

Northern Spotted Owl

In 1997, DNR developed a habitat conservation plan authorized under section 10 of the federal Endangered Species Act (ESA)¹, to assure long-term sustainable revenue-production for the trusts, and long-term health of resources and ecosystems.

DNR's 1997 *Habitat Conservation Plan* (HCP) describes mitigation strategies for two federally listed species, the northern spotted owl (*Strix occidentalis caurina*) and the marbled murrelet (*Brachyramphus marmoratus*). Since 1997, DNR has conducted additional analyses that are contained in the following documents: the *Sustainable Harvest Draft EIS* (DNR 2003), *Sustainable Harvest Final EIS* (DNR 2004), and the associated Addendum (DNR 2007).

Description

The northern spotted owl is a medium-sized owl with dark brown plumage, a barred tail, white spots on the head and breast, and dark brown eyes surrounded by prominent facial disks (Johnsgard 1988; DNR 1997a). DNR is incorporating by reference the 1997 *Habitat Conservation Plan* (p. III.1 to III.22) for a more complete description of northern spotted owl biology.

GEOGRAPHIC RANGE

The northern spotted owl's geographic range extends from southwest British Columbia through the Cascade Mountains and coastal ranges in Washington, Oregon, and northern California. The distribution of the Olympic Peninsula sub-population includes low- and mid-elevation forests up to about 3,000 feet above sea level.

GENERAL HABITAT

Northern spotted owls generally rely on older, structurally complex forests that provide for their nesting, roosting, and foraging behavior (Courtney and others 2004). Forest stand features supporting roosting and foraging include closed, layered canopies, and large accumulations of snags and down woody debris. Large and deformed trees provide nesting opportunities. Movement (dispersal) is aided by a closed forest canopy, which provides protection from predators and adequate space under the forest canopy for the owls to fly through.

BREEDING

Northern spotted owls are non-migratory and highly territorial. The "home range" of a northern spotted owl is the geographic area to which it normally confines its activity. The size of the northern spotted owl home range varies by region and generally increases in size from south to north. Forsman and others (2007) reported the median size of annual home ranges of owl pairs on the Olympic Peninsula to be 12,434 acres. Northern spotted owls usually form pairs for life and remain in the same general territory defending the area against intruders. Northern spotted owls expand their territories in fall and winter when prey becomes more difficult to find. They do not construct their nests; instead they rely on suitable nesting platforms such as tree cavities and mistletoe brooms. Cavity nests are predominate on the Olympic Peninsula (Forsman and Giese 1977; Hershey 1998). The species has a long life span, relatively high adult survivorship rate, and low fecundity² resulting from delayed onset of breeding, small clutch³ sizes and variability in nesting effort and success (Gutiérrez 1996). Juveniles begin dispersing from their parents'

¹ 16 U.S.C. § 1531 et seq.

² The number of female young fledged per territorial female.

³ The number of eggs or owlets produced at one time.

territory in September to October with an average dispersal distance of about 16 miles for females and 10 miles for males before finding their own territories about two years after dispersing (Forsman and others 2002). Survival rates are lower for juvenile owls (Anthony and others 2006). The major predator of northern spotted owls is the great horned owl (*Bubo virginianus*).

DIET

Spotted owls' diet varies considerably across their geographic range by forest type. Northern flying squirrels (*Glaucomys sabrinus*) comprise a large percentage of the diet in Douglas-fir and western hemlock forests in the north (Carey and others 1992; Courtney and others 2004, p. 4-7) and are the primary prey for spotted owls on the Olympic Peninsula (Forsman and others 1991; Carey 1993). Flying squirrel abundance on the Olympic Peninsula is low (Carey and others 1992) and as a result, the spotted owl home ranges on the peninsula are some of the largest that have been reported (Holthausen and others 1995). Flying squirrels rely on truffles and other fungal fruiting bodies associated with late-successional western hemlock and Douglas-fir forests in the Pacific Northwest (Carey and others 1992).

What Is the Status of Northern Spotted Owls?

The northern spotted owl was listed as threatened under the *Endangered Species Act* in 1990. This listing was due to widespread loss and adverse modification of suitable habitat across its geographic range and the inadequacy of existing regulatory mechanisms to conserve the owl.

In 2004, the U.S. Fish and Wildlife Service conducted a five-year review of the status of the northern spotted owl and concluded that the species should remain listed as threatened under

the *Endangered Species Act*. The review identified the continuing major threats as loss of habitat from past management activities, disturbances such as fire, and ongoing habitat loss as a result of timber harvest activities on non-federal lands. Additionally, competition with barred owls (*Strix varia*) was identified as another major threat (Courtney and others 2004; Gutiérrez and others 2006; Olson and others 2004).

Northern spotted owl population performance has been monitored across its geographic range since the late 1980s. The long-term demographic⁴ data suggest that populations decreased by about 3.7 percent per year, range-wide from 1985 to 2003 (Anthony and others 2006). Spotted owl populations in Washington are declining at a faster rate than those in both Oregon and California. Anthony and others (2006) found that from 1983 to 2003 the northern spotted owl population in Washington State had declined by seven percent per year and the Olympic Peninsula sub-population declined by 4.4 percent per year.

FEDERAL RECOVERY PLAN

The *Federal Recovery Plan*⁵ for the northern spotted owl was finalized and adopted in 2008. Federal recovery plans are not regulatory documents and do not impose any restrictions on DNR-managed lands. *The Northern Spotted Owl Final Recovery Plan* (USFWS 2008) relies on federal lands to provide a network of habitat blocks, or Managed Owl Conservation Areas. Non-federal lands are expected to provide demographic support to core owl populations or

⁴ Demography encompasses the study of the size, structure, and distribution of populations as well as spatial and/or temporal changes in them in response to birth, migration, aging, and death.

⁵ The U.S. Fish and Wildlife Service released a Recovery Plan for the owl in May 2008. The Plan was challenged in November 2008 and that litigation has not been resolved. The Plan will likely be revised after the litigation is complete.

to ensure connectivity with federal lands. In western Washington, the federal recovery plan identifies several areas outside federal lands, called Conservation Support Areas (CSAs). Conservation Support Areas “are expected to increase the likelihood that spotted owl recovery is achieved, shorten the time needed to achieve recovery, and/or reduce management risks associated with the Recovery Strategy and Actions” (USFWS 2008). The HCP conservation strategy for northern spotted owl, including the management of species habitat in the OESF, is consistent with the 2008 recovery plan recommendations and the alternatives presented in this analysis do not change those recommendations.

SPOTTED OWL STATUS ON THE OLYMPIC PENINSULA

Northern spotted owls on the Olympic Peninsula are considered a distinct sub-population, geographically isolated by a lack of suitable habitat connecting it to other sub-populations (DNR 1997a). Isolated populations are vulnerable to genetic, environmental, and demographic fluctuations (USFWS 1992). Holthausen and others (1995) found that the Olympic sub-population of northern spotted owls was robust to local extirpation except in

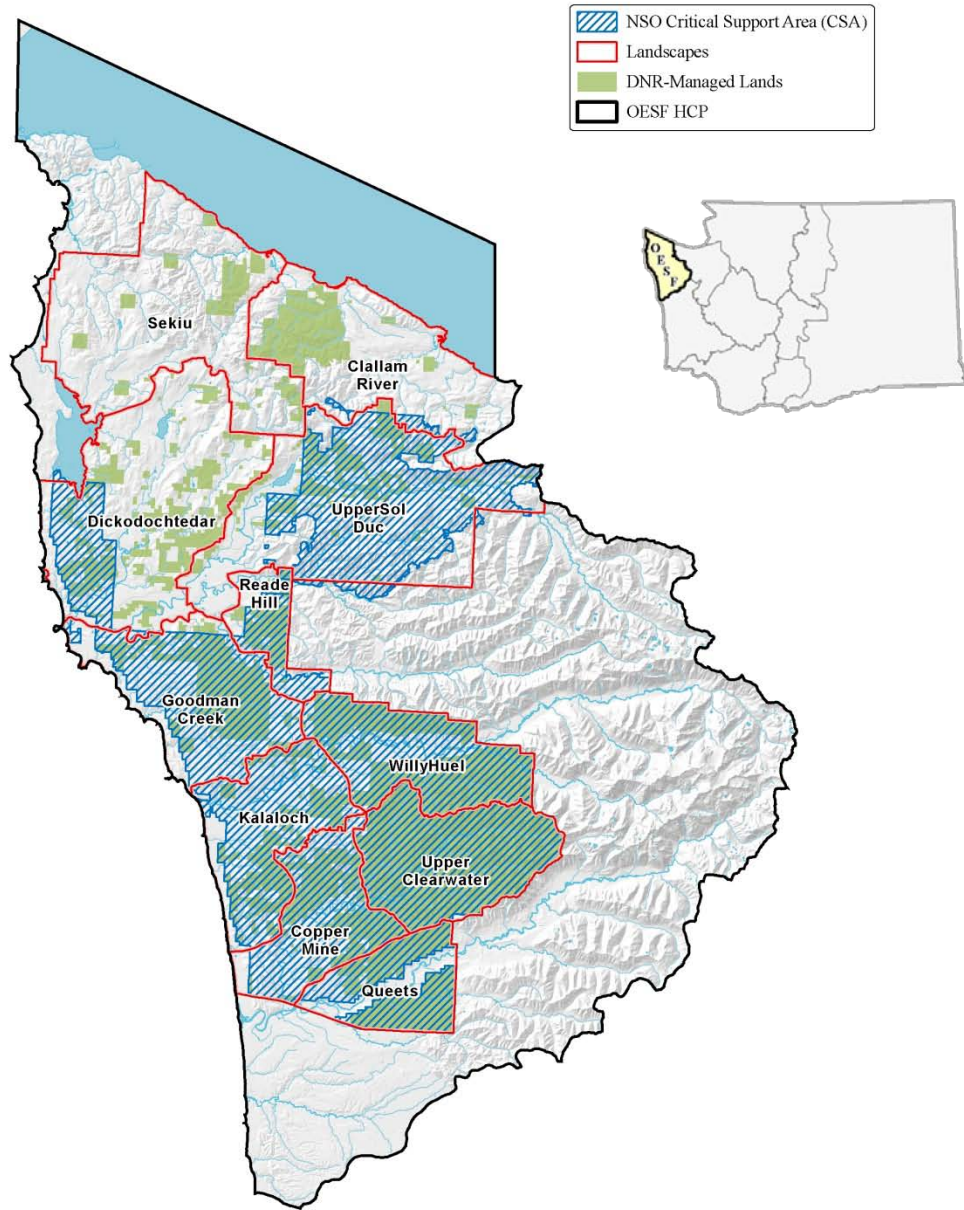
circumstances where owl numbers declined without associated habitat loss. This is currently happening on the Olympic Peninsula (Lind 2005), likely due to the harmful effect of barred owls (USFWS 2008).

The federal recovery plan delineates four Managed Owl Conservation Areas on the Olympic Peninsula, each entirely on federal lands (Map 3-13). In addition to Managed Owl Conservation Areas, the *Federal Recovery Plan* delineates Conservation Support Areas on the Olympic Peninsula where habitat contributions by private, state, and federal lands are expected to increase the likelihood for spotted owl recovery by providing demographic support to the core populations and/or facilitate dispersal of juveniles. Both Conservation Support Areas in the OESF include DNR-managed lands (Map 3-14). The Federal Recovery Plan also recognizes habitat conservation plans as important tools to assist the recovery of the species (USFWS 2008). The spotted owl conservation strategy for the OESF, as described in the 1997 *Habitat Conservation Plan*, is compatible with the habitat management actions in the Conservation Support Areas recommended by the 2008 Federal Recovery Plan, which is not modified by either alternative.

Map 3-13. Managed Owl Conservation Areas (MOCAs) in the OESF



Map 3-14. Spotted Owl Conservation Support Areas (CSAs) in the OESF



MONITORING

Measurements of the Olympic Peninsula northern spotted owl sub-population were conducted in the Olympic Peninsula Demographic Study Area, which includes 52 spotted owl territories in the Olympic National Park and 45 territories in the Olympic National Forest. This study provides a good estimate, applicable to the area of best habitat on the peninsula, of a 4.4 percent annual population decline which predicts an overall decline of nearly 40 percent from 1992 to 2002, due mainly to a decrease in adult survival (Anthony and others 2006). This is consistent with findings from recent monitoring, in which no northern spotted owls were detected in 75 percent of territories on the Olympic National Forest and vicinity in 2006 (Forsman and others 2007) and 63 percent of Olympic National Park territories in 2007 (Gremel 2008).

DNR monitored northern spotted owl occupancy and demography in the OESF from 1995 to 2001, mostly on forested state trust lands, but also including the Olympic National Park coastal strip and Queets River corridor. Owl monitoring efforts in the OESF decreased in 2001 due to low levels of owl activity and budget reductions (Horton pers. comm. 2010). DNR's last year of monitoring found one site occupied by a single female owl that had dispersed from another long-occupied territory.

THREATS TO NORTHERN SPOTTED OWLS ON THE OLYMPIC PENINSULA

Anthony and others (2006) found that from 1983 to 2003 the northern spotted owl population in Washington State had declined by seven percent per year and the Olympic Peninsula sub-population declined by 4.4 percent per year. The 2008 *Federal Recovery Plan* cites competition with barred owls and ongoing loss of suitable habitat as a result of timber harvest and catastrophic fire as the most important range-

wide threats to the northern spotted owl (USFWS 2008).

Barred owls, which are dominant in competitive interactions with spotted owls, are recognized in the 2008 *Federal Recovery Plan* as an "extremely pressing and complex" threat, requiring specific and immediate actions. To better understand the impact of barred owls on spotted owls and to start addressing this threat, the *Federal Recovery Plan* calls for barred owl control experiments in key spotted owl areas. The *Federal Recovery Plan* also theorizes that additional spotted owl habitat will alleviate the pressure from barred owl competition.

Barred owls were first detected in the Olympic Peninsula in 1985 and the number of sightings has steadily increased. Barred owls (detected incidentally by spotted owl surveys) were detected in 58 percent of monitored spotted owl sites (N=52) in the Olympic National Park in 2008. Eighty-seven percent of spotted owl sites had barred owl detections for the entire monitoring period 1992 to 2008 (Gremel 2008). Field data suggest that spotted owls are excluded from areas occupied by barred owls rather than remaining undetected. Gremel (2008) also observed that spotted owl territories which have remained occupied following barred owl presence moved further and increased in elevation relative to sites where barred owls were absent. Anthony and others (2006) found evidence suggesting that barred owls negatively affect northern spotted owl survival on the Olympic Peninsula.

A considerable amount of spotted owl habitat was lost on the Olympic Peninsula in the 1970s and 1980s as a result of timber harvest activities on private, state, and federal lands. The majority of native forests in the northern part of the OESF were harvested in the 1920s and 1930s and very little old-growth forest remains there. State trust

lands in the central and southern part of the OESF were harvested from the late 1960s to the late 1980s. Forests in those landscapes are currently a mix of young managed stands (15 to 40 year old), forest stands that regenerated from the 1921 windstorm, and existing old-growth (refer to *Forest Conditions*).

Since 1990, habitat losses were substantially reduced as a result of spotted owl conservation policies (DNR 1997a) and other state and federal regulations. For the period 1996 to 2004, Pierce and others (2005) estimated that 3.4 percent of the spotted owl habitat on private and state lands in the western Olympic Peninsula was harvested, the lowest of any area within Washington State. For a summary of harvest activities occurring in the OESF since 1999 refer to Appendix D.

The adoption of the *Northwest Forest Plan* in 1994 dramatically decreased timber harvesting activities in the Olympic National Forest. Currently, about 80 percent of federal forestland in the OESF is located within federal reserve allocations. About 66 percent is in late successional reserves, designed to serve as habitat for late-successional and old-growth related species and about 14 percent within congressionally reserved areas (wilderness areas). The management emphasis for these reserved areas is to maintain a functional, interactive, late-successional, and old-growth forest ecosystem (USDA and USDI 1994).

Windthrow, caused by strong winds, is a part of the natural disturbance regime of forests on the Olympic Peninsula. As young forest stands in the wind prone areas of the OESF mature, they develop structural elements that become increasingly prone to windthrow (DNR 1998). This may be especially true for the coastal plain areas of the OESF which are considered wind prone and likely to experience windthrow events (DNR 1998). Courtney and others (2003)

concluded that windthrow did not pose a significant risk to northern spotted owl habitat; however, portions of the OESF have experienced significant windthrow events with damage ranging from slight to almost complete removal of trees in some areas (Oliver and Larson 1996). Windthrow can be beneficial in some circumstances to help develop structural elements needed for northern spotted owl habitat, such as snags and broken top trees (Franklin and others 2002). For a discussion of modeled predictions of endemic windthrow within riparian areas, refer to the *Riparian* section. At most, approximately three percent of the riparian area is projected to experience windthrow each decade, a level similar to that of the Upland areas.

What Are DNR's Management Strategies for the Northern Spotted Owl?

DNR's 1997 *Habitat Conservation Plan* committed to managing certain forested state trust lands in order to "provide habitat that makes a significant contribution to demographic support, maintenance of species distribution, and facilitation of dispersal" (DNR 1997a).

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 and others 1993). *Maintenance of species distribution* refers to supporting the continued presence of the northern spotted owl populations in as much of its historic range as possible (Thomas and others 1990; USFWS 1992). *Dispersal* refers to the movement of juvenile, sub-adult, and adult animals (northern spotted owls) from one sub-population to another. For juvenile northern spotted owls, dispersal is the process of leaving the natal (birth) territory to establish a new

territory (Forsman and others 2002; Miller and others 1997; Thomas and others 1990).

OESF NORTHERN SPOTTED OWL CONSERVATION STRATEGY

The northern spotted owl strategy for the OESF is unique among other HCP Planning Units in its goal to combine commodity production with spotted owl conservation. This is achieved through an un-zoned management approach, experimenting with innovative silviculture and systematic application of acquired knowledge to adjust management actions (refer to Chapter 1). The conservation objective is to “develop and implement land-management plans that do not appreciably reduce chances of the survival and

recovery of the northern spotted owl sub-population on the Olympic Peninsula” (DNR 1997a). The conservation of spotted owls in the OESF will be achieved by restoring the habitat capability of the area. The desired quality, quantity, and distribution of spotted owl habitat is proposed as a working hypothesis, open to change as new knowledge on the species’ habitat requirements is acquired. Management of the desired owl habitat conditions will be planned and implemented at the landscape⁶ scale. Two phases are identified in the strategy implementation – a basic level habitat restoration followed by habitat maintenance and enhancement.

Table 3-68. Definitions of Northern Spotted Owl Habitat Types

Stand Parameters\ Habitat Types	Old Forest Habitat		Young Forest Habitat	
	Type A (HCP IV.11)	Type B (HCP IV.11)	Sub-mature (HCP IV.12)	Young Forest Marginal (Procedure 14-004-120, modified from WAC 222-16-085)
Species Composition	Multi-species canopy	Multi-species canopy	At least 30% conifers	At least 30% conifers
Canopy Closure	Greater than 70%	Greater than 70%	At least 70%	At least 70%
Canopy Layers	At least 2 of at least 2 species	At least 2 of at least 2 species	-	-
Tree Density	Canopy dominated by 15-75 trees ≥30" DBH	Canopy dominated by 75-100 trees ≥20" DBH	115-280 trees per acre	115-280 trees per acre
Tree Height	-	-	Dominant and co-dominant ≥ 85 ft	Dominant and co-dominant ≥ 85 ft
Large Tree Deformities	High incidence of broken tops, large cavities, dwarf mistletoe	Some with various deformities	-	-
Snags	At least 2/ac ≥30" DBH	At least 1/ac ≥20" DBH	At least 3/ac ≥20" DBH	At least 2/ac ≥20" DBH
Large Down Woody Debris	Large accumulation of fallen trees	Accumulation of fallen trees	5% ground cover	<div style="border: 1px solid black; display: inline-block; padding: 2px;">OR</div> 10% ground cover with 20-65% shrub cover
Shrub Cover	-	-	-	

⁶ Landscape refers to the 11 landscape planning units within the OESF.

According to this approach, each landscape is managed to maintain and restore:

1. At least 40 percent of DNR-managed lands in the landscape in Young Forest Habitat (Young Forest Marginal and Sub-mature) conditions (refer to Table 3-68) and of that 40 percent;
2. At least 20 percent of DNR-managed lands in the landscape in Old-Forest Habitat conditions (refer to Table 3-68 and *Forest Conditions* for a definition of Old Forest).

The habitat levels determined in the 1997 *Habitat Conservation Plan* were based on studies demonstrating that 30 to 50 percent habitat at spatial scales from northern spotted owl ranges to each landscape within the OESF can support reproductive pairs (Forsman and Meslow 1985; Lehmkuhl and Raphael 1993; Carey and others 1992; Holthausen and others 1994). The proposed thresholds of northern spotted owl habitat are at the low end of the range of observed values in order to allow greater flexibility to achieve integration of ecological values and timber production (DNR 1997a).

What Are the Criteria for Evaluating Impacts to Northern Spotted Owls?

The U.S. Congress passed the *Endangered Species Act* (ESA) in 1973 recognizing that our rich natural heritage is of “esthetic, ecological, educational, recreational and scientific value to our nation and its people” (ESA 1973). The purpose of the *Endangered Species Act* is to protect and recover threatened and endangered species and their habitats. The Act’s ultimate goal is the recovery of the specific species in question. DNR’s conservation objective for the northern spotted owl supports this recovery effort by providing habitat that makes a significant contribution to demographic support,

maintenance of species distribution, and facilitation of dispersal (DNR 1997a). The OESF’s role in species conservation is viewed in the context of providing recovery support to the core Olympic Peninsula northern spotted owl sub-population on adjacent federal lands. Evaluation of impacts is measured by habitat-based indicators rather than direct population criteria.

What Are the Indicators for Evaluating Northern Spotted Owl Habitat?

As outlined in the 1997 *Habitat Conservation Plan*, the conservation objective for northern spotted owls in the OESF is to restore habitat capability. The habitat capability can be measured by the development and maintenance of functional habitat and by the restoration and maintenance of landscapes that could support successfully reproducing owls. Indicators of functional habitat are the amount of HCP-defined habitat and the amount of area supporting the northern spotted owl life history requirements of movement, nesting, roosting, and foraging. The amount of Young Forest Habitat and Old Forest Habitat per landscape and the viability of individual spotted owl territories are used as indicators of successful owl reproduction at the landscape level. As an additional indicator, short-term effects to Status 1 Owl Circles are included (refer to discussion below for a definition of Status 1 Owl Circles). Some of the modeling for indicators proposed for this analysis has not yet been completed (such as measurements for the life history requirements and viability of spotted owl territories); however, methodologies for these models are presented in Appendix H.

NORTHERN SPOTTED OWL STAND LEVEL HABITAT DEFINITIONS

DNR uses a range of northern spotted owl habitat definitions to track habitat conditions in the OESF. Recent studies on spotted owl habitat relationships corroborate earlier understanding of species habitat requirements used in the 1997 *Habitat Conservation Plan* definitions (Courtney and others 2004). Indicators used in this evaluation are based on the 1997 HCP and the northern spotted owl procedure⁷ (*Northern Spotted Owl Management Westside*, Appendix E), which include definitions for Type A, Type B, Sub-mature, and Young Forest Marginal habitat (Table 3-68; DNR 1997a). These habitat definitions were built into model outputs representing the growth and yield of forest stands under different silvicultural treatments. The future projections of habitat were simulated using DNR's forest estate model (Appendix C). The habitat definitions are reported in this analysis as aggregations of Young Forest Habitat (Young Forest Marginal, Sub-mature) and Old Forest (Type A, Type B, and additional forests identified through aerial photo-interpretation).

HCP HABITAT THRESHOLD REQUIREMENTS PER LANDSCAPE

The minimum thresholds are to maintain and restore at least 40 percent of the landscape in Young Forest or Old Forest Habitat conditions (Table 3-68), at least half of which (20 percent) is in Old-Forest Habitat (Table 3-68). As discussed earlier in the section titled *OESF Northern Spotted Owl Conservation Strategy*, the minimum thresholds were based on the lower end of habitat requirements for northern spotted owls and then current (1997) U.S. Fish and Wildlife criteria for incidental take. The 1997 *Habitat Conservation Plan* used a 40

percent capable⁸ habitat threshold within northern spotted owl circles to determine risk of incidental take. At this level, the risk of incidental take was considered minimized due to the distribution of favorable habitat across the landscape as a whole. It was also assumed there would be a continued upward trend of habitat creation through the term of the 1997 HCP. The 40 percent capable habitat threshold used in the analysis for the 1997 HCP set this as a minimum threshold at the landscape scale.

ACRES HARVESTED IN EXISTING NORTHERN SPOTTED OWL CIRCLES

An additional way to assess impacts to habitat is to report the amount and type of management activities that take place in a northern spotted owls' home range. Owl Circles are a simplified representation of the owls' home range. Field studies determined that the median home range of northern spotted owls on the Olympic Peninsula could be represented by a 2.7 mile radius circle centered at a nest or detection point. These circles were classified by a status numbering system of 1 to 4 (USFWS 1991, 1992). The centers of 18 Status 1 (pair or reproductive) Circles are located on DNR-managed trust lands within the OESF (WDFW Spotted Owl Database, 2010). Because of current concerns for northern spotted owl declines in Washington State (USFWS 2004), management activities in the first decade, in Status 1 Owl Circles are reported in Table 3-72.

AREAS SUPPORTING NORTHERN SPOTTED OWL LIFE HISTORY REQUIREMENTS

The four life history requirements of territorial northern spotted owls are: movement, roosting, foraging, and nesting. Stand conditions

⁷ Procedure 14-004-12

⁸ **Capable habitat** is defined as an area that is capable of supporting a spotted owl pair.

providing for each of these life requirements are described below.

Movement—Forest stands that benefit movement ability must have sufficient canopy closure to protect northern spotted owls from predation. These stands must also have adequate flying space available, which is achieved by canopy lift (tree limbs off the ground) and tree densities low enough to not impede flight (Appendix H).

Roosting—Forest stands that benefit roosting ability must have adequate tree height for roosting opportunities, multiple tree and shrub layers for owls to move up and down in the canopy, a deep enough canopy to provide a thermal buffer (more insulation) against temperature extremes and adequate canopy cover for protection from predation (Appendix H).

Foraging—Forest stands that benefit foraging ability must have adequate prey abundance, which depends on the amount of snags and coarse woody debris. Multiple canopy layers make prey more available to owls by providing hunting perches and a more heterogeneous (varied) forests, which make catching prey easier (Appendix H).

Nesting—Forest stands that benefit nesting ability must have an adequate number of trees from larger diameter classes. Large standing trees either live or dead are used for nest trees, though large live trees are used about three times as often on the Olympic Peninsula (Forsman and Giese 1997) (Appendix H).

All four of these life history requirements allow flying space and protection from predators, via adequate forest species composition and canopy closure. The percent of the landscape achieving one or more of these life history requirements

over time can be used to assess the forests' ability to support northern spotted owls.

Habitat assessment models are currently being developed to evaluate the level of support for one or more of the life history requirements, based on similar models developed for the *South Puget HCP Planning Unit Forest Land Plan Final EIS* (DNR 2010a). These models are designed to focus on the four biological requirements essential to northern spotted owls: movement, roosting, foraging, and nesting.

The modeling work described in detail in Appendix H contains three parts: 1) development of the stand-level habitat evaluation model, 2) model indicator thresholds, 3) conceptual model configuration; however, methodologies for these models are presented in Appendix H.

NUMBER OF VIABLE NORTHERN SPOTTED OWL TERRITORIES

The feasibility of estimating northern spotted owl territories using a territory packing model developed in British Columbia, Canada (Sutherland and others 2007) is currently being investigated. The territory packing model is designed to identify areas where the amount and configuration of habitat could support a feasible northern spotted owl territory. It also calculates the map of territories for each decade based on a habitat site suitability classification and provides the least-cost movement map and potential nest site location map.

What Are the Current Habitat Conditions by Landscape for the Northern Spotted Owl?

FOREST CONDITIONS

The *Forest Conditions* section provides a description of the current conditions for each of the 11 landscapes within the OESF. Chart 3-18 provides current forest conditions for each landscape by forest stand development stage.

NORTHERN SPOTTED OWL CONDITIONS

This document uses two DNR datasets representing northern spotted owl habitat conditions in the OESF:

1. **Northern Spotted Owl Habitat Classifications**—DNR’s current forest

inventory data is used to aid in the implementation of the 1997 HCP Northern Spotted Owl Conservation Strategy by tracking northern spotted owl habitat conditions, which has been reported annually to the Federal Services.

2. **Forest Estate Model (Appendix C)**—Projections of northern spotted owl habitat conditions were based on modeled forest stand development.

A detailed description of each dataset, tables of the amount of spotted owl habitat per landscape, and graphs of the proportional distribution per landscape within the OESF are provided in Appendix H.

Table 3-69. Estimated Current Northern Spotted Habitat as a Percentage of Each Landscape*

Landscapes	Old Forest and Young-forest Habitat					
	DNR Forest Inventory Data Estimate			Forest Estate Model Estimate		
	Old Forest	Young-Forest Habitat	Total NSO Habitat	Old Forest	Young-Forest Habitat	Total NSO Habitat
Callam River	0%	10.5%	10.5%	1.7%	28.5%	30.2%
Copper Mine	14.1%	3.6%	17.7%	14.6%	5%	19.6%
Dickodochtedar	8.3%	12.9%	21.2%	8.6%	16.2%	24.8%
Goodman Creek	16.9%	7.2%	24.1%	17.0%	11.2%	28.2%
Kalaloch	12.2%	7.1%	19.3%	12.4%	9.6%	22.0%
Queets	21.8%	3.8%	25.6%	22.3%	5.7%	28.0%
Reade Hill	16.3%	17.5%	33.8%	17.4%	27.8%	45.2%
Sekiu	0.1%	3.4%	3.5%	0.4%	8.9%	9.3%
Upper Clearwater	25.7%	3.4%	29.1%	26%	4.4%	30.4%
Upper Sol Duc	1.0%	9.8%	10.8%	1.8%	23.9%	25.7%
Willy Huel	18.6%	6.0%	24.6%	19.7%	3%	22.7%

*Source: DNR 2009

DIFFERENCES IN METHODOLOGY

There are significant differences between the forest inventory and the forest estate model.

These differences result from:

1. The total area used for the calculation. For the inventory estimate, all DNR-managed lands were evaluated except for lakes and other non-forested areas. Additional lands were excluded from the forest estate model such as roads and hardwood stands. In total, the forest estate model estimate excludes approximately 15,000 acres more of DNR-managed forestlands.
2. “Unknown” habitat areas (areas lacking forest inventory) were treated differently under forest inventory and the forest estate model. The inventory estimate treats these areas as non-habitat, while the forest estate model assigns an estimate of forest conditions (refer to Appendix C).
3. The estimate of the large woody debris and snags. The inventory estimate used the sample year data for evaluating the threshold criteria in Table 3-68. The forest estate model projected down woody debris and snag levels to current conditions.

Differences between the inventory and forest estate model estimates are likely unavoidable; however, DNR plans to improve its forest modeling methodology in order to bring the forest estate model estimate closer to the inventory estimates. These updated acreage estimates can be found in Appendix C.

Comparison of Alternatives on Northern Spotted Owl Habitat

This section presents analyses of northern spotted owl habitat conditions created under each alternative. Three analysis methods were used:

1. Habitat amount using DNR northern spotted owl habitat definitions (Table 3-68).
2. Habitat abundance in OESF landscapes relative to the minimum habitat thresholds defined in the 1997 *Habitat Conservation Plan*.
3. Number of acres harvested in existing Status 1 Northern Spotted Owl Circles.

The indicators for areas supporting northern spotted owl life history requirements and northern spotted owl territories are not yet developed. Refer to Appendix H for a description of the methodology being used to develop these indicators.

What Amount of Habitat Meets the Northern Spotted Owl Habitat Definitions?

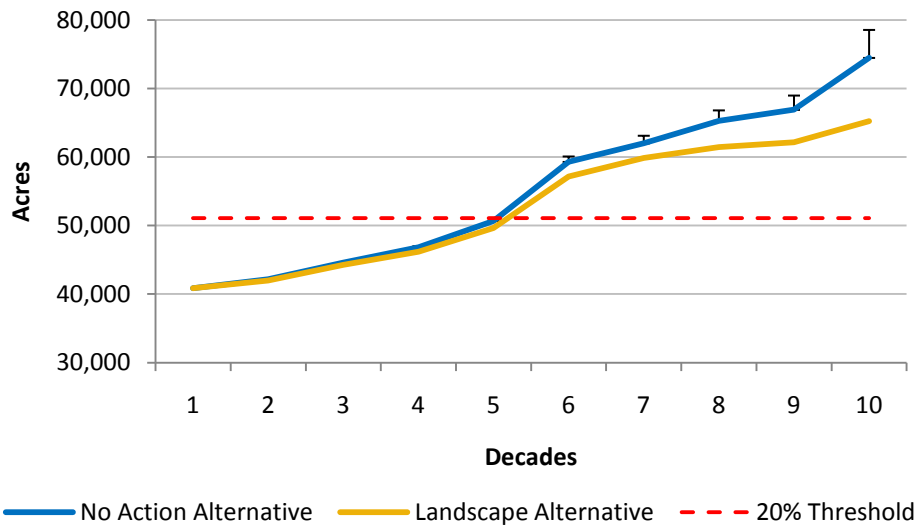
The first assessment method uses DNR’s 1997 *Habitat Conservation Plan* (HCP) habitat definitions as well as those developed as part of this planning process. Results are given for the HCP habitat threshold requirements by grouping habitat into two classes: Old Forest Habitat and Young Forest Habitat. The term “Young Forest Habitat and Better” is used to describe the combination of both Young Forest and Old Forest Habitat. Charts of acres of Old Forest and Young Forest Habitat and Better for the entire OESF by landscapes are presented in Appendix H.

1997 HCP HABITAT THRESHOLD REQUIREMENTS BY LANDSCAPE

Current forest conditions within each landscape are unique and influence the amount of northern spotted owl habitat deferred or created. These conditions, along with future management activities and natural disturbances, determine the amount and quality of northern spotted owl habitat over time. Charts 3-77 and 3-78 show the

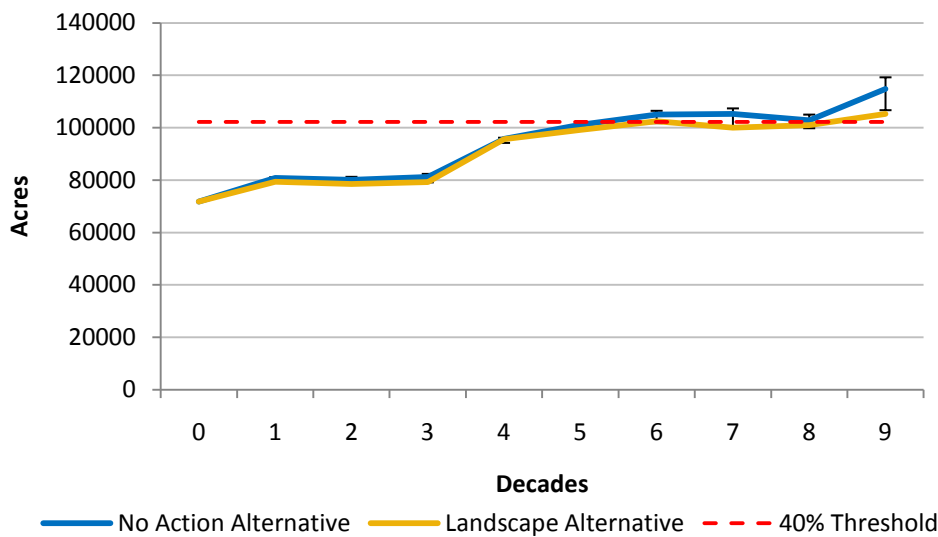
habitat trends for the entire OESF. The No Action Alternative is presented as a weighted mean with error bars showing the range within the data (refer to *How are the Alternatives Presented?*). Table 3-70 summarizes the time necessary to meet the minimum habitat thresholds, or if they are not met, the decade in which they are most closely achieved (shown in grey), for each landscape.

Chart 3-77. Acres of Old Forest Habitat by Alternative



Charts for Old Forest Habitat within each landscape are provided in Appendix H.

Chart 3-78. Acres of Young Forest Habitat and Better by Alternative



Charts for Young Forest Habitat and Better within each landscape are provided in Appendix H.

Table 3-70. Decades to Reach 20 Percent Old Forest Habitat and 40 Percent Young Forest Habitat and Better

Landscape	Decades to Reach 20 Percent Old Forest Habitat		Decades to Reach 40 Percent Young Forest Habitat and Better	
	No Action	Landscape	No Action	Landscape
Clearwater	0	0	5	4
Willy Huel	4	4	6	6
Dickodochtedar	5	5	5	9
Goodman	2	2	6	6
Queets	0	0	4	4
Coppermine	8	7	7	6
Sol Duc	8	9	7	5
Kalaloch	5	9	9	8
Clallam	9	7	4	4
Sekiu	6	7	6	7
Reade Hill	1	1	0	0
Entire OESF	5	5	6	6

* Landscapes presented in descending order by size.

** Shaded values represent the decade in which habitat thresholds are most closely achieved for those areas where the habitat threshold is not met during the planning period.

The number of landscapes that fail to achieve the minimum thresholds set by the 1997 HCP under each alternative is shown in Table 3-71.

Table 3-71. Number of Landscapes that Fail to Achieve Northern Spotted Owl Habitat Thresholds by Alternative

Alternative	20 Percent Old Forest Habitat Threshold	40 Percent Young Forest Habitat and Better Threshold
No Action	2	4
Landscape	4	6

Since the forest estate model for this document excluded some non-habitat acreage (as described under *Differences in Methodology*), the determination of compliance with minimum threshold levels (for example, 20 percent Old Forest Habitat and 40 percent Young Forest Habitat and better) was made using a smaller land base. As a result, the habitat thresholds can be met with fewer acres of suitable habitat. These lower threshold levels were used as targets in the forest estate model. Due to this modeling approach, some landscapes do not reach the 1997 HCP northern spotted owl habitat minimum thresholds, but rather achieve the

habitat target thresholds as determined by the forest estate model. Estimates for the model were adjusted and new estimates were made and are presented in Appendix C.

An example is the Sol Duc landscape, which failed to reach the HCP habitat threshold levels, but does achieve the target habitat thresholds used in the forest estate model (Charts 3-79). This example illustrates the influence of habitat thresholds in the forest estate model; once the minimum thresholds are corrected in the forest estate model, it is expected that the minimum thresholds will be met in all landscapes.

Chart 3-79. Sol Duc Landscape: Extent of Old Forest Habitat

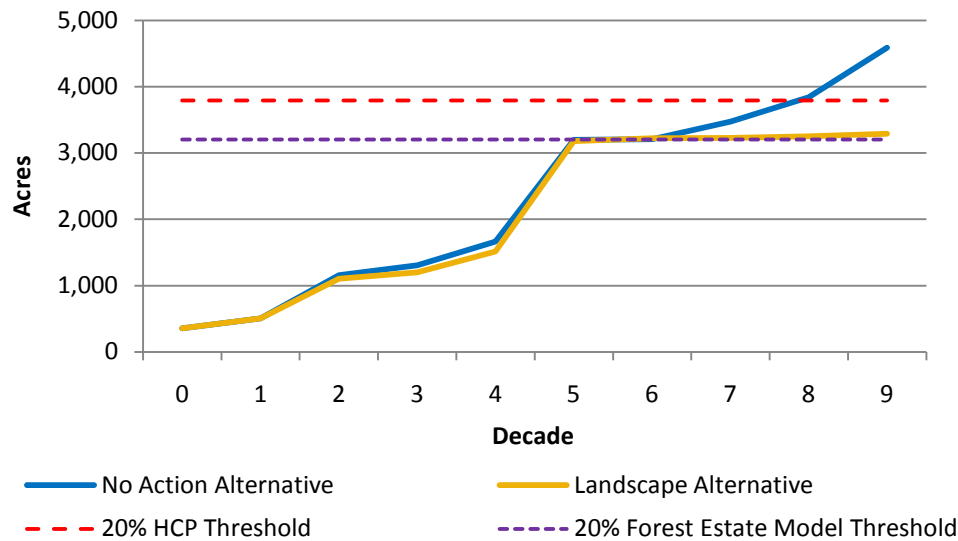


Table 3-72. Harvest Activities (by Acres) in All Status 1 Owl Circles for the Entire OESF (2010-2020, Woodstock Model)

Harvest Type	No Action Alternative		Landscape Alternative	
	All Forest*	Young Forest Habitat and Better	All Forest*	Young Forest Habitat and Better
Variable Retention Harvest	1,973	34	1,893	21
Variable Density Thinning	8,200	1,058	11,551	1,006
Total	10,173	1,092	13,444	1,027

*All Forest is comprised of non habitat and Young Forest Habitat and better. No Old Forest habitat is projected to be harvested.

ACRES HARVESTED IN EXISTING NORTHERN SPOTTED OWL CIRCLES

Harvest restrictions in some Status 1 (reproductive) Owl Circles were lifted in 2007. Table 3-72 shows the amount of harvest expected in these circles under each alternative until 2020. Under the terms of the Settlement Agreement (*WEC v. Sutherland*), variable retention harvests are not permitted in Young Forest Habitat and better until after 2014. However, no harvesting is scheduled to take place in Old Forest Habitat under either alternative.

Tables of harvest activities in Status 1 Owl Circles within the OESF are reported by landscape in Appendix H.

Summary of Analysis at the OESF Scale

As a result of the long period of time necessary for structural complexity in forests to develop from previously harvested stands, there is little difference in the projection of the amount of Old Forest and Young Forest Habitat between the alternatives in the short- (first decade) or mid-term (sixth decade) of the 100-year planning horizon. The trajectory of forest stand development is determined by both management activities and natural processes. The alternatives differ in the level of management activities permitted in riparian areas (refer to *Forest Conditions*), and the resulting forest response to these activities. Riparian areas make up approximately 23 percent of the OESF (refer to Table 3-2 in *Forest Conditions*) and wetlands

comprise approximately five percent. Differences in the projections of owl habitat between alternatives emerge in the fifth and sixth decades. By the tenth decade, the No Action Alternative is projected to have about 12.4 percent (9,238 acres) more Old Forest Habitat and 8.4 percent (9,620 acres) more Young Forest Habitat and Better than the Landscape Alternative (Charts 3-77 and 3-78). Similar trends hold at the landscape scale (refer to Appendix H).

The 1997 *Habitat Conservation Plan* acknowledges the minimum thresholds of spotted owl habitat are at the low end of the range of observed values necessary to support breeding northern spotted owls (DNR 1997a). This low range was chosen to allow greater flexibility to achieve the unique goals of the OESF: integration of ecological values and timber production (DNR 1997a). The minimum thresholds were intended to be the least amount of habitat mandated within each landscape; anything less is considered to have the potential to produce an adverse environmental impact. Some landscapes are currently below threshold levels, but as discussed above (refer to *Differences in Methodology*), this is primarily due to the method in which the threshold was implemented in the model. This discrepancy has been identified and will be changed for the Final EIS. All landscapes within the OESF are expected to meet or exceed the minimum habitat thresholds set forth by the 1997 HCP for the Final EIS. Upon application of this correction, no adverse environmental impacts are expected to occur under either alternative.

Summary of Analysis at the Landscape Scale

The analysis for the Draft EIS for the HCP (DNR 1996) evaluated the individual landscapes to ensure that there was an adequate distribution of owl habitat across the OESF. At the time the HCP was developed, the best available science concluded that 30 to 50 percent habitat at spatial scales from home range to landscapes could support reproductive northern spotted owl pairs (Forsman and Meslow 1985; Bart and Forsman 1992; Carey and others 1992; Lehmkuhl and Raphael 1993; Holthausen and others 1994; Bart 1995). The HCP selected a minimum of at least 40 percent Young Forest Habitat and Better (DNR 1997a). Bart and Forsman (1992) hypothesized a threshold amount of 20 percent Old Forest—based on observations of significantly greater occupancy and productivity by northern spotted owls than areas with less. The landscapes current threshold levels are in Table 3-69.

Potential future levels of northern spotted owl habitat within each landscape are influenced by the legacy of past management activities (harvesting, road building, and vegetation management). Each landscape within the OESF currently has a different starting point from which northern spotted owl habitat will develop. Landscapes such as the Clearwater and Queets exceed habitat thresholds for Old Forest for the entire planning horizon (Table 3-70). Others, such as Sol Duc, start with little Old Forest Habitat (approximately 350 acres), but will experience increases under both alternatives. The Reade Hill landscape is the only one in the OESF to currently meet the 1997 *Habitat Conservation Plan* threshold for Young Forest Habitat or Better (Appendix H). The 1996 *Draft EIS for the Habitat Conservation Plan* suggested that the most significant contribution of the OESF unzoned forest approach to spotted owl

conservation would result from its substantial increase in the geographic and ecological distribution of owls and their habitat on the Olympic Peninsula. The greatest increases in the development of northern spotted owl habitat are predicted to occur in landscapes currently below the 1997 HCP habitat thresholds. This trend suggests that over time Old Forest and Young Forest Habitat will increase in quantity and distribution, as observed in all landscapes under both alternatives.

Influence of Habitat Thresholds

The application of habitat thresholds has been demonstrated to strongly influence both the modeling and management of northern spotted owl habitat as evident from the analysis in the *South Puget FEIS* (DNR 2010a, p.180 to 198) which DNR incorporates by reference. The amount and quality of spotted owl habitat is set as a measurable objective according to the contractual obligations under the 1997 *Habitat Conservation Plan*. As this is but one of several objectives, local land managers must balance the competing objectives in the OESF, meaning that DNR doesn't strictly focus its management on one goal such as the development of owl habitat.

A similar result can be observed in the following projections. No substantial increases in Young Forest Habitat are observed within each landscape once the minimum threshold (approximately 40 percent⁹) has been achieved. Only in some areas is there a continued improvement in habitat, as the amount of Old Forest habitat increases beyond the 20 percent minimum threshold. This likely occurs in areas that are deferred from harvest. The proportion of Young Forest Habitat and Better does not increase in each landscape, as the model must

optimize for multiple, and sometimes competing objectives (such as the maintenance and restoration of northern spotted owl habitat, riparian restoration, and revenue production). The model has no incentive to examine management choices that would continue to increase the quantity and quality of habitat.

Spotted Owl Circles

The extent of harvest within Status 1 Northern Spotted Owl Circles¹⁰ in the first decade is used to evaluate short-term effects to northern spotted owl habitat. DNR's long-term management of owl circles in the OESF ceased in 2007 and no northern spotted owls have been detected within previously occupied circles since 2001. These circles, however, contain the last known occupied habitat within the OESF and represent the areas most likely to be re-occupied. The Landscape Alternative is projected to harvest 3,271 acres more (the majority of which is non-spotted owl habitat) in Status 1 Northern Spotted Owl Circles than the No Action Alternative (Table 3-72).

How Does DNR Management Affect Northern Spotted Owl Habitat?

TIMBER HARVESTING

DNR manages forests using a combination of silvicultural techniques. For a discussion of these practices refer to *What Type of Harvest Methods does DNR Use?* in the *Forest Conditions* section.

Silvicultural techniques used in this analysis include variable retention harvests and variable density thinning treatments (Carey and others 1996; Franklin and others 2002; Holmberg and others 2007). Forest stands in the Competitive Exclusion stage of development (refer to *Forest*

⁹ Due to model implementation, levels are slightly below the actual desired threshold of 40 percent (refer to *Differences in Methodology*).

¹⁰ Northern Spotted Owl Status 1 Circles for this analysis were evaluated only if the site center was located on DNR-managed lands.

Conditions) provide very few benefits to northern spotted owls; they lack coarse woody debris, large snags, and stand densities that allow owls to fly through. In the absence of disturbance, forest stands may persist in these stages for long periods of time (Carey 2007). Actively managing these closed-canopy stands by removing some competition between trees can accelerate the creation of structural complexity in forests needed by owls and their prey (Carey 2003b). Forest stands in the Competitive Exclusion stage are either enhanced through thinning or replaced using variable retention harvests.

Although the current assumption is that forest stands receiving these early treatments will develop the habitat elements necessary for northern spotted owls, the management practices employed are relatively new. Studies have not yet shown that such stands will be used to the same extent by northern spotted owls as older forests having developed naturally over time.

ROADS

Wasser and others (1997) found that male northern spotted owls living within a quarter mile of a logging road had elevated levels of corticosterone. Females showed no increase in corticosterone levels related to road proximity.

CREATION OF OLDER FOREST CONDITIONS

The 2006 *Policy for Sustainable Forests* requires 10 to 15 percent of each HCP planning unit to be in older-forest conditions. As shown in Charts 3-17 and 3-18 (*Forest Conditions*) the OESF already meets this threshold. The creation of older-forest conditions in this planning unit is predicted to increase above this limit which will have a positive effect on northern spotted owls. Research indicates that northern spotted owls are strongly associated with late successional and old-growth forest habitats (DNR 2007). An increase in these conditions could increase the

quantity and quality of habitat available for spotted owls, especially if targeted within northern spotted owl management areas.

Direct, Indirect, and Cumulative Effects to Northern Spotted Owls

The cumulative effects to northern spotted owls under the proposed alternatives are reflected by the amount of habitat created over time. The *Draft EIS for the Habitat Conservation Plan* (DNR 1996a) estimated that there would be a 51 percent increase in northern spotted owl habitat capability over a 100-year evaluation period. Though habitat capability was estimated differently than the habitat types; Old Forest and Young Forest Habitat provides a means to evaluate the alternatives. Both alternatives increase habitat quality and quantity over the planning horizon. There is little difference until the fifth or sixth decade when the effects of differing management activities and the forest development responses to such activities are realized.

Both alternatives are projected to have increases in northern spotted owl habitat over the 100-year model simulation. Also, both alternatives project an increasing level of Old Forest Habitat in each of the 11 landscapes over time. For Young Forest Habitat and Better, the projections show an increase up to the level of minimum standards; however, only in the No Action Alternative do some landscapes exceed the minimum standard. Four landscapes fail to meet the threshold under the No Action Alternative compared to six failing under the Landscape Alternative (Table 4; Appendix H). Under the Landscape Alternative, four landscapes fail to meet the 20 percent Old Forest Habitat threshold, two under the No Action Alternative. Modeling errors prevented a straight forward analysis of the potential impacts in this Draft EIS.

Mitigation

The OESF Forest Land Plan is a non-project action. At this level, DNR cannot say with certainty that the actions proposed will likely result in probable, significant, adverse, environmental impacts. All future actions resulting from this plan, such as proposed timber sales and road construction, will undergo additional environmental review.

DNR complies with state *Forest Practice Rules* while implementing existing policy and procedures. Mitigation is provided by following *Forest Practices Rules*, agency policy and procedures, and conditions set forth in the 1997 *Habitat Conservation Plan*. Adaptive management is the existing process to update the rules, policies, and procedures as needed when new scientific information shows a change is needed for owls.