Federal Reserves

DNR-managed lands selected to provide demographic support to spotted owl clusters on federal reserves may become less important as habitat on federal reserves develops. DNR may periodically review habitat conditions and any relevant demographic information to reassess the necessity of a contribution from DNR-managed lands. In some areas, it is possible that federal reserves alone will eventually be sufficient to support a self-sustaining spotted owl population. Where such conditions warrant, DNR may approach the U.S. Fish and Wildlife Service to amend the HCP accordingly. Proposals for such changes would be developed by DNR and submitted to the U.S. Fish and Wildlife Service and National Marine Fisheries Service. A multi-agency science team may be convened to resolve questions regarding the biological basis of the proposal.

HABITAT DEFINITIONS

This section defines the habitat types that are referred to in the NRF and dispersal management standards section above. This section is followed by a discussion of the origin and basis of these habitat definitions.

High-quality Nesting Habitat

The following definition is interim in nature due to limitations in the data from which it was derived and will be refined when DNR conducts the appropriate research. (See discussion below titled Basis for Habitat Definitions.) This definition is to be applied as an average condition over a 300-acre nesting habitat patch.

- 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.
- At least three trees from the above group of 31 trees have broken tops
- At least 12 snags per acre larger than 21 inches dbh
- A minimum of 70 percent canopy closure[2]
- A minimum of 5 percent ground cover of large woody debris

The 15 trees per acre greater than or equal to 31 inches dbh should be from the largest size classes present. If there are not 15 trees per acre greater than or equal to 31 inches dbh, the next largest available trees per acre should be retained to maintain a total of 31 trees larger than 21 inches dbh per acre.

Type A Spotted Owl Habitat

- A multi-layered, multispecies canopy dominated by large (30 inches dbh or greater) overstory trees (typically 15-75 trees per acre)
- Greater than 70 percent[3] canopy closure
- A high incidence of large trees with various deformities such as large cavities, broken tops, and dwarf mistletoe infection
- More than two large snags per acre, 30 inches dbh or larger
- Large accumulations of fallen trees and other woody debris on the ground

Type B Spotted Owl Habitat

- Few canopy layers, multispecies canopy dominated by large (greater than 20 inches dbh) overstory trees (typically 75-100 trees per acre, but can be fewer if larger trees are present)
- Greater than 70 percent canopy closure
- Some large trees with various deformities
- Large (greater than 20 inches dbh) snags present
- Accumulations of fallen trees and other woody debris on the ground

[2]For all instances in which canopy closure is used in a habitat definition, relative density (RD) will be used as a measurement if and when DNR has established a correlation between RD and canopy closure in spotted owl habitat for its lands. Relative density is defined as the basal area of a stand divided by the square root of the quadratic mean dbh of the stand (Curtis 1982). Foresters prefer this measurement to canopy closure because of repeatability of results and because it uses standard inventory data.

[3]This is a modification from Hanson et al. (1994, Appendix 4), which stated "60-80 percent". See discussion of canopy closure in subsection titled Basis for Habitat Definitions.

The Type A and Type B habitat definitions have been used by DNR spotted owl surveying crews and Washington Department of Fish and Wildlife habitat biologists since March 1991. Both habitats support spotted owl nesting (Hanson et al. 1993 p. 114).

Sub-mature Habitat

The following definition should be applied as average stand conditions. Sub-mature habitat has the following characteristics:

- 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)
- At least 70 percent canopy closure
- Tree density of between 115 and 280 trees greater than 4 inches dbh per acre
- Dominant and co-dominant trees at least 85 feet tall
- At least three snags or cavity trees per acre that are at least 20 inches dbh

The Washington Forest Practices Board Spotted Owl Science Advisory Group (Hanson et al. 1993) determined that these characteristics constitute high-quality younger forest habitat for western Washington and reported that sub-mature forests provide roosting and foraging opportunities for spotted owls.

Based on thinking that has developed since the publication of Hanson et al. (1993), DNR has determined that a down woody debris component is also important for high-quality roosting and foraging habitat. Thus, a minimum of 5 percent ground cover of large down woody debris shall also be required for sub-mature habitat. This is an explicit addition to Hanson et el. (1993) definition of sub-mature habitat. (See subsection titled Basis for Habitat Definitions, below.)

Dispersal Habitat

Dispersal habitat has the following minimum characteristics:

- Canopy cover at of least 70 percent
- Quadratic mean diameter of 11 inches dbh for 100 largest trees per acre in a stand
- Top height of at least 85 feet (Top height is the average height of the 40 largest diameter trees per acre.)
- At least four trees per acre from the largest size class retained for future snag and cavity tree recruitment

Higher quality nesting habitat, Type A, Type B, and sub-mature habitat can be counted as dispersal habitat.

BASIS FOR HABITAT DEFINITIONS

Nesting Habitat

The definition of high-quality nesting habitat outlined above is derived from two studies that measured nest tree characteristics and vegetative

structure around spotted owl nest sites in western Washington. One study included paired measurements from 15 nest sites and 15 random sites on the Olympic Peninsula (Hershey 1995), and the other included data from 11 nest sites in the western Cascades (Hamer 1995, unpublished data). This definition was developed as an attempt to replace the vague descriptive language used in the Type A and Type B habitat definitions. However, it should be viewed as an interim definition because of limitations in the data from which it was derived. These limitations stem from small sample size, less than full geographical representation of habitat types in western Washington, and the application of data derived from an unmanaged context to a managed context. This definition should be revised as more data becomes available on the vegetative characteristics of spotted nest stands and more information regarding the ability of spotted owls to nest successfully in a managed landscape. Proposals for such changes would be developed by DNR and submitted to the U.S. Fish and Wildlife Service and National Marine Fisheries Service. A multi-agency science team may be convened to resolve questions regarding the biological basis of the proposal.

TREE SIZE

Hershey (1995) found that mean nest tree size was 58 inches dbh; minimum nest tree size was 23 inches dbh and maximum size was 176 inches dbh. Hamer (1995, unpublished data) found that mean nest tree size was 74 inches dbh with a minimum of 47 inches dbh and a maximum of 115 inches dbh. (See Table IV.1.) Given that nest trees in these studies were so large, the definition for nesting habitat reflects the importance of retaining large trees in nest stands. The number and size class of large trees reflects the mean number of trees in a 21- to 31-inch dbh size class and a greater than 31-inch dbh size class found in nest stands in each study (Table IV.2). It should be noted that Hershey (1995) found no statistically significant difference in tree density in either the 21- to 31-inch-dbh and or the greater than 31-inch dbh size classes in nest plots versus random plots. (See footnotes in Table IV.2.)

SNAGS

The requirement of 12 snags per acre greater than 21 inches dbh is derived from taking the arithmetic mean of the sum of means from the 21 to 31-inch-dbh size class and the greater than 31-inch-dbh size class from each study. (See Table IV.2.) Snags are important both for nest trees and for prey. Seven of the 26 nest trees in both of these studies were snags. Carey (1995) found that the presence of large snags was the best predictor of abundance of northern flying squirrels, which is a principal prey species for spotted owls in western Washington. (See Section A of Chapter III on species ecology of the northern spotted owl.)

BROKEN-TOP TREES

The requirement for broken-top trees comes from the mean number of such trees observed in Hershey's study. Hamer did not measure density of broken-top trees. Trees with side or top cavities were used as nest trees in both study areas, however. (See Table IV.1.) These cavities are usually formed in trees with broken and secondary leaders and in trees from which large branches were broken.

CANOPY CLOSURE

A minimum of 70 percent canopy closure is consistent with a range of canopy closures defined by one standard deviation below the mean observed in both Hamer's (1989) and Hershey's (1995) studies. It is also consistent with recommendations of Hanson et al. (1993) on the basis of their review of the literature. DNR is in the process of collecting data to relate canopy closure to relative density in spotted owl habitat on its lands.

Table IV.1: Spotted owl nest tree characteristics in western Washington

dbh = diameter at breast height; s.e. = standard error; $\bar{x}$ = mean; n = number in sample

	Olympic Peninsula (Source: Hershey 1995)	**Western Washington Cascades** (Source: Hamer 1995, unpublished data)
Nest tree diameter (inches dbh)	$\bar{x}$ = 58 range = 23 to 176 s.e. = 9.7 n = 15	$\bar{x}$ = 74 range = 47 to 115 s.e. = 7.8 n = 10
Nest tree height (feet)	live trees $\bar{x}$ = 146 range = 99 to 186 n = 11 snags $\bar{x}$ = 57 range = 34 to 77 n = 4	live trees $\bar{x}$ = 194 range = 115 to 206 n = 7 snags $\bar{x}$ = 104 range 49 to 180 n = 3
Tree species	Douglas fir = 5 western redcedar = 5 western hemlock = 5	Douglas fir = 1 western redcedar = 8 western hemlock = 1
Nest structure	top cavities = 4 live tree = 1 snag = 3 side cavities = 10 live tree = 9 snag = 1 platform nests = 1	top cavities = 1 live tree = 0 snag = 1 side cavities = 9 live tree = 7 snag = 2 platform nests = 0

Table IV.2: Spotted owl nest stand characteristics in western Washington

dbh = diameter at breast height; s.e. = standard error; $\bar{x}$ = mean; n = number in sample; sd = standard deviation; p = probability that the difference is because of random characteristics within the population

	Olympic Peninsula (Source: Hershey 1995)[1]						Western Washington Cascades (Source: Hamer 1995, unpublished)[2]					
Tree density by size class (size in inches dbh, density in trees per acre)	Size class	$\bar{x}$	min	max	s.e.	sd	Size class	$\bar{x}$	min	max	s.e.	sd
	4.0-11.0	90	12	297	22	85	4-11	80	32	131	11	38
	11.1-21.0[3]	45	19	112	8	31	11-21	27	18	53	3.3	11
	21.1-31.0	16	5	31	1.7	7	21-31	16	10	24	1.5	5
	≥31	14	1.6	23	1.8	7	≥31	16	10	26	1.2	4
Tree density by height class (height in feet, density in trees per acre)	Height class	$\bar{x}$	min	max	s.e.	sd						
	25-49	40	7	110	8.3	32						
	50-75	34	10	120	8.5	33						
	76-100[4]	30	7	84	7.1	27						
	101-125[5]	25	8	78	5.3	20						
	126-150	17	8	44	2.3	9						
	≥150	11	0	23	2.0	8						
Snag density by size class (snags in inches dbh, density in snags per acre)	Size class	$\bar{x}$	min	max	s.e.	sd	Size class	$\bar{x}$	min	max	s.e.	sd
	4.0-11.0[6]	13	2.0	44	3.7	14	4-11	13	2	44	3.6	12
	11.1-21.0	4	0.8	8.5	0.6	2.3	11.21	10	2	18	1.3	4
	21.1-31.0	3.6	0.8	8.5	0.6	2.3	21-31	8	2	16	1.5	5
	≥31	3.3	0.0	9.7	0.8	3.0	≥31	8	4	12	0.8	3
Density of tree 21 in. dbh with broken tops and secondary leaders (trees per acre)		$\bar{x}$	min	max	s.e.							
		3.0	0	17	0.56							
Canopy closure		$\bar{x}$	min	max	s.e.	sd		$\bar{x}$	min	max	s.e.	sd
		78.8[7]	68.3	87.1	1.43	5.5		83	62	92	2.6	8.6

[1]Vegetation data around 15 nest sites were collected using five 0.1-ha plots, the first plot centered on the nest tree and the other four placed at four cardinal directions from nest tree. Snag data were collected using five 0.2-ha plots that surrounded the 0.1-ha plots. Vegetation was sampled around random sites as well. Random plots were chosen within a home range distance of nest sites and within forest stands in which dominant or co-dominant trees were at least 21 inches dbh. Data from random sites are not shown. Where there was a statistically significant difference between nest stands and random stands, data are shown in a footnote.

[2]Hamer's data are from the Mount Baker-Snoqualmie National Forest. Vegetation characteristics are based on 25-m-radius plots around 11 nest sites. Some of this data was originally published in USDI 1992. It was reanalyzed by Hamer for the purposes of this HCP in 1995.

[3]There was a significant difference between the mean density of trees around nest sites versus random sites in this size class. For random plots in the 11-21-inch-dbh size class the mean density was 29 trees per acre, p = 0.0467 (Hershey 1995). There were no significant differences between nest sites and random sites for any other size class.

[4]Mean density of trees in this height class at random sites is 16.3, p = 0.0236.

[5]Mean density of trees in this size class at random sites is 14.2, p = 0.0226.

[6]Mean density of snags at random sites in this size class is 7, p = 0.0402.

[7]Mean canopy closure for random sites is 74.4, s.e. = 1.27, p = 0.0033.

DOWN WOODY DEBRIS

Down wood is essential for small mammal communities (Maser and Trappe 1984; Harmon et al. 1986). Carey and Johnson (1995) found that the abundance of small mammal species was related to the amount of dead and down wood in both managed and naturally regenerated stands. From their empirical observations, they recommend that retention of 15 to 20 percent cover of coarse woody debris would allow most small mammal species to reach their potential abundances. Coverage of less than 10 percent probably would not allow these communities to reach their potential abundances (Carey and Johnson 1995 p. 347). Attaining an adequate level of large woody debris for small mammal communities is an important consideration for spotted owl nesting habitat. However, it is not clear whether providing for full potential abundance of small mammal communities is necessary given that the spotted owl's primary prey is the northern flying squirrel, which is an arboreal rodent. Down woody debris is also associated with species of fungi that are the primary food source for flying squirrels (Carey 1995). Again, the amount of woody debris cover needed to adequately provide this function is not known. A 5 to 10 percent range was chosen as the amount of down woody debris cover based on the reasoning that if 15 percent cover supported small mammal populations at their full potential abundance, the middle two-thirds of a range between 0 and 15 percent would likely provide for adequate spotted owl prey populations. This is clearly a management hypothesis and will be tested as part of the research that will be conducted to define more precisely spotted owl nest stand characteristics.

CONFIGURATION

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 61 spotted owl sites on the east slope of the Cascades, Irwin and Martin (1992) 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.

Irwin (1993) tracked the use of habitat within annual home ranges of 19 radio-tagged spotted owls and found that more than 60 percent of the area used annually was within a 700-acre area. (See also Hanson et al. 1993 p. 38-39.) In addition, Hanson et al. (1993) recommended that the area within 0.7 mile of a spotted owl activity center should be considered an area of exclusive use for that site because of data demonstrating concentrated use of habitat closer to site centers than farther away (Forsman et al. 1984),

and because this area is used heavily by juvenile spotted owls during their first summer (Hanson et al. 1993 p. 33). Based on this information, it is reasonable to arrange 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.

The distribution of one nesting habitat patch per 5,000 acres of DNR-designated NRF areas approximates a distribution of one nesting core per annual home range. Two nesting habitat patches per 5,000 acres of DNR-designated NRF area are provided to buffer against potential catastrophic loss and to increase the likelihood that suitable nesting patches will be found by dispersing juveniles.

Sub-mature Habitat

Sub-mature forest is a younger forest habitat category defined by Hanson et al. (1993). Sub-mature habitat includes mid-seral forest (non-late successional or old growth) that has the structural characteristics necessary to provide roosting and foraging functions. Foraging habitat is associated with healthy prey populations of small forest floor mammals and northern flying squirrels, though neither of these is as abundant as in older forests (Hanson et al. 1993 p. 53; Carey 1995; Carey and Johnson 1995). Roosting habitat is associated with the presence of potential perches at various vertical positions throughout the forest canopy. Sub-mature habitat corresponds with Type C habitat definition that has been used by DNR and the Washington Department of Fish and Wildlife for habitat typing in Washington. Sub-mature habitat is used infrequently for nesting by spotted owls (Hanson et al. 1993, Appendix 3, Appendix 5). Refer to Hanson et al. (1993 p. 55-59) for more information about the data they used to develop each component of the sub-mature habitat definition.

Hanson et al. (1993) proposed their spotted owl habitat definitions as working hypotheses and recommended that annual data reviews be conducted in order to revise these definitions as new pertinent information became available (Hanson et al. 1993 p. 50). Based on this recommendation, DNR is treating its use of the sub-mature habitat definition in this HCP as a working hypothesis and shall incorporate new information to revise the definition. The incorporation of a down woody debris component is an example of how DNR intends to build on the sub-mature habitat definition.

DNR added a down woody debris component to the original definition of sub-mature habitat because of the likelihood that there is an association between the presence of down woody material and abundant spotted owl prey populations as discusssed earlier. While a threshold of adequate versus inadequate amounts of down woody debris specifically for spotted owl habitat cannot be established based on existing data, the inclusion of a down wood component for sub-mature habitat is consistent with DNR's intent to provide high quality roosting and foraging habitat. Old-forest habitat is the habitat type selected by spotted owls over younger habitat types for both roosting and foraging and nesting functions (see Section A on spotted owl ecology in Chapter III) and is characterized by the presence of abundant down woody debris (Spies and Franklin 1991; Carey and Johnson 1995). Thus, during the research phase of this HCP, DNR will include a down woody debris component in both the nesting and the sub-mature habitat definitions until more data is available regarding the amount of down wood required to provide adequate foraging opportunities for spotted owls in a managed landscape.

Dispersal Habitat

Definitions of dispersal habitat based on an understanding of stand conditions and landscape patterns that relate to high rates of successful juvenile spotted owl dispersal are lacking. The model developed by Thomas et al. (1990) and adopted by the Northern Spotted Owl Recovery Team (USDI 1992) was based on range-wide conditions thought to support roosting adults. This approach, commonly referred to as the 50-11-40 rule, recommended managing areas outside of designated reserves such that 50 percent of forested lands in each quarter township would have an average canopy closure of 40 percent and trees would average 11 inches dbh. Habitat conservation plans prepared for the Murray Pacific Corporation in western Washington by Beak Consultants, Inc. of Kirkland, Washington (1993), and the Weyerhaeuser Corporation's Millicoma Tree Farm (1994) in coastal Oregon use more specific models to accomplish the same goal as the model proposed by Thomas et al. (1990). Both plans call for monitoring of the success of silvicultural prescriptions in attaining the desired stand conditions, but neither plan will monitor actual use of designated dispersal stands by dispersing juvenile spotted owls.

The Murray Pacific HCP differs from the 50-11-40 rule in that it proposes specific tree density and diameter criteria (130 trees per acre that are at least 10 inches dbh, with tree density not to exceed 300 trees per acre) to provide trees of adequate size for roosting and a canopy closure of 70 percent (versus 40 percent in the Thomas definition) that allows adequate space under the canopy for spotted owls to move in and provides adequate thermal cover. Beak (1993) considered 40 percent canopy closure inadequate for dispersal habitat for managed stands in western Washington because the tree limbs would be close to the ground and the understory vegetation would be dense. Both these conditions would likely inhibit successful foraging. The Murray Pacific HCP also provides a component of snags, live trees, and dead wood to provide foraging opportunities. This plan is designed for site conditions on the Murray Pacific Tree Farm in the western Washington Cascades.

The Weyerhaeuser Millicoma HCP also specifies tree density and size criteria, using 120 trees per acre that are at least 10 inches dbh and a maximum density of 300 trees per acre.

DNR recognizes the lack of data relating actual stand conditions and landscape patterns to successful spotted owl dispersal. For the purposes of this HCP, an interim definition will be adopted that will be replaced as better data become available. DNR is in the process of analyzing existing data for:

(1) use versus availability of habitat types by roosting adult spotted owls;

(2) habitat associations of northern flying squirrels; and

(3) habitat typing of stands used by successfully dispersed juvenile spotted owls in western Washington.

The results of this analysis will be used to derive a more precise definition of dispersal habitat. In the interim, DNR will adopt an approach similar to the model developed by Beak Consultants for Murray Pacific. The basis for each component of DNR's definition of dispersal habitat is as follows.

CANOPY COVER

For western Washington, a canopy cover of 70 percent is more likely to allow for sufficient maneuverability and thermal cover than a canopy closure of 40 percent (Beak Consultants 1993).

CANOPY HEIGHT

A top height of 85 feet should provide an adequate canopy lift, or area under the canopy that is free of obstruction from lower limbs, so as to not impede spotted owl flight, and thus enhance foraging activities.

GREEN TREE RETENTION

Green tree retention is intended for the eventual recruitment of snags and cavity trees. Snags or cavity trees are required for high densities of flying squirrels (Hanson et al. 1993; Carey 1995), a principal prey species of spotted owls in western Washington (Carey et al. 1992).

DOWN WOODY DEBRIS

The definition of dispersal habitat does not currently contain provisions for down woody debris. There are currently no data upon which to base a recommendation for down wood in dispersal habitat. However, given that one of the functions of dispersal habitat is to provide foraging opportunities, down woody debris would provide important habitat for spotted owl prey species. A down wood component shall be incorporated into the dispersal habitat requirements if and when research demonstrates its necessity or there is data upon which to base a reasonable management hypothesis.

Conservation Strategy for the Three East-side Planning Units

The conservation strategy for spotted owls on the east slopes of the Cascades is built on the same principles as the strategy for the five west-side planning units. Differences in the strategies arise from differences in forest ecology and spotted owl habitat ecology on the east and west sides of the Cascades. The outline of components is the same for both strategies, but the specifics in each component differ. (The rationale for both strategies follows the discussion of east-side habitat definitions and their basis.) The specifics for each component in the east-side strategy are described below. This strategy provides mitigation for the entire approximately 229,000 acres of DNR-managed lands covered by the HCP in the three east-side planning units.

IDENTIFICATION OF DNR-MANAGED LANDS MOST IMPORTANT TO SPOTTED OWL CONSERVATION

The process and criteria for determining what if any role DNR-managed lands could play in spotted owl conservation on the east side were similar to that used for lands on the west side. The only difference is that lands on the east-side within 1.8 miles of federal reserves were considered important for demographic support instead of within 2 miles as in western Washington. This difference reflects the difference in the radius of circles that approximate a median annual spotted owl home range on the eastern and western sides of the Washington Cascades (Hanson et al. 1993). Some lands selected to serve a demographic support function are located farther than 1.8 miles from a federal reserve. These lands are directly adjacent to the Yakama Indian Reservation and provide support for a cluster of spotted owls currently centered on a combination of DNR-managed lands, the Yakama Reservation, and federal reserve lands.

Approximately 229,000 acres of DNR-managed lands are covered by the HCP in the three east-side planning units. DNR NRF areas encompass approximately 39,000 acres in the three east-side planning units. Dispersal areas encompass approximately 85,000 acres of DNR-managed lands in eastern Washington. Lands selected for NRF and dispersal management are shown in Maps IV.6-IV.8.

DETERMINATION OF NRF HABITAT GOALS ON A LANDSCAPE SCALE FOR LANDS IDENTIFIED FOR A NRF HABITAT ROLE

The steps used to determine habitat goals for DNR designated NRF areas are the same as described earlier for the west-side strategy.

MANAGEMENT OF FOREST STANDS WITHIN NRF HABITAT AREAS

NRF habitat in eastern Washington is defined as sub-mature or higher quality forest. (See habitat definition below.) Forest management activities within DNR-designated NRF areas will take place in four different situations:

(1) in existing NRF habitat that counts toward the target amount for a WAU;

(2) in forest stands that are not yet habitat but are managed with the intent of developing habitat;

(3) in forest stands that are identified for harvest when the WAU has exceeded the target amount of NRF habitat; and

(4) in forest stands that do not count toward the target amount of NRF habitat.

Management in DNR NRF habitat that counts toward the target amount of habitat in a WAU

Management can take place within this type of habitat under the following conditions:

- The structural characteristics of sub-mature quality or higher are retained.

- No more than 5 percent of the NRF habitat within a WAU should be modified in a two-year period. Before the same WAU can be entered for any management activity that either degrades old-forest habitat to sub-mature habitat or results in the removal of commercial volumes of timber from sub-mature habitat, the original area that received such management treatment should be assessed to determine that the managed stands meet the definition of sub-mature habitat. After it has been determined that the managed stands meet the definition, an additional 5 percent old-forest or sub-mature habitat can be managed for commercial wood production.

- If the characteristics of sub-mature habitat are not present, no additional management within NRF habitat in the WAU can take place until the managed stands have again acquired sub-mature characteristics. Any future management activity should be modified so that forest stands are not reduced below sub-mature quality for more than two years.

Management in DNR NRF habitat in WAUs that contain less than 50 percent NRF habitat

Management can take place in this type of habitat as long as NRF habitat remains after management activities are complete. The standards described immediately above for management of sub-mature habitat apply in WAUs below the target condition as well. Management of stands that are not yet NRF habitat can take place only if management activities do not increase the amount of time that would be required for the target amount of NRF to be attained if all the stands in that WAU were left unmanaged.

Management in DNR NRF habitat in WAUs that contain more than the target amount of NRF habitat

Management can take place in this type of habitat if such management does not lower the total amount of NRF habitat below the target amount. As in western Washington, landscape-specific arrangements of habitat that meet the life needs of the spotted owl will be determined through a landscape assessment process that is used to implement the HCP. Harvest of excess habitat should be done in this context. This process may consider the following factors:

- Larger patches of habitat constitute higher quality spotted owl habitat than smaller patches; thus, limiting fragmentation of large, contiguous habitat patches is desirable.
- Habitat patches that are contiguous with large habitat patches on federal land have more habitat value than smaller or disjunct patches.
- Older forest may constitute higher quality habitat than younger forest that still meets the habitat definition.
- Planning harvest in excess habitat away from known spotted nest sites first and in the vicinity of known nest sites last would minimize impact to the spotted owl population.

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 U.S. Fish and Wildlife Service.

Management of DNR forest stands that do not count towards the target amount of NRF habitat in a WAU

Management can occur in these areas in WAUs that are at or above the target amount of NRF habitat as long as all activities adhere to all other provisions of the HCP and do not lower the total amount of NRF habitat below the target amount.

PROVISION OF DISPERSAL HABITAT

Dispersal habitat shall be provided in designated areas according to the definition described below. Fifty percent of DNR-designated dispersal areas within a quarter township shall be maintained in dispersal habitat conditions. In some cases, the location of quarter township lines results in a configuration of DNR-designated dispersal areas that are too small to allow practical management activities to occur. Where such situations arise, DNR-designated dispersal areas can be grouped with adjacent DNR dispersal areas in adjacent quarter townships.

MANAGEMENT IN WAUs NOT DESIGNATED TO PROVIDE HABITAT FOR SPOTTED OWLS

When harvesting spotted owl habitat outside of designated NRF areas, DNR will consider recommendations of the the U.S. Fish and Wildlife Service 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, 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. Mitigation for other listed species shall still apply, as shall Forest Practices regulations that do not pertain specifically to spotted owls as well as relevant policies of the Board of Natural Resources. If a spotted owl nest site is discovered during timber sale planning in a stand not designated to provide spotted owl habitat, seasonal harvest restrictions timed to avoid the breeding season shall be observed within a 70-acre core surrounding the nest site.

OTHER MANAGEMENT CONSIDERATIONS

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).

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 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.

HABITAT DEFINITIONS

This section defines the habitat types that are referred to in the NRF and dispersal management standards section above. This section is followed by a discussion of the origin and basis of these habitat definitions.

Nesting, Roosting, and Foraging Habitat

Nesting, roosting, and foraging functions are provided by sub-mature, mature, and old-growth forest types in eastern Washington (Hanson et al. 1993). Both Type A and sub-mature habitat provide nesting habitat. The Type A definition is included as a reference point for the range of habitat qualities that exist in eastern Washington. The management standards described above use the sub-mature definition as the minimum standard for spotted owl nesting habitat to be met within NRF management areas.

Type A Spotted Owl Habitat

Nesting, roosting, and foraging habitat in eastern Washington generally occurs in grand fir, Douglas fir, and ponderosa pine forest zones (Franklin and Dyrness 1973). Forest stands of Type A habitat are mature habitat that has naturally regenerated following windthrow or fire. These stands have the following characteristics:

- Multi-layered, multispecies canopy dominated by overstory trees that exceed 20 inches dbh (typically 35-100 trees per acre)
- At least 75 percent canopy closure
- Some dominant trees have mistletoe brooms, cavities, or broken tops
- Three snags per acre greater than or equal to 20 inches dbh
- Down woody debris that is greater than or equal to 20 inches dbh plus accumulations of other woody debris

Sub-mature habitat

This definition should be applied as average conditions over a stand. Sub-mature habitat has the following characteristics:

- Forest community composed of at least 40 percent Douglas fir or grand fir
- Canopy closure of at least 70 percent
- Tree density of between 110 and 260 trees per acre
- Either tree height or vertical diversity (one characteristic but not both needs to be present)
  - dominant and co-dominant trees at least 90 feet tall

    or

  - two or more canopy layers with numerous intermediate trees and low perches
- Either snags/cavity trees or mistletoe infection (one characteristic but not both needs to be present):
  - Three or more snags or cavity trees per acre that are equal to or greater than 20 inches dbh

    or

  - a moderate to high infection of mistletoe[4]
- Five percent ground cover of dead and down wood averaged over a stand

Dispersal Habitat

This is an interim definition of dispersal habitat. (See subsection below titled Basis for Habitat Definitions.)

- At least 50 percent canopy closure
- Overstory tree density of at least 40 trees per acre that are at least 11 inches dbh

[4]The Washington Forest Practices Board Spotted Owl Science Advisory Group recommended combining tree level indices of mistletoe infection (Baranyay and Safranyik 1970; Hawksworth 1977) with a stand level index (Roe and Amman 1970). In the tree level index, the tree canopy is visually divided into three vertical layers. Each layer is assigned a rating depending on the level of infection: 0 = no visible infection; 1 = less than half of the branches infected; 2 = more than half of the branches infected; and 3 = more than half of the branches infected and large brooms are present. The stand level index rating system is based on the number of trees in the stand that are infected: 1 = no trees infected; 2 = less than one-third of the trees infected; 3 = between one-third and two-thirds of the trees infected; 4 = more than two-thirds of the trees infected. The stand-level and tree-level ratings are then combined in a matrix to get an overall ranking. See Table IV.3 for the matrix. The Spotted Owl Science Advisory Group recommends that this system be field-verified and modified if necessary (Hanson et al. 1993 p.106-107).

Table IV.3: Recommended method for estimating habitat quality for spotted owls using tree- and stand-level indices of mistletoe infection

(Source: Reproduced from Hanson et al. 1993 p. 107)

	Stand-level infection index			
Tree-level infection index	**1 (no trees)**	**2 (< 1/3 of trees)**	**3 (1/3 - 2/3 of trees)**	**4 (> 2/3 of trees)**
0 (none)	None	None	Light	None
1 (<1/2 of branches)	None	Light	Moderate	Moderate
2 (>1/2 of branches)	None	Moderate	Heavy	Heavy
3 (>1/2 of branches, large brooms present)	None	Moderate	Heavy	Heavy

- Top height of at least 60 feet
- Retention of four green trees per acre from the largest size class present for recruitment of snags and cavity trees
- At least 50 percent of DNR-managed lands designated for a dispersal function on a quarter township basis will be maintained in the stand conditions described above

BASIS FOR HABITAT DEFINITIONS

Sub-mature Habitat

Sub-mature habitat in eastern Washington includes both even- and multi-aged stands. The characteristics of these stands result from a history of disturbance by fire, wind, insects, and disease and from selective forest management practices (Hanson et al. 1993 p. 63). Sub-mature forest has been documented to support successful nesting (Buchanan 1991; Buchanan et al. 1993, 1995; Hanson et al. 1993). See Hanson et al. (1993 p. 63-68) for an explanation of data supporting each habitat component.

Hanson et al. (1993) proposed their spotted owl habitat definitions as working hypotheses and recommended that annual data reviews be conducted in order to revise these definitions as new pertinent information became available (Hanson et al. 1993 p. 50). Based on this recommendation, DNR is treating its use of the sub-mature habitat definition in this HCP as a working hypothesis and shall incorporate new information to refine the definition.

Dispersal Habitat

As with west-side forests, an understanding of dispersal habitat based on use of stands by successfully dispersing juveniles is also lacking for forests on the east side of the Cascades. DNR's research strategy for developing more precise dispersal habitat definitions includes developing one or more region-specific definitions for the eastern Washington Cascades. The basis for devising the definitions is described in the components below.

CANOPY CLOSURE

Data from several radio-telemetry studies indicate that forest stands with a canopy closure of less than 50 percent are rarely used by spotted owls for roosting and foraging (Hanson et al. 1993 p. 65). DNR is in the process of collecting data to relate canopy closure to relative density for forests in eastern Washington.

OVERSTORY TREE DENSITY

Providing 40 trees per acre that are at least 11 inches dbh should contribute at least 50 percent canopy cover, ensure there are enough trees large enough to supply hiding cover, and include a large component of smaller trees in the stand.

STAND HEIGHT

Top height is a reliable and repeatable measure of stand height. Based on observations of stand conditions on DNR-managed lands in eastern Washington, conifers reach 60 feet in 40 to 70, years depending on site conditions. Trees in a stand at this stage of development have approximately 30 to 50 percent crown ratio. In other words, a 60-foot tree has between 30 and 42 feet of space between the ground and the first live branches. A stand with 30 to 42 feet of canopy lift should provide adequate flying space for juvenile spotted owls under the canopy.

GREEN TREE RETENTION

Retaining green trees is intended to provide for eventual recruitment of snags into dispersal stands. Snags are important for spotted owl prey species, particularly northern flying squirrels. Flying squirrels use cavities in snags as nests (Weigl and Osgood 1974). Research on snag requirements for northern flying squirrels has been conducted in western Washington but not in eastern Washington. However, snags are a documented component of spotted owl home ranges and are likely important habitat for prey species in eastern Washington (Hanson et al. 1993 p. 67).

UNIT AREA

DNR believes that a quarter township is an appropriate unit for calculating 50 percent dispersal habitat coverage in eastern Washington rather than using an entire WAU as in western Washington. The quarter township unit was recommended by Thomas et al. (1990) in their 50-11-40 rule and is smaller than a WAU. In western Washington, in addition to the stands managed directly for dispersal habitat, the conservation of riparian zones and forest stands designated for protection of marbled murrelets will provide a widespread network of older forest. This network will be absent on the east side. Thus, a smaller unit of habitat measurement is needed to reduce the potential gaps between dispersal stands.

Rationale for the Spotted Owl Conservation Objective and Strategies

DEMOGRAPHIC SUPPORT

In general, demographic support is accomplished by providing enough nesting, roosting, and foraging habitat to support one or more breeding pairs of spotted owls. Evidence from empirical studies and population modeling shows that larger clusters of breeding spotted owls — 15 to 25 pairs — have a higher likelihood of persisting in the face of random demographic, environmental, and genetic events than do smaller clusters or single pairs (Thomas et al. 1990; Lamberson et al. 1992, 1994; see also the spotted owl section in Chapter III). Thus providing habitat in or adjacent to areas currently occupied by large clusters or in areas capable of becoming occupied by large clusters of territorial spotted owls is more likely to contribute to maintaining the spotted owl population than providing habitat for dispersed single territories or small clusters.

Most of the remaining late successional and old-growth forest habitat in Washington is on federal land (USDA and USDI 1994a). Almost all of the remaining large clusters of territorial spotted owl sites are centered on federal land. However, many of the spotted owls whose sites are centered on federal land use nonfederal land to meet part of their habitat needs. There are 193 site centers on federal reserves designated under the President's Forest Plan that have DNR-managed land in some portion of their circle. Of these, 171 are territorial sites (WDFW 1995b). In order for existing sub-populations that are centered on federal land to persist, the sites near nonfederal lands need to be supported.

In addition, although the reserve system described in the President's Forest Plan was designed to accommodate large clusters of spotted owls, in many places, only small clusters exist now. Many of the federal reserves currently lack adequate amounts of suitable spotted owl habitat to support large clusters. In the eastern Washington Cascades, 16 of the 23 Late successional Reserves currently contain less than 40 percent suitable spotted owl habitat. The average amount of suitable habitat for these Late successional Reserves is 33 percent. In the western Washington Cascades, four of 22 Late successional Reserves have less than 40 percent habitat, while 10 have between 40 and 50 percent suitable habitat. The average habitat coverage for western Washington Cascades Late successional Reserves is 47 percent (USDA and USDI 1994a, Appendix G, p. 13-14).

For reasons outlined in the preceding paragraphs, DNR designed the main component of its spotted owl conservation strategies to provide NRF habitat on its managed lands that are intermingled with or within 1.8 miles of federal Congressional Reserves, Late successional Reserves, Managed Late successional Reserves, and Adaptive Management Areas in the eastern Washington Cascades or within 2 miles of these reserve designations in western Washington. DNR-managed lands in these areas will provide habitat that is important for spotted owls occupying site centers currently located on federal reserves but that use nonfederal habitat. The lands will also provide habitat to assist in supporting the development of larger clusters of spotted owl territories where smaller clusters exist now and sufficient habitat on federal lands is lacking, but the potential to support larger clusters clearly exists.

The 50 percent habitat level was chosen as a reasonable landscape coverage of nesting, roosting, and foraging habitat based on the median amount of suitable habitat found within median annual home ranges of spotted owl pairs in both eastern and western Washington (Hanson et al. 1993) and on

studies of spotted owl abundance and amount of older forest habitat in the landscape. The median amount of late successional habitat found in the median annual pair home ranges in western Washington was 44 percent (n = 7) (Hanson et al 1993 p. 20-21). In these telemetry studies, late successional habitat was used in greater proportion than its abundance. In eastern Washington, the median amount of late successional habitat was 50 percent (n = 4) (Hanson et al. 1993 p. 21). In addition, Bart and Forsman (1992) found that levels of occupancy and reproductive success increased with an increasing amount of old growth in the landscape; spotted owl density and reproductive output were higher in areas with greater than 60 percent older forest than in areas with less than 20 percent forest. However, there was no significant difference in these variables in areas having between 50 percent and 60 percent older forest in the landscape (Bart 1995). Given that the spotted owl population is likely in a state of demographic decline (Burnham et al. 1994, see also the spotted owl section in Chapter III), maintaining habitat levels near the amount considered by the U.S. Fish and Wildlife Service to harm an individual — 40 percent of median home range-size circles — could likely lead to long-term negative consequences to the population. In other words, it could be argued that if the population is in a state of decline, maintaining the status quo would maintain the decline.

DNR chose not to provide specific spotted owl habitat conservation measures for demographic support to the population on the northeastern portion of the Olympic Peninsula (Straits Planning Unit). The reasons for this decision are two fold. First, the results of demographic modeling performed and analyzed by the federal Reanalysis Team (Holthausen et al. 1994) suggest that remaining habitat on nonfederal lands on the northeastern portion of the Olympic Peninsula is not crucial to maintaining the spotted owl population on the Olympic Peninsula as a whole. Holthausen et al. (1994) thought that nonfederal lands on the western side of the peninsula could make a potentially higher positive contribution to the population. The Olympic Experimental State Forest will contribute NRF habitat to support the Olympic Peninsula population in this area. (See a later section in this chapter on the Spotted Owl Strategy for the Olympic Experimental State Forest.) Second, DNR will likely provide older forest habitat in the Straits Planning Unit that is suitable for spotted owls as part of the riparian and marbled murrelet conservation strategies. Given the less important role for nonfederal lands for spotted owl conservation in the Straits Planning Unit, DNR feels that the indirect contributions from these other conservation strategies will provide benefits appropriate for that area.

DNR also chose not to provide specific spotted owl habitat conservation measures for the purposes of demographic support in its South Coast Planning Unit, which encompasses most of southwest Washington. The results of the federal Reanalysis Team's report (Holthausen et al. 1994) were again important in this decision. The federal Northern Spotted Owl Recovery Team (USDI 1992) identified nonfederal lands as important for supporting several clusters of spotted owls that would provide a demographic link between the Cascades and the Olympic Peninsula. In analyzing the Recovery Team's proposal, the Reanalysis Team found that the development of 370,000 acres of high-quality habitat in southwest Washington would not make a measurable difference in the stability of the Olympic Peninsula population, given that the population was already nearly stable. DNR manages approximately 239,000 acres of forest land in the South Coast planning unit, so even if the agency dedicated 100 percent of its acreage to NRF, the Reanalysis Team's report indicates that this contribution would not play an important role in the long-term persistence of spotted owls on the Olympic Peninsula as hypothesized by the Recovery Team.

MAINTENANCE OF SPECIES DISTRIBUTION

Maintaining the distribution of the spotted owl population throughout the range of ecological conditions and geographic locations in which the spotted owl has historically resided is important to conservation of the species because it reduces the risk of widespread extirpation (USDI 1992). The Northern Spotted Owl Recovery Team (USDI 1992) cited four ways in which a well-distributed population reduces the risk of extirpation. The first is that any substantial reduction in the range would lower the number of local populations contributing to the whole population (the metapopulation). The fewer local populations, the higher the chance that large portions of the metapopulation could become extinct, and thus the higher chances that the entire population could become extinct. Second, range reduction reduces the kinds of environments (i.e., forest types) that the spotted owl inhabits, thus subjecting the population to extirpation from random environmental events such as rapid change in climatic conditions or catastrophic loss of habitat from fires, insects, disease, or volcanic eruption. With a well-distributed population, it is unlikely that the entire population would be lost to a small number of such random environmental events. Third, the elevational and geographic fringes of a species' range are often where a species makes the most rapid adaptations to different environments. Thus losing the population at these fringes could inhibit the spotted owl's evolutionary capabilities. Fourth, the geographical and elevational fringes of the range may prove to be important in the face of climate change. The northern part of the range and higher elevation habitats would be important if climate change produced a warmer regional climate in the Pacific Northwest. If however, climate change produced local cooling pockets in the Pacific Northwest (Smith 1990), lower elevation habitats and the southern portion of the spotted owl's range would become important to the owl's survival as a species. Maintaining species distribution thus requires that clusters of breeding owls are maintained throughout the range of ecological conditions and geographic extent and that connectivity is maintained between sub-populations throughout the range.

DNR's strategy in western Washington contributes to the maintenance of species distribution in two ways. First, most habitat on federal lands is in the mid- to high-elevation zones of spotted owl use. DNR-managed lands occupy more mid- to low-elevation zones. By providing NRF habitat within 2 miles of federal reserves, DNR-managed lands will be providing habitat across a wider elevation gradient than would be present if habitat were maintained only on federal reserves. Second, DNR is providing large blocks of NRF habitat beyond the 2-mile band surrounding federal reserves in two areas that were identified by the Northern Spotted Owl Recovery Team (USDI 1992) as important for maintenance of species distribution. The Siouxon Creek area (in the Columbia Planning Unit) supports spotted owl cluster in under-represented low-elevation habitat. The Columbia River Gorge area south of the Gifford Pinchot National Forest (also in the Columbia Planning Unit) provides an important link between Washington and Oregon spotted owl populations.

The federal Reanalysis Team (Holthausen et al. 1994) recognized that maintaining and developing habitat in southwest Washington could have significant effects on maintaining species distribution, though they did not analyze this aspect. Given that southwest Washington constitutes a large geographical region within the historic range of the spotted owl, it is important for the reasons described above. However, without commitment on the part of surrounding private landowners to develop and maintain NRF habitat, it is not practical for DNR alone, given its trust responsibilities, to develop enough habitat to support large clusters of spotted owl sites.

Some positive benefit to the spotted owl may occur incidentally as a result of the riparian and marbled murrelet conservation strategies in this area.

DISPERSAL

The spotted owl population is comprised of semi-isolated sub-populations or local populations that are connected through dispersing juveniles and, possibly, non-territorial single owls. (See Section A of Chapter III on the spotted owl.) The maintenance of the whole population is dependent on successful movement of owls from sub-populations that are stable or increasing in size to sub-populations that are decreasing in size or to areas where a small sub-population may have been extirpated (USDI 1992). Interaction among clusters of spotted owls also ensures genetic integrity of the population. Dispersal is facilitated by managing forests that provide adequate food and cover for juveniles as they travel between their natal area and suitable, unoccupied habitat (Thomas et al. 1990). Because juvenile spotted owls disperse in random directions (Miller 1989), the conditions that allow for successful dispersal need to be present across large landscapes rather than restricted to selected corridors (Thomas et al. 1990). DNR's strategy includes providing dispersal habitat in areas that are crucial for movement of juveniles between spotted owl sub-populations.

DNR designated its managed forest lands for dispersal habitat in areas that were farther than 2 miles from federal reserves in western Washington or farther than 1.8 miles from federal reserves in eastern Washington, but where connectivity between federal reserves is important. In one place, dispersal habitat is designated to provide connectivity between the Yakama Indian Reservation and a federal reserve.

Current Habitat and Projected Habitat Growth in Nesting, Roosting, and Foraging and Dispersal Management Areas

Designated NRF areas under the HCP encompass approximately 202,000 acres of DNR-managed lands. Designated dispersal habitat areas encompass approximately 200,000 acres. A summary of acreages by planning unit is provided in Table IV.4. On the basis of estimates of current habitat and the criteria for deciding how much habitat to maintain in each WAU, the HCP will result in the retention of approximately 102,000 acres of spotted owl NRF habitat within NRF management areas and approximately 100,000 acres of dispersal habitat.

Although age class does not necessarily equate to habitat, age-class distribution has been used as a surrogate for projected habitat growth over the next 100 years in the five west-side planning units as shown in Figures IV.1-IV.5 Forest that are 70 years and older can contain structural elements of spotted owl habitat. Because so many of the forests on DNR-managed lands in the east-side planning units are in uneven-aged stands, it is not possible to use age-class distribution as a surrogate for habitat growth there.

These figures represent the outcome from one possible set of harvest scenarios modeled by DNR. The other HCP strategies were included in the modeling.

Table IV.4: Summaries of current spotted owl habitat conditions by planning unit

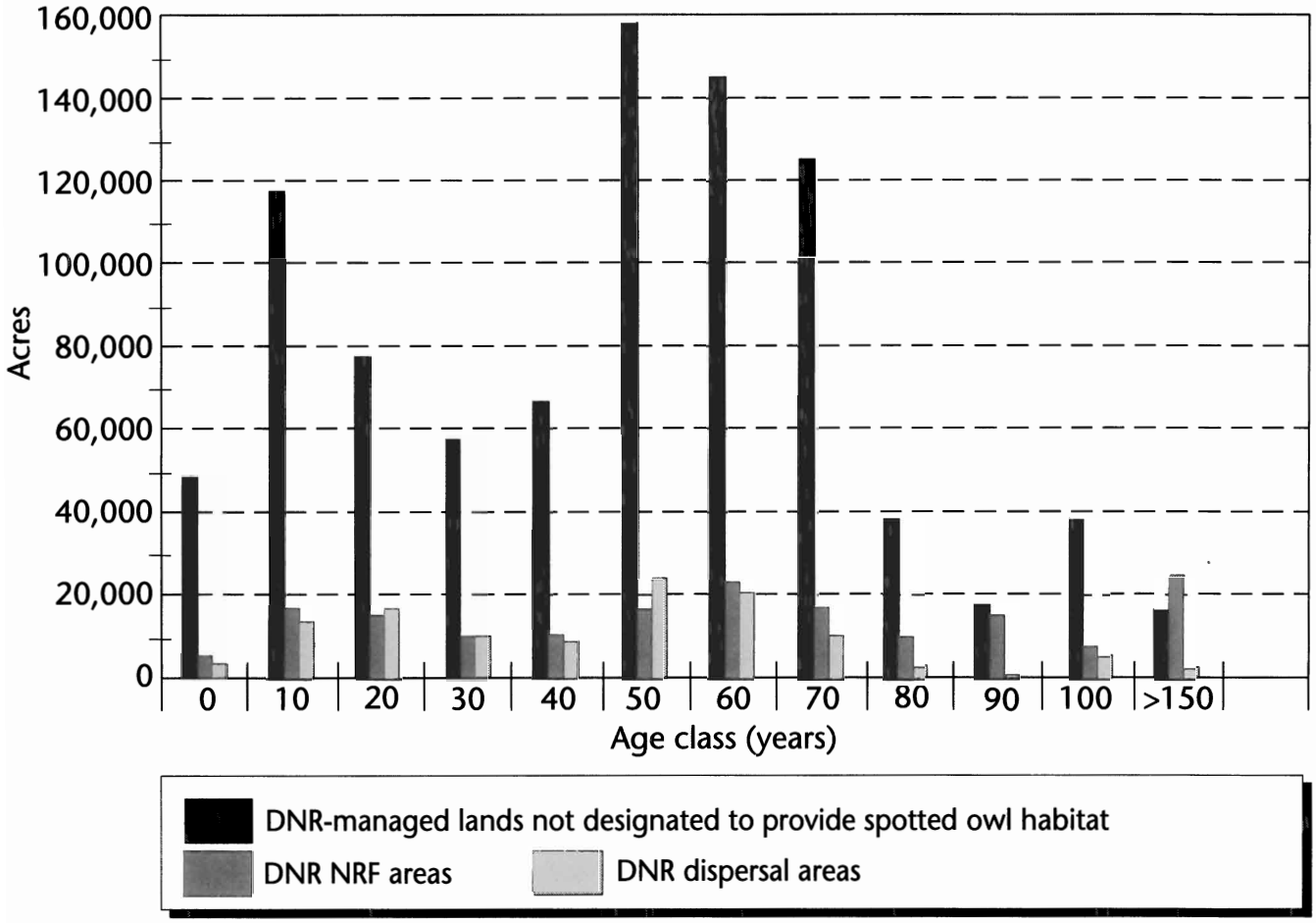
Planning unit	Acres of DNR-designated NRF areas[1]	Percent DNR-designated NRF areas currently in habitat (acres)	Acres of DNR-designated dispersal areas	Percent DNR-designated dispersal areas currently in potential dispersal habitat[2] (acres)
North Puget	107,599	48 (51,494)	22,234	51 (11,515)
South Puget	2,648	58 (1,535)	66,588	55 (56,534)
Columbia	52,996	60 (31,925)	27,029	82 (22,172)
Straits	0	0	0	0
South Coast	0	0	0	0
Chelan	5,647	54 (3,064)	0	0
Yakima	13,567	35 (4,714)	8,332	no data
Klickitat	19,939	58 (11,653)	76,726	no data
Totals	**202,397**	**51 (104,384)**	**200,909**	—

[1] Includes 14,765 acres of Natural Area Preserves (NAP) and Natural Resource Conservation Areas (NRCA). See Chapter I for an explanation of how these lands are treated in the HCP. The North Puget Planning Unit contains 13,108 acres of NAP and NRCA lands in NRF areas.

[2] Potential dispersal habitat was estimated assuming that forest stands that are 40 years old or older would have characteristics of dispersal habitat for western Washington. This estimate does not take into account the spatial arrangement specified in the management standards for dispersal habitat.

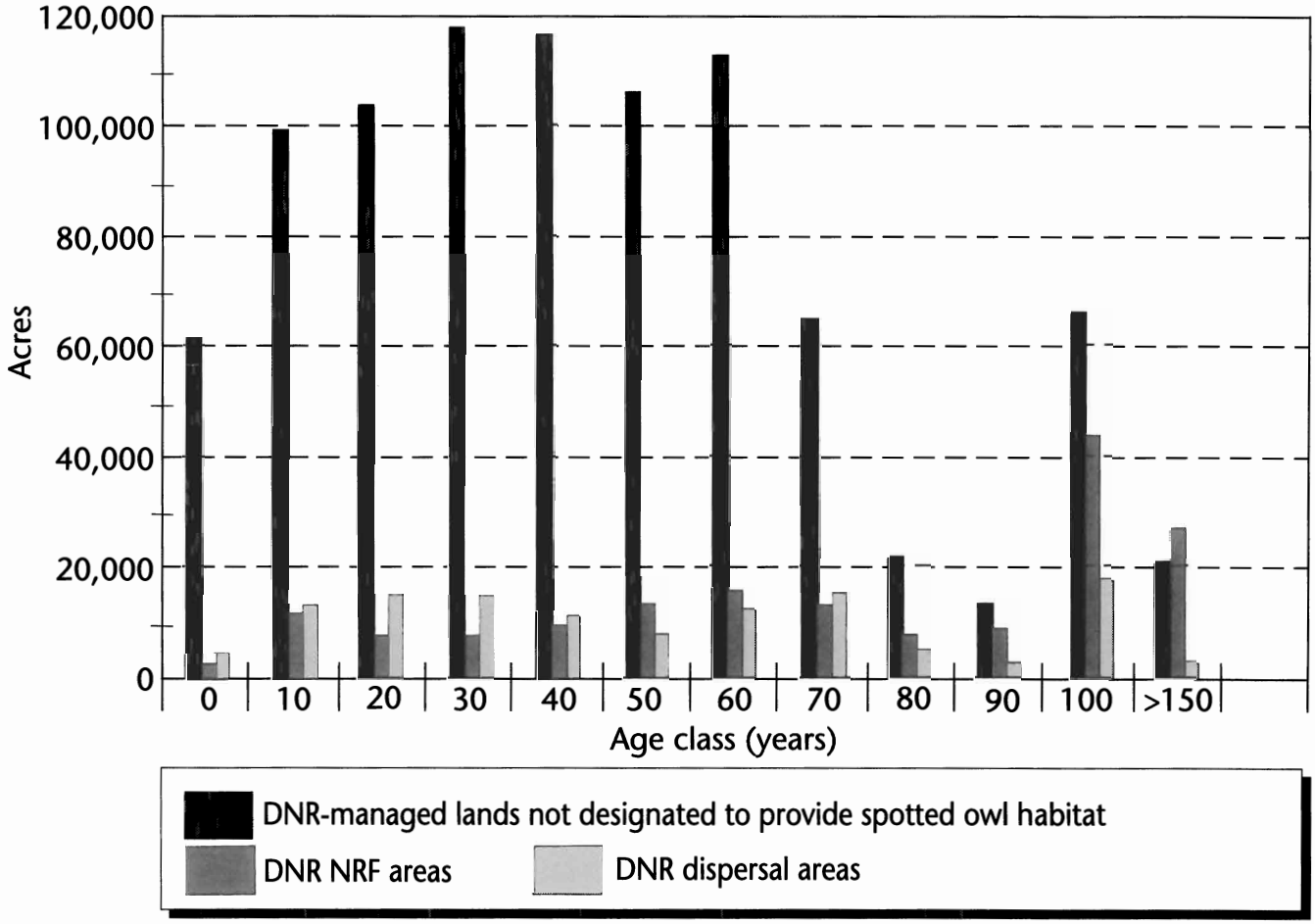
NRF = nesting, roosting, and foraging habitat

Figure IV.1: Age-class distribution in the five west-side planning units in 1996



NRF = nesting, roosting, and foraging

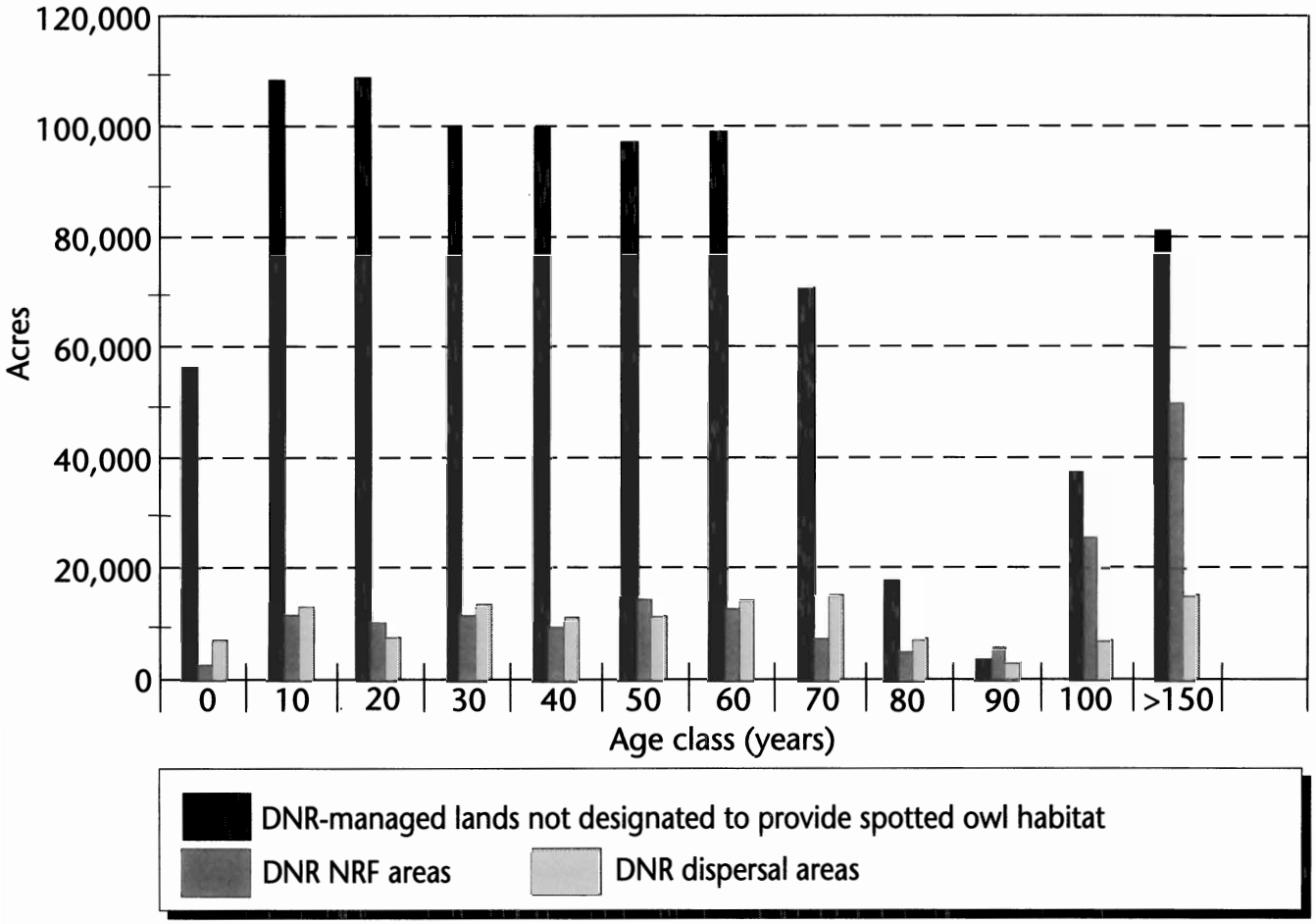
Figure IV.2: Projected age-class distribution in the five west-side planning units in 2046



Note: This represents the outcome from one possible set of harvest scenarios modeled by DNR. The other HCP conservation strategies were included in the modeling.

NRF = nesting, roosting, and foraging habitat

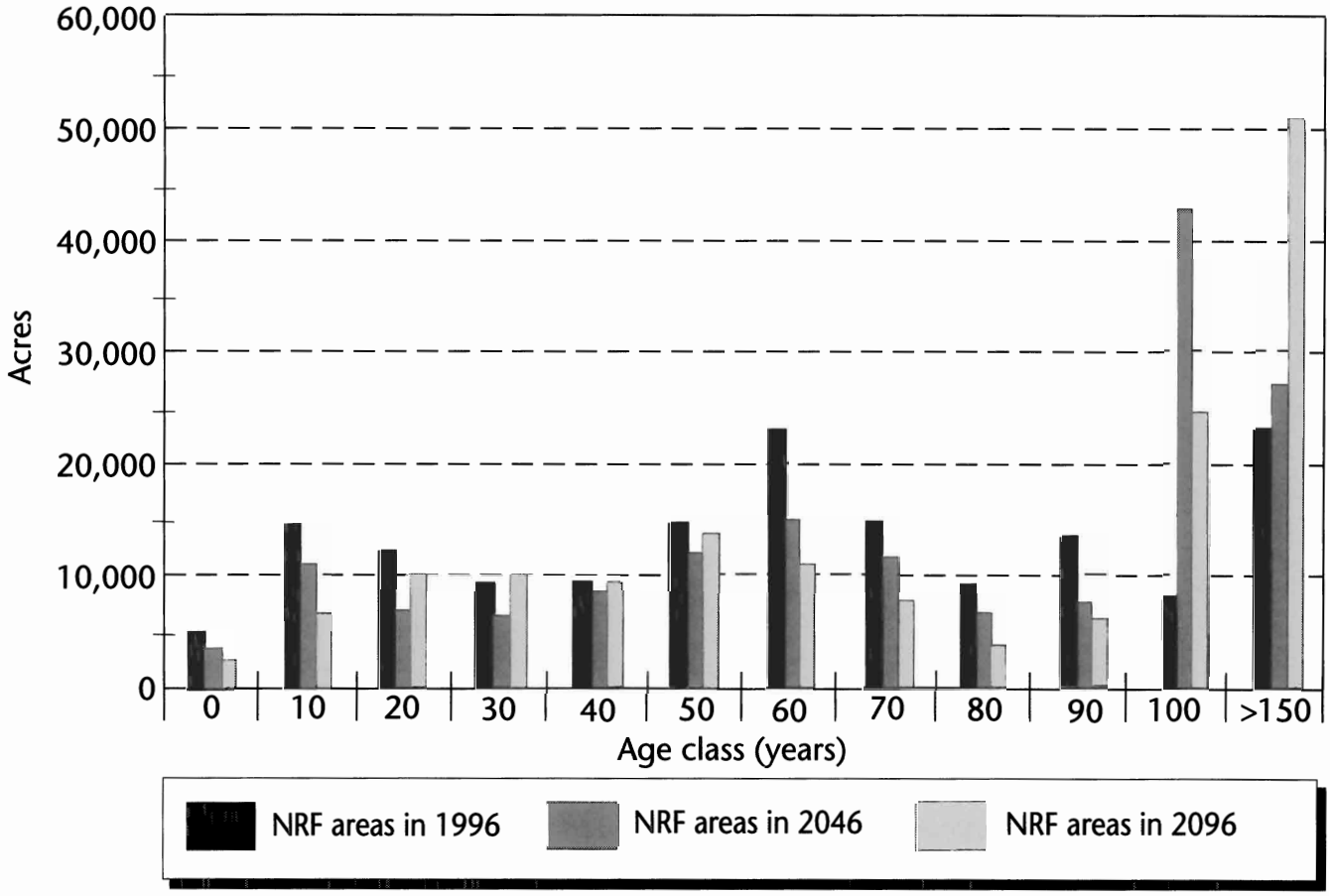
Figure IV.3: Projected age-class distribution in the five west-side planning units in 2096



Note: This represents the outcome from one possible set of harvest scenarios modeled by DNR. The other HCP conservation strategies were included in the modeling.

NRF = nesting, roosting, and foraging habitat

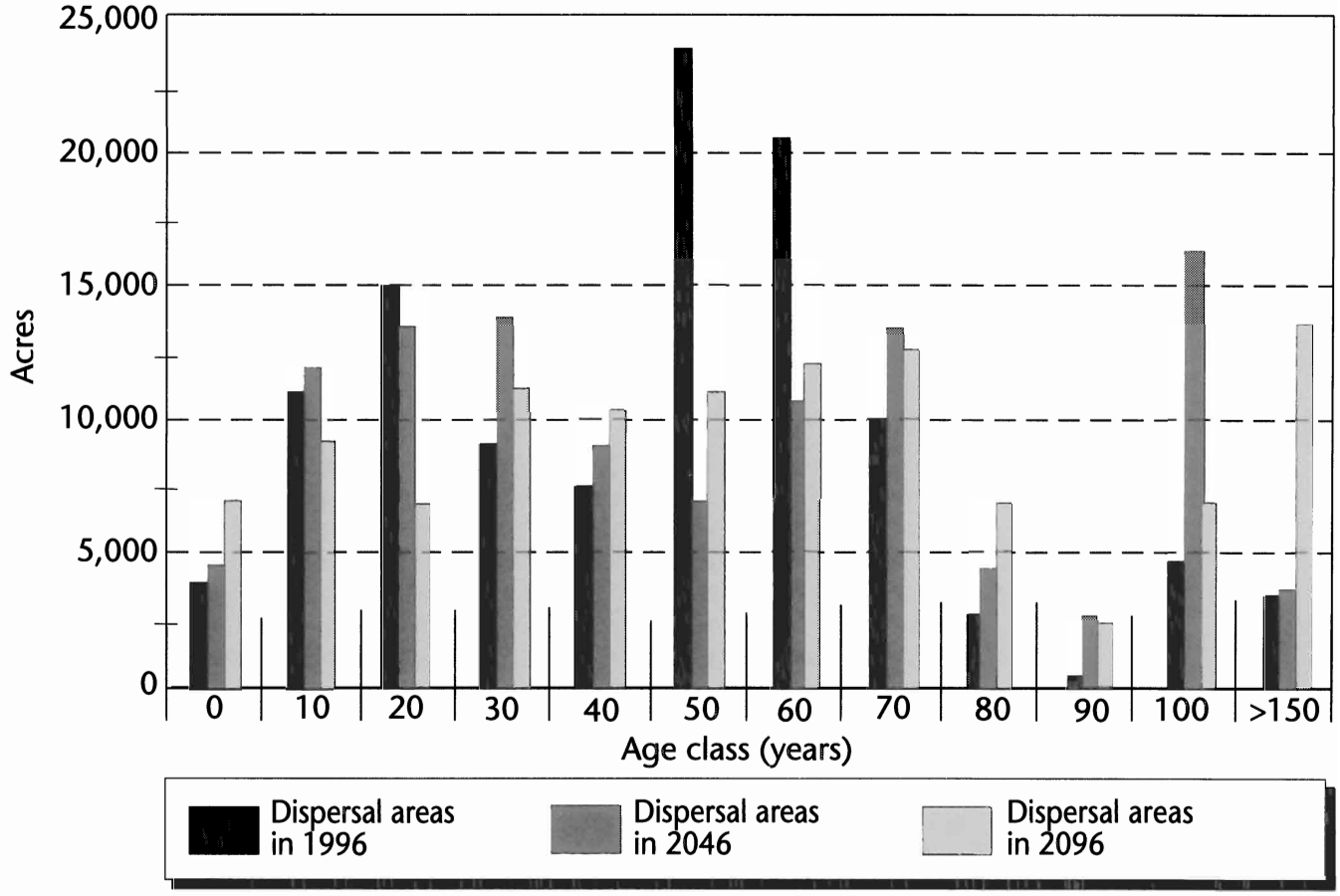
Figure IV.4: Projected age-class distribution in DNR NRF areas in the five west-side planning units from 1996 to 2096



Note: This represents the outcome from one possible set of harvest scenarios modeled by DNR. The other HCP conservation strategies were included in the modeling.

NRF = nesting, roosting, and foraging habitat

Figure IV.5: Projected age-class distribution in DNR dispersal areas in the five west-side planning units from 1996 to 2096



Note: This represents the outcome from one possible set of harvest scenarios modeled by DNR. The other HCP conservation strategies were included in the modeling.

Potential Benefits and Impacts to Spotted Owls

BENEFITS

The primary benefits of the HCP for spotted owls are:

(1) provision of NRF habitat in areas that make a significant contribution to the demographic support of the spotted owl population by supporting the federal reserve system established under the President's Forest Plan;

(2) provision of NRF habitat in areas that make a contribution to maintaining species distribution by maintaining habitat in a broader elevational and geographic range than would be provided by federal reserves alone; and

(3) provision of dispersal habitat in areas that are important for movement of dispersing juveniles between population clusters.

DNR currently manages its lands following the rescinded U.S. Fish Wildlife Service spotted owl take guidelines. Under this approach, DNR and other nonfederal landowners generally harvest suitable spotted owl habitat within regulatory spotted owl circles as long as the overall habitat level remains at or above 40 percent of the area of the circle. The result of this approach is that the amount of habitat available at individual spotted owl sites tends to move toward the 40 percent level with no incentive to develop new habitat in circles that are at or below the 40 percent level. Habitat that is lost due to attrition, natural disturbance or human-caused processes (e.g., loss of habitat functionality from increased fragmentation and edge effects) will not likely be replaced. Furthermore, harvest can occur in suitable, but unoccupied habitat, thus any opportunity for future occupancy by dispersing juvenile spotted owls is lost. Finally, there is no long-term planning at a landscape level that assesses where habitat is needed to support the population. The trend for nonfederal landscapes then is decreasing amounts of habitat and increasing fragmentation of remaining habitat.

This HCP moves away from the above circle-by-circle approach to a landscape-based plan that will provide at least 101,000 acres of NRF habitat in support of large and medium clusters of spotted owls that are located mainly on federal lands. The HCP provides habitat based on landscape condition that takes into account the amount of habitat both in DNR-designated NRF areas and adjacent or nearby federal reserves within any WAU in which DNR-designated NRF areas exist. At least 50 percent of the DNR-managed lands within a NRF area will provide habitat at a spatial scale that also allows spotted owls to use habitat on adjacent or nearby federal lands. In WAUs in which DNR NRF areas currently contain more than 50 percent habitat and federal reserves have less than 50 percent, DNR NRF lands will be maintained at current habitat levels to compensate for the inadequate habitat conditions on federal reserve lands.

In addition to providing demographic support within a median home-range radius of federal reserves, DNR NRF areas in the Siouxon and Columbia Gorge blocks in the Columbia Planning Unit provide large contiguous blocks of habitat that by themselves support medium-size clusters of spotted owl sites. The Siouxon block is important for providing low-elevation habitat in the western Cascades and for providing a potential link between the Oregon and Washington populations across the Columbia River (USDI 1992 p. 120). DNR-designated NRF lands in the Columbia Gorge area also provide an important link between Washington and Oregon spotted owl populations.

Both areas are thus important to maintaining species distribution by providing habitat at broader elevational ranges than on federal reserves alone and by providing habitat in areas where spotted owl clusters are needed to maintain population connectivity.

The third benefit to the spotted owl population from the DNR's HCP is the provision of 100,000 acres of dispersal habitat at any one time in areas where dispersal landscapes are needed for movement of juveniles among federal reserves. DNR management without an HCP makes no explicit provision for dispersal habitat. Landscape patterns that result from timber harvest can thus leave wide gaps between forest stands that provide adequate cover and structure to support dispersing spotted owls.

IMPACTS

There are currently 283 spotted owl site centers in the area covered by the HCP whose regulatory circles include some DNR-managed lands. This does not include the Olympic Experimental State Forest Planning Unit, which is discussed separately in a later section in this chapter. Of these spotted owl site centers, 226 are confirmed territorial pair or single sites[5]. Fifty-one of these territorial sites are located on DNR-managed lands. There are approximately 298,000 acres of DNR-managed lands within the 226 territorial spotted owl circles, 122,000 acres (40.1 percent) of which are estimated to be suitable habitat. Figure IV.6 shows the amounts of habitat on DNR-managed lands that contribute to spotted owl sites in the area covered by the HCP.

Under the provisions of the HCP, DNR will no longer manage forests specifically for spotted owl habitat in 112 of the 226 territorial spotted owl circles which include DNR-managed lands. These 112 site centers are outside DNR NRF areas. DNR-managed lands contribute habitat that amounts to 1 percent or less of the area of the regulatory spotted owl circle at 24 of these sites. Seventeen of the 112 circles have more than 40 percent of their area in habitat on federal reserves. (For a more specific discussion of impacts to these site centers, see the Draft Environmental Impact Statement that accompanies this HCP.)

Of the total 226 known territorial spotted owl circles that include DNR-managed lands, designated NRF areas will continue to contribute habitat to 114 of them. Currently, DNR-managed lands within NRF areas are contributing 66,400 acres of habitat to territorial spotted owl circles. Under the HCP, DNR-designated NRF areas will have a minimum of 101,000 acres of spotted owl NRF habitat at any one time. There are 54 WAUs in which DNR will be developing a total of 14,100 acres of habitat in designated NRF areas where there is now less than 50 percent NRF habitat. As habitat conditions improve over time on both federal reserve lands and in DNR NRF areas, DNR expects these NRF areas to contribute habitat to new spotted owl territories.

Under the provisions of the HCP, DNR will incidentally provide older forests that may meet some of the habitat needs for spotted owls outside of NRF areas. This older habitat will occur in riparian management areas, in potential marbled murrelet habitat that is deferred from harvest during the interim marbled murrelet strategy, and in forest stands that are protected from harvest because they are occupied by marbled murrelets.

[5]Territorial pair or single sites are designated status 1 (pair or reproductive), status 2 (presence of two adult territorial spotted owls, pair status unconfirmed), or status 3 (territorial single) sites using the terminology employed by the Washington Department of Fish and Wildlife in its spotted owl database. Status 4 sites are those at which a spotted owl has been detected, but occupancy of that site is unconfirmed.

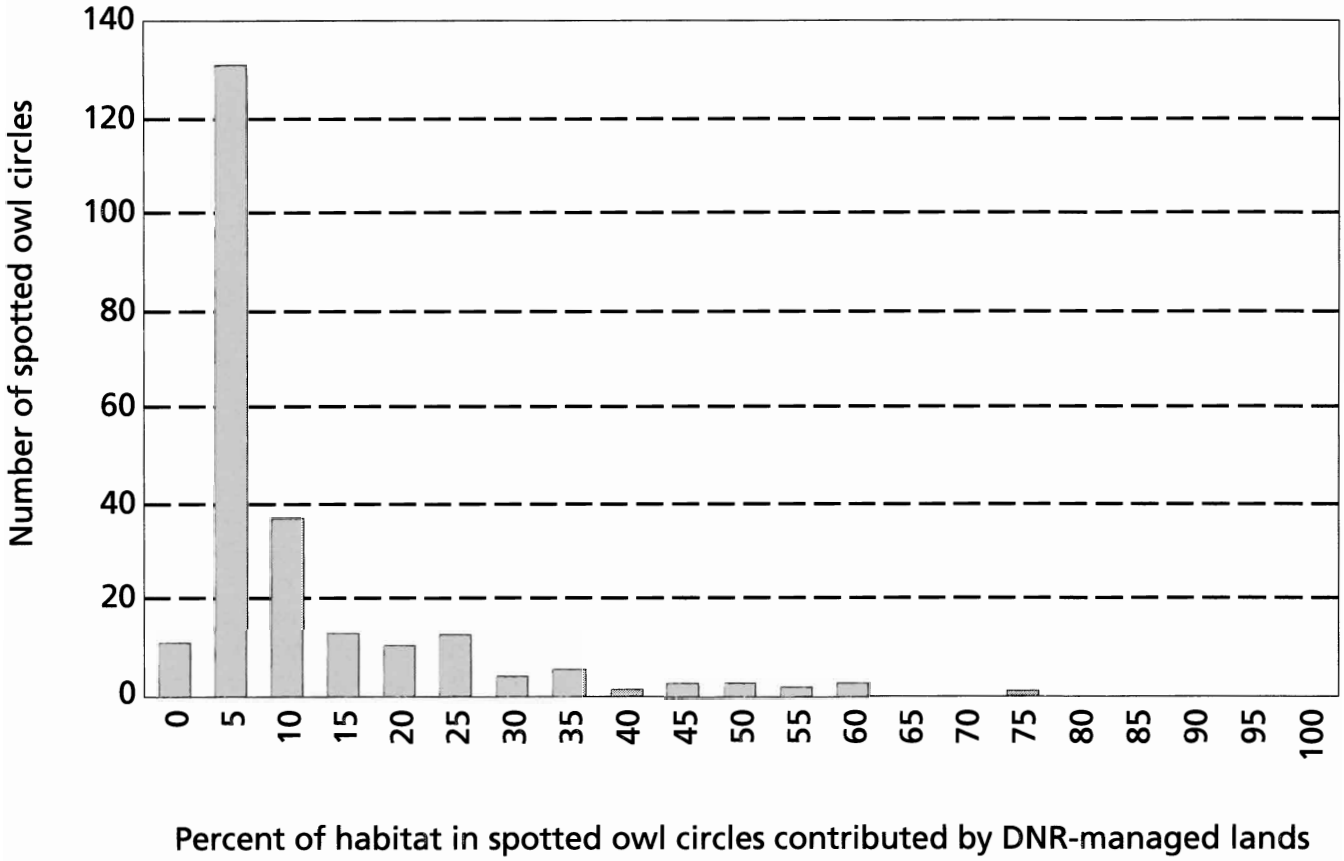



Figure IV.6: Contribution of habitat from DNR-managed lands to known spotted owl circles in the five west-side and all east-side planning units