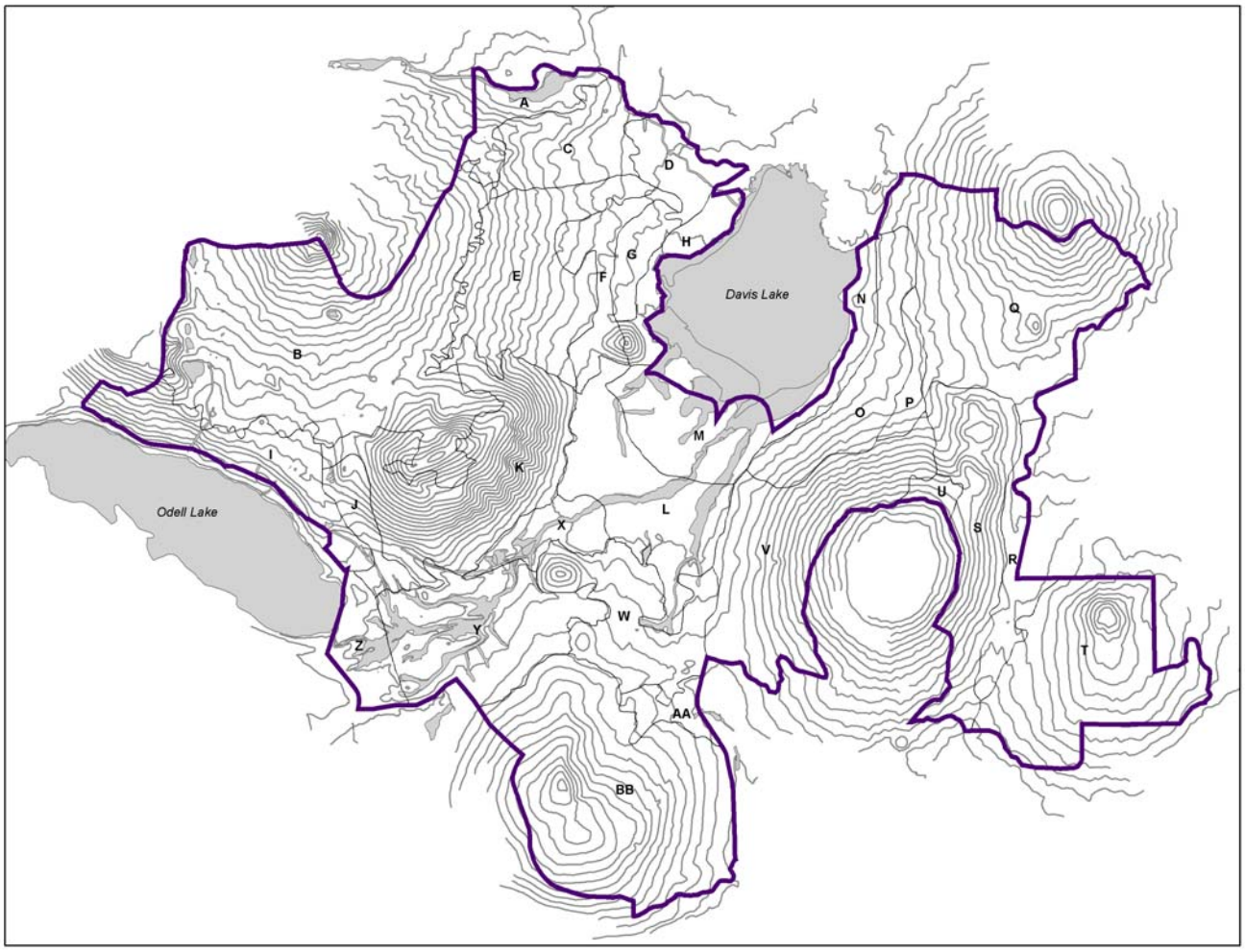
This Late-Successional Reserve is designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem.
Northwest Forest Plan, ROD C-11



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EXECUTIVE SUMMARY

BACKGROUND - The Davis Late-Successional Reserve (LSR) is 48,890 acres and is located east of the Oregon Cascade crest on the Crescent District of the Deschutes National Forest. This area was designated by the 1994 Northwest Forest Plan as part of a network of late-successional and old growth forest ecosystems that will serve as habitat for late-successional and old growth related species such as the northern spotted owl. As part of the Northwest Forest Plan, management assessments are to be prepared for each designated LSR before habitat manipulation activities are designed and implemented.

In February 1995 the Deschutes N.F. prepared a Forest LSR Overview to set the context for the eleven LSRs located on the Deschutes National Forest. The overview provided general information on forest processes, pattern, structure and function, and also outlinted the Forest LSR Assessment process. For the Davis LSR Assessment, this process included a continuation and expansion of the 1994 Odell Pilot Watershed Analysis, which provided the social, physical and biological context for the area around Davis and Odell Lakes.

The original Davis LSR Assessment was completed in 1995. This 2007 revision was initiated following the Davis Fire of 2003, which burned over 20,000 acres of forested landscape mostly within the Davis LSR boundary.

KEY QUESTIONS - The LSR Assessment Team focused on two key questions derived from the Northwest Forest Plan's stated objective for LSR management - to protect and enhance late-successional and old growth forest ecosystems and the habitats they provide. The key questions included: 1) How does the Davis Late-Successional Reserve serve as habitat for late-successional and old growth related species including the northern spotted owl? and 2) Where and when are forest management activities for risk reduction needed to protect the existing and potential habitat for late-successional and old growth related species within the Davis LSR?

MANAGEMENT STRATEGY OVERVIEW - The first question was answered by analyzing existing and historic vegetative conditions within the LSR and determining the historic, present, and potential use of the LSR by late-successional and old growth related species. Following the assimilation of this information, emphasis wildlife species were identified for the areas that logically could be managed to provide a similar habitat type and function. These areas are as follows:

- Mixed conifer for northern spotted owl
- Mixed conifer for bald eagle and northern spotted owl
- Mixed conifer/lodgepole/ponderosa pine for bald eagle, great gray owl, and/or black-backed woodpecker
- Lodgepole pine for black-backed woodpecker and connectivity for northern spotted owl
- Lodgepole/mixed conifer riparian for black-backed woodpecker and/or riparian species and connectivity for northern spotted owls
- Mountain for wolverine and high elevation species

To answer the second key question, these six areas were assessed according to the following criteria: the existing habitat function within and outside the LSR; the effects of past timber harvesting on the desired habitat function; the risk of large-scale loss of existing old growth due to fire, insects and disease; existing human uses within the area; and other factors influencing the attainment of the desired late and old structured ecosystems. The immediate need in the LSR was determined to be reducing the risk of large-scale loss in a portion of the existing late and old-structured stands that are susceptible to insect attack and/or wildfire.

MANAGEMENT STRATEGY AREAS - A strategy to maintain a balance between adjusting the existing vegetative conditions within the LSR to a more sustainable balance in the short and long term and maintaining suitable habitat for old growth depended species that utilize high-risk stands was developed. The appropriate locations, scales, and scheduling of management activities that are exempted from further review by the Regional Ecosystem Office (REO) is based on the existing and desired conditions for the LSR. The original LSR Assessment identified 28 Management Strategy Areas; this 2007 revision has lumped the 28 MSAs into six "Habitat Groups" based on the habitats and focal species described above. Appropriate management options are specified for each Habitat Group; these are not standards and guidelines, but are an interpretation of the intent of the Northwest Forest Plan. Site-specific analysis will be required prior to implementation of activities exempted for further REO review made in this assessment.

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Glossary

A

Advanced Regeneration - Small trees, usually less than 1 inch in diameter, which are growing under mature trees prior to planned harvest activities.

B

Bald Eagle Management Areas (BEMAs) - Areas managed under the Deschutes National Forest Land and Resource Management Plan for the protection of the threatened northern bald eagle. BEMAs provide nesting and roosting habitat for the species.

Bryophytes – Non-vascular plants including mosses, liverworts, and hornwarts.

C

Canopy - The uppermost spreading branchy layer of a forest.

Capable – Plant associations that can support the mix and density of trees to produce NRF habitat. Specifically, the plant associations in the following PAGS qualify: MCW (all), MCD (CRS1-11, CWC2-11, CWH1-11, CWS1-14 and CWS1-15), and MHD (CMS1-11 below 6,000 feet in elevation).

Climax - Used in two ways in this document:

Catastrophic levels of habitat loss - Within the sideboards of the ROD, a catastrophic level of habitat loss occurs when the MSA loses its ability to function as habitat for the emphasis species. An interdisciplinary team evaluating disturbance events would make the determination of whether a habitat loss is catastrophic. Constituent habitat elements currently being lost would be key to this determination.

- *Climatic climax* refers to the vegetative structural condition that would develop in the absence of significant disturbance events. This condition would vary in longevity and large scale disturbance events would be anticipated as the next step in the cycle of vegetative processes.
- *Fire climax* refers to the vegetative structural condition that would develop with fire allowed in a manner similar to historic conditions. This condition would be expected to last longer than climatic climax conditions and may or may not include anticipation of large scale disturbance as the next step in the cycle.

Condition Classes - A function of the degree of departure from historical fire regimes. Condition class 1 is within or near historical conditions; class 3 is significantly altered from historical regimes.

Cryic - Soils in this temperature regime have a mean annual temperature higher than 0°C but lower than 8°C.

Cycle - As applied to uneven-aged management, it is the time interval between harvest entries. It should be noted that harvest entries in uneven-aged management are to leave residual levels of growing stock which should not need treatment for at least one cycle length.

D

DecAID – DecAID is a knowledge-based advisory model that provides guidance to managers in determining the size, amount, and distribution of dead and decaying wood (dead and partially dead trees and down wood) necessary to maintain wildlife habitat and ecosystem functions.

Desirable Species - Any species of plant or animal which is considered to be compatible with meeting management goals and objectives.

Disturbance - Events that disrupt the stand structure and/or change resource availability or the physical environment (Oliver, 1996).

Dispersal Habitat – Stand characteristics that are intermixed across the landscape that provide for movement of young birds when they leave nesting areas. **For example in the lodgepole pine, prescriptions for young stands must have at least 30% canopy cover and 7 inches in diameter.**

Early Seral - Plants which inhabit a disturbed site within the first few years subsequent to the disturbance.

Emphasis Species - Species or species groups and their associated habitats selected to provide a means of focusing and prioritizing areas within the LSR for protection activities. Emphasis species were selected because they utilize and represent a broad spectrum of habitat types in the various plant association groups.

Endemic - Native insects or disease levels considered to not be a problem to future conifer growth and development.

Enhance – Those activities that may or may not be related to risk reduction activities (such as thinning of young stands) that improve future LSR and Old Growth forested conditions.

Epidemic - Native or introduced insects or disease that are at levels considered to be a problem to future conifer growth and development, usually posing the threat of large scale losses of a particular species or size class of trees.

F

Fire Hazard – The potential fire behavior for a fuel type, regardless of the weather-influenced fuel moisture content (i.e. based upon physical fuel characteristics).

Fire Risk – The probability or chance of a fire start, determined by the presence and activities of a causative agent.

Fire Regime - A function of the historical frequency of fire and the degree of severity of those fires.

Fire Use Fire – **The management of natural ignited fires to achieve resource benefits where fire is the major component of the ecosystem.**

Fuels - Vegetative matter, dead or alive, that burns in a fire. It is broadly characterized by the following categories:

- **Surface or ground fuels** are within a foot or so of the ground surface.
- **Ladder fuels** exist when you have a continuous vertical arrangement of fuel that allows

fire to easily go from ground level into the tree canopy.

- **Crown fuels** are the tree limbs and leave that can burn with enough heat and/or wind.
- **Live fuels** are the green (live) herbs and shrubs.

G

Group Selection - A stand management method in which silviculturists identify groups of trees which need to be removed from a stand of trees in order to meet management objectives.

I

Imminently susceptible -
A situation where the conditions are such that it is very likely there will be significant change in structure or character of forest stands on a large scale as a result of insect attack and/or fire within the next 10 years.

Individual Tree Selection - A stand management method in which silviculturists identify individual trees that need to be removed. In this method specific types, sizes, or qualities of trees are identified for either removing from the stand or remaining in the stand.

L

LOS - Forest seral stages which include trees that are large in size for a given sites potential. These may include moderate to high canopy cover, multi-layers, and multi-species; dominated by large overstory trees. LOS may or may not qualify as NRF habitat for the NSO as it may or may not include structural composition necessary. See the definition for NRF.

M

Mechanical Thinning - Reducing the number of trees in a stand using a factor which is independent of tree quality. The use of spacing for thinning is one type of mechanical treatment. For example, the closest tree to the points of a 15' by 15' grid would be left, regardless of tree quality.

N

Near-NRF - Forested habitat that has large trees and most of the critical elements of NRF but falls just short of meeting understory and/or canopy closure needed for NRF habitat, but can grow into NRF habitat generally within 20 years or less. This habitat type was given a name by the team to the assumptions that had been carried through active management in Seven Buttes and Seven Buttes Return to recognize risk reduction activities do not eliminate stands from being NRF habitat over the long-term, just the short-term.

In order to model these stands and confirm the 20-year assumption, the same data as Modeled NRF was used. Near-NRF was defined as having 25 to 40 percent canopy cover AND meeting two of the three stand attributes, and of the two attributes one had to be the large tree components. Modeling through FVS indicates that stands recovered approximately 5 percent canopy cover per decade and could recover missing understory attributes within 20 years or shorter.

NEPA - An acronym for National Environmental Policy Act.

NFMA - An acronym for the National Forest Management Act.

Noxious Weeds (Invasive plants) - Non-native plants listed by the State that generally have either economic or ecosystem impacts, or are poisonous to wildlife and/or livestock. They aggressively invade disturbed areas such as fires, road sides, and construction areas.

NRF – Stands that qualify as nesting, roosting and foraging habitat for the northern spotted owl in complex, multi-stored stands. This assessment utilizes the Deschutes National Forest GIS layer in all quantifications of existing NRF, capable NRF and all habitat calculations. This GIS layer uses the following stand characteristics to delineate NRF: ***Forest stands, below 6,000 ft elevation, (regardless of plant association), having a total canopy cover greater than or equal to 40 percent AND a canopy cover of at least 5 percent among trees >21" dbh were labeled as NRF.*** This definition assumes that the stand is multi-storied and contains some large trees. This is the standard Deschutes National Forest GIS layer, created utilizing the 1995 Photo Interpretation (PI) layer updated with the activities and fire layers and Digital Elevation Model layer (DEM). This mapping likely overestimates the amount of habitat that is available for spotted owl NRF because it does not include more finite variables that are important to habitat such as snags.

P

Prescribed Fire - Fire which is planned and used as a tool to meet specific management objectives.

Problem Fire – Problem fires are wildfires that, because of extreme fire behavior, present a greater than acceptable risk to human safety and loss of forest.

Protection – Afforded through risk reduction to perpetuate conditions of LSR and old-growth forest ecosystems.

R

Rotation - A pre-determined time frame in which an even-aged forest stand will reach maturity and be harvested.

S

Salvage – The removal of trees from an area following a stand replacement event. It also may refer to utilizing dead wood in a live stand (i.e. beetle-killed lodgepole in a ponderosa pine stand. The intent is to prevent negative effects on late-successional habitat while permitting some commercial wood removal; subject to the Standards and Guidelines in the NWFP ROD, C-13 through C-16.

Seral Stages - Seral stage describes the phase of development of a plant community. Early seral species are those species you would expect to find on a site soon after a major disturbance, like fire. These are species such as pines, Douglas-fir, snowbrush, fireweed, etc. They are generally shade intolerant species. Late seral are the species that can come in under a fully developed vegetative canopy, such as true firs, prince's pine, lichens, etc.

Silviculture -The theory and practice of directing forest establishment, composition, and growth for the production of forest resources to meet specific management objectives.

Silviculturist - One who plans, assists in and supervises the implementation of silviculture projects. The silviculturist determines (prescribes) the vegetative treatments necessary to meet the objectives for vegetation on a given site.

Site - A specific location where management activity is considered, planned, or operating.

Site Potential – Site potential is the specific ability of a site to grow vegetation. It includes the soil, topographic, and climatic conditions that determine the resources available for growing vegetation.

Site Preparation - The removing or rearranging of vegetation or woody debris to meet specific management objectives. Most often it is used to describe the process(s) used to expose mineral soil areas suitable for planting or seeding desirable species of plants.

Special Status Species – Plant or animal species that are listed as Threatened, Endangered, or are proposed for listing by USFWS, listed as sensitive by FS, or as Survey and Manage in the NWFP.

Stand - A group of trees of similar canopy structure, species composition, and/or size growing on a continuous area. A stand is distinct from neighboring stands in structure, growing conditions, or management objectives.

Stand Contiguity – **All parts of one area being in physical contact with other areas.**

Stand Dynamics -The changes in forest stand structure with time, including stand behavior during and after disturbances (Oliver, 1996).

Stand Structure - The physical and temporal distribution of trees and other plants in a stand (Oliver, 1996).

Suitable - Vegetative conditions that a particular plant or animal species could use as habitat for a portion or all of its reproductive/life cycle.

Sustainable - Vegetative conditions that are expected to persist with key components remaining intact through time. These are usually conditions that are quite resilient after normal disturbance events such as fire.

T

Take - In this document, the percentages of NRF habitat acres available for owls in proximity to nest sites and within home ranges have been used to identify the threshold for determining "take" in Section 7 consultations with the US Fish and Wildlife Service. If there is less than 50 percent suitable NRF habitat within the 0.7 mile radius (i.e., 493 acres) or less than 40 percent within the 1.2 miles radius (i.e., 1,158 acres), then any modification of the habitat that results in a change from NRF to non-NRF may constitute a “take” under the Endangered Species Act.

Thinning - Any cutting or removal of vegetation (trees, brush, etc.) resulting in a reduction of competition for water, light, and/or nutrients between individual plants. Thinning is

commonly referred to as **commercial thinning** and **small tree thinning**.

- **Commercial thinning** refers to removing material that has an established dollar value on the open market and can be sold with at least a minimal net value sufficient to pay for the thinning activity.
- **Small tree thinning** may or may not have a dollar value and usually includes the need to pay someone to accomplish the work. This is sometimes called pre-commercial thinning because the trees are smaller than the sizes that have a commercial value.

Tolerance Intervals - were used to determine habitat levels. A tolerance interval includes the range of snag density between tolerance levels. Using the example below, the 30-50% tolerance interval would be habitat with at least 0.3 snags per acre and less than 1.7 snags per acre.

Tolerance Level (t.l.) is the percent of a population that would use a density of snags or down wood cover percentage. For example, for a population of 100 individual white-headed woodpeckers, at the 80% t.l., 80 of them would use habitat with at least 3.7 snags per acre greater than or equal to 10 inches dbh.

Treatment - A term used to broadly refer to the vegetative changes made to meet management objectives. It may include thinning, cutting of undesirable trees, prescribed fire, salvage, or any manipulation of the vegetative conditions.

Treatment Trigger – The point at which an event or condition that causes a re-evaluation of component(s) of landscape for possible changes in management direction.

U

Underburn - Using prescribed fire under the canopy of an existing stand of trees.

Undesirable Species - Any species of plant or animal which is NOT considered to be compatible with meeting management goals and objectives.

W

Woody Debris - Dead pieces of woody vegetation such as stems, limbs, or leaves which are on a site.

SUMMARY AND UPDATE

Introduction

The Davis Late-Successional Reserve Assessment (Davis LSRA) was completed in 1995 in accordance with direction of the Northwest Forest Plan (NWFP). Over the last ten years, changed conditions from the 2003 Davis Fire, as well as an increase in knowledge and modeling tools, have led to a need to update the Davis LSRA. The objective of the LSR remains grounded in NWFP direction:

> "Late-Successional Reserves are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. These reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem" (ROD C-11).

This revised assessment gives greater acknowledgement to the role of fire and greater emphasis to prevention of large-scale loss of forest vegetation to fire, insect and disease through density management and strategic fuels treatments.

The following were identified as factors in updating this assessment:

Watershed Analysis

- Odell Pilot Watershed Analysis updated in 1999 (Tier 1).

Project Implementation

- Vegetation management and lessons learned from the Seven Buttes and Seven Buttes Return Projects and subsequent monitoring reviews.

Fire

- The 2003 Davis Fire and the restoration efforts (defined "catastrophic" as discussed on page C-13 of the ROD).

Research and Management Review

- Status and Trends demography of northern spotted owls study by Anthony et al. (2003).
- Scientific evaluation of the status of the northern spotted owl (SEI report) by Courtney (2003).
- Results of the USFWS status review of the northern spotted owl (2003).
- 15 years of snag and down wood research accumulated at the DecAID website (2006).
- A review of the first 10 years of the Northwest Forest Plan, published in two General Technical Reports: Status and Trends of Northern Spotted Owl Populations and Habitat (2005);
- Preliminary Assessments of the Condition of Watersheds (2005).

Tools

- Updated GIS/assessment/modeling tools.
- Updated Deschutes National Forest Vegetation layers (2000).

Management Direction

- Changes in the NWFP designation and treatment of Survey and Manage species (2001).
- Managing northern spotted owl habitat in dry forest ecosystems workshop, USFWS Synthesis Report (2005).
- USFWS proposal to finalize a Northern Spotted Owl Recovery Plan and designation of Spotted Owl Critical Habitat.

Lessons Learned

Watershed Analysis

The original Odell Pilot Watershed Analysis (WA) was completed in 1994 before regional standards were set. The WA was revised in 1999 to meet regional standards and incorporate new information. The WA was adjusted to account for the following:

- Wildlife and Fish: **peregrine falcon** was removed from the federal list of endangered and threatened species and added to the Pacific Northwest Regional Forester's (R6) sensitive species list; **bull trout**

listed as threatened under the Endangered Species Act and; redband trout was added to the R6 sensitive species list.

- Aquatic: Stream monitoring data from 1994-1999 were incorporated. Odell Lake was placed on Oregon Department of Environmental Quality's list of water quality impaired bodies (pursuant to Section 303d of the Clean Water Act).
- Botanical: ***Mimulus jepsonii*** was removed from the R6 sensitive plant species list; commercial use of fungi (specifically matsutaki mushrooms) increased, and the issue of invasive plant species came to the forefront.

The following landscape trends were identified in the Odell WA area. In order of importance, they are:

1. Reduction in numbers and size of large-tree dominated stands.
2. Increasing risk to the viability of bull trout populations in Odell Lake and its tributaries.
3. Increasing risk of large-scale disturbance in forest stands.
4. An increase in frequency and diversity of human use[1].

Project Implementation

Seven Buttes (1996) and Seven Buttes Return (2001) projects with associated management and Provincial Advisory Committee (PAC) reviews[2].

Most of the 160,000 acre Seven Buttes analysis area is within the Northwest Forest Plan. Decisions associated with the Seven Buttes and Seven Buttes Return Environmental Assessments took a proactive approach to reversing some of the trends identified in the Odell WA and Davis LSRA. Projects associated with these decisions involved thinning 25,000 acres of the most imminently susceptible stands to insects and disease by the year 2015. Although these two disturbance agents were the drivers for action, stands were also strategically selected to be the most effective on a fire landscape, using the best modeling tools and professional judgment of the day. Vegetation management activities would focus on retaining options for the most important habitat for late and old forest-associated species while promoting large trees across the planning area.

The earlier Seven Buttes project strategically identified and thinned approximately 7,000 acres of high risk stands from 1997 to 2006. From 2004 to 2015, the Seven Buttes Return project will complete approximately 7,000 more acres of thinning and fuels reduction activities. Due to the Davis Fire, the remaining acres identified for active management in the Seven Buttes Return decision have been reassessed in the Five Buttes Environmental Impact Statement, which is projected to reach a decision in the spring of 2007.

The Seven Buttes and Seven Buttes Return projects primarily focused on high priority stands outside northern spotted owl home ranges. Various silvicultural and fuels treatments were utilized to reduce timber stand stocking and move stands toward either a multi-story condition that maintains spotted owl foraging habitat or a single story condition that maintains dispersal habitat.

Within the Seven Buttes planning area, the following PAC implementation monitoring has occurred:

- Density management within the LSR in Davis Top Timber Sale in 2002;
- Small diameter thinning and fuels reduction in Eggs Timber Sale in 2003;
- Treatments of northern spotted owl nesting roosting and foraging habitat (NRF) in Goose Timber Sale, post-fire logging in Davis Fire and prescribed fire treatments in Hammy, 2005.

As a result of the feedback from PAC monitoring reviews and the result of the Davis Fire, the Crescent Ranger District utilized adaptive management and came up with the following concepts:

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[1] http://www.fs.fed.us/recreation/programs/nvum/
http://www.fs.fed.us/r6/centraloregon/recreation/cohvops/links.shtml

[2] Required by the Northwest Forest Plan and consisting of members representing a diverse background in the Deschutes Province. Members provide monitoring and feedback on projects to bring in an element of collaboration.

1. Continue a wide variety of density reduction activities. Consider more intensive thinning (i.e. greater basal area reduction), where possible, to minimize the number of subsequent entries needed to maintain resilient conditions.
2. Conduct activities across larger blocks. Treatments need to be adequate in scope and intensity and strategic in placement on the landscape to be effective, especially for fire.
3. Consider managing ponderosa pine-dominated stands for species other than spotted owls. The Seven Buttes project had a large variety of treatments and treatments were planned in blocks, but the strategy was to retain NSO habitat in places where it might be more appropriate to emphasize habitat for other species, particularly in the ponderosa pine plant associations.
4. Ensure that activity fuel reduction projects match realistic workforce and budget projections in a timely manner.

Fire

Ninety percent of the time, the typical fire `within the LSR is less than one quarter of an acre. The 2003 Davis Fire burned through 21,000 acres, most of which were in the Davis LSR. The extent and intensity of the wildfire highlighted a need for density management and strategic fuels treatments on a larger scale than had ever been proposed on the Crescent Ranger District. The severity of the fire also emphasized a need for returning low intensity fire closer to its historical proportions on the District.

About three quarters of the Davis Fire burned with moderate to high intensity with nearly complete tree mortality. Only around the edges of the fire was there a mosaic of burn intensities and surviving trees. Fire intensities were considered uncharacteristically high for the type of vegetation burned, which was mostly mixed conifer. Historically, a characteristic fire in ponderosa pine stands would tend towards ground fire with occasional torching of individual or small groups of trees. Fires in mixed conifer stands would also tend to burn on the ground, but would burn in a mosaic pattern; if a fire gets elevated to stand replacement conditions in mixed conifer, typically it would be limited to approximately 100 acres in size.

Restoration efforts identified in the Davis Fire Recovery EIS focused on the long-term. The goal was to actively manage a part of the burned area for “open grown” stands managed with a low intensity fire regime. Where most appropriate, potential fuel loadings were reduced in all size classes to more historic levels. The intent was for fire to be able to return to its characteristic role as quickly as possible, while the new forest develops. Regrowth of forest habitats was accelerated (in some cases by more than 100 years) by planting a diversity of species as soon as possible.

The 2005 Davis Fire Recovery EIS strategy was reviewed and found to be consistent with the NWFP by the Regional Ecosystem Office and is formalized within this revision of the LSRA.

At the time of the Davis Fire in 2003, previously thinned areas were used for placement of fireline and to anchor burnout operations. Fuels treatments had not been completed in all units and they suffered mixed intensity burns, but they generally were successful in slowing the fire. Seven Buttes Return units that had not been thinned typically suffered a higher intensity fire.

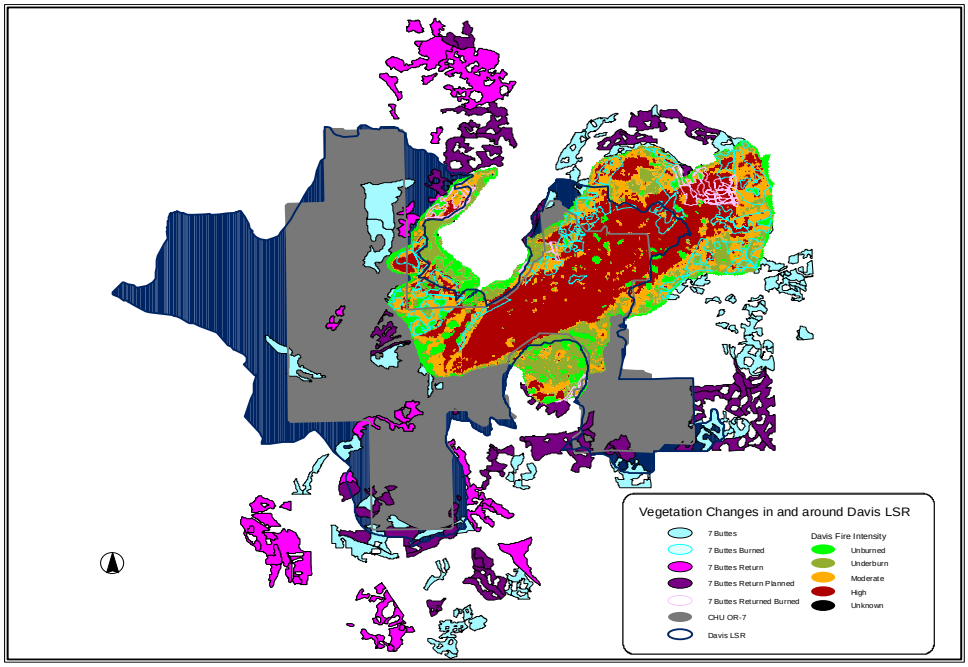

Figure I-1. Vegetation density changes in and around Davis LSR.

Research and Management Review

Review of the Status of the Northern Spotted Owl

The U.S. Fish and Wildlife Service (FWS) completed a 5-year review of the listing classification of the northern spotted owl (Northern Spotted Owl, Five-Year Review: Summary and Evaluation. 2004 US Fish and Wildlife Service Portland, Oregon). The Service recommended that the northern spotted owl remain listed under the ESA as "threatened." They concluded that for every risk factor that has declined since listing (e.g., rate of habitat loss due to timber harvest, the threat of predation), another factor was identified that counterbalanced risks (e.g., habitat removal due to uncharacteristic wildfires, West Nile virus, barred owls). These new or increasing risk factors potentially pose greater risk to the northern spotted owl than those considered during the original listing. There was some research identified as high priority in the report: effects from the barred owl, prey dynamics (especially prey response to changes in habitat conditions), and effects of wildfire and demographic responses to habitat variables.

In preparation of the review the FWS contracted with Sustainable Ecosystems Institute, Inc. (SEI) to collect, organize, synthesize, analyze and summarize all new scientific information that has become available since the northern spotted owl was listed as a threatened species in 1990. The FWS used the SEI's report "Scientific Evaluation of the Status of the Northern Spotted Owl" (SEI report), the "Status and Trends in Demography of Northern Spotted Owls" (Demography study) and other documents to complete its review.

Points from the SEI report that influence changes in the management of the LSR include:

- "Variable-density thinning, however, holds promise for acceleration of the development of spotted owl habitat and dense prey populations, especially when appropriate attention is paid to decadence (snags, cavity trees, and coarse woody debris)" (4-25).
- Forests east of the Cascades historically have a shorter, but variable fire return intervals with frequent fires of low to moderate intensity, which has been altered by fire suppression. ...There "fire–adapted under-stories of grasses, forbs, and low shrubs being replaced by flammable ladder fuels that may threaten catastrophic destruction of the forest when fire does occur" (4-25-26).

Glossary

- Late seral forests are part of the forest mosaic and not independent stands. "...spatial heterogeneity (patchiness) may prove to be the key to restoration of forest health and low intensity fire regimes while retaining patches of complex forests that benefit owls and their prey" (4-26).
- ".....owl locations used for nesting and roosting tend to be centered in large patches of old forest than in the available landscape, forest fragmentation is not necessarily equivalent to habitat fragmentation, at least in some portions of the Northern Spotted Owl's range. Ecotones within owl home ranges may benefit Spotted Owls by providing increased prey abundance and/or availability but still need to be balanced with the presence of interior older forest" (5-23).
- "...threats from catastrophic habitat loss have increased on the east side of the Cascade Range and some locations within the Klamath region. ...In some areas, managing the threat of habitat loss by wildfire should be a habitat management priority....In addition, it has been hypothesized that succession toward shade-tolerant understory trees on the east slope of the Cascade Range may reduce owl occupancy (presumably because of reduced prey abundance and/or access. If true, this would represent another growing threat resulting from lack of tree density control, which is a consequence of fire suppression" (6-4).
- "Management activities designed to accelerate development of new habitat are becoming an important part of forest management. Retention of legacy (snags and course woody debris) in current areas of timber harvest will shorten the time necessary for those areas to achieve the habitat complexity deemed to be suitable Northern Spotted Owl habitat. There is a need for land managers to develop the ability to track development of habitat and validation of that habitat for its suitability to owls" (6-8).
- "....the NWFP allows for silvicultural treatments, including mechanical and prescribed fire methods, of old-growth forests on sites characterized by frequent, light to moderate intensity fire, such as pine and mixed-conifer dominated forests on the eastern slopes of the Cascade Range.... This NWFP recommendation has not been widely implemented because such treatments often involve areas currently or potentially occupied by Northern Spotted Owls. Land management agencies appear not to have aggressively implemented such treatments... (9-7).
- "It is important to note that such fuel treatments are ***not*** appropriate on sites that are naturally characterized by heavy fuels accumulations and infrequent stand-replacement fire regimes..." (9-17).
- "... very little management has been conducted to reduce risk of wildfire by removing these surface and ladder fuels forests. However, we also are concerned that widespread thinning to reduce the risk of catastrophic wildfire without the understanding its effects on Northern Spotted Owl habitat may itself pose a threat" (11-13).
- "The focus of conservation might best be centered on the dynamics of ecosystems and landscapes, not individual species" (Appendix 3-26).
- "There is no one-size-fits-all or any canned prescriptions; diagnosis must be done watershed by watershed and prescription should follow diagnosis. It must be recognized that past management has had diverse effects on spotted owls and their prey; some second growth has abundant prey, some second growth is depauperate in prey and other species. No one has yet demonstrated successful intentional acceleration of development of diverse and abundant spotted owl prey or spotted owl habitat –too little time has passed since attempts to do so were begun" (Appendix 3-26).

The "Status and Trends in Demography of Northern Spotted Owls, 1985-2003" has about 30 authors, with the principle investigator being Dr. Robert Anthony of the USGS. The purpose of this analysis was to provide an assessment of the status and trends of the northern spotted owl throughout most of its range, with emphasis on areas managed under the Northwest Forest Plan. The analysis of data was from 14 study areas in Washington, Oregon, and California. The analysis comprises about 12 percent of the range of the subspecies, including federal, tribal, private, and mixed federal and private land ownerships. Preliminary findings of this study were:

- The analysis suggests that the range-wide northern spotted owl population declined at about 3.7 percent per year during the years 1985 to 2003.
- The rate of population decline for the eight monitoring areas under the Effectiveness Monitoring Plan was 2.4 percent per year.
- Oregon declined by 2.8 percent per year, California by 2.2 percent per year and unexpectedly Washington declined by 7.3 percent per year.
- Fecundity (numbers of young produced) was variable among the 14 study areas.
- Survival rates were declining on 5 study areas and stable on the remaining 9 areas.
- Populations were declining on 9 of 13 study areas and stationary on 4 areas. One study area did not have sufficient data to analyze population trends

The results of the study did not identify the causes of population declines. Recommendations for management of the northern spotted owl and its habitat were not given in the report. The relevance of the report to the LSRA is the information on the overall decline of the spotted owl population, and the support for the idea that there is a need for careful consideration of any management across the landscape in potential habitat. As did other reports, this information highlights the need to provide habitat over time for this species where we can.

10-Year Review of the Northwest Forest Plan

This collection of reports on the 10-year anniversary of the Northwest Forest Plan (the Plan) is the first comprehensive analysis and interpretation of monitoring data since the 1994 Record of Decision. These reports attempt to use monitoring and research results to answer questions about the effectiveness of the Plan. The set includes a series of status and trends reports, a synthesis of all regional monitoring and research results, a report on interagency information management and a summary. A copy of the report can be found at http://www.reo.gov/monitoring/10yr-report/.

Preliminary Assessment of the Condition of Watersheds PNW-GTR-647

The assessment is based on 250 watersheds selected at random within the Plan area. The distributions of conditions are presented for watersheds and for many of the attributes that contribute to the condition of watersheds by land use allocation. Under the Plan, management activities were implemented with the intent to promote positive changes in the condition of watersheds. The preliminary assessment revealed that:

- The growth rate of trees (2 to 4 percent) exceeded losses (1.6 percent owing to stand-replacing fire and harvest), and nine times more roads were decommissioned than were constructed.
- Fifty-seven percent of the watersheds had higher condition scores in time 2 (1998–2003) than in time 1 (1990–96) across the entire Plan area. Only 3 percent of the watersheds had lower condition scores in time 2, and the scores did not change in the remainder of the watersheds.
- More key watersheds, which were given the highest priority for restoration activities, increased in condition than non-key watersheds.
- The greatest positive change in watershed condition occurred in late-successional reserves.

Strategy Shift within the Davis LSRA

The original Davis LSRA has proven to be useful and forward-thinking. It recognized the need for tree density management to provide for habitat over time in both a climatic climax condition and a fire climax condition. The major strategy shifts in the revised assessment are:

1. The inclusion of strategic fuels treatments along with management of stand density to provide late-successional habitat over time, recognizing that these conditions will shift around the landscape as some areas fade out due to fires or insects, and as other areas grow back into conditions that will support species that are dependent upon late-successional habitat;
2. A shift away from trying to manage dry ponderosa pine sites for spotted owl habitat; and
3. Controlled access management due to the increase in recreational use and the ongoing reduction of road densities.

Also, happening in Critical Habitat Unit CHU-OR7 (USFWS designation of critical habitat boundary) within the LSR, there may be a future adjustment as part of the final NSO recovery plan which is under development. Regardless, this strategy is based upon providing late-successional habitat over time, within and outside the boundaries.

A main goal within the LSR is to minimize the likelihood of an active crown fire event, or if such an event occurs, timber stands would not be in a condition that would sustain the event over large areas of the landscape. Fuels risk reduction activities are largely based upon spotted owl habitat suitability and a protection strategy as appropriate for the plant association group. For example, more thinning and prescribed burning may occur in ponderosa pine sites, where there is no Nesting, Roosting, Foraging (NRF) habitat. In mixed conifer sites,

thinning and fuels treatments would vary dependent upon the importance of the stand for NRF and the strategic position on the landscape. If the NRF habitat is within an owl home range, then fuels treatments would be less intense or not done at all. If the NRF is outside a home range and within an area that falls within the protection strategy, the treatment intensity would correspond to the vegetation type and crown fire potential. Lodgepole pine would be allowed to continue natural disturbance processes in most areas. If stands are strategically located in an area that is important from a fuels reduction perspective, prescriptions would be used that would retain owl dispersal characteristics. In Management Strategy Areas (MSAs) where the emphasis species is dependent upon lodgepole pine snags and down wood, many of these stands would continue with natural succession. Very little high elevation mountain hemlock density management would be needed. More information on suppression strategy and fuels prescriptions can be found in Chapter 3.

How to Use this Document and Changes Made

For the first time reader, Chapters 1-4 provide useful information prior to planning any habitat manipulation activities. Through the overview and Chapter 1, it is important to understand the latest knowledge and research that has been used to formulate the strategy for determining how to implement a project. Chapter 2, has the most up to date existing condition within the LSR as of 2007. Chapters 3 and 4 should be the focus of the reader familiar with the LSR and seeking specific direction for what is appropriate, and what is not. Both chapters are integrated and should be used mutually. Chapter 3 displays priorities for management activities and appropriate scales and schedules. It sets the overall context. Tables 3-4a through f are key in identifying suitable habitat criteria for a emphasis species by PAG, including desired levels of snags and down wood. Chapter 4 expands on Chapter 3 and applies it to individual Management Strategy Areas, where management options are spelled out.

The following describes the updates to this assessment:

Chapter 1

- Background information – little to no change

Chapter 2

- Key questions remain the same, answers and key components and habitats were updated.
- The flammulated owl and white-headed woodpecker component in ponderosa pine plant associations would no longer be managed as NRF habitat. Frenzel (2002) found that the greatest nesting success occurred in stands where there were 12 ponderosa pine per acre greater than 21 inches diameter. Development of dense understories due to fire exclusion is one cause of reduced white-headed woodpecker habitat
- Bald Eagle Consideration Areas (BECAs) were dropped from the Eagle component and the LSRA altogether for the following reasons:

  1). With a declining spotted owl population and an increasing eagle population, the focus of activities in the LSR will shift to provide more consideration for developing and maintaining owl habitat in stands and plant associations where it can occur.

  2). The Deschutes LRMP provides no standards for vegetation management within BECAs. Bald Eagle Management Areas (BEMAs) provide sufficient habitat. The Davis/Wickiup and Crescent/Odell BEMA plans provide for a mix of habitat types for the eagle. These BEMAS are primarily managed for relatively open conditions with portions of multi-layer dense canopies to provide winter roost opportunities and habitat for other dependent species.
- The connectivity component was updated from 6 corridors to 8.
- Plant Association Group (PAG) conditions were updated and descriptions were edited to meet the updated version. Historic and Existing condition were updated with current vegetation, fire risk and condition class information. Access management information was updated. The botany component and invertebrate components were updated and combined into Survey and Manage Component. A botany

component dealing with sensitive plants and invasive plant species was added and updated. The Survey and Manage (S&M) information was updated to correspond to the 2001 amendment.

Chapter 3

- Considerations for species and associated late successional habitat, unique habitats, insect and disease risks, and fire risks were melded together to develop 6 broad landscape patterns, previously referred to as "areas with a common habitat type and function". Emphasis/indicator species such as the northern spotted owl were selected for each of the six areas and their habitat needs were quantified to help characterize the desired late-successional conditions.
- The Management Strategy Overview was revamped to describe a broader range of habitat descriptions within each area description to depict the dynamic conditions over time.
- The Desired Condition Table (3-1) which represented a forest wide standard in the original LSRA was adjusted to better fit the Davis LSR.
- Tables 3-4a through 3-4f "Suitable Habitat Condition by Plant Association Group" was updated to include new information on snags and down logs (from DecAID).
- Fire suppression priorities and strategies were completely revamped to differentiate between initial attack, extended attack and large fire incidents.
- A fuels strategy was developed.
- All redundant management opportunities were moved to this chapter, and a matrix to display the MSAs and management opportunities was developed.

Chapter 4

- Management Strategy areas were reviewed and updated or changed where appropriate. Format was changed to reduce the size of the document.
- The suppression strategy to keep all fires a 100-acre maximum size, regardless of intensity, was dropped from all MSAs.
- The necessity of strategic fuels treatments to provide a landscape-level protection to the entire LSR was recognized; MSA Y and a portion of J in the wet lodgepole were adjusted to allow some fuels treatment.
- MSAs I, O, and J were changed from an eagle focal species to a joint eagle and spotted owl focal species to recognize the importance of these MSAs for spotted owl connectivity and establishment of newly found territories.
- MSA F was changed from an eagle to an owl focus. Rationale for this change includes:
  --- Bald Eagle Consideration Areas (BECA)s are no longer considered in the LSRA or the Deschutes Forest Plan. Bald Eagle Management Areas provide sufficient areas for bald eagles within the LSR.
  --- Analysis of stand and nest grove data taken at spotted owl nest sites across the district showed that a key component of nesting habitat is large (40 inches and larger in diameter) Douglas-fir. Management in all MSAs that have the ability to produce this key component will focus on providing NRF habitat through time.

Owl Strategy

There are no plant associations within the Davis LSR that can sustain spotted owl nesting roosting and foraging (NRF) habitat indefinitely. The original LSRA recognized that fact and set up goals in Chapter 3 for the percent of the LSR, by PAG, that would be habitat at any given time. For this revision of the LSRA, the original goals were reviewed and projected habitat development was tested with current modeling capabilities. The analysis is not yet complete, but initial indications are that the percentage of the landscape that can exist as NRF habitat at any one time may be less than originally thought. This is due to the length of time it takes to grow back nesting habitat from a stand replacement event, such as a fire or extensive mortality of the large trees from bark beetles. Another factor is that some sites previously identified as mixed conifer sites, such as those that occur on the south side of some buttes, are really ponderosa pine sites with little potential to provide suitable NRF habitat through time. Although these areas would continue to provide northern spotted owl dispersal habitat, they are

better suited to be managed for late-successional species such as white-headed woodpeckers and flammulated owls while maintaining fuels conditions that minimize active crown fire.

A growing body of literature indicates that "suitable habitat" for spotted owls and other late-successional obligate species may not be sustainable on the east side of the Cascade Range. By definition, the concept of sustainability in landscape management refers to the ability of that landscape to provide certain habitat elements over an extended period of time. East side habitats, however, are extremely dynamic and subject to a variety of disturbance factors that can alter or remove habitat elements. Suitable habitat conditions for late-successional species that require climatic climax conditions in this fire-adapted landscape can develop, but historically are transient and distributed around the landscape in a disjunctive pattern.

The 10-year Northwest Forest Plan Review on the Status and the Trends of the Northern Spotted Owl Populations and Habitat (Lint, et al 2005) acknowledged that owl survival and productivity in the Oregon coast range seemed to be improved for spotted owls when there was a mixture of early seral, non-forest, and mid- to late-seral conditions. Though a patchiness of early and late seral stand conditions in Davis LSR are not as dense as at the coast range, some owl pairs successfully reproduce in as many as four of five years (Crescent RD Survey Data).

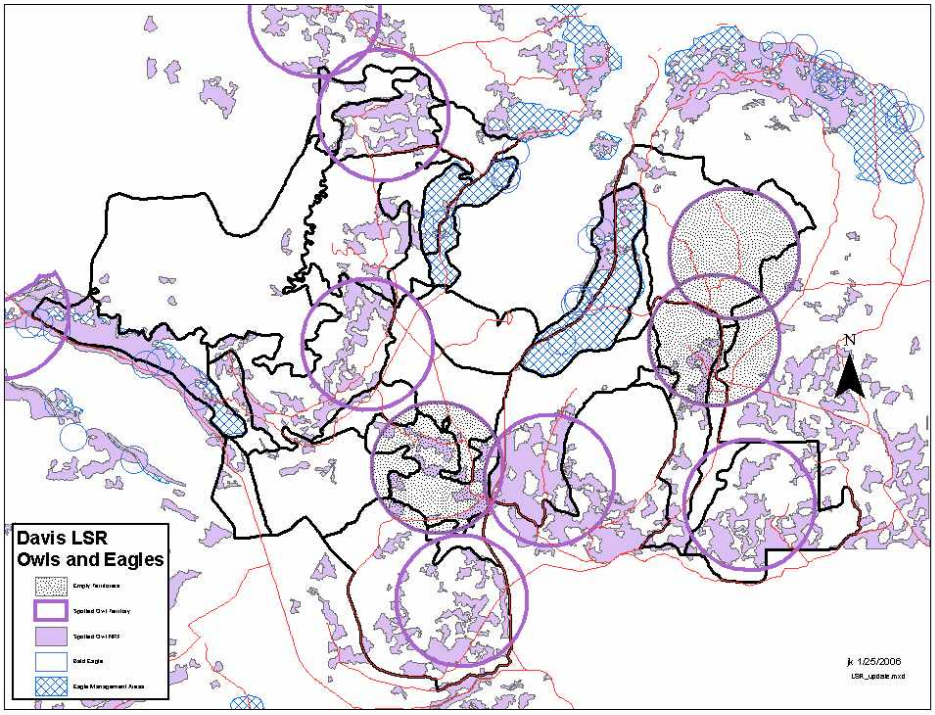

Figure I-2. Spotted owl and bald eagle habitat in the Davis LSR.

The focus of all treatments is to maintain the large tree component on the landscape. The ability to have NRF habitat somewhere on the landscape at all times is the goal. Since we recognize that NRF conditions are not sustainable in eastside fire-adapted ecosystems, the NRF present on the landscape would change locations through time. Hence, there would need to be stands in near NRF conditions that could return within a few decades. NRF and dispersal stands would need to be intermixed/adjacent across the landscape to provide for movement of the young birds when they leave the nesting areas. It is assumed that the disturbance events in NRF stands would set the stands back to mid-seral or early seral conditions. These stands would need to be managed for an appropriate mix of tree species and kept fairly well thinned (open grown) so they could grow back to large tree-dominated structures as quickly as possible.

PAGs capable of producing large Douglas-fir will be managed for NRF. Most of the dry ponderosa pine habitat in the LSR is suitable as habitat for species such as white-headed woodpeckers and bald eagles. These stands have little or no potential to be suitable NRF for the northern spotted owl. Lodgepole pine and mountain hemlock (dry) areas also have little or no potential to be NRF for the northern spotted owl because of lack of necessary stand structure. These stands will be allowed to continue their natural disturbance processes in most areas.

Fire Suppression Strategy

Fuel loadings and risk from wildfire varies across the LSR. The LSR and surrounding areas were rated for potential for a problem fire event, where suppression efforts would not be able to keep fires small, or where fire effects result in mixed to high severity. Level of risk was determined using problem fire potential based on fuel model, crown bulk density, trees per acre, and historical weather observations.

Fuels Strategy

The Davis LSRA fuels strategy considers how fires move across the landscape, and is built upon a fusion of Geographical Information Systems and landscape fire behavior modeling (Figure 3-8, Davis LSR Fuels Strategy). Strategically placed landscape area treatments, or SPOTS, is the concept used. Built on a concept developed by Mark Finney of the Missoula Fire Lab, fuels reduction is optimized on the landscape. This was the basis for developing areas in the Davis LSR that are maintained through time where fire behavior is modified.

Identified as the largest and most destructive fire in the area in recent times, the 2003 Davis Fire was used to represent the "problem fire" scenario. Opportunities for fuels modification and maintenance are identified in key places to isolate owl home ranges and reduce the risk of multiple home ranges being affected by a wildfire event. These landscape-level treatments will not only reduce the risk and maintain late-successional habitat, but will also reduce the risk to surrounding communities in La Pine and Crescent/Gilchrist.

FlamMap, Version 3 (www.fire.org) was the primary modeling tool for the risk analysis with Forest Vegetation Simulator (FVS) and Fire Fuels Extention (FFE) projections providing key input data. Much of the analysis process was conducted in the ArcFuels (Ager, 2006) analysis framework using Visual Basic scripts (Pattison 1998) and the ArcObjects library (Chang, 2004) including building FVS-FFE runs, mapping FVS outputs, and building the input files for FlamMap. FVS-FFE was used to calculate the following inputs to FlamMap including:

- crown bulk density (kg/m2)
- height to live crown (ft)
- total height (ft)
- canopy (percent)
- flame length (ft)
- crown fire activity.

These variables were then combined with a map of fuel models (Scott and Burgan, 2005) obtained from the Deschutes National Forest and used to generate landscape input files for FlamMap. The following processes were essential elements in modeling risk:

- location of point of ignition
- weather conditions
- distribution of fuels across the landscape
- fuel reduction activities
- suppression efficacy
- fire behavior
- fuel conditions in Late Successional Habitat.

In areas where fuels reduction is to be accomplished by small diameter thinning alone, both NRF and Non-NRF areas will utilize the following prescriptions based upon owl habitat suitability and asset protection. The goal is to retain a diverse range of size classes, if available. The purpose of the fuels treatments is to reduce problem fire potential by isolating the canopy. This is being accomplished by modifying three aspects of a fuel profile:
1. Reduce fuel loading (decreases surface fire flame lengths)
2. Reduce ladder fuels (decreases conduit for ground to crown fire)
3. Raise the canopy base heights (another way to keep surface fire from the crown)

The main difference between NRF and Non-NRF fuel reduction activities is the size and intensity of small diameter tree thinning. In NRF treatments, the trees to be thinned would be the smaller diameters (generally 3 inches in diameter and less) and would have reduced spacing between leave trees, whereas non-NRF tree diameters range up to approximately 6 inches with wider spacing. NRF treatments remain classified as NRF after treatment. For examples of prescriptions, see Chapter 3 for more details.

All areas will retain sufficient dead and down woody material by condition class and habitat type as specified in Tables 3-4a through f.

Risk Reduction through Salvage Strategy (ROD, C-13 through C-16)

The original assessment allowed for risk reduction through salvage within most MSAs where there was a catastrophic loss of habitat, but did not specify a level. This assessment provides more specific direction based on lessons learned in the Davis Fire.

It is recognized that fire creates large pulses of snags. A snag analysis at the proper scale would determine the amount of risk reduction that should occur. Types of treatments that would be appropriate would include varying degrees of removal of dead wood for economical reasons, post-salvage fuels activities and reforestation. Planning efforts should take into account the feasibility of implementing post-salvage fuels treatments and incorporate the effects in the appropriate context. Planting strategies should include variable density planting with a mix of tree species to match what was present prior to the fire. Spacing of conifer seedlings should be wide enough to achieve the habitat objectives for future nest trees. Also, intermediate thinning of trees should be needed in very few circumstances. Snags and down wood levels to be retained would be based on focal species for that MSA, and the best available science.

In MCD and PP, where the potential for uncharacteristically severe fire behavior is possible, treatments to accelerate habitat development and maintain stands with fire would be appropriate if:

- The area of high intensity/stand replacement fire is large enough to where it is determined the potential fuel loading could threaten adjacent resources;
- The potential for replacing suitable habitat is shown to be delayed by at least 100-years using estimates of the current state of knowledge (i.e. loss of seed source and risk to the regenerating forest) and;
- Proposed treatments meet B-8 through B-9 direction in the ROD for “Management after Disturbance” and C-13 through C-16 Standards and Guidelines.

Retain lodgepole pine habitats after a wildfire event for 5-7 years to provide habitat for the black-backed woodpecker. After that, fuels treatments, including potential special forest products such as biomass and firewood, should be considered in areas in and adjacent to major roads, recreation sites, fuels strategy areas and wildland urban interface.

In PAGs where the fire regime has a long fire return interval and it usually is stand replacement, such as in Mixed Conifer Wet and Mountain Hemlock Dry, fuels treatments would be inappropriate except in identified fuels strategy areas and in areas of high human use, including Wildland Urban Interface areas.

CHAPTER 1 - BACKGROUND INFORMATION

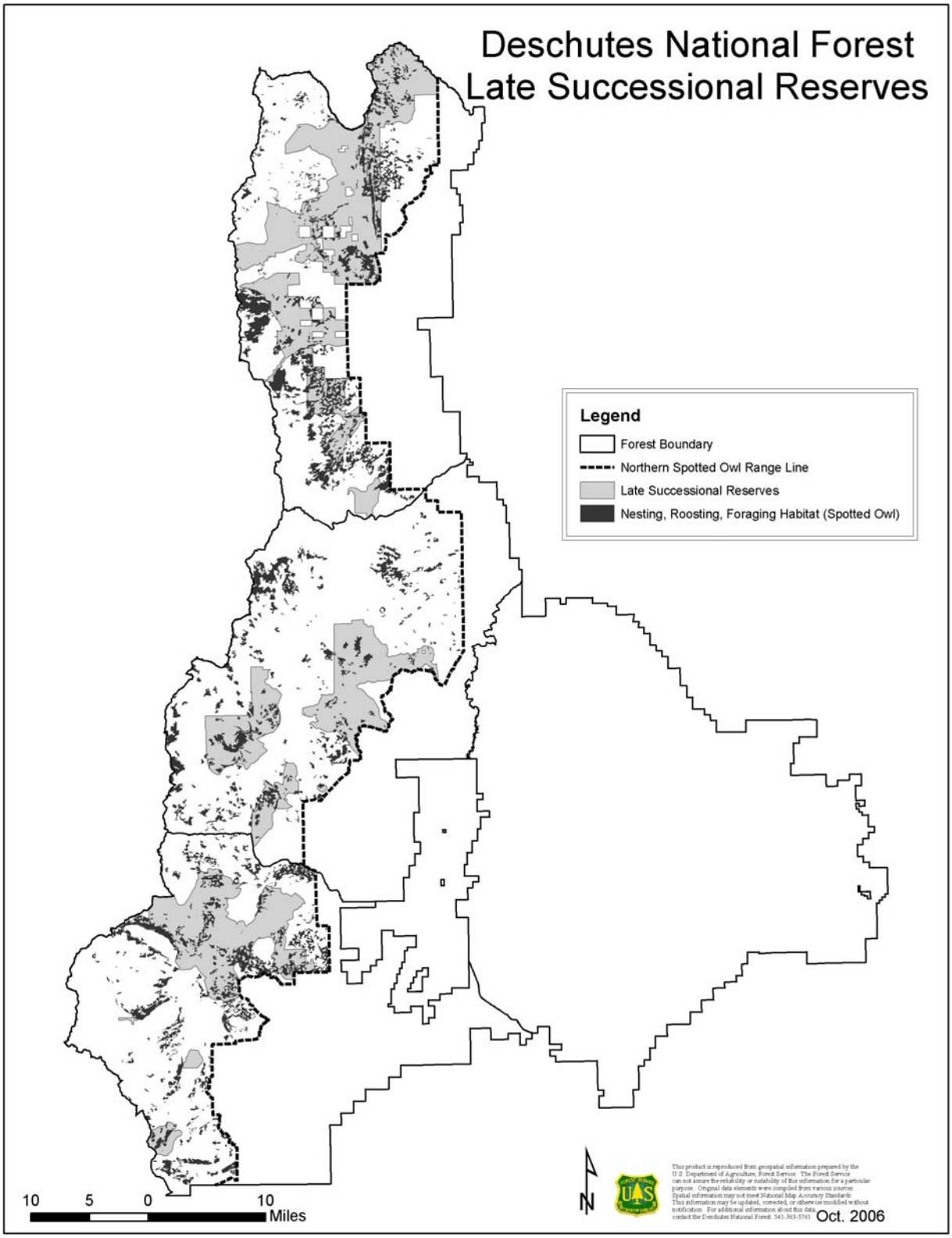

Figure 1-1. Deschutes National Forest Late Successional Reserves.

WHAT IS A LATE-SUCCESSIONAL RESERVE ASSESSMENT?

The 1994 Northwest Forest Plan allocated areas within National Forests of the Pacific Northwest to be managed as part of an interacting network of late-successional and old-growth forest ecosystems that will serve as habitat for late-successional and old-growth related species such as the northern spotted owl. As directed by the Northwest Forest Plan, management assessments are to be prepared for each designated LSR before habitat manipulation activities are designed and implemented. These assessments should generally include the following eight elements:

1) A history and inventory of overall vegetative conditions within the reserve;

2) A list of identified late-successional associated species known to exist within the Late-Successional Reserve and information on their locations;

3) A history and description of current land uses within the reserve;

4) A fire management plan;

5) Criteria for developing appropriate treatments;

6) Identification of specific areas that could be treated under those criteria;

7) A proposed implementation schedule tiered to higher order plans; and

8) Proposed monitoring and evaluation components to help evaluate if future activities are carried out as intended and achieve desired results.

(Northwest Forest Plan, Record of Decision, C-11)

To some extent, the eight elements listed above have all been addressed in one or more of the following documents: the 1994 Northwest Forest Plan, the 1994/1999 Odell Pilot Watershed Analysis, the 1995 Deschutes National Forest Late-Successional Reserve Overview, the 1990 Deschutes National Forest Land and Resource Management Plan (LRMP), and this document - the Davis Late-Successional Reserve Assessment. The following is a brief summary of each of these documents as they pertain to the eight elements.

1994 NORTHWEST FOREST PLAN

The 1994 Northwest Forest Plan provides the objectives for this LSR assessment. The following objective was used to develop the team's key questions and focus the assessment:

> "Late-Successional Reserves are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. These reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem" (C-11).

Other objectives include:

> "...provide a distribution, quantity, and quality of old-growth forest habitat sufficient to avoid foreclosure of further management options...provide habitat for populations of species that are associated with late-successional forest...and help ensure that late-successional species diversity will be conserved" (B-4, 5).

Summary and Update

Protection from a large scale disturbance through risk reduction is the main objective for this LSR Assessment. The Northwest Forest Plan allows management strategies and activities to be developed that "protect and enhance" conditions which inherently exist on the east or west sides of the Cascade Mountains.

The Northwest Forest Plan recognizes that LSRs east of the Cascades have an increased risk of fire due to lower moisture conditions and the large accumulations of fuels following insect outbreaks and drought; therefore, it provides for maximizing late-successional conditions by developing a strategy in locations and patterns across the landscape that make a difference, and that end up protecting more acres than are actively managed.

The ROD Standards and Guidelines state that risk management activities are encouraged because they may reduce the probability of major stand-replacing events. Specific guidelines for salvage (C-13 through C-16) and multiple-use activities other than silviculture (C-16 through C-19) are provided in the Northwest Forest Plan ROD.

DESCHUTES NATIONAL FOREST LSR OVERVIEW

In February 1995, the entire network of Late-Successional Reserves designated on the Deschutes National Forest was assessed to provide a larger context for each of the site-specific LSR assessments (see Figure 1-1). A Forest-wide overview document was prepared to provide LSR teams with the following information: 1) a general description of the vegetative series and related flora and fauna species for each specific LSR; 2) a discussion of the processes that sculpted the Forest landscape and potential future risks; 3) a description of forest pattern and structure; and 4) a discussion of forest function across the landscape with regard to habitat and habitat connectivity.

The Forest Overview recognizes that some of the Deschutes LSRs provide habitat for species, such as the white-headed woodpecker, that rely on late structured stands maintained by frequent, low intensity fire regimes. Much of the Davis LSR is occupied by dry mixed conifer forest that is characterized as a "fire-climax" ecosystem. Currently, most of these forest stands are overstocked and at high risk of insect and disease infestation and catastrophic wildfire.

The LSR also contains wet and dry mixed conifer forests which can be managed as "climatic-climax" ecosystems. These ecosystems are better suited for providing habitat for species like the northern spotted owl that are dependent on late and old structured stands.

The Forest Overview acknowledges the need to maintain a dynamic balance of all vegetative series including both the climatic-climax and fire-climax ecosystems to provide opportunities for ecosystem maintenance and restoration of existing and potential natural vegetation.

The Forest Overview also notes that the mountain pine beetle epidemic has affected many of the late and old-structured lodgepole stands in the Davis LSR. When present, these types of stands can serve as dispersal habitat for the northern spotted owl.

Davis LSR is surrounded by the following land allocations on the Crescent Ranger District: Administratively Withdrawn Areas; Congressionally Reserved Areas; Matrix areas; and other LSRs (Crescent LSR, Upper Big Marsh LSR, Lower Big Marsh LSR).

A large contiguous block of Administratively Withdrawn lands (LRMP designation - Dispersed Recreation) flanks the Davis LSR to the northwest. The Diamond Peak Wilderness located west of Davis LSR and the Oregon Cascades Recreation Area located to the southwest constitute the majority of Congressionally Reserved Areas on the district and provide connectivity of late and old-structured (LOS) forests between the Davis LSR, Crescent LSR and LSRs west of the crest of the Cascade Range.

The majority of the land north of Davis LSR on the Crescent and Bend Ranger Districts is Matrix land. These Matrix lands are highly fragmented and habitat connectivity to the Cultus and Browns LSRs is marginal,

especially after the 2003 Davis Fire. Matrix and private land dominate the landscape south of Davis LSR. Habitat connectivity between the Davis and Lower Big Marsh LSRs is also fragmented. Approximately 6,000 acres of Matrix land (west of the spotted owl range line) flank Davis LSR to the east. This area provides additional NRF habitat for spotted owls but is also fragmented. The northeast boundary of the Davis LSR is bordered by Matrix land on Davis Mountain, which provides limited dispersal and NRF habitat connectivity to the Browns LSR located about three miles to the north.

CRITICAL HABITAT UNIT DESIGNATIONS

The Davis Late-Successional Reserve is encompassed by a designated Critical Habitat Unit (CHU OR-7). Only minor portions of this CHU fall outside of the Davis LSR boundaries. This inconsistency is more by oversight than intent. This CHU land designation by the US Fish and Wildlife Service (USFWS) provides protection of habitat under the Endangered Species Act. Consultation with the USFWS is required before land management activities can occur in the CHU.

DESCHUTES NATIONAL FOREST PLAN

The 1990 Deschutes National Forest Land and Resource Management Plan (DNF LRMP) allocated several areas within the Davis LSR to be managed to provide specific wildlife habitats. Three Bald Eagle Management Areas (BEMAs) are designated within the LSR near Davis and Odell Lakes (see Figure 2-5). Four Old Growth Management Areas are also designated within the LSR (see Figure 2-5). Two Key Elk Areas are designated within the lodgepole pine plant association group (see Figure 2-6).

1994/1999 ODELL PILOT WATERSHED ANALYSIS

The Davis LSR Assessment is considered to be a continuation of the 1994/1999 Odell Pilot Watershed Analysis which set the overall physical, social, and biological context for the Davis LSR. Only a small portion of the LSR is not included in the Odell Watershed (see Figure 1-2).

A great deal of knowledge about wildlife species in the Davis LSR has already been documented in the 1994/1999 Odell Pilot Watershed Analysis (Odell WA). The LSR team attempted to minimize repetition of information already documented in the Odell WA and its appendices. Therefore, this updated assessment summarizes important information or incorporates information from the watershed analysis by reference. However, an updated list of wildlife species by Plant Association Group and the structural stages that they utilize for breeding, foraging and/or nesting habitat can be found in Appendix E – Wildlife of the Watershed Analysis. Also in this appendix is an updated listing of botanical species by Management Strategy Area.

DAVIS LATE-SUCCESSIONAL RESERVE ASSESSMENT

This document is a site-specific LSR Assessment for the Davis LSR, which encompasses 48,890 acres near Davis Lake. This document accounts for each of the eight elements listed in the Northwest Forest Plan (C-11) for LSR Assessments. Pertinent information from the documents described above plus additional new information has been organized into a strategy designed to attain the objectives developed for LSRs in the Northwest Forest Plan.

The following is an index for the eight elements to be included in a Late-Successional Reserve Assessment. The location of pertinent information addressing each element is identified.

1) A history and inventory of overall vegetative condition;

-- Odell Pilot Watershed Analysis - Historic Range of Variability and Plant Association Group discussions. These have been updated and described in Chapter 2 of the LSRA.
-- Deschutes LSR Overview - Forest overview of vegetative conditions.
-- Chapter 4, Management Strategy Areas - Existing Condition, Late and Old Structured Stands, Forest Dynamics.

-- Chapter 3, LOS Protection Strategies.

2) A list of identified late-successional associated species;

-- Deschutes LSR Overview - Forest context of habitats.
-- Odell Pilot Watershed Analysis - Biological Domain.
-- Chapter 4, Management Strategy Areas - Existing Condition, Wildlife.
-- Chapter 3, Areas with a Common Habitat Type and Function Description.
-- Chapter 2, Components of the Wildlife Composite Map with Documentation.

3) A history and description of current land uses within the reserve;

-- Odell Pilot Watershed Analysis - Social Domain.
-- Chapter 4, Management Strategy Areas - Existing Condition, Social Context, Summary Table.

4) A fire management plan;

-- Chapter 4, Management Strategy Areas - Existing Condition, Fire; Management Options, Fire Suppression.
-- Chapter 2, Fire Component - Fire History, Hazard, and Risk.
-- Objectives and Guidelines for Implementing Fire Management Activities in the Davis LSR are incorporated into the Chapter 4 MSA discussions. Also included are elements to consider when completing a Wildland Fire Situation Analysis.

5) Criteria for developing appropriate treatments;

-- Northwest Forest Plan, Record of Decision.
-- Chapter 4, Management Strategy Areas - Emphasis and Selected Species; Criteria for Developing Appropriate Treatments - Objective, Desired Condition, and Management Options.
-- Chapter 3, Management Strategy Overview.
-- Odell Pilot Watershed Analysis - Goals, objectives, and opportunities.
-- Deschutes Forest Plan - Standards and guidelines, Bald Eagle Management Plans, etc.

6) Identification of specific areas that could be treated under those criteria;

-- Chapter 4, Management Strategy Areas - Objective and Management Options.
-- Chapter 3, Management Strategy Overview, LOS Protection Strategies.
-- Chapter 2, How Management Strategy Areas were delineated.

7) A proposed implementation schedule tiered to high order (i.e. larger scale) plans;

-- Chapter 4, Management Strategy Areas - Objective and Management Options.
-- Chapter 3, LOS Protection Strategies.

8) Proposed monitoring and evaluation components to help evaluate if future activities are carried out as intended and achieve desired results.

-- Chapter 4, Management Strategy Areas - Monitoring of Management Options; Monitoring, Evaluation, and Research.
-- Chapter 3, Monitoring Priorities.
-- Odell Pilot Watershed Analysis.

PUBLIC AND INTERAGENCY PARTICIPATION

In March 1995, a public open house was held in Bend, Oregon, to share information about Late-Successional Reserves and the assessment process. Some issues and concerns were identified for the Davis LSR. However, the majority of public issues concerning the Davis LSR were identified during the 1994/1999 Odell Pilot Watershed Analysis.

Interagency participation during the Odell Pilot Watershed Analysis helped provide the ground work needed for the Davis LSR Assessment. A representative from the US Fish and Wildlife Service was a member of the watershed analysis core team. Representatives from the US Fish and Wildlife Service helped review the LSR Assessment and Update process and consequent management options. In December 1995, US Fish and Wildlife representatives and members of the interagency Issue Resolution Team (IRT) and the Regional Ecosystem Office's (REO) Late-Successional Reserve Working Group visited the Davis LSR to review and provide input to the draft assessment. The REO Working Group attended a field trip in June, 2006, to review the 2006 LSRA update.

Throughout the update process, the Deschutes Provincial Advisory Committee (PAC) has been presented with progress reports and new information as well as trips to the field after the 2003 Davis Fire.

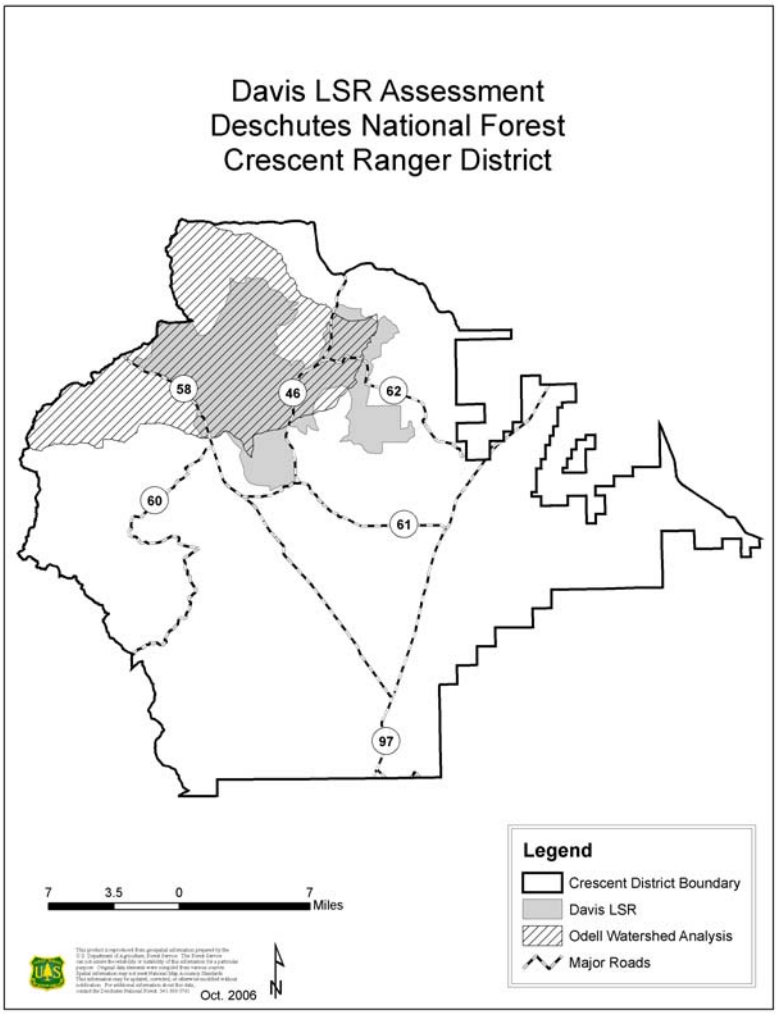

Figure 1-2. Locations of the Davis LSR and the Odell Watershed Analysis area.

From here to there… the road to the Davis LSR

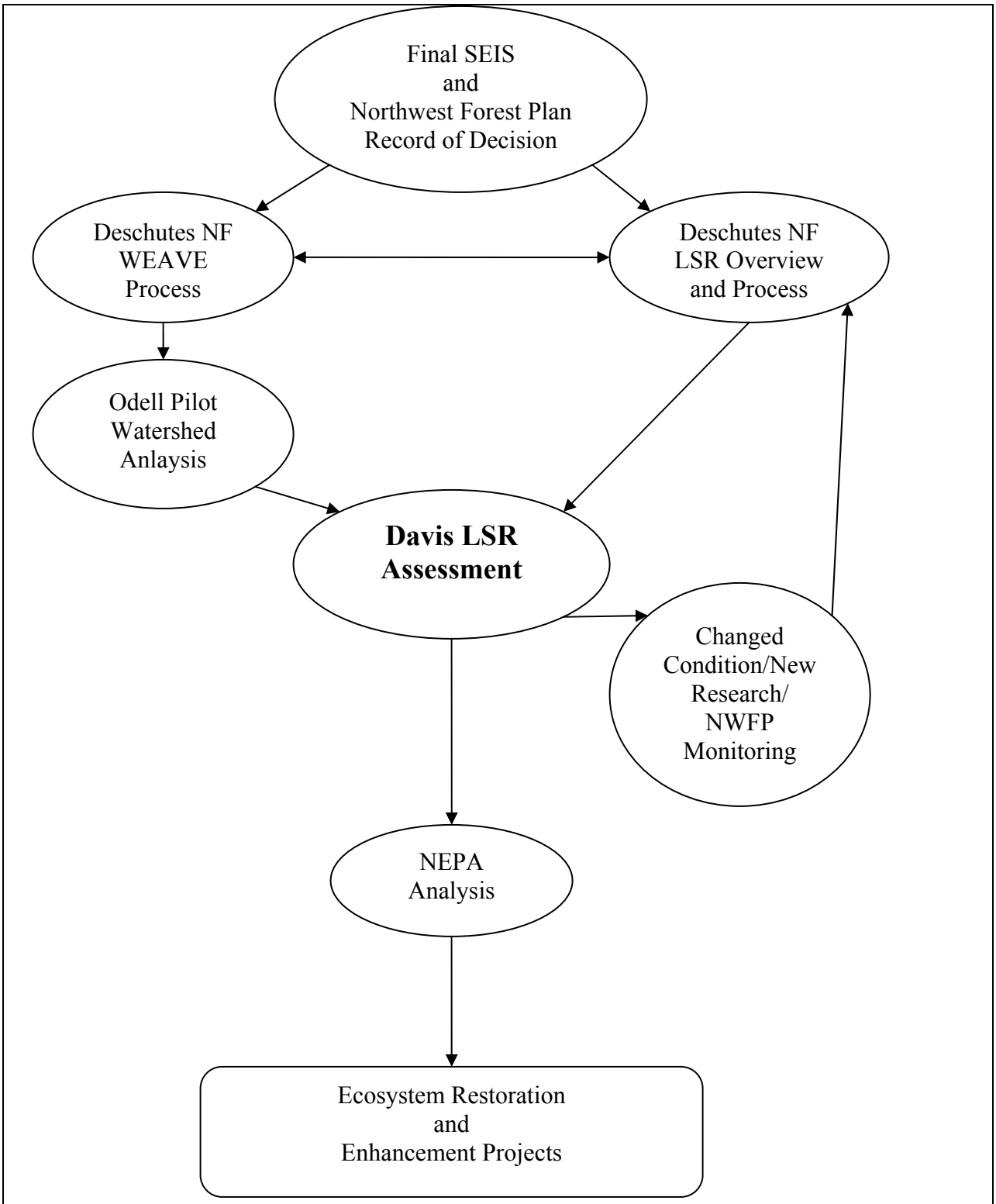

Figure 1-3. The LSR Assessment process.

CHAPTER 2 - ANSWERING THE KEY QUESTIONS

LSR OBJECTIVE

"Late-Successional Reserves are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. These reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem" (Northwest Forest Plan C-11).

KEY QUESTIONS TO ANSWER

In response to the objectives set for LSRs in the Northwest Forest Plan (C-11), the Davis LSR Assessment Team developed two key questions to guide and streamline their data gathering and analysis process. The two key questions were stated as follows:

> **FIRST** - How does the Davis Late-Successional Reserve serve as habitat for late-successional and old growth related species including the northern spotted owl?
>
> **SECOND** - Where and when are forest management activities for risk reduction needed to protect the existing and potential habitat for late-successional and old growth related species within the Davis LSR?

The first question was developed to understand the different types of late-successional and old growth habitat that exist, or have the potential to exist, within the Davis LSR. By answering this question the LSR was stratified into six areas with each area representing a different type of wildlife habitat and function. These areas were mapped and their functions within and outside the Davis LSR were documented (see the beginning of Chapter 4 and Figure 2-7, Areas with Common Habitat Type and Function).

The second question was then developed to understand the existing condition of these delineated habitat areas and determine "when" and "where" management activities are indicated to protect late and old-structured components. The scope of potential management activities was confined to the issues and opportunities identified in the Northwest Forest Plan, the Deschutes National Forest LSR Overview, the 1994/1999 Odell Pilot Watershed Analysis, Davis Fire EIS (USDA FS, 2003), Provincial Advisory Committee (PAC) reviews, *Northern Spotted Owl, Five-Year Review: Summary and Evaluation (2004 US Fish and Wildlife Service), Scientific Evaluation of the Status for the Northern Spotted Owl (2004 SEI Report), Status and Trends in Demography of Northern Spotted Owls, 1985-2003, the Preliminary Assessment of the Condition of Watersheds (PNW-GTR-647), and the 10-Year Review of the Northwest Forest Plan*. Consequently, the following activities were considered:

- Attainment of LSR-related objectives and opportunities in the Odell Watershed Analysis
- Protection and maintenance of threatened and endangered species and their habitats in appropriate places
- Development, maintenance and enhancement of existing habitat for late-successional and old growth related species (including animals, plants and fungi), as well as accelerating development of new habitat
- Where, when, and how much fuels treatments can be most efficacious on the landscape
- Wildfire suppression as well as the careful return of prescribed fire in appropriate places
- Utilization of fire, insect, and disease disturbances to meet habitat needs
- Strategic reduction of the risk of uncharacteristically severe fire and/or problem fire disturbances
- Strategic reduction of the risk of uncharacteristically severe insect and disease disturbances

- Restriction/improvement/reduction/maintenance of road access
- Management of invasive plant species
- Restoration/maintenance of soil quality within the LSR
- Management of commodities within the LSR, including under what circumstances salvage activities are appropriate
- Management of recreational use within LSR
- Identification of resource inventory needs
- Monitoring/evaluation of management activities

From this analysis, a wide range of conditions were determined to exist throughout the identified habitat areas. For example, some areas that provide or have the potential to provide habitat for the northern spotted owl were assessed as being in imminent risk of losing their late and old-structured components from insects, disease, or fire. In addition, other areas providing the same type of habitat were assessed as being healthy with a need for minimal maintenance activities.

To represent this diversity of existing conditions, the six large areas (beginning of Chapter 4) representing the different types of wildlife habitat and/or function within the LSR were subdivided into smaller areas. The team refers to these areas as Management Strategy Areas (MSAs) because their existing and potential conditions seem unique enough to logically suggest a different management strategy in terms of activities or timeline.

The overall management strategy overview for the six large areas is discussed in Chapter 3. In addition, the desired late successional conditions for the LSR as a whole are displayed - specifically for the plant association groups and emphasis species. Managing for the dead wood component and LOS protection through risk reduction strategies are also documented in Chapter 3.

The listing of appropriate activities are documented and organized by the Management Strategy Areas (Chapter 4). There are twenty-eight MSAs delineated within this 48,890 acre LSR. For each MSA, an existing condition, desired condition, objective, management options, and monitoring and evaluation elements have been identified and documented.

QUESTION #1: HOW DOES THE DAVIS LSR SERVE AS HABITAT FOR LATE-SUCCESSIONAL AND OLD GROWTH RELATED SPECIES?

Because the end product of the LSR Assessment should be a strategy that protects habitat for all late successional and old growth species known or suspected to occur in the Davis LSR, it is necessary to make conscious decisions about where to manage for which species and over what time period. A balance between species needs must be achieved and sustained over time because they vary.

Equally important are the interactions of these species and their culmination in a functioning forest ecosystem. Although it was not possible to visually illustrate the concept of "the whole is more than a sum of its parts" in this process, ecosystem function as well as emphasis species needs were considered to be key components in delineating the different habitat areas within the Davis LSR.

The following species or species groups and their associated habitats were selected to provide a means of focusing and prioritizing areas within the LSR for protection through risk reduction activities: ***northern spotted owl, pileated woodpecker, northern goshawk, black-backed woodpecker, great gray owl, flammulated owl, white-headed woodpecker, northern bald eagle, osprey, wolverine, marten, fisher, elk, amphibians, and neotropical migratory birds.*** These emphasis species were selected because they utilize and represent a broad spectrum of habitat types in the various plant association groups (PAGs).

How does the Davis Late-Successional Reserve (LSR) serve as habitat for late-successional and old growth related species including the northern spotted owl?

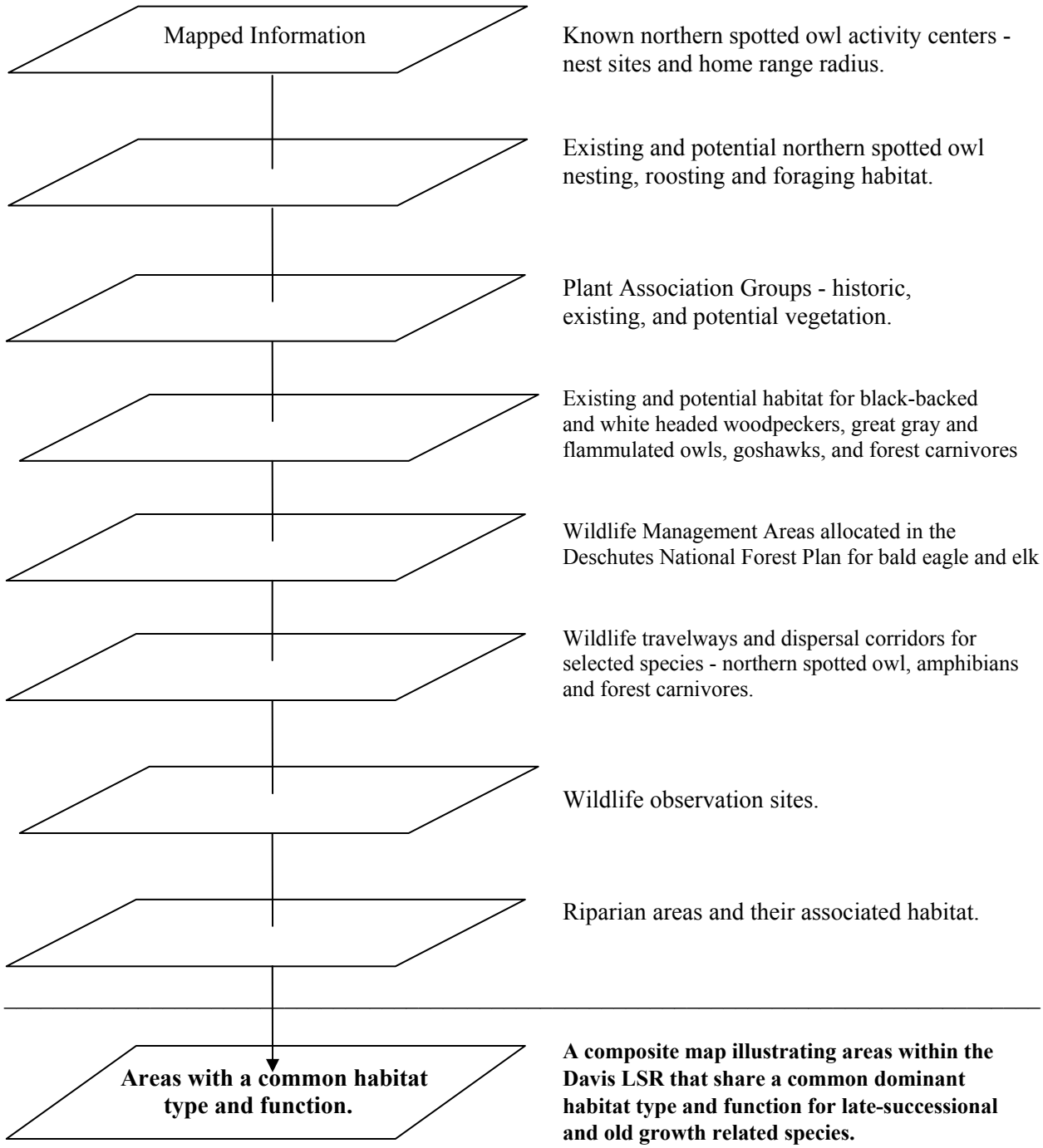

Figure 2-1. The LSRA Process - Question #1.

For example, the black-backed woodpecker primarily utilizes late and old growth stands in the lodgepole pine PAG, and the spotted owl utilizes late and old growth stands in the mixed conifer PAGs. Moreover, various species may prefer different structural conditions within the same plant association group. In the mixed conifer dry PAG, the white-headed woodpecker utilizes forest stands with a more open structure, while spotted owls utilize stands with a more dense, multi-storied structure. It is assumed that by protecting late successional ecosystems and attempting to accommodate the diverse habitat needs of these emphasis species, other late successional species such as the northern goshawk and pygmy nuthatch will have their habitat needs addressed.

Figure 2-1 illustrates the thought process that was used to determine and delineate areas within the LSR that share a common dominant habitat type and/or function. A prototype composite map, which is not included as part of this document, was first created by overlaying all of the habitat maps illustrated in Figure 2-1. Different habitat areas were delineated based on the current condition of habitat for these species. For example, if an area presently functions as a spotted owl activity center, it was delineated to serve as "climatic-climax" type habitat versus "fire-climax."

From this prototype wildlife habitat composite map, which was a cluttered and complex assimilation of all of the key species habitats, a revised map, entitled "Areas with a Common Dominant Habitat Type or Function" was derived (see Figure 2-7). This map illustrates common habitat function and connectivity within the various plant association groups.

For example, one area identifies where it is desirable to maintain a functional late and old structured (LOS) ecosystem in the mixed conifer PAG. This area would provide nesting, roosting, foraging (NRF) habitat for the spotted owl and the myriad of other plant and wildlife species that are associated with this type of ecosystem. Another area on the map illustrates an area of lodgepole pine PAGs where it is desirable to provide habitat for black-backed woodpeckers and a multitude of riparian associated species. The "Dual Connectivity Areas" provide important habitat links and functions in both the lodgepole and the mixed conifer PAGs.

This map illustrates the first step toward delineating the Management Strategy Areas (MSAs) within the LSR. The map of the areas with a common dominant habitat type or function was the foundation, or base map for determining the MSAs. The subdivision of these areas into the MSAs is described in the next section which answers the second key question.

COMPONENTS OF THE DAVIS LATE SUCCESSIONAL RESERVE

The following is a general description of each component that contributed to the identification of the areas with a common dominant habitat type or function within the LSR. Detailed descriptions of habitat needs and their existing conditions can be found in Chapter 2, Biological Domain-Wildlife Section and Appendix E of the Odell Pilot Watershed Analysis (Odell WA) and in Chapter 4 of this assessment.

NORTHERN SPOTTED OWL COMPONENT

The Davis LSR is located at the eastern edge of the range for the northern spotted owl. Protection of the owl in this fringe habitat is believed to be important for the viability of the species. Individuals and populations at the edge of a species range often possess the genetic constitution that expands the adaptive capability of the species. This capability affords the species protection from random large-scale disturbance events and enhances its ability to adapt to large-scale changes such as global warming.

The Davis LSR is located in a designated Critical Habitat Unit for the northern spotted owl. This land designation by the United States Fish and Wildlife Service (USFWS) provides protection of habitat under

the Endangered Species Act and requires consultation on management activities that may affect habitat in the CHU.

There are eight known spotted owl activity centers in the LSR. Information on these owls, including their reproductive history, has been collected since 1989. Table 2-1 displays the last 14 years of information on the status of all known activity centers. One nest site, Davis Mountain, has been abandoned due to stand replacement wildfire in 2003 (Davis).

Table 2-1. Reproductive History of the Northern Spotted Owls With Complete or Partial Home Ranges within the Davis LSR on the Crescent Ranger District.

Forest Owl Pair Number	Forest Site Name	Status 93	Status 94	Status 95	Status 96	Status 97	Status 98	Status 99	Status 00	Status 01	Status 02	Status 03	Status 04	Status 05	Status 06
2001	McCool Bt.	unk	unk	NA	NA	NA	NA	P-1	NA	NA	unk	NA	NA/B	NA	NA
2002	Hamner Bt.	R/2	unk	P	P	P	NA	NA	NA	NA	NA	R-1	P	P	NA
2003	Ringo Bt.	R/?	P-1	P	R/1	NA	R/2	P-1	unk	NA	NA	NA	P-1	P	NA
2004	Maklaks Mt.	unk	unk	R/1	R/1	P-1	P	P-1	NA	NA	R/2	NA	R/2	R/1	NA
2005	Moore Cr.	unk	R/1	P	P	unk	P	NA	unk	unk	R/1	R/?	NA	NA	NA
2006	Davis Mt.**	NA	R/2	R/1	R/2	P	R/1	P	R/1	P-1	P	R/1*	ab	ab	ab
2008	Saddle Bt.	P-1	R/1	P-1	R/1	NA	R/2	P-1	unk	NA	NA	NA	NA	NA	NA
2010	Royce Mt.	unk	unk	P-1	NA	P-1	NA	unk	unk	unk	S	S	NA	NA	NA
2011	Moore Cr. Trail	P	S	NA	unk	NA	unk	NA	unk	NA	NA	NA	NA	S	P
2013	W. Pass											P	NA	NA	NA

* One adult and one juvenile owl were located on Hamner Butte in late July following the Davis Mountain Fire. Since there were no responses during two Hamner Butte surveys earlier in the year, it is unclear whether the adult and juvenile located were from the Hamner Butte site or birds that had moved from the Davis Mountain site to escape the fire.

**Davis Mt. Prior to the 2003 fire was 56% NRF within 1.2 mile
S = single site, single bird; P = pair site, occupied; P-1 = pair site occupied, 1 bird located; R/# = pair, nesting attempt/# of young;
NA = surveyed; not active; B= Barred Owl; unk = unknown site status; ab = abandoned

Currently, within the LSR there are 8,313 acres (17 percent of the LSR) of spotted owl nesting, roosting, and foraging habitat (NRF) (see Table 2-2 and Figure 2-3). In the original 1995 assessment, there was 15,451 acres of NRF. In 2002, understory thinning reduced this number to 12,497 acres. Then, the 2003 Davis Fire reduced this further to the current level.

Table 2-2. Nesting Roosting, Foraging Habitat within the Davis LSR.

Davis Late-Successional Reserve	**2000/2001**	**2002/2003**	**2003/2004**	**2004/2005**
Total LSR Acres		49,126	49,126	49,126
Acres NRF in LSR	13,551	12,497	8,313	8,313
Acres LSR Overlap with Critical Habitat Unit		31,775	31,775	31,775
# Occupied HR in LSR / Total HR in LSR	Unknown	5/10	5/10	3/10

Originally, NRF management was based on the assumption that mixed conifer wet and dry Plant Association Groups can be managed to create and sustain NRF habitat, with 28,857 acres of potential NRF habitat in LSR or approximately 51 percent of the landbase. Since 1995, definitions of NRF and where it can be sustained on the landscape has been refined. Regardless of the label on the plant association, it is recognized that NRF habitat on the Deschutes National Forest is generally not considered sustainable on an indefinite basis on any acre without management intervention. Currently, structure owls are using has developed as a result of fire exclusion and the consequent shift in fire intolerant species in the understory. This habitat type is considered unstable and was not historically present in the quantity that it is today. This was evidenced in the 2003 Davis Fire, where stand mortality likely occurred in greater proportions than historically.

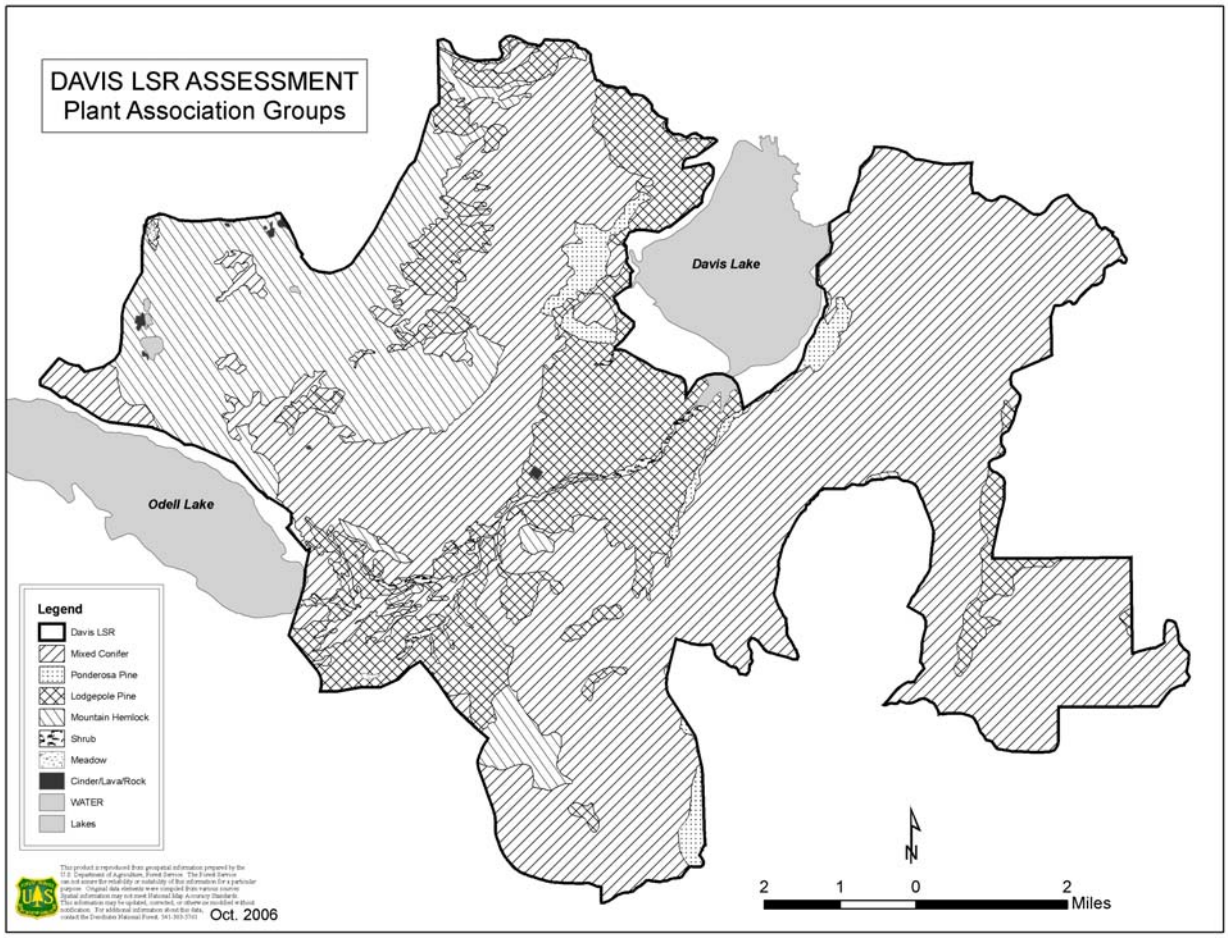

Figure 2-2. Davis LSR Plant Association Groups.

There are 54 plant associations grouped into 9 PAGs (Plant Association Groups). District-wide, analysis has shown only 6 plant associations of the 54 (2 PAGs) where vegetation is most capable (i.e. potential for large Douglas-fir trees and typically productive) of producing NRF. These associations produce over 80 percent of all NRF found in all the plant associations. Similar results were found for the Davis LSR. The Mixed Conifer Wet plant association is also "capable", however, very little exists within the Davis LSR. See Chapter 4 of this document for additional vegetation information.

Five plant associations (CRS1-11, CWC2-11, CWH1-11, CWS1-14, CWS1-15) are in the "mixed conifer" PAG and one (CMS1-11) is in the "mountain hemlock" PAG. Where the mountain hemlock

PAG occurs in transition with mixed conifer plant associations, it is capable of developing NRF habitat. See Appendix D for distribution of NRF in all 54 plant associations.

Table 2-3. Distribution of NRF Habitat in the Northwest Forest Plan on the Crescent Ranger District.

Plant Association Group	"Capable" Plant Associations	Acres of Plant Association	Acres of NRF	Percent Plant Association Currently NRF	Percent Distribution of NRF[3]
MCD	CRS1-11	19,929	2,955	15%	11%
	CWC2-11	1,846	620	34%	2%
	CWH1-11	32,564	11,823	36%	43%
	CWS1-14	4,760	1,679	35%	6%
	CWS1-15	16,143	1,956	12%	7%
MCD Total		**75,242**	**19,033**	**25%**	**69%**
MHD Total	CMS1-11	**69,094**	**5,909**	**9%**	**21%**
All Others		**86,665**	**2,743**	**3%**	**10%**
Total		**231,001**	**27,686**	**12%**	**100%**

Table 2-4. Distribution of NRF Habitat in the Davis LSR.

Plant Association Group	"Capable" Plant Associations	Acres of Plant Association	Acres of NRF	Percent Plant Association Currently NRF	Percent Distribution of NRF
MCD	CRS1-11	5,835	1,202	21%	14%
	CWC2-11	1,590	525	33%	6%
	CWH1-11	11,665	3,635	31%	43%
	CWS1-14	1,014	350	35%	4%
	CWS1-15	7,490	936	13%	11%
MCD Total		**27,594**	**6,647**	**24%**	**78%**
MHD Total	CMS1-11	**7,910**	**1,124**	**14%**	**13%**
All Others		**13,616**	**718**	**5%**	**8%**
Total		**49,120**	**8,313**	**17%**	**100%**

Table 2-5. Distribution of NRF Habitat within Owl Home Ranges within the Davis LSR.

Plant Association Group	"Capable" Plant Associations	Acres of Plant Association	Acres of NRF	Percent Plant Association Currently NRF	Percent Distribution of NRF
MCD	CRS1-11	2,128	745	35%	11%
	CWC2-11	589	170	29%	2%
	CWH1-11	7,348	3,064	42%	44%
	CWS1-14	996	398	40%	6%
	CWS1-15	6,240	973	16%	14%
MCD Total		**17,301**	**5,524**	**32%**	**79%**
MHD Total	CMS1-11	**3,121**	**1,168**	**37%**	**17%**
All Others		**6,423**	**258**	**4%**	**4%**
Total		**26,845**	**6,950**	**26%**	**100%**

[3] 27, 686 total acres divided by NRF acres in Plant Association

The most prevalent plant association providing NRF habitat is CWH1-11. This plant association is mixed conifer/snowbrush-chinquapin. It is one of the more productive plant associations on the district, but has a range of conditions that include ponderosa pine and Douglas-fir dominated stands. It includes a range of conditions from dense understories that provide prime spotted owl NRF habitat to ponderosa and sugar pine dominated stands that are better suited for white-headed woodpecker habitat. These woodpeckers need large trees and more open habitat, therefore, there is an opportunity to incorporate these areas into a landscape-scale fire risk reduction strategy, where ladder and ground fuels can be modified to provide risk reduction. Specifically, these areas would provide more protection to the more vulnerable NRF stands and larger blocks of the LSR. In Chapter 3, there is a more detailed discussion that describes Plant Association Groups, their distribution on the landscape, and why they are considered habitat.

The LSR team believes not all plant associations are capable of developing NRF and the associations that are, would not necessarily be managed for NRF habitat in this decade. In some circumstances, they would be better suited to provide habitat for other species. The strategy is to have existing and developing NRF habitat within the plant associations most capable, although the timing of any given stand could be years to decades. For a discussion on a strategy for moving NRF around the landscape through time, reference Chapter 4. In this current updated assessment, Management Strategy Areas have not changed; however, some of the focal species may have changed from the 1995 version to reflect the habitats that cycle in and out through time.

There are approximately 27,594 acres within the MCD PAG and 7,910 acres in the MHD PAG capable of developing NRF. This is approximately 73 percent of the LSR. University of Washington Professor Dr. Jerry Franklin in consultation with Eric Forsman, associate professor at Oregon State University and well-known specialist with owl ecology, provided comments on NRF management to the 2003 B&B Fire Recovery Project. In Dr. Franklin's critique, he stated the owl needs some very dense patches of forest characterized by grand/white fir for NRF habitat and its prey base on about 25 percent of the landscape. This is relevant to this assessment because the B&B Fire burned through the Metolius LSR, which is very similar to the Davis LSR. He recommended the only way to sustain the disturbance-prone habitat is to embed it in landscapes where it does not exist as a contiguous block. These "islands" would exist within a treated matrix, with additional risk reduction activities within the islands themselves, especially around the larger pine trees (USDA Forest Service: B&B Fire Recovery Project Researchers Reviews, 2005).

Over the last 30-40 years and prior to the 1994 Northwest Forest Plan and 2003 Davis Fire, approximately 13,612 acres of commercial harvest activities (28 percent of the LSR) resulted in stands returning to an early successional stage. The Davis Fire portion that burned within the LSR added another 6,000 acres, for a total of approximately 20,600 acres. The majority of the harvest activities and wildfire occurred in stands that formerly provided NRF habitat for the owl. Outside the Davis Fire, regeneration harvest that occurred 30-40 years ago would not provide late successional and old forest conditions for a minimum of 80-100 years. Within the Davis Fire, this would be a much longer time interval (200 years or longer). Due to the 100 percent mortality experienced in the stands capable of growing NRF, tree species desired for long-term LSR objectives (such as ponderosa pine and Douglas-fir) would be an average of 14 inches in diameter where active management has occurred (Davis Fire Recovery Project EIS, 2004). It is estimated another 100 years would be needed to attain the suitable tree size and understory.

Other activities that reduced LSR/NRF habitat include understory thinning on 1,400 acres under the 1996 Seven Buttes EA. These stands could provide late successional and old forest conditions in 10-20 years. Prescriptions were designed to maintain two of the three main attributes for NRF: structural (canopy cover) and overstory/large trees. The understory (third attribute) can be achieved in a relatively short period of time.

Table 2-6 displays the acreages of existing NRF habitat within a 0.7 mile and 1.2 mile radius (home range) around each owl activity center i.e., nest site). The percentages of NRF habitat acres available for owls in proximity to nest sites and within home ranges have been used to identify the threshold for determining "take" in Section 7 consultations with the US Fish and Wildlife Service. If there is less than 50% suitable NRF habitat within the 0.7 mile radius (i.e., 493 acres) or less than 40 percent within the 1.2 miles radius (i.e., 1,158 acres), then any modification of the habitat that results in a change from NRF to non-NRF may constitute a "take" under the Endangered Species Act. Of the ten NSO home ranges within the Davis LSR, only Hamner Butte is above this threshold.

Table 2-6. NRF Habitat within 0.7 Mile and 1.2 Mile Radii.

Forest Owl Pair Number	Forest Site Name	Current NRF w/in 1.2 mi. Acres/Percent	Current NRF w/in .7 mi Acres/Percent
2001	**McCool Bt.**	639 (22%)	221 (23%)
2002	**Hamner Bt.**	1,557 (54%)	603 (62%)
2003	**Ringo Bt.**	906 (31%)	350 (36%)
2004	**Maklaks Mt.**	642 (22%)	269 (28%)
2005	**Moore Cr.**	754 (26%)	439 (45%)
2006	**Davis Mt.** [4]	8 (<1%)	0 (0%)
2008	**Saddle Bt.**	271 (9%)	157 (16%)
2010	**Royce Mt.**	804 (28%)	281 (29%)
2011	**Moore Cr. Tr.**	762 (26%)	280 (28%)
2013	**Willamette Pass**	776 (27%)	299 (30%)

It is assumed that the forest surrounding these owl activity centers can support a greater percentage of suitable NRF habitat, given the potential of the major Plant Association Group (Mixed Conifer Dry). However, there does not appear to be a correlation between reproductive success (Table 2-1) and the amount or distribution of NRF on the landscape.

[4] Nest site burned and abandoned in 2003

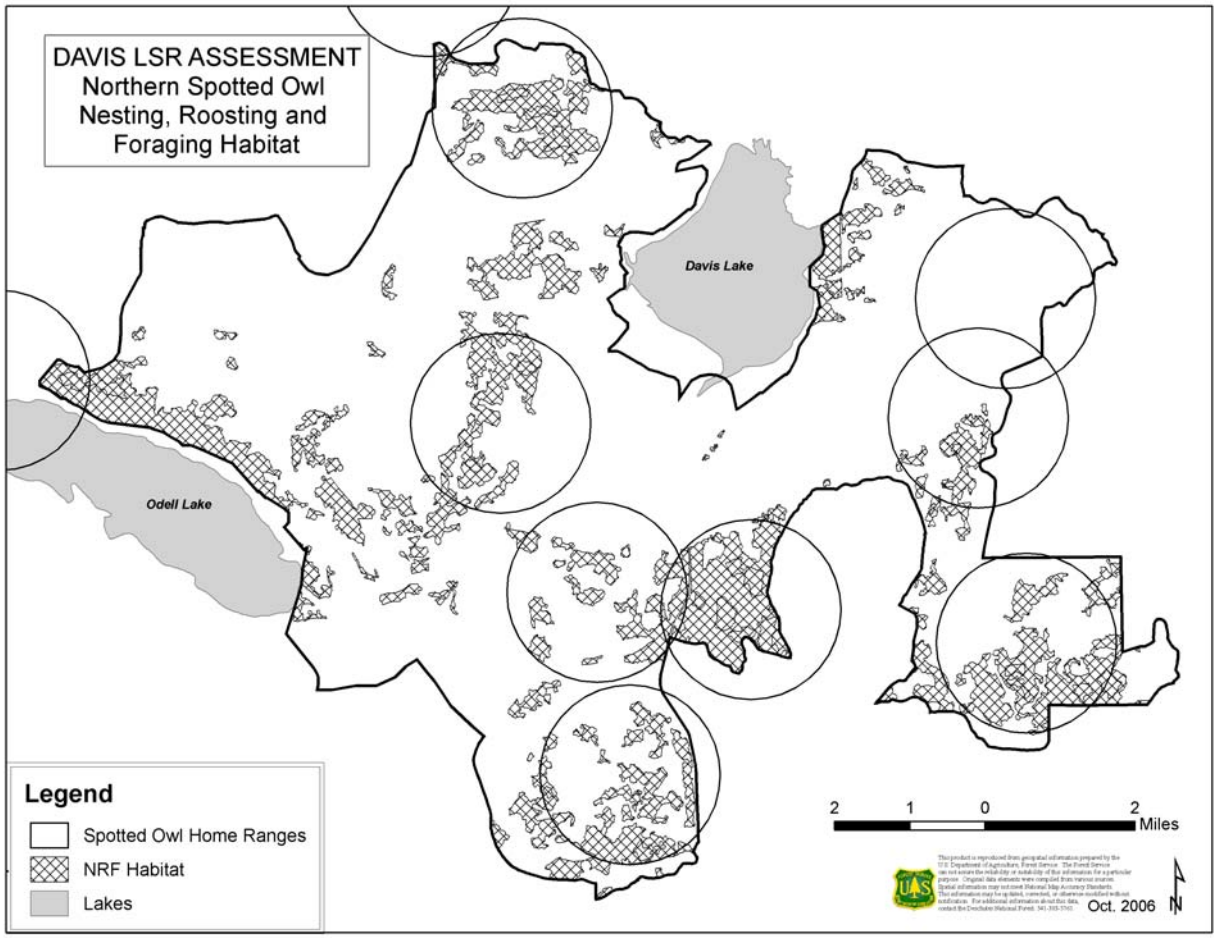

Figure 2-3. Spotted owl nesting, roosting and foraging habitat.

BLACK-BACKED WOODPECKER COMPONENT

Wisdom (2000) describes source habitats for blacked-backed woodpecker as a year round resident that occurs in various forest types. Within its range it is most abundant in recently burned forests, but in Oregon, bark-beetle-killed forests are frequently occupied. Marshall et. al (2003) reports for this species the "center of abundance" in Oregon is the "lodgepole pine forest east of the Cascade crest between Bend and Klamath Falls". Endemic levels of bark beetles, common in lodgepole pine (10 inches in diameter and greater and 170 trees per acre), provide a constant food source in small pockets and individual trees scattered across the forest. In a study conducted on the Deschutes National Forest, Goggins (1989) found black-backed woodpeckers used stands with a mean dbh of 8 inches for nesting. Mean nest tree dbh was 11 inches. All of the nests in the study were in lodgepole pine stands and 93 percent of foraging took place in lodgepole pine forests. Goggins found mountain pine beetles had infested 81 percent of the trees used for foraging. Recent dead trees were used most often (68 percent of the time) for foraging.

The black-backed woodpecker is one of those species whose populations actually increase with wildfire and populations usually peak 3-5 years post-fire (O'Neil 2001). Although wildfire and beetle outbreaks both produce a boom-bust type cycle for the black-back woodpecker, wood boring insects that come in with fire differ from mountain pine beetle outbreaks. Marshall (2003) warns that burned forests and bark-beetle outbreaks should not be considered equivalent habitats. Wisdom (2000) contrasted nesting success of 68.5 percent in Oregon bark beetle infested forests with 100 percent success in burned forests of western Idaho and northwestern Wyoming. Squirrel predation accounted for the nest losses in Oregon lodgepole pine forests. In the Idaho fire, colonization of the large burn areas by squirrels did not take place during the first 3 years after the fire.

There are documented sightings of the black-backed woodpecker within the LSR. Approximately 19 percent (9,100 acres) of the LSR is potential habitat for black-backed woodpeckers and other lodgepole pine associated species (Figure 2-4). Although black-backed woodpeckers are also documented in other PAGs, only lodgepole pine would be managed for habitat. Density levels of black-backed woodpeckers are most likely high in response to the 2003 Davis Fire. Oregon State researchers have established plots within the wildfire to monitor the effects of salvage intensity on small mammals, birds and bats. Preliminary results will be incorporated into this assessment when available.

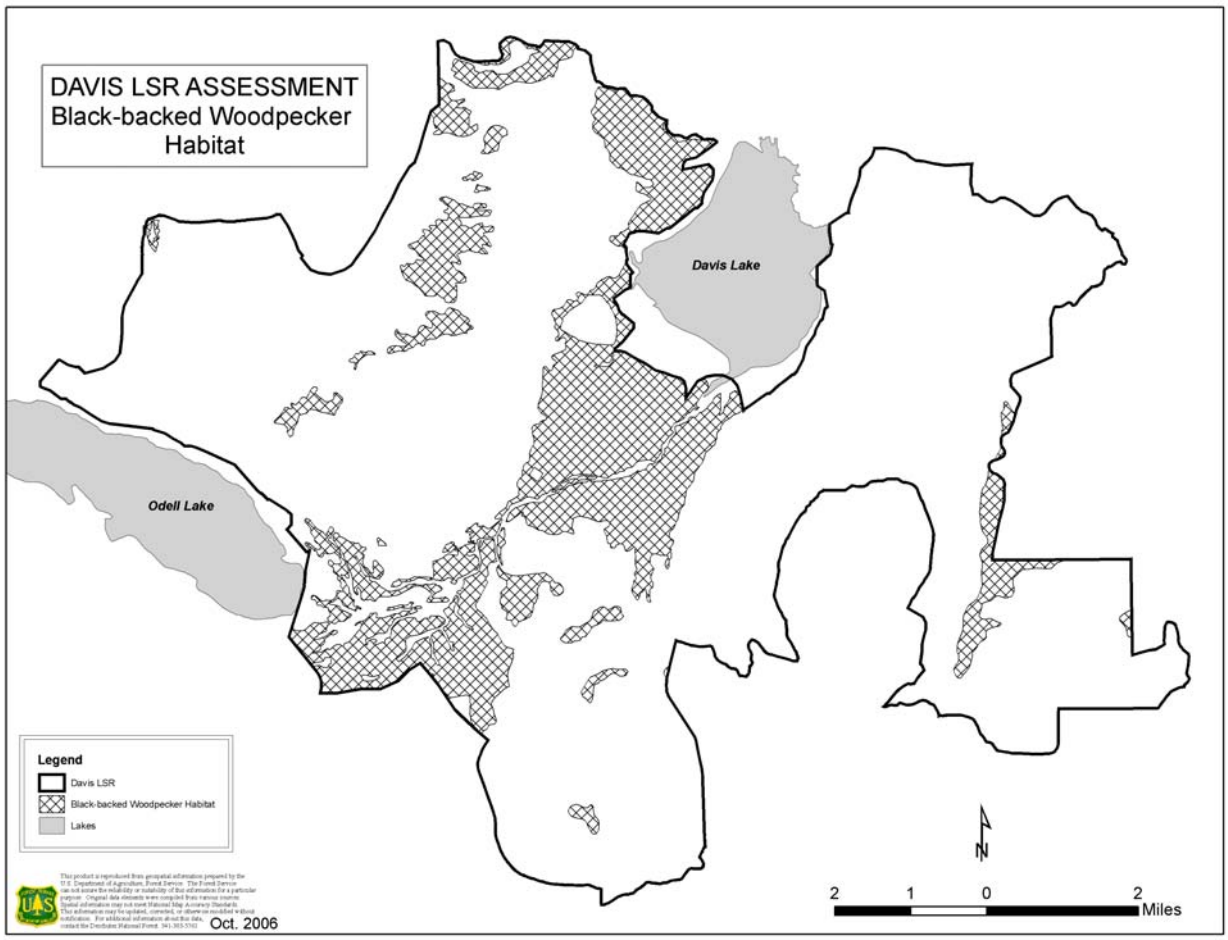

Figure 2-4. Black-backed woodpecker habitat.

GREAT GRAY OWL COMPONENT

Great gray owls generally inhabit open lodgepole or mixed lodgepole/ponderosa pine forests in mid- to late structural stages (lodgepole older than 70 years, ponderosa older than 200 years). Foraging habitat is typically defined as natural meadows greater than 10 acres in size, riparian areas, clear-cut and selectively harvested areas. These areas provide prey habitat for small mammals including shrews, voles, chipmunks, squirrels, and snowshoe hares.

Great gray owls do not build their own nests, but utilize nests created by other birds or formed by dwarf mistletoe brooms, depressions in broken-topped trees, stumps, or artificial platforms. Trees/snags used for nesting generally range from 18 to 37 inches dbh (Wisdom et al. 2000, vol. 2-54-55). Within the range of the northern spotted owl, suitable nesting habitat may be found in mature forested stands with greater than 60 percent canopy cover, although some nests have been recorded in stands with only 40 percent canopy cover.

Studies of Great Gray Owls outside the range of the spotted owl found similar results (Bull and Henjum 1990, Bryan and Forsman 1987). These studies also found few owls above 4900-5400 foot elevation. Bryan and Forsman (1987) found great gray owls were widely distributed in south-central Oregon, but common only in concentrations of appropriate habitat.

While there may be habitat within the LSR, it is uncertain whether snow depths that persist into April prohibit occupancy. The owls plunge through the snow to capture prey at ground level. Snow conditions may make prey less available. In eastern Oregon, most great gray owls in the study area moved in the winter from areas that had accumulations of snow greater than 59 inches (150cm) to areas that averaged 20 inches. Snow depth was also found to delay nesting at the higher elevations in the eastern Oregon study from mid-March to early April. Bryan and Forsman (1987) found concentrations of great gray owls 1-5 miles east of the LSR, southeast of Wickiup Reservoir and west of the Little Deschutes River. Elevations in this area range between 4,200 and 4,400 feet. The nearest known great gray owl nest is on Refrigerator Creek, where the elevation is approximately 4,700 feet. With elevations within the Davis LSR ranging from 4,400 feet to 7,089 feet, it is questionable if the area provides habitat. Habitat may be limited to 6,500 acres in the lower elevations (4,400-4,900 feet) next to Davis Lake.

Riparian areas, meadow habitat, open lodgepole pine stands, and the Davis Fire area are likely foraging habitat in the planning area. Nesting habitat on the Crescent Ranger District consist of older stands of lodgepole pine with ponderosa pine or Engelmann spruce, a canopy cover exceeding 40 percent, and within 0.25 mile of foraging habitat. Potential nesting habitat occurs along Odell Creek drainages outside the project area and on the south side of Davis Lake in those years when the water levels are low.

Great gray owls were surveyed in and around Davis LSR in 1999, 2000, 2003, and 2006. Surveys did not detect the presence of any great gray owls. While there is uncertainty of the habitat to provide for great gray owls the team decided to leave the component in as representative habitat for species dependent on open meadow, forest, and riparian, as well as old growth habitats.

NORTHERN GOSHAWK COMPONENT

Although not a focal species for a specific MSA, it is a beneficiary of similar late-successional habitat needs for the northern spotted owl – which is grouped into six Management Strategy Areas discussed in more detail in Chapter 3. The goshawk is generally associated with ponderosa pine. It uses mid- to old-aged stands with varying densities. Dense stands are favored for nesting and more open stands for hunting. Its prey includes a wide variety of birds and mammals. Desimone and DeStefano (2005), in a retrospective study in south central Oregon, found late-closed and mid-aged closed forests were important indicators of forest conditions that supported breeding goshawks. Goshawks in the study area were more likely to persist in the historical nest area that had approximately 50 percent of mature and older-closed canopy forest surrounding 128 acres of the nest site.

There are documented sightings and known goshawk nest sites in the LSR. Habitat for this species exists in the majority of the PAGs throughout the forested areas of the LSR. Optimal habitat is probably encompassed in the northern spotted owl NRF habitat.

AMERICAN MARTEN COMPONENT

Also not a focal species for a Management Strategy Area, American marten benefit from habitat managed for the black-backed woodpecker and/or riparian species and connectivity for northern spotted owls. Found in a variety of habitats throughout the LSR, they are found wherever there are large amounts of down wood with large (20 inches dbh or larger) diameter trees, snags and logs. They use snags and logs with intermediate levels of decay with greatest use in the larger (30 inches in diameter or larger) size classes when available (Raphael and Jones 1997). Canopy cover plays a greater role in winter, where marten select for higher canopy cover during snow periods than snow-free periods. A study conducted in lodgepole pine forests of the Winema National Forest, south of the project area, estimated 0.2 live trees, 0.3 snags, 0.6 logs and 1.3 slash piles /ha (0.08 live, 0.12 snags, 0.24 logs, and 0.52 slash piles per acre) of appropriate size would meet denning and resting needs (Raphael and Jones 1997). In Chapter 3, there

is more discussion on the strategy to isolate these fire-prone habitats and maintain them on the landscape through time.

There have been frequent sightings from 1986 through 2005 across the Ranger District in the majority of the PAGs. Track-plate surveys in 1994 just north of the LSR boundary indicated extensive use of beetle-killed lodgepole pine stands.

FLAMMULATED OWL AND WHITE-HEADED WOODPECKER COMPONENT

Flammulated owls are found in ponderosa pine dominated stands with dispersed dense thickets and grassy openings. They utilize cavities in live or dead trees created by pileated woodpeckers or northern flickers. The average diameter of snags and trees used for nesting were 22 and 28 inches (Marshall et al. 2003). Flammulated owls were surveyed and detected in 1998, 1999, and 2000. They are also often detected during surveys for the northern spotted owl.

White-headed woodpeckers utilize habitat of large open ponderosa pine, low shrub levels and large snags. The white-headed woodpecker is a primary cavity excavator of soft snags and prefers large diameter trees averaging 31 inches. On the Winema National Forest, to the south of the LSR, the white-headed woodpeckers were found to be using small-diameter trees, logs in a slash pile and upturned roots (6-13" dbh) where large snags were uncommon (Frenzel 2002). Dr. Frenzel noted snag density may be less important for white-headed woodpeckers than other woodpeckers since they forage mostly in live trees. He found the mean snag densities at nest sites to be 1.5 trees per acre. Nesting success was greatly influenced by the number of large green trees available at the nest site; specifically there was greatest success in stands where there were 12 ponderosa pines per acre greater than 21 inches diameter. Development of dense understories due to fire exclusion is one cause of reduced white-headed woodpecker habitat.

Beneficiaries of white-headed woodpecker habitat are pygmy nuthatches, which have very similar requirements. They require large trees for roosting, typically ponderosa pine within the range of the northern spotted owl. Provision of snags for white-headed woodpeckers is assumed to provide for the needs of the pygmy nuthatch, as no species specific guidelines have been developed for this species (Record of Decision and Standards and Guidelines for Amends to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, 2001). Both the white-headed woodpeckers and pygmy nuthatches have been sighted in the LSR.

Stands dominated by ponderosa pine would be managed for flammulated owls and those in association with sugar pine would be managed for white-headed woodpeckers. White-headed woodpeckers depend on the sugar pine as a secondary seed source when ponderosa seed crop is poor. These species favor open stands, providing opportunities to be managed and maintained as areas where potential fire behavior can be modified. The more productive sites with Douglas-fir could cycle into NRF habitat as needed in coordination with areas maintained for fuel management objectives. Although, in general, these stands would be too open for nesting habitat, portions of these stands could be managed to provide dispersal habitat with occasional pockets for foraging.

NORTHERN BALD EAGLE COMPONENT

Existing and potential habitats for bald eagles are believed to be adequately represented by Bald Eagle Management Areas (BEMAs). There are 4,291 acres of BEMA in the LSR (see Figure 2-5), and all eagle nests within the LSR occur within them. About 9 percent of the LSR contains existing and potential habitat for bald eagles and ospreys.

The following BEMAs are located within the LSR:

- Odell Lake: This is an important dispersal corridor for owls over the Cascades. The habitat closely resembles westside owl habitat which is sustainable with passive management for relatively longer periods of time than eastside conditions.
- Davis Lake West: These areas provide habitat for flammulated owls, white-headed woodpeckers, pygmy nuthatches, as well as provide roost and nest sites for ospreys and eagles.
- Davis Lake East: These areas provide habitat for eagles, osprey, and the northern spotted owl.

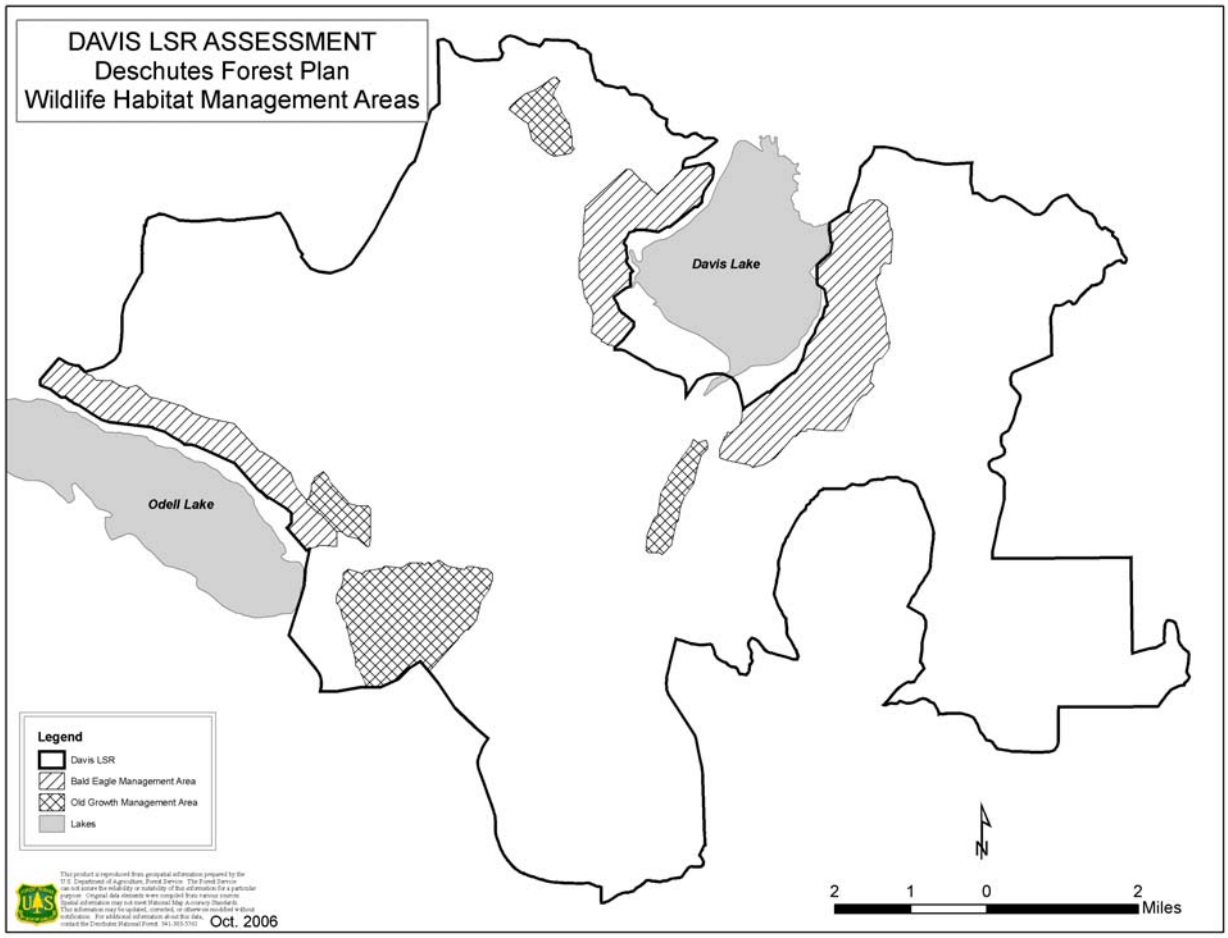

Figure 2-5. Bald Eagle and Old Growth Management Areas.

ELK COMPONENT

Two key elk habitat areas (Davis and Maklaks) are located in the LSR (See Figure 2-6). These areas delineated in the Deschutes Forest Plan were designated in cooperation with the Oregon Department of Fish and Wildlife. The Key Elk Management Areas provide important calving grounds and summer habitat for the species. The 2003 Davis Fire removed a substantial amount of cover in the Davis Key Elk Area. Since then, management activities have focused on planting conifers and riparian-associated species to return to conditions favorable to elk, as well as other dependent species.

In Chapters 3 and 4, the LSR objectives for overlapping key elk areas call for managing habitat for black-backed woodpecker and/or riparian species and connectivity for northern spotted owls. Appropriate

activities include retention of large blocks of lodgepole pine in a decadent condition, as well as thinning of younger trees for development of owl dispersal habitat. These actions would also provide for maintaining the key elk areas in a condition for which they were created.

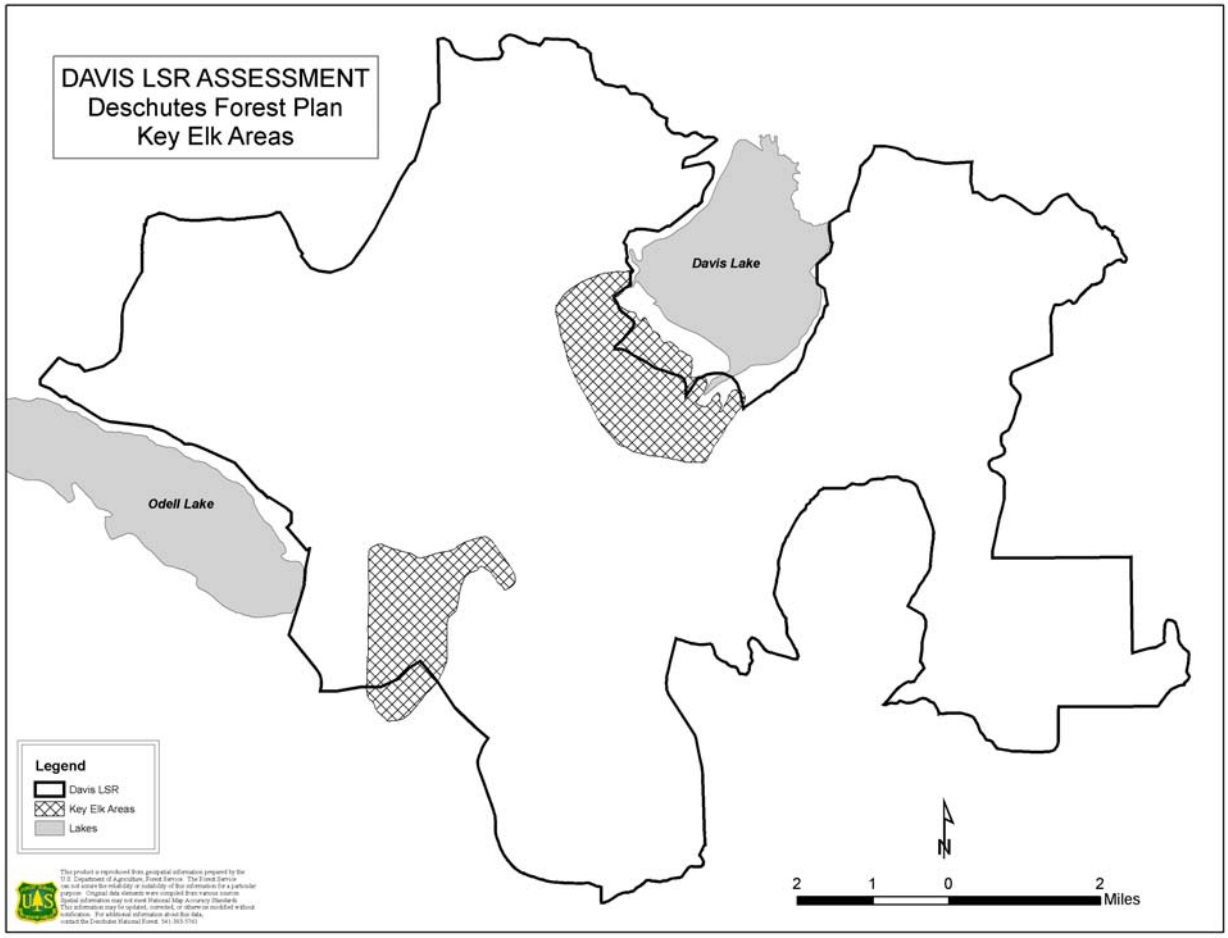

Figure 2-6. Key Elk Areas.

SURVEY AND MANAGE/SENSITIVE SPECIES COMPONENT FOR VERTEBRATES and INVERTEBRATES

Currently, the status of the survey and manage/sensitive species component has not been finalized. As of January 2007, public comment is being requested for the Supplement to the July 2006 Draft Supplement to the 2004 Final Supplemental Environmental Impact Statement To remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines. The Region 6 Forester's Sensitive List was last revised in October 2006. This component discusses old growth-dependent species, such as the wolverine and pacific fisher, and the Crater Lake tight coil mollusk. Currently, the Pacific fisher is a federal candidate for listing. Regardless of the status, habitat requirements for these species would be managed beneficially with other old-growth and riparian-dependent species objectives within the LSR.

Wolverine

Wolverines occupy a wide variety of habitats from the arctic tundra to coniferous forest. The most common habitats are those that contain a high diversity of microhabitats and high prey populations. Wolverines tend to avoid areas with high temperatures (Ruggiero et al. 1994). Wolverines are opportunistic and will forage on whatever is readily available. Small mammals, hares and berries make up a large part of the diet in summer months, and large ungulates or carrion in winter (Ruggiero et al. 1994). The most critical and limiting habitat for wolverines seems to be acceptable denning habitat. Denning habitat has been described as high elevation rocky slopes or cirque basins on north and east slopes that have persistent snow into the spring and summer months.

Unconfirmed wolverine sightings have been reported near Willamette Pass, on Maklaks Mountain, and near Crescent Creek. Potentially suitable, but limited, denning habitat may be found in the Maiden Peak Inventoried Roadless Area. It is assumed that wolverines may travel through and/or forage infrequently at the lower elevations of the LSR, and utilize higher elevation habitat for most of their needs. Carnivore snow tracking, baited camera sets, and track plates have been used to try and detect marten, fisher, and wolverine presence on the district with surveys occurring in 1994, 1995, 1996, and 1998. There was no detection of wolverines.

Pacific Fisher

The fisher is a house-cat sized member of the Mustelidae family which includes weasels, mink, marten, and otters. Their occurrence is closely associated with low- to mid-elevation forests (generally <1250 m) with a coniferous component, large snags or decadent live trees and logs for denning and resting, and complex physical structure near the forest floor to support adequate prey populations (Powell and Zielinski 1994). Prey item remains collected in Oregon include snowshoe hare, brush rabbit, California ground squirrel, Douglas' squirrel, northern flying squirrel, woodrats, opossum, striped skunk, porcupine (male fishers only), bobcat, deer, elk, Stellar's jay, pileated woodpecker, and hairy woodpeckers (Aubry and Raley 2002). They are fast, agile and adept at climbing trees and will eat any prey the can catch and overpower, including squirrels, hares, mice, birds and porcupines. Although adapted for climbing, fishers are primarily terrestrial. When inactive, the fisher occupies dens in tree hollows, under logs, or in ground or rocky crevices, or rests in the branches of conifer trees during the warmer months. Young are born in a tree hollow or under a log or in a rocky crevice. Large snags greater than 20 inches in diameter are important as maternal den sites (Thomas et al. 1993). In the western USA, fishers generally avoid clearcuts and forested stands with less than 40 percent canopy cover, occur at low densities in second-growth forests and landscapes that have been extensively fragmented by timber harvesting (Aubrey and Lewis 2003).

In Oregon, the fisher apparently has been extirpated from all but two portions of its historical range (Aubrey and Lewis 2003). Carnivore surveys were conducted on the Crescent District in 1993-1996 and 1998 using bait with camera sets, snow tracking and track plates. There were no detections of fishers or

wolverine from these surveys although marten were confirmed. At the present time there is no confirmation there are reproducing fisher populations on the Crescent Ranger District.

Mollusks

No surveys of mollusks have been performed in the Davis LSR. Review of NWFP Appendix J2, which discusses known information on species of concern, does not list any known sites in this LSR. Many mollusk species are rare local endemics and are restricted to small geographic areas. Riparian areas and perennial seeps and springs may be important for localized mollusk populations. Species dependent on springs may have very small populations that are reproductively isolated, much like species living on islands.

The Crater Lake tightcoil (*Pristiloma arcticum crateris)* is known to occur on the Deschutes National Forest. This species may be found in moist conifer forests and among mosses and other vegetation near wetlands, springs, seeps and riparian areas, above 610 m. (2000 feet) elevation and within 10 meters of water.

BOTANICAL: SURVEY AND MANAGE/THREATENED, ENDANGERED, AND SENSITIVE PLANT COMPONENT

There are no known federally listed threatened or endangered plants or plants proposed for listing. The Region 6 Forester's Sensitive Plant List was last revised in July 2004 as a result of the 2004 ROD that removed Survey and Manage Standards and Guidelines from the Northwest Forest Plan. Survey and Manage species that met criteria for listing on the R6 Sensitive Plant List were added. (Refer to current direction for management of Survey and Manage species.) The following table lists the species that are documented or suspected to occur on the Deschutes National Forest. There are no known sites in the Davis LSR for any plants on the R6 Sensitive Plant List.

Table 2-7 lists Survey and Manage fungi and plant species with potential habitat and known sites on the Crescent Ranger District. A complete listing of all the species on the Deschutes National Forest is on file at the Ranger District.

Table 2-7. Survey and Manage Fungi and Plant Species: Potential Habitat and Known Sites on the Crescent Ranger District.

Species	S&M Category	Group	PAG	MSA[5]	Known Sites
Chaenotheca subroscida	**E**	**Pin lichen**	**Mixed Conifer/Wet**	**Known: K** **Potential: BB, I**	**Maklaks Mt. un-named tributary of Odell Creek**
Chalciporus piperatus	**D**	**Fungus**	**Mixed Conifer/Wet**	**Potential: BB, I, K**	**Trapper Creek Camp (Outside LSR)**
Clavariadelphus ligula	**B**	**Fungus**	**Mixed Conifer/Dry**	**Potential: C, E, F, K, N, O, P, Q, S, T, V, W**	**North Side Odell Lake (Outside LSR)**

[5] Assigned according to the dominant tree species in PAGs found in the MSAs with which the fungi are associated. From Handbook to Strategy 1 Fungal Species in NFWP, Castellano et al 1999; and Handbook to Additional Fungal Species of Special Concern in the NWFP, Castellano et al PNW-GTR-572, 2003.)

Species	S&M Category	Group	PAG	MSA[5]	Known Sites
Gastroboletus subalpinus	**B**	**Fungus**	**Lodgepole Pine/Dry Mountain Hemlock Mixed Conifer/Dry**	**Potential: B, BB, C, E, F, K, F, N, O, P, Q, S, T, V, W, U, Z**	**Trapper Creek Trailhead (Outside LSR)**
Mycena overholtsii	**D**	**Fungus**	**Mixed Conifer/Dry**	**Potential: C, E, F, K, N, O, P, Q, S, T, V, W**	**West End Odell Lake (Outside LSR)**
Ramaria amyloidea	**B**	**Fungus**	**Mixed Conifer/Wet Mixed Conifer/Dry**	**Potential: MSA BB, C, E, F, I, K, N, O, P, Q, S, T, V, W**	**Trapper Creek Trailhead (Outside LSR)**
Ramaria rubripermanens	**D**	**Fungus**	**Mixed Conifer/Wet Mixed Conifer/Dry**	**Known: I Potential: MSA BB, C, E, F, K, N, O, P, Q, S, T, V, W**	**North of Odell Lake in Inventoried Roadless Area (Outside LSR)**
Rhizopogon truncatus	**B**	**Fungus**	**Lodgepole Pine/Dry Mountain Hemlock Lodgepole Pine/ High Elevation Mixed Conifer/Dry Ponderosa Pine**	**Potential: B, C, D, E, F, G, H, J, L, M, O, P, Q, R, S, T, U, V, W, X, Y, Z**	**Hamner Butte (Outside LSR)**
Rhizopogon atroviolaceus	**B**	**Fungus**	**Mixed Conifer/Wet Mixed Conifer/Dry**	**Potential: MSA BB, C, E, F, I, K, N, O, P, Q, S, T, V, W**	**Diamond Peak Wilderness, Yoran Lake (Outside LSR)**
Tritomaria exsectiformis	**B**	**Liverwort**	**Riparian**	**Known: M Potential: All MSAs with Riparian Resources**	**Dell Spring and Ranger Creek**
Note: MSAs with less than 5% area by PAG are not listed in the PAG column. Listed fungi are assigned to PAGs according to the tree species in those PAGs from which the fungi are associated (from Handbook to Strategy 1 Fungal Species in NFWP, Castellano et al. 1999; and Handbook to Additional Fungal Species of Special Concern in the NWFP, Castellano et al. 2003.)					

Bryophytes, Lichens, and Vascular Plants

Table 2-8 lists Survey and Manage Vascular Plants, Bryophytes, Lichens, and Fungi with Category A or C status and require pre-disturbance surveys.

Table 2-8. Survey and Manage Vascular Plants, Bryophytes, Lichens, and Fungi Documented or Suspected on the Deschutes National Forest (Pre-disturbance surveys required)

Taxon	Group[6]	Category	Comments
Botrychium minganense	VP	A	Suspected on DES
Botrychium montanum	VP	A	Suspected on DES
Bridgeoporus nobilissimus	F	A	Suspected on DES
Cypripedium montanum	VP	C	Documented on DES (SIS)
Leptogium cyanescens	L	A	Suspected on DES

[6] **Group:** VP = vascular plant; L = Lichen; B = Bryophyte; F = Fungus.

Taxon	Group[6]	Category	Comments
Lobaria linita var. *tenuoir*	L	A	Suspected on DES
Pseudocyphellaria rainierensis	L	A	Suspected on DES
Schistostega pennata	B	A	Documented on DES (CRE)
Tetraphis geniculata	B	A	Suspected on DES

INVASIVE PLANT COMPONENT

Invasive plants are undesirable in forest ecosystems because they tend to displace native plants, including, potentially, rare and protected species, degrade habitat for animal species, promote soil erosion, and lessen the value of recreational experiences. Current direction for the management of invasive plants in the Davis LSR is tiered to national, regional, and forest direction.

National Direction

The Noxious Weed Management Act (1974) contains provisions to prevent the dissemination of noxious weeds. Other provisions in the act authorize the cooperation of Federal agencies with agencies of State, districts, farmers' associations and similar organizations or individuals in carrying out operations or measures to eradicate, suppress, control or retard the spread of any noxious weed. In addition, 36 CFR 222.8 acknowledges the Agencies' obligations to work cooperatively in identifying noxious weed problems and developing control programs in areas where National Forest System lands are located.

Executive Order 13112 implemented on February 3, 1999 requires Federal agencies to use relevant programs and authorities to prevent the introduction of invasive species. It also advises agencies to not authorize or carry out actions that are likely to cause the introduction or spread of invasive species unless the agency has determined, and made public, documentation that shows the benefits of such actions clearly outweigh the potential harm. All feasible and prudent measures to minimize risk of harm will need to be taken in conjunction with the actions. The USDA Forest Service *Guide to Noxious Weed Prevention Practices* (July, 2001) supports implementation of Executive Order 13112 on Invasive Species.

Regional Direction

Region 6 of the Forest Service has prepared an Invasive Plant Environmental Impact Statement (R6 IP EIS). The Final EIS was released in June 2005 and the Record of Decision (ROD) was signed in October 2005 with implementation beginning March 1, 2006. Standards and Guidelines in the R6 IP EIS are incorporated into Forest plans in the region.

Forest Direction

In 1998, the Deschutes National Forest Noxious Weed Control Environmental Assessment (DNF Weed EA) with its supplemental Deschutes National Forest Integrated Weed Management Plan (IWMP) was completed in accordance with the Regional Vegetation Management FEIS and Mediated Agreement. The Decision Notice from the DNF Weed EA selected an alternative that allows a variety of noxious weed treatments, including herbicides (USDA Forest Service, Deschutes National Forest, 1998). In the DNF Weed EA, treatments (including herbicides) were allowed on the section of Highway 46 in or adjacent to MSAs N, O, and Q.

The DNF Weed EA and IWMP identify and promote actions for invasive plant management strategies of prevention, early treatment, maintenance, and awareness. Implementation of management strategies includes risk analysis for invasion during the project planning process and developing tactics to avoid

introduction or spread. It also established clean equipment provisions in contracts on the forest and includes suggestions for increasing public awareness.

Since the early 1990s, information of location and size of infestations has been gathered for all known sites. This information has been mapped and entered into a database which is updated on an annual basis.

Under the authority of the DNF Weed EA, invasive plants have been treated in the Davis LSR since 1999 using various methods, primarily manual control (hand-pulling). Herbicide use is authorized by the 1998 DNF Weed EA in or adjacent to MSAs N, O, and Q on Highway 46 (Cascade Lakes Highway). The most recent available data on herbicide use from Oregon Department of Agriculture indicates that individual knapweed plants are treated on a total of approximately one-half acre with the herbicide Dicamba applied at a rate of 32 ounces per acre.

Currently, a site specific Invasive Plants Environmental Impact Statement for central Oregon (Deschutes, Ochoco National Forests and Crooked River National Grassland) is in the process of preparation. This EIS is tiered to the R6 IP EIS and is expected in FY 2007.

Invasive Plants in Davis LSR

Currently, the greatest concern for expansion of existing populations and introduction of new invasive species is in the Davis Fire. Monitoring has shown that existing sites, especially existing bull thistle and common mullein sites in past harvest units and along roadsides, are spreading to adjacent areas where the fire killed trees and created bare ground. One site for Dalmatian toadflax on the 6240-010 road that was found in 2000 before the fire was visited for the first time after the fire in 2006. One Dalmatian toadflax plant was found and pulled. Manual treatment in 2000-2002 reduced the infestation from about 50 plants to the one plant found in 2006. As trees and other vegetation grow, shading will increase and bare ground will decrease which will have a positive effect over the long term in reducing the potential for invasive plant establishment and spread.

Invasive plants along Highways 46 and 58 in the Davis LSR have been manually treated (pulled) each year for the past several years. As continually disturbed and open, roadsides are highly suitable habitats for many invasive plants. This is also where many of the invasive plant sites within the Davis LSR are located. Motorized vehicles are most likely the major vector and have the potential to transport invasive plant seeds included in soil and debris stuck in tire treads, or on undercarriages. Also, portions of whole, seed-bearing invasive plant species can become wedged in bumpers and within undercarriages when vehicles drive through patches of weeds. By these means, invasive plant seeds can be imported to the Davis LSR or moved about.

Information currently in the Natural Resources Information System/Terra database (NRIS/Terra), the Deschutes National Forest GIS weed layer, and past survey records document the presence, in or near the Davis LSRA boundary. There are 26 invasive plant species on 25 different invasive plant sites covering a total of approximately 2,277 acres. Sixteen of the 26 invasive plant species are currently being tracked in NRIS/Terra.

Table 2-9 lists the weeds known to occur in or near the Davis LSR Management Strategy Areas.

Table 2-9. Management Strategy Areas and Invasive Plant Species.

MSA	Invasive Plants	Habitat/Location of Invasive Plants
A	None	
B	None	
C	Tansy ragwort	Plantations

D	None	
E	Bull thistle, common mullein	Plantations
F	None	
G	None	
H	Reed canary grass	Around shoreline of Davis Lake
I	Spotted, diffuse, and meadow knapweeds; Dalmatian toadflax, butter and eggs, Canada thistle, bull thistle, Scot's broom, Klamath weed, tansy ragwort, common mullein, kochia	Invasive plants found along Highway 58 adjacent to MSA I.
J	None	
K	None	
L	Bull thistle	Along Road 4660 and adjacent to plantations
M	Reed canary grass, bull thistle, common mullein	Around shoreline of Davis Lake
N and O	Spotted and diffuse knapweeds, Canada thistle, bull thistle, Scot's broom, Klamath weed, ox-eye daisy, common mullein	Road 46 between MSAs N and O
O	Bull thistle, common mullein	Plantations
P	Tansy ragwort, bull thistle, common mullein	Plantations
Q	Dalmatian toadflax	Road 6240-010
R	Bull thistle, common toadflax	Road 62
S	Bull thistle, common toadflax	Road 62
T	Bull thistle	Plantation
U	None	
V	None	
W	Spotted knapweed Bull thistle	Road 4660 Road 4660 and plantations
X	None	
Y	None	
Z	Spotted and diffuse knapweeds, Canada thistle, bull thistle, Klamath weed, ox-eye daisy, Dalmatian toadflax	East end of Odell Lake, section of Hwy 58 in MSA, adjacent to the railroad
AA	Spotted and diffuse knapweeds, Canada thistle, bull thistle, St. Johnswort, common mullein	Section of Hwy 46 adjacent to MSA
BB	Spotted knapweed, Canada thistle, bull thistle, St. Johnswort, butter and eggs, Russian thistle, field bindweed, common mullein	Section of Road 61 (Crescent Cutoff Road) adjacent to MSA

The following are brief descriptions of the invasive plants that occur in or adjacent to the Davis LSR. The invasive plants that are listed are from the R6 Invasive Plant FEIS Appendix B (2005).

Spotted knapweed: Spotted knapweed (*Centaurea biebersteinii*, CEBI2; formerly named *Centaurea maculosa*) is a biennial or short-lived perennial composite with a stout taproot (Mauer and Russo, 1991). This species reproduces by seeds, which are dispersed by wind, vehicles, animals, or humans. The competitive superiority of this species suggests pre-adaptation to disturbance (Roche et al., 1986 in Mauer and Russo, 1991). The initial invasion of spotted knapweed, like other noxious weeds, is correlated highly to disturbed areas. Once a plant or colony is established though, it may invade areas that are relatively undisturbed or in good condition (Tyser and Key, 1988 and Lacey et al., in Mauer and Russo, 1991). Monitoring has shown that most spotted knapweed sites on the Deschutes National Forest have decreased in size and numbers of plants due to treatments with herbicides and manual treatments (hand pulling).

Spotted knapweed has been found and treated by pulling and herbicides along Highway 46, the Crescent Cut-off Road and Highway 58 in and adjacent to the Davis LSR. Spotted knapweed has nine documented sites with a total 10.45 infested acres.

Diffuse knapweed: Diffuse knapweed (*Centaurea diffusa*, CEDI3) is a highly competitive herb in the sunflower family (Asteraceae). The plants first form low rosettes and may remain in this form for one to several years. After they reach a threshold size they will bolt, flower, set seed, and then die. Thus they may behave as annuals, biennials, or short-lived perennials (Carpenter and Murray 1998a). Diffuse knapweed is a highly competitive and aggressive plant that forms dense colonies (Zimmerman 1997 in Carpenter and Murray 1998a). It is especially adept at spreading along rights-of-way and can spread rapidly (Allred and Lee 1996 in Carpenter and Murray 1998a). Disturbed lands are prime candidates for colonization, but diffuse knapweed will also invade undisturbed grasslands, shrublands, and riparian communities (Zimmerman, 1997 in Carpenter and Murray 1998a).

Diffuse knapweed has been found as isolated plants and hand-pulled along the major travelways in the Davis LSR. Diffuse knapweed occurs on 4 documented sites with total 5.5 acres infested.

Canada thistle: Canada thistle (*Cirsium arvense*, CIAR4) is an erect perennial rhizomatous thistle distinguished from all other thistles by: 1) creeping horizontal lateral roots; 2) dense clonal growth; and 3) small dioecious flowerheads (male [staminate] and female [pistillate] flowers on separate plants) (Nuzzo, 1997). Canada thistle spreads primarily by vegetative growth of its roots, and secondarily by seed (Nuzzo, 1997). Despite its common name, Canada thistle is native to Europe and was apparently introduced to North America in the early 17th century.

Small infestations of Canada thistle are known to occur along the Crescent Cut-Off Road, Highway 58 near Odell Creek, and Highway 46 in the Davis LSR. A well-established dense infestation of Canada thistle was recently documented outside Davis LSR on the north shore of Davis Lake. Canada thistle has 12 documented sites on a total of 863 acres of which 22.6 acres are infested.

Bull thistle: Bull thistle (*Cirsium vulgare*, CIVU) is a biennial with a fleshy taproot. It reproduces solely from seeds that are dispersed by wind, water, animals, and human activities. Disturbed areas are prime habitat for bull thistle to invade (Beck, 1999). On the Deschutes National Forest, bull thistle has been sighted, but has not proven to be an aggressive noxious weed. When it occurs on a disturbed site, it seems to decrease and disappear when native vegetation regains its pre-disturbance levels (which may take many years). In areas that are continually disturbed, such as roadsides, bull thistle may invade and persist if not controlled. Due to a combination of limited funds and noxious weed species of higher priority, bull thistle has not been actively treated on the Deschutes National Forest.

Small infestations of bull thistle (one to a few plants) are found along the major travelways in the Davis LSR, with larger infestations occurring in some past harvest units, especially in landings and skid trails. Bull thistle occurs on 14 sites on a total of 19 acres infested.

Russian thistle: Russian thistle (*Salsola kali*, SAKA) is a summer annual that reproduces by seed. When the plant is mature it breaks off at the ground forming "tumbleweeds" that are tossed by the wind, scattering seeds. A single plant can produce 100,000 to 200,000 seeds. Seeds are dormant over winter allowing the seed to germinate in spring over a wide range of temperatures and with very little moisture, generally in late March or early April. Seed viability is short and rapidly declines after two years in the soil. A large, spreading root system enables plenty of shoot growth with little moisture (Morisawa, 1999).

Russian thistle is found occasionally when doing manual weed control along the major travelways on Crescent Ranger District. Russian thistle has been found to occur on 1 site with a total of 0.5 acres infested.

Dalmatian toadflax and Common toadflax: Dalmatian toadflax (*Linaria dalmatica*, LIDA) and common toadflax (*Linaria vulgaris*, LIVU2) are perennial herbs in the figwort family (Scrophulariaceae). Both species are classified as weeds in Europe, Russia, Canada, and the United States, and are common throughout North America (Carpenter and Murray, 1998b).

A toadflax plant has from 1-25 vertical, floral stems. These floral stems have thick-walled, woody xylem and supporting fibers. Flowers are bright yellow and resemble snapdragons. The taproot may penetrate a meter into the soil. Horizontal roots may grow to be several meters long, and can develop adventitious buds that may form independent plants (Carpenter and Murray, 1998b).

Both species are persistent, aggressive invaders capable of forming colonies through adventitious buds from creeping root systems. These colonies can push out native grasses and other perennials, thereby altering the species composition of natural communities. In North America, both species of toadflax are considered strong competitors. They are quick to colonize open sites, and are capable of adapting to a wide range of environmental conditions (Carpenter and Murray, 1998b).

In North America, *Linaria dalmatica* and *Linaria vulgaris* primarily occur on sandy or gravely soil on roadsides, railroads, pastures, cultivated fields, range lands, and clearcuts (Saner et al., 1995 in Carpenter and Murray, 1998b). Both species of toadflax reproduce by seed and vegetative propagation, and once established, high seed production and the ability for vegetative reproduction allow for rapid spread and high persistence (Saner et al., 1995 in Carpenter and Murray, 1998b). Both species of toadflax can adapt their growth to fit a range of habitats, and have a tolerance for low temperatures and coarse textured soils (Carpenter and Murray, 1998b).

Common toadflax and Dalmatian toadflax occur mainly along roadsides on Crescent Ranger District. Common toadflax occurs on 4 weed sites totaling 0.4 acres infested. Dalmatian toadflax has been found to occur on 5 sites with a total of 1.8 acres infested.

Tansy ragwort: Tansy ragwort (*Senecio jacobaea*, SEJA) is a member of the groundsel tribe (*Senecioneae*) of the sunflower family (Asteraceae). It is a biennial or short-lived perennial with one to a few coarse, erect purplish-red stems, simple except above (Macdonald and Russo, 1989).

Tansy ragwort is a disturbance area plant found on creek bottomlands, in pastures, forest clearcuts, overgrazed pasture, and along roadsides (Macdonald and Russo, 1989).

On the Crescent Ranger District it is found mainly in clearcuts and also occasionally along roadsides. Tansy ragwort occurs on 6 sites with a total of 8.4 acres infested.

Scot's broom: Scot's (or Scotch) broom (*Cytisus scoparius*, CYSC4) is a perennial shrub of the legume (Fabaceae) family. Scot's broom grows best in dry, sandy soils in full sunlight (Hoshovsky, 1986a). Scot's broom invades pastures and cultivated fields, dry scrubland and "wasteland", native grasslands and along roadsides, dry riverbeds and other waterways (Gilkey, 1957, Johnson 1982, Williams 1981 in Hoshovsky, 1986). Although it is primarily found west of the Cascades, it has been found growing on the eastern slopes as well (Gilkey, 1957 in Hoshovsky, 1986a). It does not do well in forested areas but invades rapidly following logging, land clearing, and burning (Mobley, 1954, Williams, 1981 in Hoshovsky, 1986a). Seeds can stay viable in the soil for 75 years or more.

On Crescent Ranger District, Scot's broom occurs mainly along roadsides from seeds most likely transported from the west side Cascades by vehicles. Scot's broom has infested 4.1 acres.

St. Johnswort: St. Johnswort (*Hypericum perforatum*, HYPE) is a perennial species with a deep penetrating taproot. It is commonly referred to as goatweed or Klamath weed. This species can become established in degraded or pristine forest or rangelands. Any soil disturbance will decrease competition for St. Johnswort and will cause it to increase (Piper, 1999). Manual control is difficult for St. Johnswort due to its ability to reproduce from small root fragments left in the soil after pulling plants.

St. Johnswort is common along roadsides on all the major roads on Crescent Ranger District. St. Johnswort has 10 sites with 4.1 acres infested.

Common mullein: Common mullein (*Verbascum thapsus*, VETH) is a biennial, perennial or, rarely, an annual with a deep tap root. It grows 5-18 decimeters tall and can produce as many as 180,000 seeds per individual plant. Seeds may remain viable for over 100 years. Mullein depends on the presence of bare soil to germinate and establish. (Hoshovsky, 1986b).

Common mullein is common in most disturbed sites (road sides, past harvest units, campgrounds, etc.) on Crescent district, especially in the Davis Fire area. Common mullein sites are not tracked in the DNF invasive plant geodatabase.

Field Bindweed: Field bindweed (*Convolulus arvensis*, COAR4) is a persistent, perennial vine of the morning-glory family (Convolvulaceae) which spreads by rhizomes and seeds. Habitats with little competition, repeated disturbance, and high light – such as roadsides – are ideal for growth of field bindweed (Lyons, 1998b).

On Crescent Ranger District, field bindweed has been found in one small isolated patch on the Crescent Cut-off Road adjacent to MSA BB.

Cheatgrass: Cheatgrass (*Bromus tectorum*, BRTE) is an erect winter- or spring- annual grass. Cheatgrass reproduces only from seeds, germinates in the fall or winter, expands its roots, and rapidly exploits the available water and nutrients in early spring. Cheatgrass can persist in unpredictable environments because seed germination is staggered from August until May (Carpenter and Murray, 2000?).

Notable cheatgrass infestations occur along roadsides and in MSA N on the east shoreline of Davis Lake. Control is difficult. Cheatgrass sites are not tracked in the DNF geodatabase.

Sweetclover: Sweetclovers (*Melilotus alba* – white-flowered, MEAL, *M. officinalis* – yellow-flowered, MEOF) are annual, winter annual, or biennial legumes in the Pea Family (Fabaceae). The sweetclovers were introduced from Europe and Asia, becoming common along roadsides and waste areas. Sweetclover is often one of the first plants to appear on disturbed sites (Whitson, ed., 1992)

Sweetclover infestations on Crescent Ranger District occur mainly along Highway 58 where it was a contaminant in the seed mix used by fiber optics line contractors for revegetation after installation (McMahan, personal comm.).

Reed canarygrass: Reed canarygrass (*Phalaris arundinacea*, PHAR3) is a cool-season perennial grass that grows successfully in northern latitudes. It can be invasive in wet habitats and so is often a target for control. Since reed canarygrass is tolerant of freezing temperatures and begins to grow very early in the spring, it can out compete many other species. Reed canarygrass spreads within sites by creeping rhizomes and forms dense, impenetrable mats of vegetation. New sites are colonized by seeds (Lyons, 1998c).

Reed canarygrass has been referred to as a "Dr. Jekyll and Mr. Hyde kind of grass" (Hodgson, 1968 in Lyons, 1998). It is valued as a forage grass and for revegetating denuded ditchbanks. However, it can also overgrow irrigation ditches and small natural watercourses, alter soil hydrology, is poor forage for domestic stock when fresh, and invades native vegetation where it outcompetes desirable native species. Almost any moist, fertile habitat is suitable for this species. Reed canarygrass invades and dominates wetland and riparian areas. Human-caused disturbance and alteration of water levels encourage reed canarygrass invasion (Hoffman and Kearns, 1997 in Lyons, 1998c).

Crescent Ranger district records show that reed canarygrass was seeded in 1955 in the area of the Davis Lake site (approximately 40 pounds of seed on twenty acres, along with alta fescue, meadow foxtail, and orchard grass) and again in 1965 in the Davis Lake Cattle and Horse (C&H) grazing allotment when 120 pounds of seed were planted in the vicinities of the mouths of Odell and Ranger Creeks. The Davis Lake reed canarygrass site now occupies 1256 acres.

Other species of invasive plants in the Davis LSR that are on the Region 6 Invasive Plant List (FEIS 2005) that have not been previously tracked in NRIS/Terra because they are not on the Oregon State Noxious Weed list include:

- *Anchusa officinalis* (ANOF, common bugloss), one small site has been found with a few plants.
- *Centaurea debauxii* (CEDEx, meadow knapweed), one plant was pulled in 2005 during weed control and inventory activities along Highway 58 (Odell Lake area). During weed control activities in 2006, about five meadow knapweed plants were found and pulled.
- *Cichorium intybus* (CIIN, chicory), a few plants are pulled along Highway 58 during weed control and inventory activities almost every year.
- *Daucus carota* (DACAx, wild carrot), a few plants are pulled along Highway 58 during weed control and inventory activities almost every year.
- *Dactylis glomerata* (DAGL, orchardgrass) found occasionally along major travelways.
- *Hypochaeris radicata* (HYRA, hairy cats-ear) a few plants are pulled along Highway 58 during weed control and inventory activities almost every year.
- *Kochia scoparia* (KOSC, kochia) a few plants are pulled along Highways 97 and 58 almost every year.
- *Leucanthemum vulgare* (LEVU, oxeye daisy) found along major travelways Plants are pulled during weed control and inventory activities.

- *Rubus discolor* (RUDI, Himalayan blackberry) one known site along Highway 58 was pulled in the Davis LSR.
- *Tanacetum parthenium* (TAPA, feverfew) a few plants are pulled along Highway 58 during weed control and inventory activities almost every year.
- *Tanacetum vulgare* (TAVU, common tansy) a small infestation was pulled at the 46/61 junction adjacent to Davis LSR.

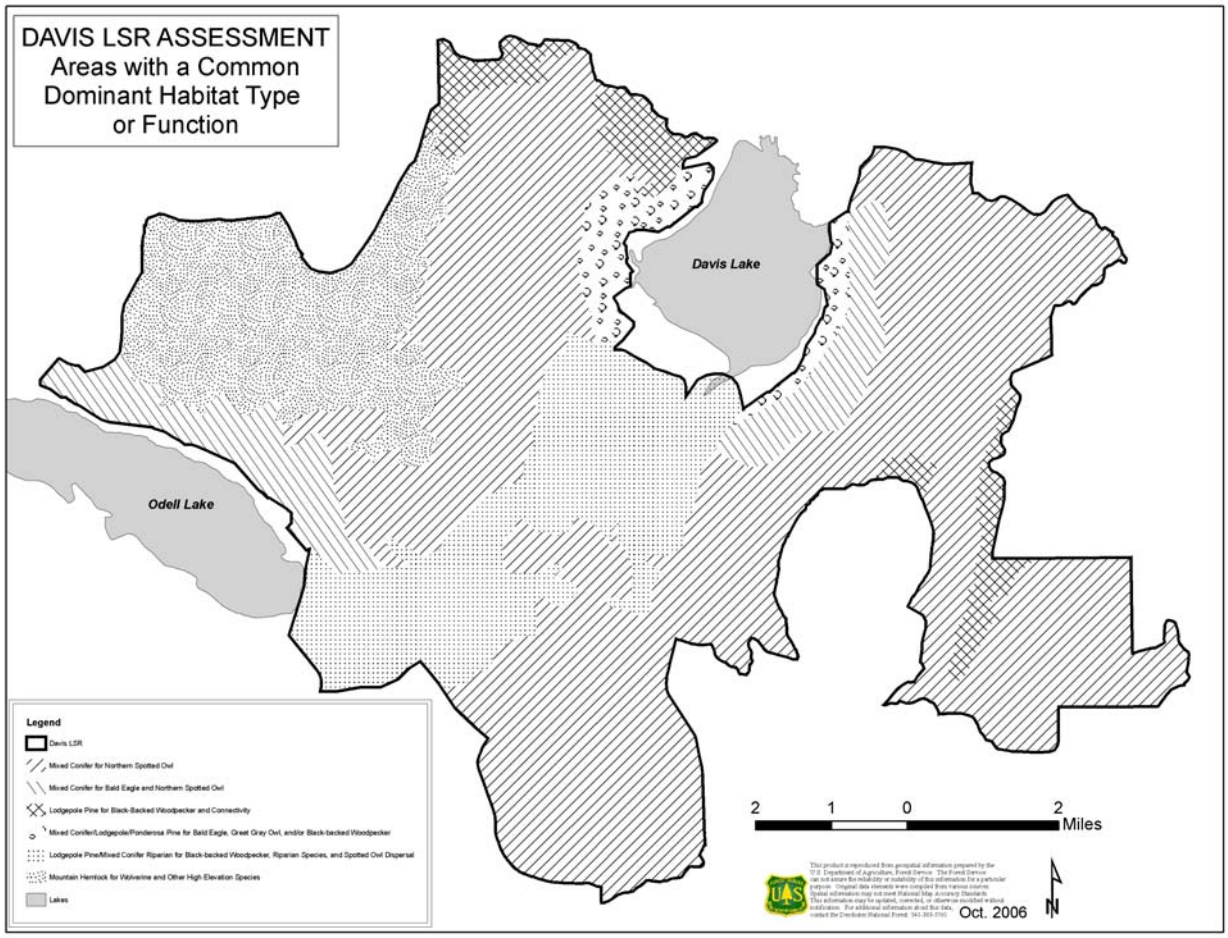

Figure 2-7. Areas with Common Habitat Type or Function.

WHERE AND WHEN ARE FOREST MANAGEMENT ACTIVITIES FOR RISK REDUCTION NEEDED TO PROTECT THE EXISTING AND POTENTIAL HABITAT FOR LATE-SUCCESSIONAL AND OLD GROWTH RELATED SPECIES WITHIN THE DAVIS LSR?

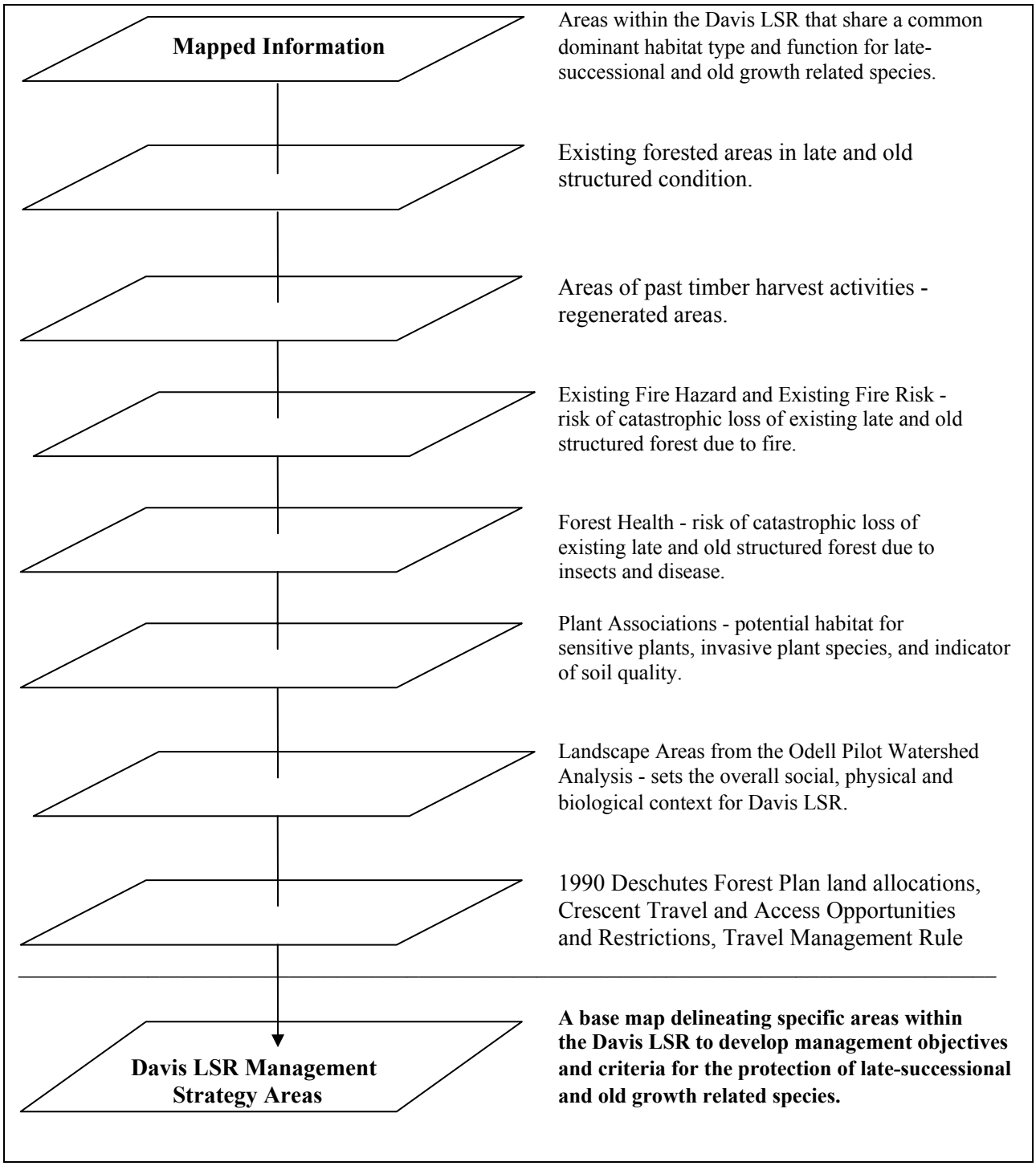

Figure 2-8. Additional information used in the LSR assessment process.

The map generated by answering the first key question, "Areas with a Common Habitat Type or Function," was used as the base map for delineating specific areas where activities are needed to protect late-successional habitats within the LSR. Figure 2-8 illustrates the additional information that was used to subdivide these habitat areas into smaller areas that better reflect the diversity of existing conditions such as the varying levels of stand stages, or the amount of existing vegetation in a late-successional condition. These smaller, subdivided areas are referred to as Management Strategy Area (MSAs).

The following is a description of each component that helped determine the existing condition of the late-successional habitats within the Davis LSR and delineate the twenty-eight Management Strategy Areas.

EXISTING FOREST STRUCTURE COMPONENT USING GNN or INFORMS DATA

Existing forested areas having a late and old structured (LOS) condition were mapped. This information was obtained in using information from the Landsat (PMR Data) maps combined with specific stand information in the Geographic Information System (GIS) stand database to model the LOS stands. All stand information was populated using INFORMS most similar neighbor program. This was most useful for those stands where no information was available. The information was then tested in the field to help create a query that best reflected the LOS conditions within the Davis LSR plant association groups (see Figure 2-9).

Gradient Nearest Neighbor (GNN) was used for modeling certain stand attributes for fire behavior modeling.

Table 2-10 is a summary of the Plant Association Group condition in the Davis LSR.

Table 2-10. Summary of PAG Condition in the Davis LSR

PAG	Large Tree Retention	Large Tree Replacements	Resilience to Disturbance	Time Period of Relevance
LPD (Lodgepole Pine Dry)	Not applicable - normal cycle is for overstory replacement to occur as overstory trees reach 8" dbh and larger and begin to experience competition-induced mortality from mountain pine beetle.	Replacements of lodgepole pine overstory are common in most stands unless disturbance agents persist.	This PAG is characterized by disturbance, often at moderate stand replacement levels. Rapid and dense regeneration often follows disturbance.	• This PAG can cycle from stand replacement disturbance through regeneration, development, maturation and back to stand replacement in 60-80 years (Agee 1993). • High elevation areas may have longer fire cycles than basin areas (Dickman and Cook, Can. J. Bot Vol 67, p.2005-2016, 1989).
LPW (Lodgepole Pine Wet)	Stands in this PAG are often associated with riparian areas; large trees in this association are typically Engelmann spruce.	Currently not lacking in mid and understory spruce trees on these sites.	Similar to LPD but with the spruce component.	Similar to LPD but cycles are potentially longer due to the moister environment.

PAG	Large Tree Retention	Large Tree Replacements	Resilience to Disturbance	Time Period of Relevance
MCD (Mixed Conifer Dry)	• Fire exclusion combined with little or no management activity has put the large trees at risk. • Overstory trees are predominantly ponderosa pine with some Douglas-fir and sugar pine in portions of the landscape. • Severe competition with understory true fir and lodgepole pine has made the overstory trees highly susceptible to bark beetles.	• The extremely dense mid and understories of these stands are almost exclusively comprised of true fir and lodgepole pine. • The few ponderosa pine and Douglas-fir in the mid and understories are severely suppressed with little potential to respond to release from competition and grow to dominant overstory size.	• Without replacement trees of the same species these overstory trees could not be replaced for several centuries. • With such high mid and understory densities these stands will lose the overstory trees in the event of fire or insect infestations greater than endemic proportions. • Three centuries or more would be required for these stands to return to their present condition and structure after a disturbance event.	• **Short term (Now-20 yrs):** These stands provide important wildlife habitat but the critical components of that habitat could be lost in a very short time period, i.e. one fire event. • **Long term (20 yrs plus):** These stands will lose most or all of their large tree components and will continue to move to small tree dominated stands at least until a stand replacement event occurs. Loss of large trees will continue at random levels ranging from few to most or all of the trees.
MCW (Mixed Conifer wet)	The very few stands of MCW in this project area are on the dryer end of the MCW spectrum and are very similar in characteristics and risks as the MCD stands. These do tend to have a few more true fir in the overstory than the MCD.	Same as MCD.	Same as MCD.	Same as MCD but may have a slightly longer short-term period by a decade or so.
MH (Mountain Hemlock)	Not really a factor in this PAG as the normal cycle is for overstory replacement events from fires every few-to-many centuries. This PAG is well within its normal fire regime.	The stands in this PAG tend to be single cohort stands dominated by mountain hemlock, so replacements are common. Fire events tend to be stand replacing events, so the cycle just starts over again.	While lodgepole pine and western white pine are common invaders on disturbed sites, the mountain hemlock usually begins to dominate again after a century or so.	While the next disturbance event is not predictable in time, it is predictable in fact. The cycle for these stands seems to range from 200 to 1000 years or more (Dickman and Cook, 1989).
PPD (Ponderosa Pine Dry)	Fire exclusion and minimal management activity has allowed for heavy in-growth of midstory and understory trees. The increased competition is making bark beetle-killed overstory trees more and more common. Conditions are becoming favorable to allow increasingly severe overstory loss to insects.	Although some stands have very high levels of lodgepole pine in them, most stands have adequate numbers of replacement trees of the same species. However, many of these replacements are suppressed enough to impair their ability to respond to release.	• Loss of the large trees to bark beetles is stochastic. Replacements of the large trees could take centuries. • Fire events would most likely be moderate to severe due to the density of the stands and the propensity to crown fires.	• **Short term (Now-20 yrs):** These stands provide important wildlife habitat, but the critical components of that habitat could be lost in a very short time period, i.e. one fire event. • **Long term (20 yrs plus):** These stands will lose most or all of their large tree components and will continue to move to small tree dominated stands at least until a stand replacement event occurs. Loss of large trees will continue at somewhat random levels ranging from few to most or all of the trees.

Figure 2-9 shows the broad plant association groups and current structural stages within each group in the Davis LSR.

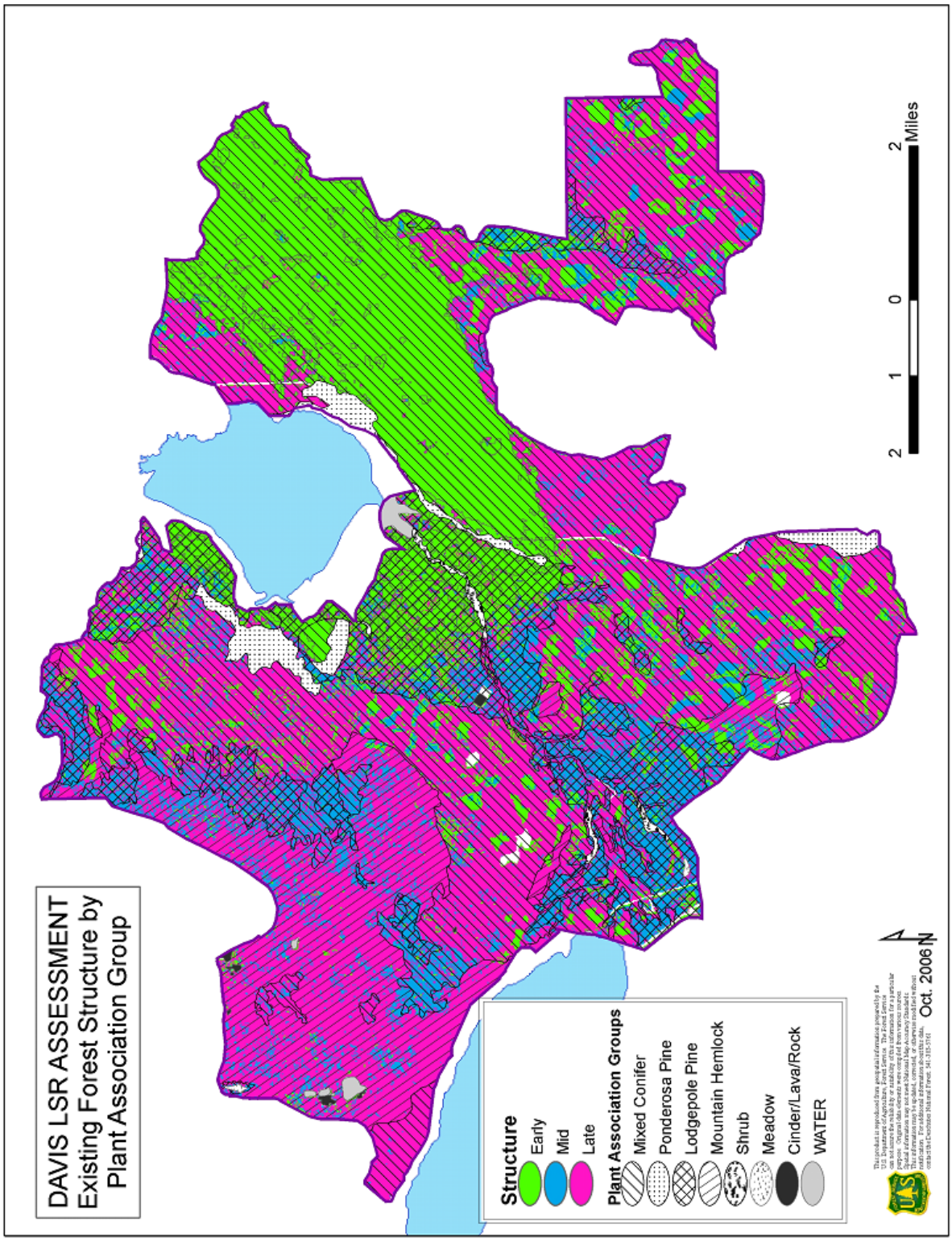

Figure 2-9. Davis LSRA Plant Association Groups and Structural Stages.

FIRE COMPONENT

Fire management planning has been identified as a critical component of Late-Successional Reserve assessment planning east of the Cascade Mountains (ROD, Standards & Guidelines). Large-scale disturbance has the potential to eliminate old-growth and late-successional habitat on hundreds or thousands of acres by limiting the critical structural components of eastside late-successional habitat. Furthermore, the alteration or elimination of fire as a natural process in fire-dependent ecosystems (e.g. Davis LSR) is known to threaten the existence of plant and animal species adapted to such conditions (Swanson 1994). For these reasons, fire management planning becomes a significant issue in late-successional and old-growth management.

The natural disturbance regimes and how far they have departed was determined using Fire Regime Condition Class (FRCC), existing fire hazard was mapped, and a risk analysis was completed.

Historic Conditions and Natural Disturbance Regimes

Fire is a natural process that has played a role in shaping the landscape of the Davis LSR Area. Fire suppression and the effects of fire exclusion have also played a role in shaping the current landscape patterns (Metolius WA, Heath 1995). "Fire changes an ecosystem, community and population structure either by selectively favoring certain species or creating conditions for new species to invade. It usually favors early successional species, but sometimes can accelerate succession to favor late successional species" (Agee 1993).

Ponderosa Pine PAG

Approximately 1,013 acres or 2 percent of the Davis LSR falls within the ponderosa pine (PP) wet and dry disturbance regime.

This particular PAG typically falls into a low severity fire regime. Historically, fires were of low intensity, rarely scorching the crowns of the mature trees. Frequent underburns killed most of the small understory trees which colonized the sites during brief fire-free intervals, maintaining an open park-like appearance. (Agee 1992) These open, park-like stands had substantial grass and forb cover (Wickman 1992, Heath 1995). Frequent, light burning allowed bunchgrasses and most forbs to recover rapidly, so the herbaceous vegetation dominated the understory.

Although there is little current definitive information available for down woody material under eastside conditions in this plant association, historic records indicate there was very little of any size class with periodic fires (Hopkins, 1992). Fuels were rarely at high levels because frequent fires (every 1-25 years) consumed forest floor fuels and pruned residual trees. The average crown cover of these stands was likely less than 50 percent.

Mixed Conifer (Dry and Wet)

Approximately 696 acres of mixed conifer wet (MCW) and 30, 019 acres of mixed conifer dry (MCD) are located within the Davis LSR. Together the mixed conifer PAGs constitute 30, 715 acres or 63 percent of the LSR.

This PAG typically falls into a moderate/high severity fire regime. Agee (1992) believes that historically, the mixed conifer forests show the most frequent fire activity of all Eastside forests, although cooler, wetter sites, i.e. mixed conifer wet, have longer fire return intervals. Frequent fires in drier plant association groups are likely due to higher productivity, when compared to the ponderosa pine

associations. After a fire, the fine dead fuels needed to carry another fire are more rapidly replaced in the mixed conifer associations.

Fire return intervals were estimated by Bork (1995) at 9 to 25 years. Hopkins estimates them to be 30 to 50 years in the lower elevations (1500 to 4000 feet) and 50 to 80 years in the higher elevations (4000 to 5000 feet). McNeil and Zobel (1980) found an increasing fire-return interval with elevation. The average fire return interval was 9 to 42 years along an elevation gradient. Fire return intervals in mixed conifer are quite variable and a specific fire regime for the entire area is difficult to determine.

Hopkins (1995) estimates the average fire size for low intensity fires ranged from 50 to 100 acres and that stand replacement fires were 200 to 500 acres in size.

Mountain Hemlock (Subalpine Ecosystem)

Approximately 7,910 acres or 16 percent of the LSR is located in the mountain hemlock (MH) PAG. This PAG typically falls into a high severity fire regime.

Fire is the primary large-scale disturbance factor in the high elevation forest. Due to the lack of fire resistance of the major tree species in these forests, most fires are stand replacement events. The estimation of fire intensity in high elevation forests is complicated by the erratic, often weather-driven nature of these fires (Agee, 1993). Crown fires can occur when foliar moistures are low and may be aided by lichen draped within the canopy.

Fire return intervals are typically in the 200-300 year range. In normal to somewhat unusual years, a fuel-limited situation for crown fire development exists, but in very unusual years, large-scale crown fires will burn regardless of the fuels situation.

Lodgepole Pine (Wet & Dry)

Approximately 7,966 acres of lodgepole dry (LPD) and 1,138 acres of lodgepole wet (LPW) account for 19 percent of the landbase in the LSR.

The lodgepole pine PAGs typically fall into the moderate severity fire regime category. Fire frequency is not well documented for these forests. The average fire-return interval is most likely in the range of 60-80 years, with areas surrounded by higher productive forests at the lower end of the range. The magnitude of natural fires ranges from slowly burning logs across the forest floor to crown fires.

Climax lodgepole pine forests rarely grow for a century without a major disturbance by fire or insects.

Meadow and Riparian Areas

Within the forested areas, fire occurrence was a light intensity fire, possibly every 50 to 100 years within 0 to 1 acre in size. Any high-intensity fire depends on drought severity with possibly a fire frequency of 100 to 200 years and a range of 1 to 50 acres. Flat grass lands within the wet lands, before European influence, were most likely burned off, yearly by Native Americans knowing green-up that followed would attract foraging game animals.

Fire behavior and history varies across the analysis area as a result of the interactions of weather, topography, fuel conditions, and vegetation composition and structure. The predicted results of high natural fire frequencies and variability at the landscape scale usually is a mosaic of vegetation patches, the scale of which depends on the fire severity regime and drought cycles (Lehmkuhl 1993).

Existing Condition

Management activities, primarily fire exclusion, and to a lesser extent, stand management, have had significant effects on vegetation and fire regimes within the Davis Late-Successional Reserve area. The development of a heterogeneous landscape pattern has been interrupted by fire exclusion, allowing regeneration and more shade-tolerant species to colonize the landscape. Consequently, the structural architecture of the vegetation has been altered both horizontally and vertically. The spatial distribution of a mosaic of clumped groups and of even-aged trees has been replaced by larger, denser, patches of shade-tolerant vegetation. The subsequent increase in the vertical continuity of vegetation and fuelbeds allows surface fires to develop into understory or crown fires under moderate weather conditions (Newberry Fire 1995). Concurrent to the increase in average fire intensity, average fire tolerance of vegetation is decreasing as a result of shading and overstocking.

Risk Analysis

In conjunction with high fire hazard; recreational use, urban interface, social activities, and lightning occurrences have resulted in a relatively moderate fire occurrence rate within the Davis LSR area. Since 1940, a total of 249 fires, 144 lighting-caused and 105 human-caused, have occurred within the LSR.

The following charts demonstrate the criteria used to determine hazard and risk ratings of Low, Moderate, and High:

HAZARD RATING	LOW	MODERATE	HIGH
Flame Length	1-2’	3-6’	6-8’
Flame length intensity = FLI	40-60	60-120 btu/ft	120-200
Rate of Spread (ROS) ft/sec	1-2’	2-10’	10-30

RISK RATING	LOW	MODERATE	HIGH
Total # of Fires (1940-1994)	0-10	11-19	20+
*Risk rating: some MSAs may differ from parameters set due to other considerations, such as access, public use, etc.			

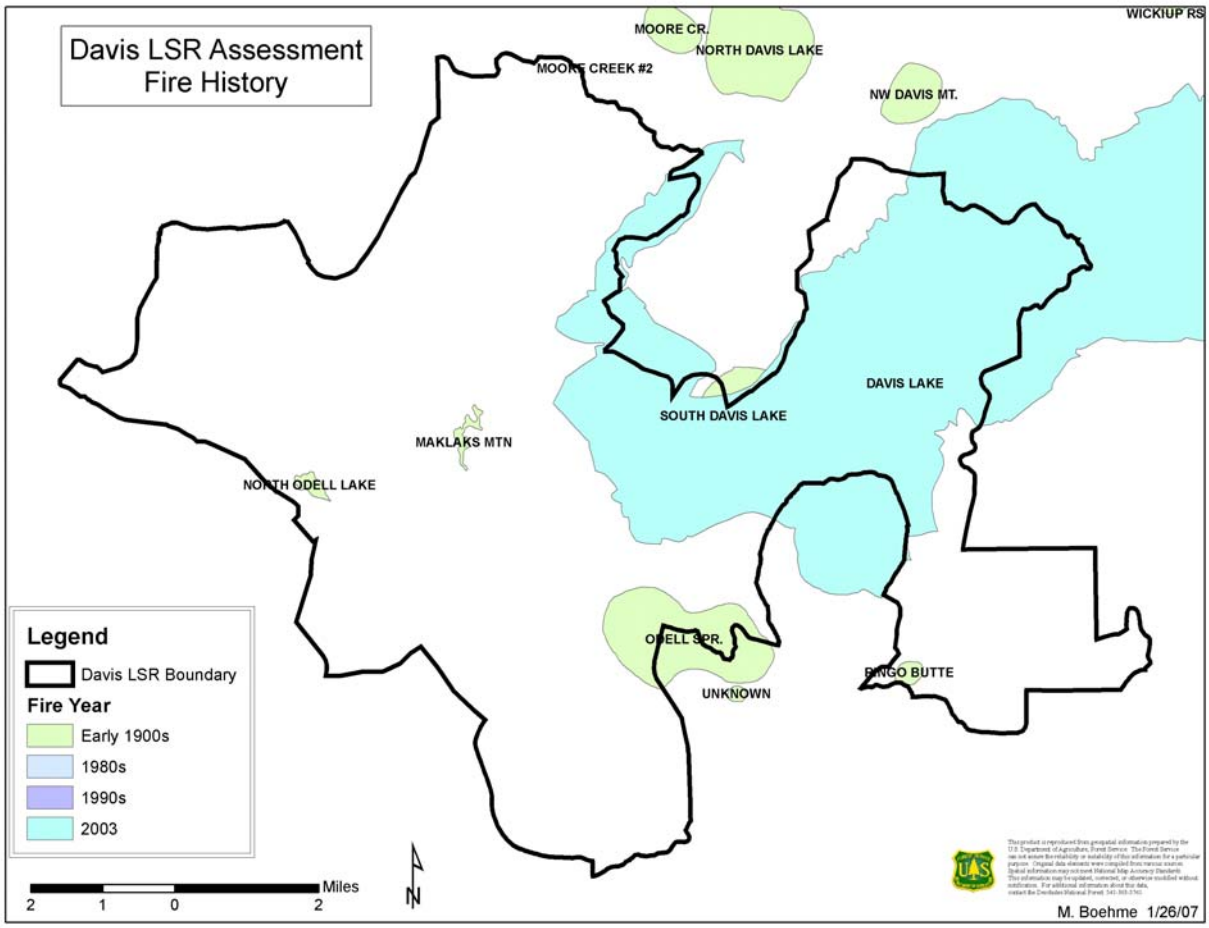

Figure 2-10. Large Fire History in the Davis LSR

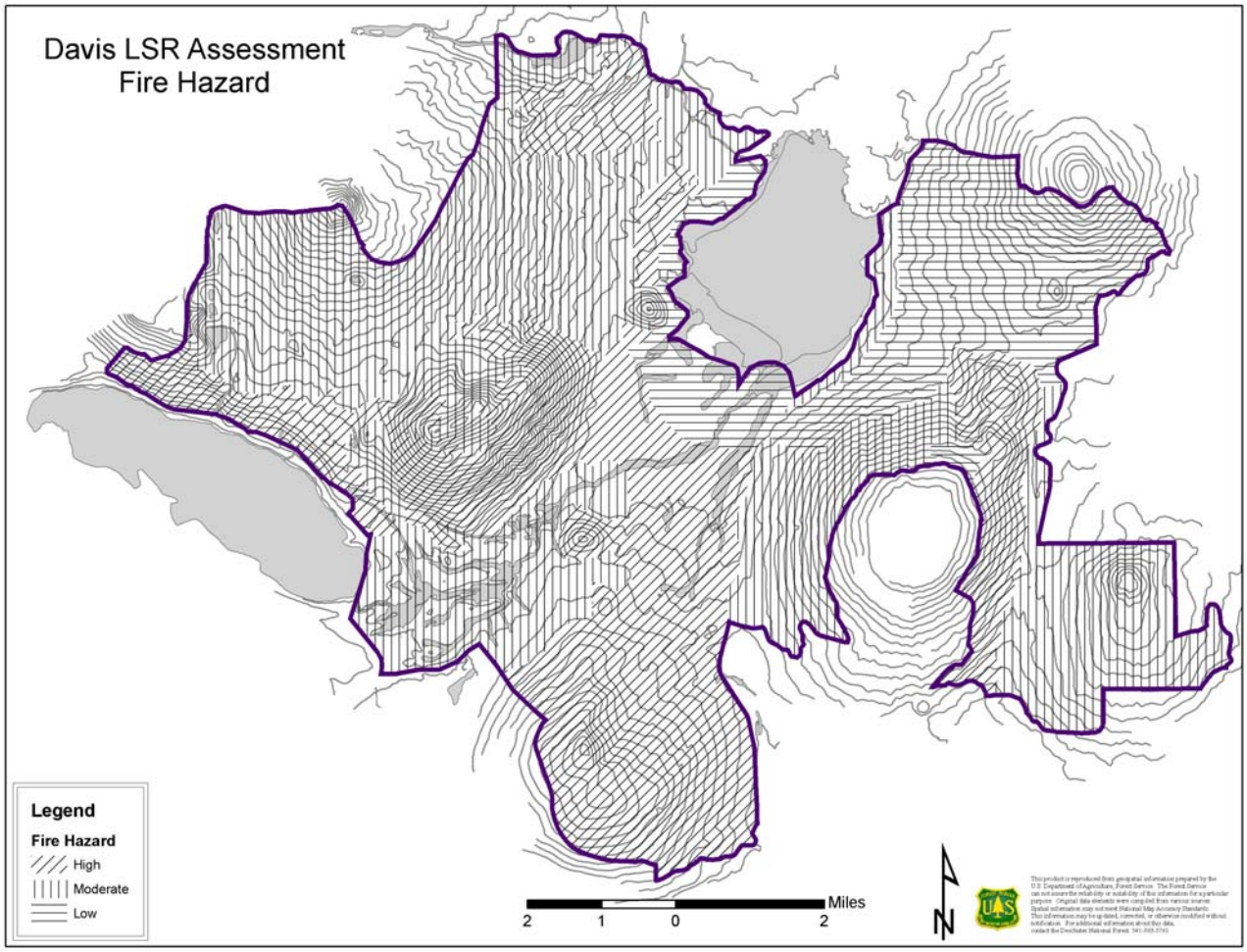

Figure 2-11. Fire Hazard in the Davis LSR.

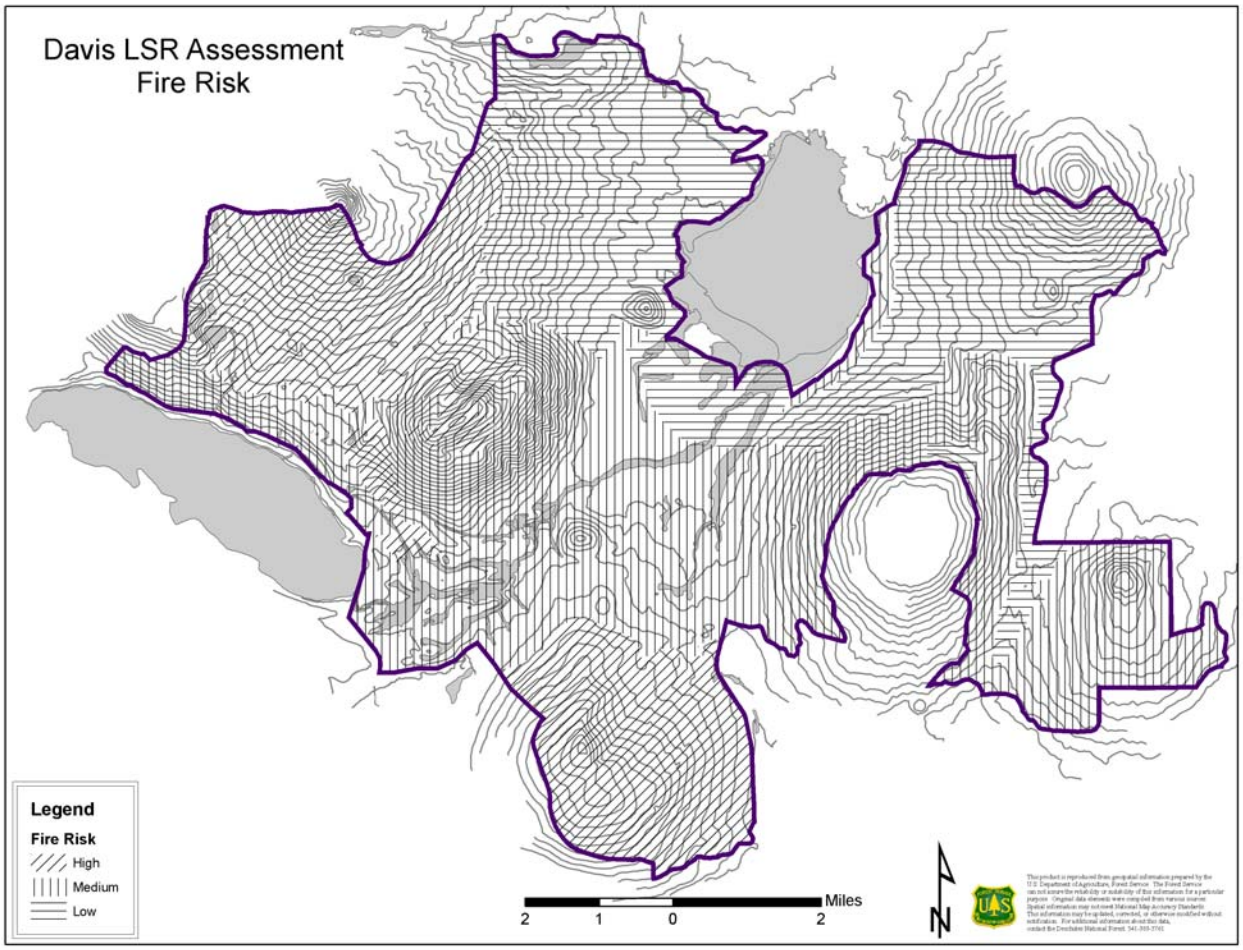

Figure 2-12. Fire Risk in the Davis LSR.

Table 2-11. Historical Small Fire Occurrence[7] by Ignition Type.

MSA	Total # of Fires (1940-2005)	# Lightning (1940-2005)	# Human (1940-2005)
A	2	2	0
B	6	6	0
C	4	3	1
D	0	0	0
E	6	6	0
F	0	0	0
G	0	0	0
H	8	5	3
I	14	3	11
J	2	0	2
K	16	13	3
L	12	4	8
M	11	0	11
N	22	2	20
O	2	1	1
P	2	1	1
Q	18	15	3
R	4	4	0
S	4	4	0
T	12	10	2
U	3	3	0
V	7	4	3
W	7	4	3
X	3	2	1
Y	4	3	1
Z	11	1	10
AA	12	10	2
BB	15	14	1

Table 2-12. Historical Large Fire[8] Occurrence by Ignition Type.

MSA[9]	MSAs Burned[10]	Year(1900-2006)	Lightning Start	Human start	Acres
M	**N,O,P,Q,H,U,S**	**2003**	**NO**	**YES**	**21,000**
W	**V**	**1910**	**UNKNOWN**	**UNKNOWN**	**1,448**
M	**N,O**	**1910**	**UNKNOWN**	**UNKNOWN**	**738**
S	**S**	**1910**	**UNKNOWN**	**UNKNOWN**	**65**
I	**I**	**1911**	**UNKNOWN**	**UNKNOWN**	**61**
K	**K**	**1930**	**UNKNOWN**	**UNKNOWN**	**62**

[7] Less than 10 acres
[8] Greater than 10 acres
[9] MSA where fire originated
[10] Total MSAs burned per incident

See Figures 2-11 and 2-12 for fire hazard and fire risk.

FOREST HEALTH COMPONENT

Within the past several decades there have been some very significant impacts from insects and disease on forested stands and tree species. The risk is tied to forest density and density class and is generally considered high where stand densities exceed the Upper Management Zone (UMZ) and the condition class is other than "1". It is considerate moderate, if density is greater than or equal to UMZ and condition class is "1". It is considered low, if it is below UMZ regardless of condition class. Beginning in the 1930s it was recognized that the white pine blister rust (*Cronartium ribicola*) was a significant problem for the 5-needle pines across the continent. In the 1970s, the Douglas-fir tussock moth (*Orgyia pseudotsugata*) reached epidemic proportions in several western states. About the same time, the Dutch elm disease (*Ceratocystis ulmi*) was killing most of the elm in the United States. Within the last decade, the mountain pine beetle (*Dendroctonus ponderosae*) has killed most or all of the overstory lodgepole pine on hundreds of thousands of acres in central Oregon alone. In addition, the western spruce budworm (*Choristoneura occidentalis*) has killed true firs, Douglas-fir, spruce, and western larch on thousands of acres in northeastern and central Oregon.

Although infestations at endemic levels provide for a diversity of habitat necessary for dependent species, they can occur at epidemic levels, resulting in serious ecosystem, economic, and aesthetic losses. Recognition of the potential impact insects and diseases can have on the Davis LSR is critical to meeting the goals and objectives of the LSR. As discussed in the LRMP, prevention of pest problems is preferable over suppression activities. Evaluation of the risks varies with the different plant associations, with the current plant communities, and with the vegetative disturbance history for a given site.

It seems that whenever there is a large amount of forest vegetation in a fairly narrow range of conditions, there is also a corresponding pest or range of pests able to thrive under those conditions.

Listed below is a summary of the different levels of risk to large scale insect and disease losses in the Davis LSR. These risks are summarized by landscape area (Odell WA) in an attempt to tie the risks in with the management objectives and options currently in effect. (See Figure 2-14 for the location of the landscape areas within the Davis LSR)

The discussion includes the most likely scenarios, but caution is advised in thinking that these are the only possibilities. For example, during extended periods of drought, these conditions, in conjunction with normal levels of pests, can cause mortality when typically a healthy stand could resist these factors. Risks are subjectively determined using a combination of sensitivity and resiliency to determine the overall risk for the landscape area. Most regeneration units are assumed to be low, so the risks are assessed on the unmanaged portions of each of these landscape areas.

Central Conifer Association

The overall risk is high, especially in unmanaged stands. This area is primarily characterized by unmanaged mature stands of mixed conifer fragmented by managed regeneration patches of primarily ponderosa pine, Douglas-fir, and areas of heavy natural regeneration of lodgepole pine.

The managed stands of regeneration are susceptible to the typical pests common in all regeneration areas on the Crescent District. These pests include: Dwarf-mistletoe from adjacent trees or stands; tip borers; needle blights; and miscellaneous animal pests.

The unmanaged or previously lightly entered mature stands are susceptible to a fairly wide range of insect and disease pests. These stands presently have a relatively low density of large, mature trees with very dense understory vegetation comprised of more shade tolerant later seral species. The overstocked condition of these stands is beginning to show in the amount of overstory mortality.

Overstory mortality is mostly due to the mountain pine beetle and western pine beetle (*Dendroctonus brevicomis*) in the pines, and fir engraver beetle (*Scolytus ventralis*) in the firs. At this time and due to the nature of infestation associated with these beetles, it is not apparent above endemic levels. The Douglas-fir beetle (*Dendroctonus pseudotsugae*) may also be found currently at endemic levels in the stands with Douglas-fir. Armillaria root disease (*Armillaria spp*) can affect all of the conifer species on these sites and is found at endemic levels throughout this landscape area.

Mortality in the understory appears to be mostly from competition levels combined with droughty conditions at present.

What might normally be considered endemic levels of dwarf-mistletoe are currently contributing to mortality at all levels in the stand with the periodic drought conditions.

Odell Lake/Willamette Pass Area
The overall risk is high. This landscape area is very similar to the Central Conifer Association except there is more contiguous late and old forest, a low level of roads, and it contains a larger proportion of mixed conifer wet plant associations.

Davis Lake Area
The overall risk is high. This landscape area is characterized by unmanaged stands of mature ponderosa pine and mixed conifer dry plant associations with mature and dead lodgepole pine fragmented by regeneration cuts.

In the lodgepole pine most of the overstory larger than 6 or 7 inches has been killed by mountain pine beetles. The “thinning from above” that the beetles have done has opened these stands up making them more insect and disease resistant and free to grow.

Regeneration stands have similar risks as those in the previous landscape areas.

The ponderosa pine and mixed conifer dry stands are characterized by fairly large, well-distributed overstory ponderosa pine and Douglas-fir, usually over 200 years old, with a very dense understory of lodgepole pine and true firs developing. Ponderosa pine and mixed conifer areas are similar to that of the Central Conifer Association. Lodgepole pine areas are similar to those of the East Odell Creek Landscape Area.

Mountain Hemlock
The overall risk is moderate. Large, contiguous stands of mountain hemlock, western white pine, and lodgepole pine with scattered other conifer species characterize this landscape area. Few activities such as road building and forest management of stands have occurred in this area.

Very old pockets of laminated root rot (*Phellinus weirii*) are common in this landscape area. White pine blister rust in the 5-needled pines has virtually eliminated the western white pine as a viable species in this area. There are still many standing, live western white pine, but it is difficult to find an individual without the blister rust.

East Odell Creek
The overall risk is moderate. The portion that did not burn in the 2003 Davis Fire is characterized by unmanaged stands of mature and dead lodgepole pine fragmented by regeneration cuts. The majority of the overstory larger than 6 or 7 inches has been killed by mountain pine beetle. The "thinning from above" that the beetles have done has opened these stands up making them more insect and disease resistant and free to grow.

Regeneration stands have similar risks as those in the previous landscape areas.

West Odell Creek
The overall risk is moderate. Mountain pine beetles have removed some of the overstory on the drier sites. In the wetter sites, spruce beetle (*Dendroctonus rufipennis*) may be on the increase as several newer infestations were observed this year. Stands are currently very dense and little activities that would fragment habitat has occurred in this landscape area.

Conclusion
Most of the stands which currently meet the desired conditions for LSR are at risk of losing some or all of the desired structural characteristics over the next 10-50 years due to insect or disease infestations on a large scale. Efforts should be made to develop a wide diversity of structure and growing conditions in those landscape areas to increase their sustainability and resilience to insect and disease disturbances.

CONNECTIVITY COMPONENT

The degree of connectivity of owl NRF habitat between activity centers within the LSR and connectivity between Davis LSR and adjacent LSRs was examined mapped (Figure 2-13). Objectives for each area can be found at the end of this component discussion. Management activities to protect short and long-term connectivity can be found in Chapter 4, Appropriate Management Activities.

Connectivity can be provided in this LSR regardless of plant association. Basically, connections can be made with NRF or dispersal habitat with vegetation manipulation as long as there is existing forest structure to work with, allowing them to remain in the same location on the landscape through time.

Intact habitat connectivity corridors were not delineated but were incorporated into the composite map, e.g. the contiguous forest running northeast from Hamner Butte to Saddle Butte. The following paragraphs summarize the logic and objectives that were utilized to map the habitat connectivity corridors. (Figure 2-13)

Owl activity centers and home ranges were used to design a network of contiguous habitat in the LSR. It was recognized that this habitat connectivity is desirable for owl dispersal. This connectivity may also be beneficial to other plant and animal species especially those that are less mobile than the owl and have limited dispersal capabilities, e.g. lichens, arthropods, amphibians, fungi, etc. However, there is not enough information available on these species to conclude that the connectivity designed for the spotted owl will be functional for these other plant and animal species.

- Habitat Connectivity #1 - Objective: Provide contiguous habitat in the mixed conifer PAG between the Moore Creek and Maklaks Mountain activity centers. This corridor is considered to be a very high priority, because it is desirable to promote genetic exchange and facilitate dispersal of the spotted owl into the Cultus LSR 10 miles north.

- Habitat Connectivity #2 - Objective: Reduce habitat fragmentation by accelerating growth and reducing road density to promote successful dispersal of young owls from the Ringo Butte activity center. This corridor is considered to be a high priority because the owls occupying Ringo Butte are living in the lowest quality habitat that exists at the eastern edge of the owl's range. These birds have adapted to somewhat different habitat, and it is important to pass on their genetic material to other eastside owls.

- Habitat Connectivity #3 - Objective: Reestablish an east-west link between Hamner-McCool-Maklaks activity centers. Connectivity has been diminished partly due to the 2003 Davis Fire and fragmentation from past forest management.

- Habitat Connectivity #4 - Objective: Reestablish a block of habitat to provide dispersal habitat between Royce and McCool activity centers and tie into the eastside-westside dispersal corridors. This area could contribute to a contiguous block of habitat in the more sustainable mixed conifer wet PAG.

- Habitat Connectivity #5 - Objective: Provide connectivity between Davis LSR and the Brown's LSR, 3-5 miles to the north.

- Habitat Connectivity #6 - Objective: Provide connectivity between Ringo-Saddle-Davis activity centers.

- Habitat Connectivity #7 – Objective: Provide east–west connectivity between Willamette Pass and the Willamette National Forest LSRs and Owls to Royce Mountain activity center and Davis LSR.

- Habitat Connectivity # 8 – Objective: Provide connectivity on the western most portion of the LSR south to the Trapper Creek activity center.

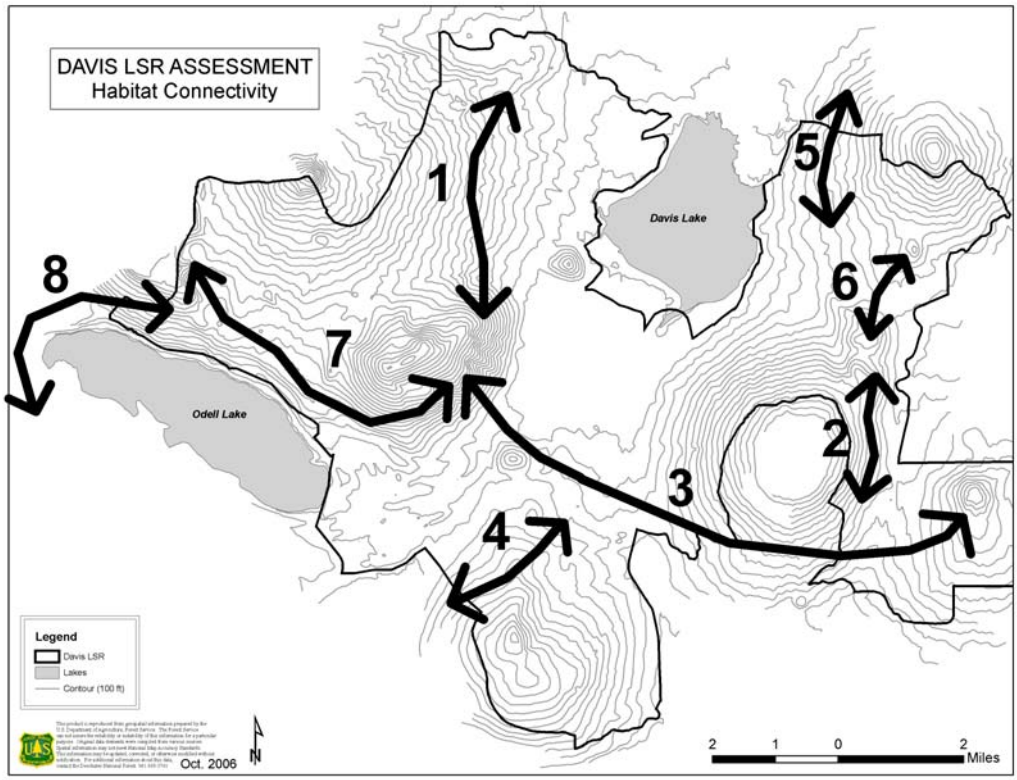

Figure 2-13. Habitat connectivity.

SOIL COMPONENT

Parent materials for the dominant soil types in this watershed are airfall pumice and ash from the Mount Mazama eruption. The original thickness of this airfall deposit within the watershed ranged from about 16 inches (0.4 m) at the west edge (Cascade Crest) to about 60 inches (1.5 m) along the southeast edge (Royce Mountain and Hamner Butte). Particle sizes range from fine to medium sand sizes in the west, to coarse sand to small gravel sizes in the east. Since the eruption, the Mazama ash has moved considerable distances down the steeper slopes and formed thick wedges and aprons. Mazama ash has been stripped from many ridges and tops of buttes by erosion. On lava flows north and northwest of Davis Lake, the ash has eroded from projections and ridges of lava and accumulated in local depressions. The effect of this erosion is a more subdued, less hummocky landscape. Because the Davis Lake Lava Flow erupted after Mount Mazama, no ash is found on the lava or in the sediments of Davis Lake.

The portions of the watershed that were glaciated have fine sandy loam-textured soils over compacted ground moraines (irregular, rolling topography). Here, the older glacial material influences water transport and plant growth in the area.

Soil moisture regimes are Xeric (dry) in the basin and on the eastern edges of the watershed and Ustic (moisture is limited but present) in the more moist sections of the watershed. Soil temperature regimes range from Frigid to Cryic (warmer than frigid in the summer). A more detailed description of soil resources can be found in the Odell Watershed Analysis, 1994 and 1999.

Disturbances to the soils resource due to management activities have occurred across most the Davis LSR outside of roadless areas. Priorities for soil restoration in the MSAs have changed since the 1995 LSR Assessment due to the changing watershed boundaries, methodology used to assess the detrimental soil conditions in the subwatersheds, and activities that have taken place since 1995. Direction for soil quality is provided by the Deschutes Land and Resource Management Plan (LRMP) as amended by the Northwest Forest Plan and regional guidance.

The (LRMP) specifies that management activities be prescribed to promote maintenance or enhancement of soil productivity by leaving a minimum of 80 percent of an activity area in a condition of acceptable productivity potential following management activities (LRMP 4-70, SL-1 and 3). The LRMP guidelines ensure soils are managed to provide sustained yields of managed vegetation without impairment of the productivity of the land. These standards call for rehabilitation measures when cumulative impacts of management activities causing damage to soils exceed 20 percent of an activity area (SL-4); limits the use of mechanical equipment in sensitive soil areas (SL-5), and provides ground cover retention objectives to minimize soil erosion by water and wind (SL-6).

Detrimental soil impacts are those that exceed Soil Quality Standards:

- Detrimental Compaction in volcanic ash/pumice soils is an increase in soil bulk density of 20 percent or more, over the undisturbed level.
- Detrimental puddling that occurs within the depth of ruts or imprints is six inches or more
- Detrimental Surface Erosion requires visual evidence of surface loss in areas greater than 100 square feet, rills or gullies, and/or water quality degradation from sediment or nutrient enrichment.

The Forest Service Region 6 Supplement also includes policy direction for designing and implementing management practices which maintain or improve soil and water quality. An emphasis is placed on protection over restoration. Specifically, under 2520.3 – Policy, the narrative reads:
"When initiating new activities:
Design new activities that do not exceed detrimental soil conditions on more than 20 percent of an activity area. (This includes the permanent transportation system).

In areas where less than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effect of the current activity following project implementation and restoration must not exceed 20 percent.
In areas where more than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration must, at a minimum, not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality."

The 1994/1999 Odell Watershed Assessments stated that soil compaction was on an increasing trend. Since that time, improvements in harvest technology and additional design features, such as seasonal and mechanical restrictions and wider skid trail patterns, have made progress in protecting soil quality. Prior to 1990, skid trails on moderately flat ground averaged 50 feet apart, corresponding to approximately 20 percent of the unit that would be in detrimental soils condition from soil compaction. Between 1990 and 1993, administration records show skid trail systems increased to an average spacing of 75 feet, or approximately 14 percent of the harvest unit area in detrimental soils conditions. Since 1994, skid trails have typically been spaced 100 feet apart which corresponds to 11 percent of the harvest unit. In addition, there has been a significant decrease in the use and size of clearcuts which require machinery to visit virtually every tree. Along with the decrease in detrimental impacts due to skid trails and a change in harvest practices, there has been an increase in soil restoration through activities such as subsoiling. Approximately 634 acres of restoration has occurred to date.

The majority of the LSR (53 percent) has less than 10 percent detrimental soils from past management activities. Approximately 37 percent has between 10-19 percent detrimental soils conditions and 10 percent has more than 20 percent in detrimental soils from past management activities.

WATERSHED ANALYSIS COMPONENT

In addition to the references made to the 1994/1999 Odell Pilot Watershed Analysis, the Landscape Areas from that analysis were used to set the overall physical, biological, and social context of the LSR. However, a portion of the Davis LSR is located outside of the boundaries of the Odell Watershed including Ringo Butte, most of Royce Mountain, Davis Mountain, and Hamner Butte.

After reviewing the landscape trends, goals, objectives and opportunities documented for the "Central Conifer Association" Landscape Area in the Odell WA, it was decided that the Central Conifer Association should be expanded to include these portions of the LSR. The goals, objectives, and opportunities for each landscape area were then used to assist in the delineation of the Management Strategy Areas (see Figures 2-15 and 2-16).

In addition to this information, the Odell WA also provides a majority of the social context for this LSR. A map of the watershed illustrates how the social context appears on the landscape. Documentation in the Odell WA thoroughly describes the LSR in terms of social expectations; human settlements influencing the LSR; the history of Forest Service management within the LSR; access and travel; scenic values; recreational use; commercial use and commodities; and heritage resources.

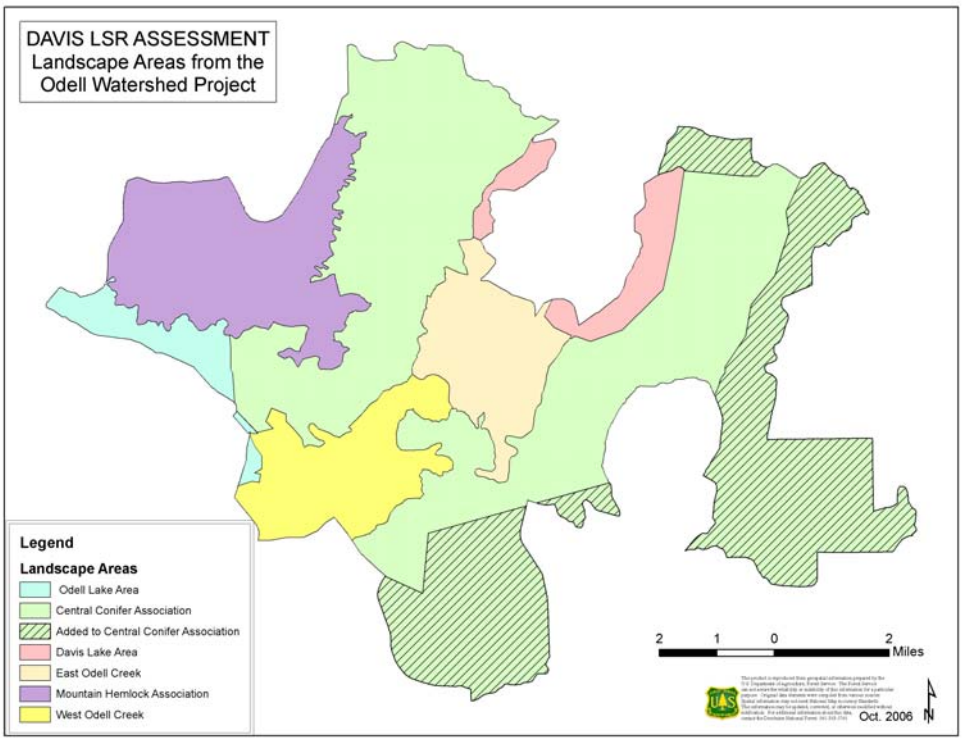

Figure 2-14. Landscape areas from the Odell Watershed Analysis.

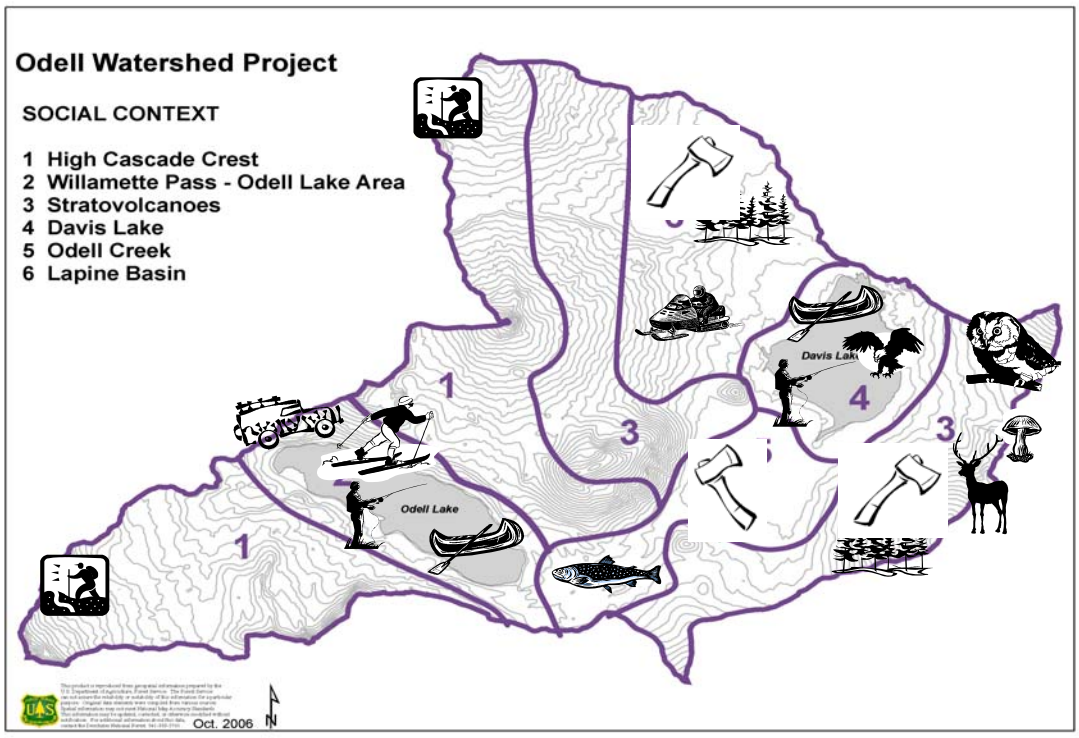

Figure 2-15. Social context of the landscape around Davis LSR (from the Odell Watershed Project).

RIPARIAN COMPONENT

The Odell Pilot Watershed Analysis provided a thorough analysis of the riparian habitats within the Davis LSR. Riparian Reserves were delineated and their functions for riparian related species were documented. No boundaries were changed from the default standard widths found in the Northwest Forest Plan. The riparian component was used to help determine opportunities within the Davis LSR to provide habitat for riparian related species (Figure 2-16).

As mentioned in the soil component section, the biggest change since the last update of the Odell Watershed Analysis in 1999, is the change in subwatershed/watershed boundaries. This change will be reflected in acres, however the specific objectives for the riparian components of the specific MSA groups remain the same.

Floodplain function and the quality of the riparian vegetation have been maintained in over 95 percent of the watershed. The basin is in excellent shape, except in localized recreation sites where human influences have altered both form and function of riparian and floodplain areas. Vegetation in these areas can be found denuded or trampled, and in some cases, soils are compacted. Riparian vegetation has also been adversely altered or destroyed in the high concentration use zones, especially around resorts and campgrounds. The stream banks and lakeshores in many of these areas have been trampled and protective vegetation has often been eliminated. This was particularly apparent along Trapper Creek near the campground. A stream rehabilitation project has addressed this problem by planting over 3,000 native plants/trees along the stream bank, obliterating two developed campsites and fencing off the stream from the campground. A few trails (hiking, OHV, and snowmobile) traverse or parallel riparian zones and have detrimentally impacted some wet meadows. There are several sites adjacent to Davis Lake where four-wheel drive vehicle networks have been developed in riparian zones causing vegetation damage and concentrating water flow through the meadow which disrupts hydrologic function. The impacts associated with the concentration of people in riparian zones include: trampled vegetation; slight increase in runoff, erosion, and sediment delivery to the water body; and damage to the stream banks. Collection of downed material as firewood and trampling of vegetation in the riparian zone can directly and indirectly affect instream and floodplain wood volumes and potential shading on streams.

The riparian conditions within the watershed are believed to be similar to what they were prior to the 1850s. One possible exception is the lodgepole and mixed conifer plant association groups where fire played an active role in creating open patches (open meadows in this plant association intermixed with the lodgepole and mixed conifer) in the landscape. Fire exclusion had greatly changed riparian function along lower Odell Creek. Encroaching lodgepole pine trees were able to become established and riparian dependent shrubs began to decline. The Davis Fire of 2003 burned this area, killing many of the lodgepole and the riparian area responded very positively. Grasses and shrubs have shown remarkable growth and the water table has become elevated as a result of decreased evapotranspiration losses from the lodgepole pine. Historically, a greater percentage of open meadows were present in the watershed. Within these areas where fire has been suppressed, fuel loading (both live and dead) is higher than the perceived natural range of variability, and conifers are encroaching. The addition of fire to these areas would produce a mosaic of vegetative types and seral stages. Continued fire exclusion allows additional buildup of fuels in the riparian/wetlands/floodplains, which results in an increased susceptibility to fire and a decline in the species dependent on herb/shrub meadows. Riparian areas in general do not burn all that well in comparison to the surrounding drier areas. Fires have a tendency to creep in and out of these moist areas at relatively low intensity compared to upland vegetation types. Large scale wildfires such as the 2003 Davis, have the ability to be stand replacing within the riparian area. This was beneficial at this particular location due to lodgepole pine encroachment into the floodplain. As the human population in Oregon and neighboring states increases, it is anticipated a greater number of people will be recreating in

the Odell watershed at established and dispersed sites, putting more pressure on proper functioning conditions.

Roads have the potential to create a pathway for adding sediment to streams, influence stream movement, reduce floodplain efficiency and affect riparian vegetation. Road densities are typically an important factor in determining riparian health and function, particularly within aquatic influence zones and within perennial stream reaches. While road densities within the LSR are relatively high, hydrologic connectivity is very low. This is largely due to porous soils and generally flat topography in the area. In this environment, the location of roads is more important to hydrologic function and sediment contributions than density. Developed and dispersed recreation sites tend to focus in riparian areas. Roads, either system or user-created are developed to provide easy access to these sites. Roads within the riparian area are more prone to focus water and increase peak discharge events, intercept surface and subsurface flow, and/or contribute sediment from the road prism. A native surface road (Road 4660-600) parallel to lower Odell Creek was closed following the 2003 Davis Fire. This road provided access to several streamside dispersed campsites. Stream and riparian health had been compromised from trampling on the banks of the stream causing erosion. These sites also contributed to loss of large woody debris through firewood cutting for campfires and campsite access. Culverts at two perennial stream crossings have been replaced with a bridge at Odell Creek (Road 4600) and a bottomless arch at Maklaks Creek (Road 4668). The road surface at each site has been hardened to reduce potential fine and angular sediment contributions.

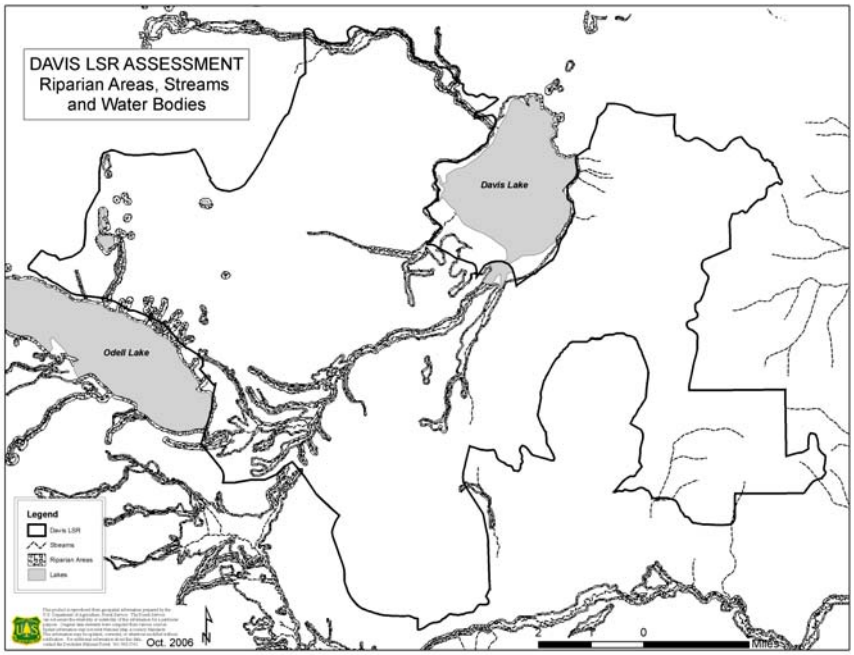

Figure 2-16. Riparian areas.

Table 2-13. Percentage of Area Occupied by Roads within Aquatic Influence Zones by Subwatershed

Subwatershed	Area in Roads Within Aquatic Influence Zones (%)	Area in Roads Within Perennial Aquatic Influence Zones (%)
Moore	1.0	<1.0
Odell Creek	1.0	0.8
Odell Lake	0.6	0.6

FOREST PLAN AND ACCESS COMPONENT

The Management Areas from the Deschutes National Forest Land and Resource Management Plan were utilized to determine existing management objectives and standards and guidelines (Figure 2-17). The 1995-1996 Crescent Ranger District Travel and Access Map and the 2003 Forest-wide Roads Analysis were used to determine access restrictions and allowable uses. A map of the open and closed roads within the LSR was also created (Figure 2-18). Currently, access management within the LSR is incorporated into the planning process for the Travel Management Rule due to be implemented in 2008/2009.

Road densities are high in many parts of the LSR reducing amount of habitat available, and reducing effectiveness of LOS through increased edge. Since 1995, decisions have been made to reduce road access and densities, change access status, and improve stream crossings. Not all of those decisions have been implemented at this time. Access to Davis Lake has been rerouted to benefit bald eagles, stream crossing on Odell Creek and Moore Creek have been improved. Access restrictions for public safety and to reduce wildlife harassment as a result of the 2003 Davis Fire is temporary, until the forest has completed the process to implement the Travel Management Rule.

There are no designated ORV trails other than snowmobile trails within the LSR. In 2004, 30 miles of groomed snowmobile trails adjacent to Hamner Butte and Royce and Davis Mountains. Approximately 4 miles are within or adjacent to the LSR. The trail was designed to use existing roads and to connect existing designated trails to focus use onto trails outside the LSR and away from off trail use throughout the LSR. Current and ongoing research indicates off-road vehicles, including snowmobiles, pose a risk to wildlife. Current research indicates that snowmobile disturbance to wildlife is only one factor. Over-the-snow vehicles also cause snow compaction, increasing predator access to small mammals, reduce survival of subnivean species through limiting movement, and increase vulnerability to predators (Graves and Reams 2001, Stokowski and LaPointe 2000). Off road/trail use would be considered detrimental to the LSR.

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Table 2-14. Road Densities for Davis LSR in Miles per Square Mile.

	Objective Open Road Density	Operational Road Density	Total Road Density
Current Condition	1.81	2.19	3.88
If Davis Roads Analysis Were Implemented	1.59	N/A	3.84

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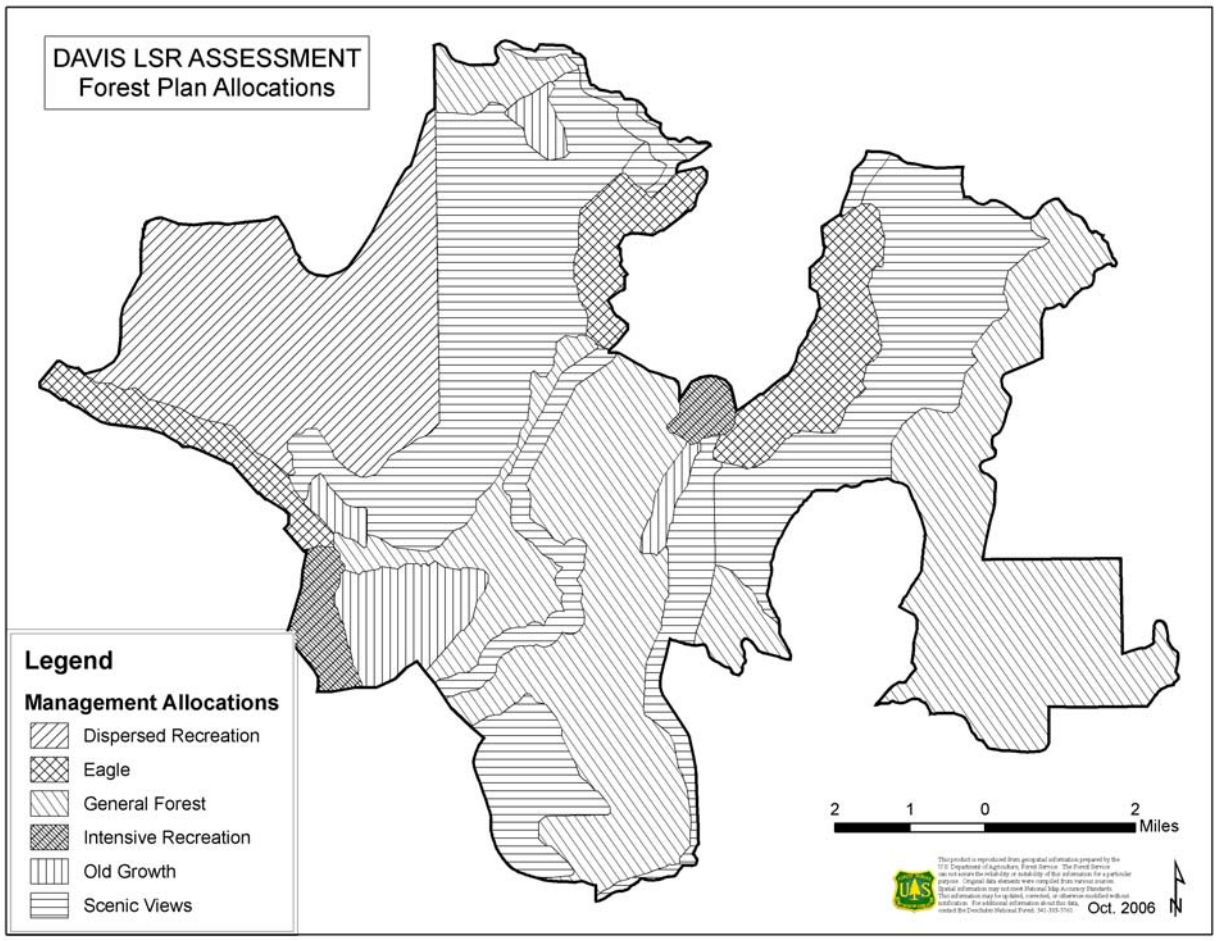


Figure 2-17. Deschutes NF Forest Plan allocations.

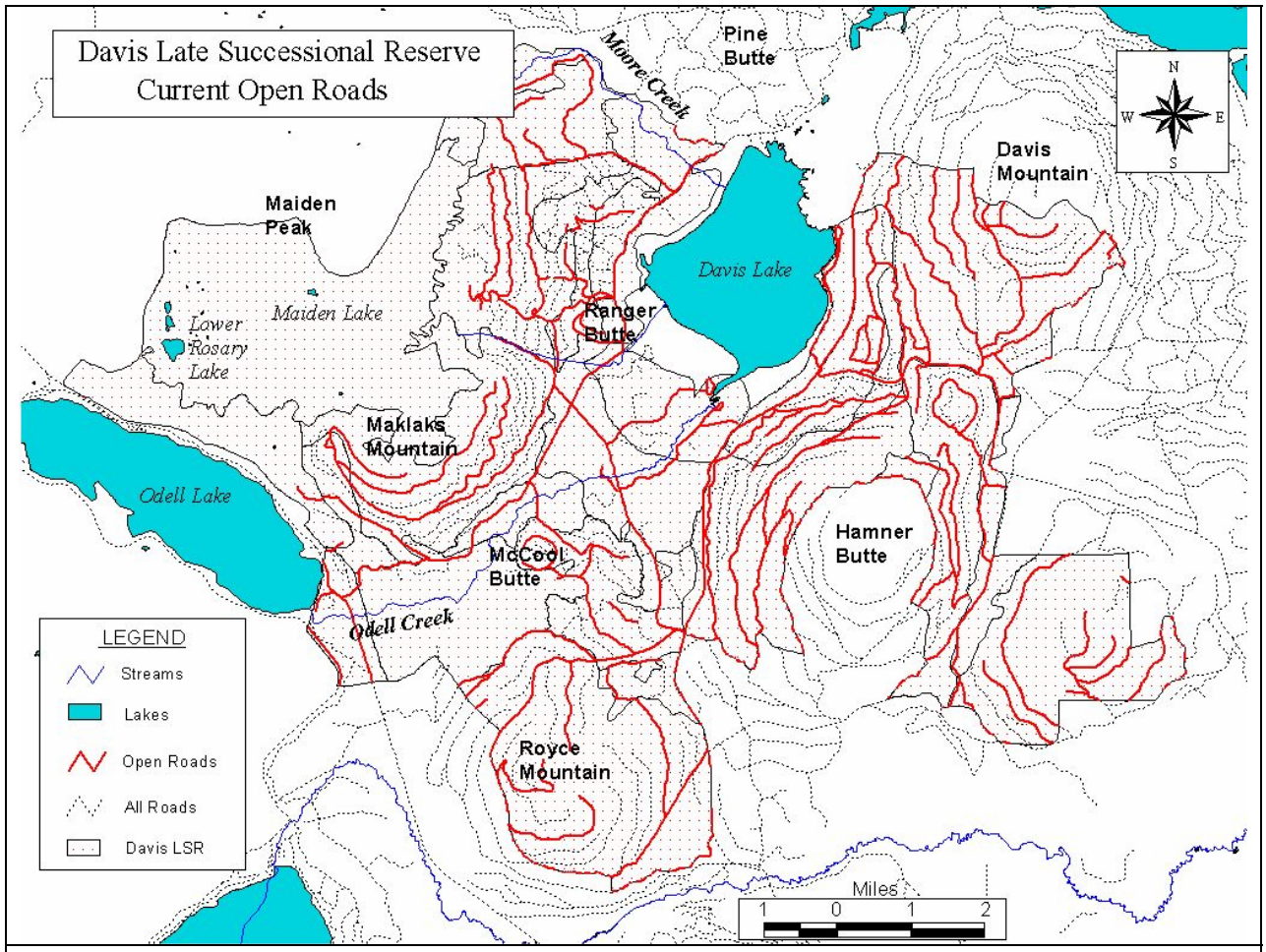


Figure 2-18. Open and Closed Roads in the Davis LSR.

MANAGEMENT STRATEGY AREA BASE MAP (MSAs)

The Management Strategy Area Base Map represents the answers to both of the key questions developed for the Davis LSR Assessment. This base map delineates specific areas within the Davis LSR where management objectives and criteria for the protection of late successional and old growth related species will be developed for the short and long-term. Consequently, all of the objectives and management options are related to a spatial and temporal scale (see Figure 2-19).

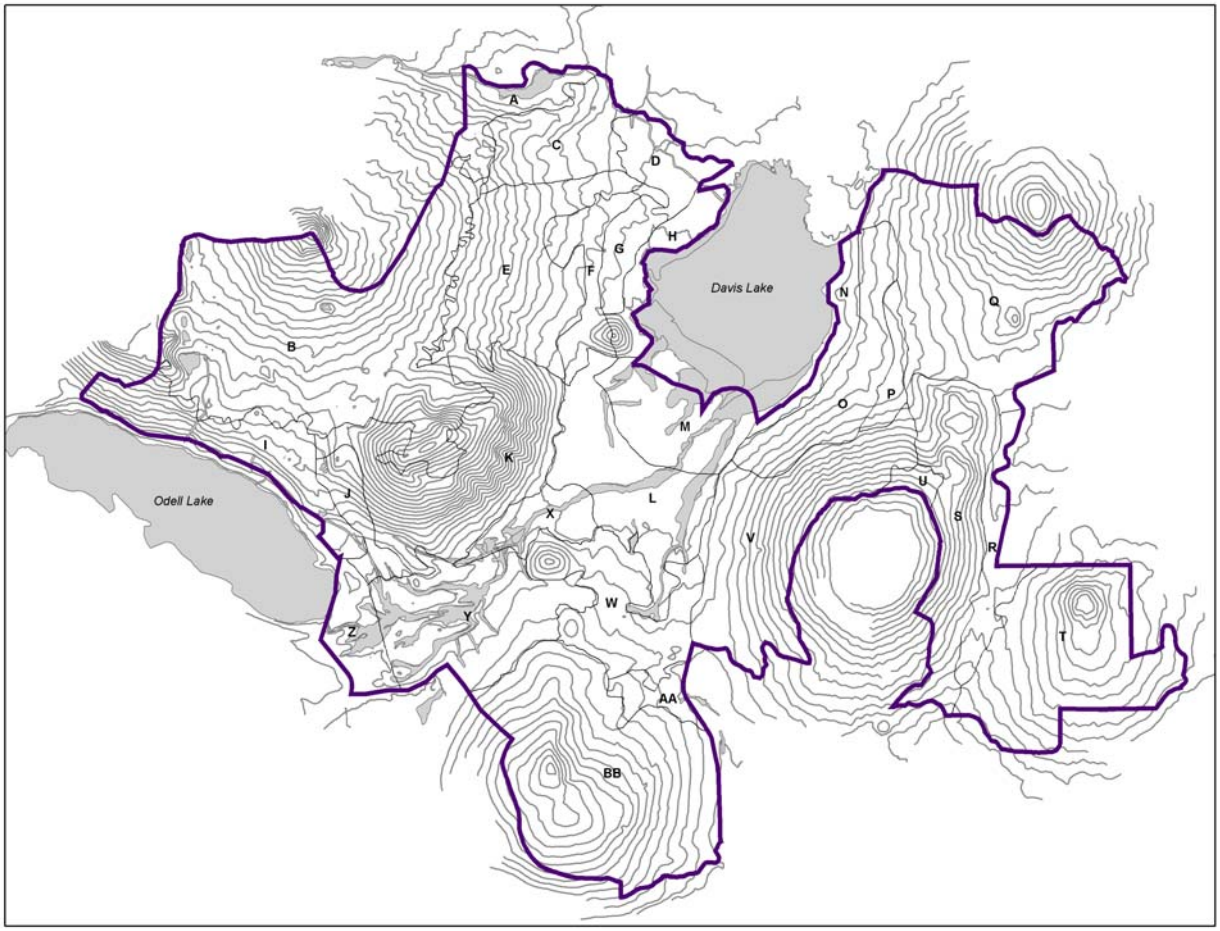


Figure 2-19. Davis LSR Management Strategy Areas.

CHAPTER 3 - DAVIS LSR MANAGEMENT STRATEGY OVERVIEW

INTRODUCTION

This chapter is intended to be an overview of the management strategies developed to protect the Davis LSR. These strategies range from identifying the desired levels of snags and large woody debris to reducing the risk of catastrophic loss of late and old structured (LOS) forest within the LSR. Where appropriate, priorities for management activities and appropriate scales and schedules are listed. The next chapter provides more specific information and appropriate management activities for each individual Management Strategy Area (MSA).

The management strategy for the Davis LSR has been developed to protect, through risk reduction "to maintain a functional, interacting, late-successional and old-growth forest ecosystem" (ROD C-11). For an east side LSR this includes consideration for the fire adapted system under which these late successional systems developed. Key to the management strategy is the concept upon which this LSRA was originally built and the added knowledge of the research and monitoring of the northern spotted owl and the Northwest Forest Plan.

1. The density of trees needed for northern spotted owl habitat places those stands at risk for an uncharacteristic disturbance from insect, disease and wildfire.
   - Currently the multi-storied and densely stocked patches are more continuous, and thus wildfires, insects and pathogens can spread quickly and easily (Moeur et al. 2005).
2. NRF habitat can be sustained on the landscape over time; however, stands are dynamic and may cycle in and out at any one place.
   - Late seral forests are part of the forest mosaic and not independent stands. "...spatial heterogeneity (patchiness) may prove to be the key to restoration of forest health and low intensity fire regimes while retaining patches of complex forests that benefit owls and their prey" (SEI 2004).
3. Active management would focus on protection and maintenance of large trees – the most difficult component to replace.
4. Fire is a part of this ecosystem.
   - "Wildfire is an inherent part of managing owl habitat in certain portions of the range. We should not depend solely on the repetitive design of the plan to mitigate the effects of catastrophic events. We may be able to influence, through management, how owl habitat will burn and the extent of the burn when the inevitable happens" (Lint et al. 2005)

Considerations for the species and associated late successional habitat, unique habitats, insect and disease risks, and fire risks were melded together to develop 6 broad landscape patterns, previously referred to as "areas with a common habitat type and function" (see Figure 3-1). Emphasis/indicator species such as the northern spotted owl were selected for each of the six areas and their habitat needs were quantified to help characterize the desired late-successional conditions. Later in this chapter, Suitable Habitat Descriptions by Plant Association Groups and Emphasis Species (Tables 3-4a through 3-4f) uses these groupings by mixed conifer (fire climax, climatic climax), lodgepole pine, and high elevation hemlock to quantify suitable habitat. The six areas include:

1994 LSRA Habitat Areas	2006 LSRA Habitat Areas
o Mixed conifer for northern spotted owl 54% of the Davis LSR MSA: C, E, K, P, Q, S, T, V, W, BB	o Mixed conifer for northern spotted owl 56% of the Davis LSR MSA: C, E, F, K, P, Q, S, T, U, V, W, AA, BB
o Mixed conifer for bald eagle 8% of the Davis LSR MSA: I, J, N, O	o Mixed conifer for bald eagle and NSO 7% of the Davis LSR MSA: I, J, O
o Mixed conifer/lodgepole with dual connectivity function 3% of the Davis LSR MSA: X, R	o Lodgepole for black-backed woodpecker and connectivity 5% of the Davis LSR MSA: A, D, R
o Mixed conifer/lodgepole/ponderosa for great gray owl and/or bald eagle 6% of the Davis LSR MSA: D, F, G, H	o Mixed conifer/lodgepole/ponderosa for bald eagle, great gray owl, and/or black-backed woodpecker 3% of the Davis LSR MSA: G, H, N
o Lodgepole with/without riparian for black-backed woodpecker and/or riparian habitat 16% of the Davis LSR MSA: A, L, M, U, Y, Z, AA	o Lodgepole/mixed conifer riparian for black-backed woodpecker and/or riparian species and connectivity for northern spotted owls 16% of the Davis LSR MSA: L, M, X, Y, Z
o Mountain hemlock for wolverine and black-backed woodpecker 13% of the Davis LSR. MSA: B	o Mountain hemlock for wolverine and high elevation species 13% of the Davis LSR. MSA: B

Habitat Area Descriptions:

Mixed conifer for northern spotted owl - This area encompasses approximately 27,663 acres (56 percent) of the Davis LSR. The MSAs in this strategy include C, E, F, K, P, Q, S, T, U, V, W, AA, and BB. The mixed conifer plant association group occupies the majority of the area. It is comprised of areas with the highest site productivity and potential to produce and sustain NRF habitat over time. It contains areas that currently function as nesting, roosting and foraging habitat for the northern spotted owl as well as providing habitat for other old growth related species with similar needs. These include goshawk and great gray owls. The eight known owl activity centers in the LSR and their respective home range habitats are included in these areas. Two home ranges, Davis and Saddle Butte no longer function as a result of the Davis Fire. Although all or large portions of NRF habitat in O, P, Q, S and V Management Strategy Areas were also lost due to the Davis Fire, the main focus remains to develop habitat for the

northern spotted owl. Two MSAs (F and AA) with similar NRF attributes and potential were added to this group.

The original desired condition for this mixed conifer area is to provide climatic-climax habitat versus a fire-climax condition - recognizing that this may leave the desired components of habitat at high risk to uncharacteristic disturbance processes. The overall strategy was to reduce the imminent susceptibility of habitat loss while maintaining the highest quantity and quality of climatic-climax habitat as possible in the short and long-term. With the recent loss of over 5,000 acres of NRF habitat and two owl territories, the strategy for the LSR has changed to a more strategic active management scenario. The desired condition is to manage at least 60 percent of the remaining unburned area toward a climatic-climax condition through time maintaining at least 25 percent in NRF habitat. This requires a landscape-scale strategy to cycle in and out of NRF habitat while maintaining the large tree component throughout the cycle. The cycling from non-NRF, to near NRF to NRF (definitions following) across the landscape over time would reduce risk to large and contiguous blocks of habitat disturbance processes. The objective of these MSAs is to provide habitat for the spotted owl, which is relatively the most vulnerable to disturbance processes.

NRF – These are complex, multi-storied stands generally below 6000' elevation. This assessment looks at certain stand attributes to qualify:

- There must be at least 40% canopy cover, a presence of snags per acre over 16" dbh, 8 PP and/or DF greater than 21" dbh, and a presence of PP, WF or DF greater than 36" dbh.
- The overstory must be dominated by DF, WF, MH, and/or ES.
- The understory must have at least 82 trees per acre under 21" dbh and of those trees, DF, WF, MH, and/or ES must dominate.

Non-NRF – Can be stratified into two categories:

- <u>No potential</u> – Will never become NRF, such as stands of lodgepole pine that have no potential for acquiring the necessary stand attributes.
- <u>Potential</u> – Has the potential for becoming NRF with the required stand attributes. This is further stratified to two areas:
    - Long-term – It will generally take more than 20 years to become NRF. These are plantations (stands classified as in the early structural stage) that may not currently have any of the required stand attributes.
    - Short-term (or near-NRF) – These stands have most of the attributes in place. Canopy cover can be 25-40%. Modeling has shown most stands can acquire the missing component(s) and canopy cover (if less than 40%) within 20 years or less.

Those stands currently in an early successional stage (Davis Fire) would be managed under the appropriate fire regime until the trees are large enough to consider moving toward dispersal or NRF habitat.

From a more active management scenario, not all the climatic-climax stands in these MSAs would remain static. Stands dominated by ponderosa pine and sugar pine, may be more appropriate to be cycled into a more open, fire-climax condition better suited for white-headed woodpecker and flammulated owl habitat. These stands would be incorporated into a landscape-scale fire risk reduction strategy, where ladder, canopy and ground fuels can be modified in a way to alter fire behavior and increase probability of initial attack forces containing the fire. These areas would be maintained through time to remain effective. Strategic placement of fuel treatment "blocks" would lessen the chances of multiple owl territories burning in a single wildfire event

Mixed conifer for bald eagle and northern spotted owls - This area encompasses approximately 3,671 acres (7 percent) of the Davis LSR. MSAs in this strategy include: I, J, and O. The area primarily consists of stands in the mixed conifer PAG that are proximate to either Davis or Odell Lake and are most advantageous to the bald eagle. The management strategy for this area is focused on sustaining and enhancing a large nest-tree component adjacent to the lakes while providing NRF and/or dispersal habitat for the northern spotted owl in the upland. MSAs I and J make up part of key east-west, north-south connectivity corridors to other LSRs. Upland stands would be a mosaic of fire-climax and climatic-climax depending on the productivity of the stands. Stand replacement occurred in the Davis Fire on three quarters of MSA O. It would be managed under a normal fire-regime condition until the trees are large enough to provide options which could include a range of habitat conditions from open to dense stands.

Lodgepole habitat for black-backed woodpeckers and connectivity - These areas encompass 2,362 acres (8 percent) of the Davis LSR. The MSAs in this strategy include A, D, R. They are mostly comprised of the lodgepole PAG and connect other large patches of late and old-structured suitable lodgepole habitat within the Davis LSR. The location and physiographic features of these areas also make them an important link for connecting existing spotted owl activity centers. Although these areas are not capable of providing nesting, roosting, or foraging habitat, the strategy is to manage these stands to provide dispersal habitat for the northern spotted owl and suitable LOS lodgepole habitat for black-backed woodpeckers.

Mixed conifer/lodgepole/ponderosa for bald eagle, great gray owl and/or black-backed woodpecker – This area encompasses approximately 1,622 acres (3 percent) of the Davis LSR and includes several plant association groups. MSAs in this strategy include: G, H and N. The close proximity to the west shore of Davis Lake and Moore Creek creates an opportunity to manage a variety of late-successional habitats and they are diverse; consisting of ponderosa pine stands next to water, mixed conifer, meadow habitats, and lodgepole pine. Much of this area experienced a range of burn intensities during the Davis Fire, creating a mosaic of habitats. Many of the large ponderosa pine trees remain. Eagles continue to utilize the entire range of habitat conditions, including the most intensely burned forest. The overall management strategy is to grow, sustain and/or enhance large trees to accommodate the bald eagle in the short and long-term, where ponderosa pine is present. The focus for many of these stands is to move them toward a fire-climax habitat to retain large nest trees, and to lessen the risk of another uncharacteristic disturbance. This also will benefit those species that depend on this habitat, such as the flammulated owl and white-headed woodpecker. A fire-climax strategy near the water is also beneficial in maintaining meadows, which are an important habitat component for the great gray owl. Lodgepole stands would be managed for the benefit of black-backed woodpeckers.

Lodgepole/mixed conifer riparian for black-backed woodpecker and/or riparian species and connectivity for northern spotted owls - This area encompasses approximately 7,298 acres (16 percent) and delineates the La Pine Basin within the Davis LSR. This basin is dominated by lodgepole pine PAGs and bisects the mixed conifer stands and spotted owl habitat within the LSR. The overall strategy for this area is to provide large contiguous blocks of mature lodgepole for the black-backed woodpecker and marten throughout the short and long-term. Large blocks (1000+ acres) of late- and old-structured lodgepole will be rotated throughout the area to sustain an area of old growth over time and reduce the risk of a catastrophic fire in the LSR. In areas where the fire hazard is inherently low due to high water tables (MSA - Y), management will focus primarily on monitoring and enhancement activities such as meadow maintenance.

There is 692 acres in the Mixed Conifer Wet Plant Association Group. The riparian corridors are dominated by mature Engelmann spruce with some ponderosa pine. Also, there are several cold water springs and stringers the seep through the glacial moraine, contributing to the riparian network. Some of

the meadows where encroachment from lodgepole pine has occurred, are moving towards a late seral stage with some Engelmann spruce. These riparian areas provide connectivity for species such as bald eagles between Odell and Davis Lakes. MSAs in this strategy include: L, M, X, Y, and Z.

Mountain hemlock for wolverine and other high elevation species - MSA B delineates this entire area. This high elevation roadless area encompasses about 6,490 acres (13 percent) of the Davis LSR. The elevation varies from 5,600 feet to 7,700 feet and is characterized by the mountain hemlock PAG. The vegetation within this area is believed to be within its historic range of variability and is not as highly susceptible to uncharacteristic loss from disturbance as the other MSAs. The overall management strategy for this area can be best described as "passive management." At this time the existing condition is consistent with the desired condition. Management will focus on enhancement activities such as the planting of blister rust resistant white pine in existing root rot pockets.

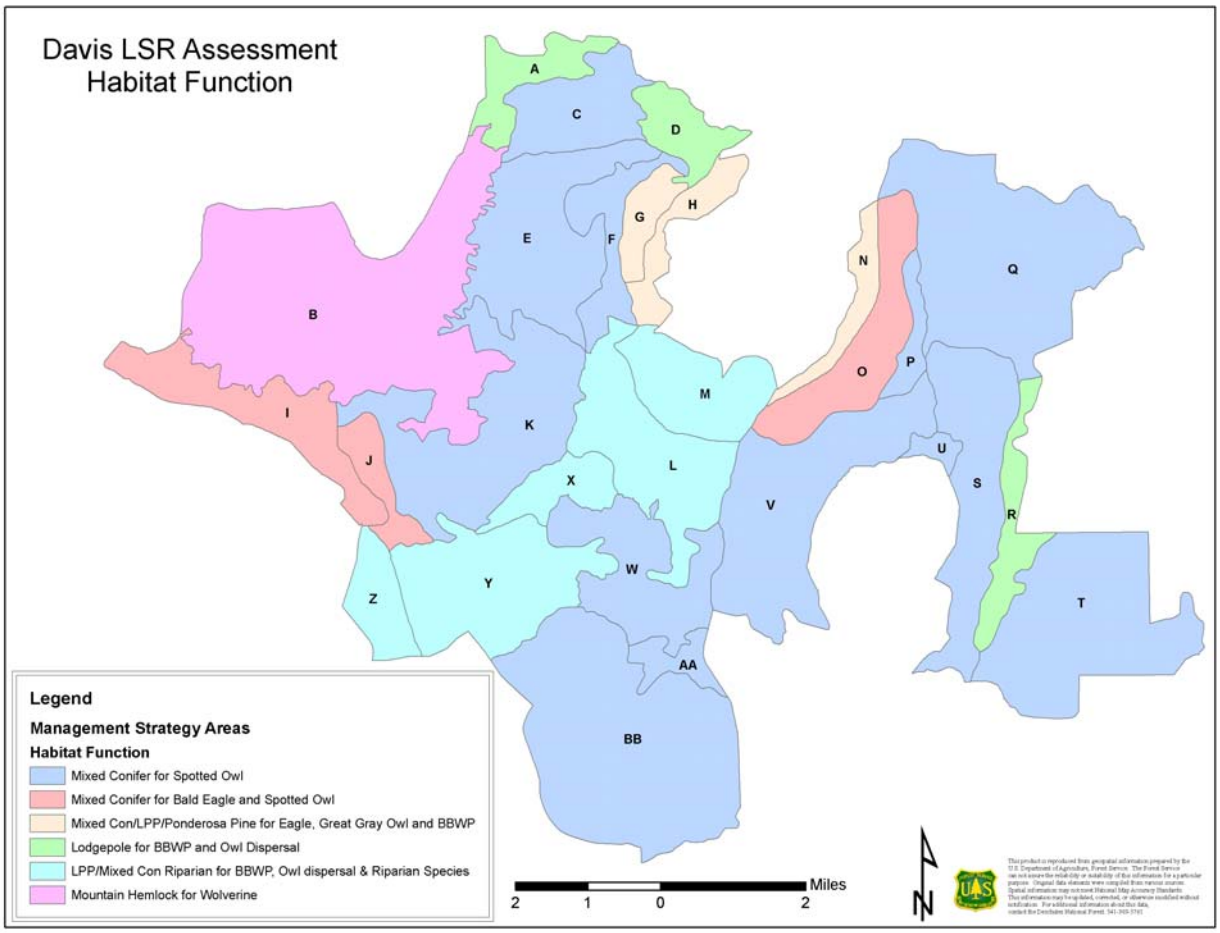


Figure 3-1. Areas with common habitat function.

DESIRED LATE SUCCESSIONAL CONDITIONS

The intent of the following section is to: (1) provide a quantitative overview of the LSR in terms of how much and where suitable habitat will be rotated through time for the selected late-successional and old-growth related species ; (2) provide a quantitative description of the desired suitable habitats for the emphasis of late-successional related species by PAG; and (3) document the logic path, thought processes, and criteria utilized to develop these descriptions.

Overall Desired LSR Conditions

Although it has been recognized for some time that forest conditions east of the Cascades are more susceptible to uncharacteristic loss from disturbance processes than westside forests, the reality of how these differences would affect the management of the Davis and other LSRs on the Deschutes National Forest was not fully realized until the spring of 1996. As various LSR and project implementation teams across the Deschutes National Forest began comparing suitable habitat conditions with stand conditions that silviculturists, entomologists, and pathologists consider sustainable, the determination was made that suitable habitat is not sustainable in most eastside ecosystems.

This determination made it clear that a strategy was needed to determine how LSRs on the Deschutes National Forest could be managed to retain both suitable and sustainable habitat conditions on a temporal and spatial scale. A forest team was established on the forest to develop a scientifically credible strategy to address the issue. Documents detailing the processes and products are available upon request from the Crescent Ranger District. The following summarizes the findings of the forest team that affect the management strategies for the Davis LSR.

To quantify and define "**sustainable habitat**," the forest team developed criteria to classify forest stands as imminently susceptible to insect attack or wildfire. Imminently susceptible is defined as a situation where the conditions are such that it is very likely there will be significant change in structure or character of forest stands on a large scale as a result of insect attack and/or fire within the next 10 years. Changes that would result in uncharacteristic loss of existing late- and old-structured components within the LSR were the primary concern of the LSR team.

The upper management zone (UMZ) for a given plant association group represents the point at which tree mortality begins to occur due to competition for site resources. The UMZ is the site-specific density level of trees at which a suppressed class of trees develops (Cochran et al. 1994). This density level, which varies by mixed conifer species, also identifies the point at which pine-associated bark beetles and other density-related pests can develop to epidemic levels. The non-density related pests also benefit from stands above the UMZ in that they have considerable opportunity to become established in the stands especially when periodic droughts occur.

Using Cochran's findings, the upper management zones were derived by allocating Stand Density Index among stratified diameter classes within the Davis LSR. Then, these size classes at or below UMZ were established for the various PAGs within the Davis LSR in conjunction with fuel profiles to determine "sustainable habitat" (Table 3-1). ***Therefore, only forest stands with a density level equal to or below the UMZ established for each PAG (less than 100 percent UMZ) are considered to be sustainable in the long-term and then, only as management activities maintain these conditions.*** The UMZ and fuel profiles were chosen as indicators of risk because bark beetle epidemics and high intensity wildfires are the most common causes of significant and unexpected large tree mortality.

The difference between what is believed to be "sustainable habitat" versus what is currently functioning as "suitable habitat" within the Davis LSR is illustrated by the example below. This table displays Basal Area (BA) and Trees per Acre (TPA) for an existing late- and old-structured mixed conifer dry stand

within the Davis LSR. Values in the first column indicate suitable habitat conditions for the northern spotted owl (nesting, roosting, and foraging habitat). Values in the second column indicate sustainable habitat as defined by stand density indexes and upper management zones (Cochran et al. 1994). In this case, suitable habitat for northern spotted owl is not sustainable for mixed conifer dry plant association groups.

SUITABLE HABITAT	SUSTAINABLE HABITAT (100% UMZ)
BA = 169 Range (135-203)	BA = 120 Range (115-128)
TPA = 345 Range (276-414)	TPA = 90 Range (40-175)

The differences between "suitable habitat" and "sustainable habitat" challenged the forest team to determine an appropriate balance of vegetative conditions that would allow the LSR to function as intended and be sustainable in the short and long-term. The following considerations were factored into quantifying the desired balance:

- Habitat thresholds for LOS associated species;
- Context of the LSR within the surrounding landscape and management allocations;
- Upper management zones;
- Historical Range of Variability (HRV); and
- Cycling structural stages to provide suitable habitats throughout time.

The table below is one of the final products developed by the forest team and used in the original LSRA. The table displays a balance of three vegetative conditions including an effective proportion of both "suitable" and "sustainable" habitats. The second column identifies appropriate proportions of climatic climax and fire climax habitats by PAG identified by the forest team. Fire Climax may or may not be at a sustainable level. The third vegetative condition represents a "transitional" stage in which forest stands do not contain the desired "suitable" and/or "sustainable" habitat conditions. Stands in this condition could have tree densities above the upper management zone (greater than 100 percent UMZ) and/or structural components that do not provide suitable habitat. The fourth column is the appropriate percentage of a PAG that should be below UMZ.

Table 3-1. Desired Late Successional Reserve Condition from the 1995 Forest Overview Team.

PAG	Suitable Habitat for Emphasis Species[11]		% ≥ UMZ but < Suitable Habitat for Emphasis Spp	% <UMZ
	Climatic %	Fire %		
MH	70 (40-70)	N/A	15 (0-30)	15 (0-30)
MCW	60 (51-69)	N/A	10 (0-20)	30 (20-40)
MCD	40 (30-50)	10 (5-10)	25 (20-30)	25 (20-30)
PPW/PPD	5 (0-10)	55 (40-70)	20 (10-30)	20 (10-30)

[11] Suitable is defined as vegetative conditions that a particular plant or animal species could use as habitat for it's a portion or all of its entire reproductive/life cycle. For example, MCD Climatic Climax emphasis species is NSO and PP Fire Climax emphasis species is the white-headed woodpecker.

LPW/LPD	50 (30-70)	N/A	10 (0-20)	40 (20-60)

MH = mountain hemlock; MCW = mixed conifer wet; MCD = mixed conifer dry; PPW/PPD = ponderosa pine wet and dry; LPW/LPD = lodgepole pine wet and dry.

Table 3-2 incorporates the previous table with acres added to display how the desired conditions apply to the Davis LSR using the current plant association groups.

Table 3-2. Desired Late Successional Reserve Condition within the Davis LSR, With Acres

	Suitable Habitat for Emphasis Species				**≥ UMZ but < Suitable Habitat**		**<UMZ**	
PAG Total Acres	**% Climatic**	**Acres**	**% Fire**	**Acres**	**%**	**Acres**	**%**	**Acres**
MH	70	5,537	N/A	N/A	15	1,187	15	1,187
7,910 Acres	(50-70)	(3,164-5,537)			(0-30)	(0-2,373)	(0-30)	(0-2,373)
MCW	60	418	N/A	N/A	10	70	30	209
696 Acres	(51-69)	355-480			(0-20)	0-139	(20-40)	139-278
MCD	40	12,008	10	3002	25	7,505	25	7,505
30,019 Acres	(30-50)	(9,006-15,010)	(5-10)	(1,501-3,002)	(20-30)	(6,004-9,006)	(20-30)	(6,004-9,006)
PPW/PPD	5	51	55	557	20	203	20	203
1,013 Acres	(0-10)	(0-101)	(40-70)	405-709	(10-30)	101-304	(10-30)	101-304
LPW/LPD	50	4,552	N/A	N/A	10	910	40	3,641
9,104 Acres	(30-70)	(2,731-6,373)			(0-20)	(0-1,821)	(20-60)	(1,821-5,462)

The LSRA team reviewed Tables 3-1 and 3-2 under the light of recent science and monitoring. To update the desired condition, the team stratified the landscape vegetation into classes of suitable habitat by emphasis species, incorporating the effect of position on the landscape on a specific vegetation type's capability of providing habitat. For example, MH occupies the higher elevations within the LSR. At its lower elevations where it mixes with MCD, MH provides suitable habitat for the NSO. MH generally doesn't have the capability of providing necessary habitat components for NSO NRF habitat at higher elevations, but does provide dispersal habitat.

The mid-elevations are occupied by a combination of MCW and MCD, and provide the areas most capable of developing suitable habitat for the selected emphasis species. The team combined MCW and MCD to focus on capable habitat for species and providing habitat over time for the NSO and other LOS species. In drier, less productive, and lower elevation sites, MC generally becomes dominated by ponderosa pine and is less capable of providing suitable habitat for species such as the NSO that require dense forest conditions. The bulk of ponderosa pine habitat is found in drier site MCD. There is very little PPD and PPW in the LSR and NRF would not be managed in these vegetation types. Lodgepole pine generally occurs in the lower elevation flat basins between the buttes. LPW/LPD does not provide NSO NRF habitat but is important for dispersal.

Seventy-two percent of the Davis LSR is capable of growing NRF. The Davis LSRA team has determined that 25 percent of the MC will be managed as NRF at any one time, reflecting a strategy in

which climatic climax (disturbance prone) conditions are embedded into and dispersed about the landscape; this strategy allows for stochastic conditions and NRF to be cycled around the landscape.[12]

Approximately 28 percent (9,900 acres) of the plant associations capable of achieving NRF are in an early seral condition. For now, management activities are focused on moving these stands to a late stand condition where eventually they can be cycled into the pool of NRF habitat that is rotated on the landscape. Some stands, particularly those that were set back to an early stage as a result of the Davis Fire, will take longer than 100 years before they begin to achieve average diameters of 14 inches (Davis Fire Recovery EIS, USDA Forest Service, 2005) and even longer before stands would achieve at least 2 of the 3 stand attributes necessary for NRF (that is, Structure, Overstory and Understory). It is acknowledged that the actual acres of NRF that are validated on the landscape will be less than the identified potential for early seral stands to achieve NRF.

The LSRA team has assumed that stands within 20 years of becoming NRF (that is, "near-NRF") have two of the three stand attributes with one of them being the structural component that provides foraging habitat (that is, large trees). These stands are also in the pool of acres that could be cycled in and out of NRF. Therefore, about 19,267 acres (60 percent of MC-PP) or 39 percent of the LSR is managed for a combination of NRF and near-NRF, not counting any contribution from MH, 46 percent is managed for dispersal and 15 percent is maintained in open fire climax with some dispersal. This strategy would maintain islands of NRF bordered by more open stands that are managed to alter fire behavior, and would cycle capable stands in and out of NRF on the landscape; this new strategy is more likely to retain habitat for spotted owls over the long-term than is the status quo.

Table 3-3. Updated Desired Late Successional Reserve Condition.

	Suitable Habitat				≥UMZ but < Suitable		< UMZ, < Suitable	
PAG Total Acres (% of LSR)	% Climatic Climax (Range)	Acres (Range)	% Fire Climax** (Range)	Acres (Range)	% (Range)	Acres (Range)	% (Range)	Acres (Range)
MH 7,910 (16%)	Wolverine, NSO NRF		N/A	N/A	Near NRF, NSO Dispersal		Early-Mid Seral*	
	70	5,537			15	1,187	15	1,187
	(50-70)	(3,164-5,537)			(0-30)	(0-2,373)	(0-30)	(0-2,373)
LPW/LPD 9104 (19%)	BBWP, NSO dispersal		N/A	N/A	BBWP Habitat		Early-Mid Seral*	
	50	4,552			10	910	40	3,641
	(30-70)	(2,731-6,373)			(0-20)	(0-1,821)	(20-60)	(1,821-5,462)
MCW/MCD 30,715 (63%)	NSO NRF Habitat		WHWO Habitat		Near NRF		Early-Mid Seral*	
	25	7,679	15	4,607	35	10,750	25	7,679
	(15-35)	(4,607-10,750)	(10-20)	(3,072-6,143)	(25-45)	(7,679-12,822)	(15-35)	(4,607-10,750)
PPW/PPD	N/A	N/A	WHWO Habitat		N/A	N/A	Early-Mid Seral*	

[12] Supported by the *Scientific Evaluation of the Status of the NSO* (SEI Report) and comments from Eric Forsman and Dr. Jerry Franklin attending a B&B Fire Recovery Project Researchers Review field trip in 2003. For selected references from the SEI report and the content of researchers comments, refer to the Introduction section and Chapter 2.

1,013 (2%)			60	608			40	406
			(40-80)	(405-810)			(10-60)	(101-608)
**Fire Climax can be sustainable with the application of fire. *Early-Mid Seral stage is not necessarily devoid of large trees								

This quantitative description of the overall desired condition for the LSR serves several important functions. First, it sets clear and measurable objectives for future management of Davis LSR as a whole. Secondly, it provides project planning teams a means to evaluate the existing condition of the LSR in relation to the desired condition. This allows teams to prioritize management activities within the LSR.

The previous "Desired Late-Successional Reserve" table also provides baseline data to evaluate and monitor how effectively future projects move the LSR toward the desired condition. This baseline can also facilitate an evaluation and comparison of LSR conditions across the Deschutes National Forest.

The manner in which the desired balance of vegetative conditions shown in Table 3-3 is spatially distributed throughout Davis LSR over time and is best illustrated by the six areas described at the beginning of this chapter. The bulk of areas designated within the LSR to provide "mixed conifer for northern spotted owl" and "mixed conifer for bald eagle and northern spotted owl" will be managed toward climatic-climax suitable habitat. The remaining areas would be managed in a fire climax condition for fire behavior modification and bald eagle nesting.

Areas designated as "Lodgepole/mixed conifer black-backed wood pecker and/or riparian species" or "Lodgepole pine for black-backed woodpeckers and connectivity" will be managed to attain the desired balance of vegetative conditions for lodgepole pine. The area designated as "Mountain hemlock for wolverine and high elevation species" will continue to provide a balance of conditions as quantified for the mountain hemlock PAG.

Over time, the desired percentages of each PAG in the "sustainable" or "transitional" conditions will shift spatially throughout the LSR based on the existing conditions of vegetation and the associated habitats. The twenty-eight Management Strategy Areas (MSAs) described in Chapters 2 and 4 delineate the diversity of existing conditions within the LSR. Chapter 4 provides detailed descriptions of the existing conditions within each MSA and identifies when and where changes in the existing conditions are appropriate in the short and/or long-term.

Suitable Habitat Descriptions by PAGs and Emphasis Species

The tables below describe and quantify "suitable habitat" as referenced in Table 3-3. Suitable is defined as vegetative conditions that a particular plant or animal species could use as habitat for a portion or all of its reproductive/life cycle. The descriptions in Table 3-4 are organized by habitat condition by plant association groups and the associated emphasis/indicator species. The habitat conditions were derived from the forest overview team and desired LSR conditions from Table 3-3.

Suitable habitat is categorized into six conditions: Mixed Conifer (Fire Climax and Climatic Climax), Ponderosa Pine (Fire Climax), Lodgepole Pine, High Elevation Mountain Hemlock (Montane Mixed Conifer), and Unique Habitats based on peer-reviewed literature most appropriate for eastside habitat conditions and research conducted on existing habitats within the Deschutes National Forest. Data collected from forest stands within the Davis LSR that currently function as nesting, roosting, and foraging habitat for the northern spotted owl was also used to quantify suitable climatic-climax habitat with the mixed conifer dry PAG.

The suitable habitat conditions characterized in the following Tables 3-4a through 3-4f should be used to determine appropriate silvicultural treatments and prescribe appropriate levels of snags and down wood throughout the Davis LSR. To know if you have achieved the "Desired Condition", it is helpful to focus on the "Total Mean" column to determine the density to retain for the respective suitable habitat condition. The numbers displayed in Tables 3-4a through 3-4f display common conditions within the LSR and see Appendix C for more information and examples for snag and down log levels.

As previously mentioned, the 28 MSAs described in Chapter 4 delineate the desired locations for these conditions within the Davis LSR. The six areas previously described by PAG and emphasis species such as "mixed conifer for the northern spotted owl" provide a conceptual picture of how these habitats should be distributed across the LSR. In areas identified for fire behavior modification, reference Tables 3-8 through 3-10 to determine the fuel parameters to modify. It also displays appropriate levels of down logs to be retained.

Table 3-4a through f describes the range of stand conditions at various scales for focal species that fall into the six habitat types. Tree densities can be below those listed and still function as habitat. Field verification would be needed in cases where numbers are at or below the low end of the ranges given in the tables. In table 3-4a the focal species is the northern spotted owl. The stand level tree densities approximate what is needed to meet spotted owl NRF habitat. This type of habitat also provides for the pileated woodpecker as well as roosting habitat for the northern bald eagle. Species specific or niche information is given in the **Special Features** portion, and **Key Tree Species** provides specific tree species information, such as large ponderosa pine and Douglas-fir preferred for nesting by the northern bald eagle and northern spotted owl, respectively.

The snag and down wood sections describe the density and distribution of dead wood needed across the landscape. Because the LSR does not have sufficient acreage in each habitat type to represent a landscape, a larger area is needed to accommodate the numbers given. The densities were developed utilizing the Odell Pilot Watershed Assessment and information from DecAID 2.0. DecAID is a web-based database that is a synthesis of research and data on all aspects of snags and down wood prior to 2006. Snag and down wood levels can be adjusted as new research is completed and/or DecAID updated. See Appendix C for a description of the landscape and an explanation of the development of the numbers for this portion of the table.

When projects are analyzed at the site-specific level, the densities and distributions across the larger landscape should fall into the ranges in the tables by habitat type. Overall, the LSR is to be managed at the 50 percent tolerance level with actual densities within that range depending on the productivity of a site. This level meets NWFP ROD B-5 for moderate to high levels as the 80 percent tolerance level generally represents high mortality as a result of a large-scale disturbance event (i.e. fire, insects or disease). Some areas of the LSR may be at the lower levels due to historic events such as logging or fire. For more information on tolerance levels refer to the DecAID website.
http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf

In the table, densities are given for different categories of snags depending on diameter: between 9.9 and 20 inches dbh and greater than 19.9 inches dbh. Both of these conditions must be met to meet the wildlife tolerance level. This format is similar to the DecAID information from which it was derived. Down wood densities are expressed in terms of percent cover from DecAID, tons per acre which is more commonly used, and number of whole trees often used in prescriptions. The number of whole trees retained can be converted to various diameters available in the stand by utilizing the tables in Appendix A.

Within actively managed areas (or units), minimum standards are given as footnotes to snags and down wood, although more can be retained. Clumping in areas of variable densities can be utilized with numbers expressed on a per-acre basis to meet the standards. Where stands do not meet minimum snag densities, creation should be considered to increase numbers, but not necessarily meet the standard. It should depend upon available funding. Snag creation is a short-term fix for a problem that needs a long-term solution where snag densities are an inherent result of stand dynamics.

Snags and down wood at the 80 percent tolerance level, created by disturbances, should be retained on the landscape to meet the distribution of high densities where possible. These disturbances could be a pocket of insect-caused mortality within a stand, wind throw, or stand replacement events. When these are determined to be uncharacteristic, it should be analyzed to determine the trade-off between restoration of habitat and the need for high dead wood levels for dependent species.

The down wood standards within the 3-4 tables do not apply to risk reduction treatments in Fire Behavior Modification areas and strategic risk reduction areas. The standards that apply to these areas are found in tables 3-8 through 3-10.

Table 3-4a. Suitable Habitat Condition for Climatic Climax.

	Mixed Conifer Climatic Climax Stand Composition									
DFC	Canopy Cover	Canopy Layers	Total Mean		Sapling/ Poles 1.0-8.9"	Small 9.0-14.9"	Small 2 15.0-20.9"	Medium 1 21-24.9"	Medium 2 25-31.9"	Large >31.9"
15-35% (Climatic)	40-100%	2-3	TPA	345	274	35	16	10	6	5
			Range	*276-414*	*160-329*	*28-42*	*13-19*	*8-12*	*5-7*	*3-5*
			BA	169	30	28	28	29	26	28
			Range	*135-203*	*24-36*	*22-34*	*22-34*	*23-35*	*21-31*	*22-34*
			Stand SDI (PSME)	251	76	46	39	35	28	27
			Range	*201-301*	*60-92*	*28-63*	*13-65*	*28-42*	*22-34*	*22-32*
			Focal And Indicator species, Special Features and Key Tree Species							
			Focal and Indicator species: Suitable Habitat for northern spotted owl, pileated woodpecker, bald eagle winter roost, northern goshawk nesting,							
			Special Features: Pileated woodpecker: roost stands of white fir with >4TPA >20" dbh live or dead. Northern spotted owl: >40% true fir/Douglas-fir >8"dbh. Large trees with cavities for nesting. **Northern Goshawk**: Maintain a diversity of large trees scattered through the stands, especially near small breaks in the canopy, or adjacent to riparian areas. **Prey species**: Maintain trees with heart rot, gall rust cankers, trunk scars or mistletoe at just less than epidemic levels.							
			Key Tree Species: Ponderosa pine, Douglas-fir large tree component. Sugar pine, western white pine, Pacific yew, Shasta red fir species diversity.							

SNAGS*						DOWN WOOD**				
>9.9" And <20 dbh	>19.9" dbh	Total/Acre > 9.9"dbh	WL tolerance level	% of PAG based on Total/Acre|>19.9"dbh		tons/acre	% cover >5" dbh	# of 16" dbh whole tree/acre DF (PP)	WL tolerance level	% of landscape
			<30%	45-55	60				<30%	51
4-6	5-10	9-16	30%	31-40	20	8-17	2-4%	12-25 (11-24)	30%	15
11-24	5-8	16-32	50%	6-10	10	17-25	4-6%	25-36 (24-34)	50%	30
14-31	6-18	16-49	80%	5-7	10	25-42	6-10%	36-60 (34-59)	80%	4

Snag and down wood tolerance levels are from the combined narratives in DecAID 2.0 of EMC S/M with L structural stages. % of PAG is based on the watershed reference condition which combined DecAID information with HRV information from the Odell Pilot Watershed Analysis. See Appendix C Snag and Down Log for how watershed reference conditions were determined.

***Snags:** Do not conduct activities that manage for <30% tl. **In treatment areas manage for a minimum of 16 snags /acre >9"dbh with at least 5 of those greater than 19.9"dbh.** A total of 30% of the MCD Climax area should have at least 5 snags > 19.9 regardless of the number <19.9. Preserve higher density clumps where they exist. Generally younger stands will have the bulk of the small snags, where old growth stands would have fewer small snags and more of the larger snags. Higher productivity sites manage for the higher snag densities. Higher numbers are from dense clumps extrapolated to a per acre basis. Stand replacement events and small high density pockets are expected to meet the 80% tolerance level.

****Down Wood:** Do not conduct activities that manage for < 30% tl. Across the PAG manage for larger diameter material where ever posssible. **In treatment units manage for a minimum average of 20 tons/acre >5"dbh, including high density clumps >25 tons/acre on 2% of each treatment units.** See Appendix A to determine # of pieces/acre at different diameters. If down wood densities preclude reaching stand objectives, hard down logs (class 1,2) can be moved to facilitate treatment.

Dead wood analysis needs to be completed on a larger scale than the LSR. Densities below those given above does not necessarily preclude management. Actions must be justified.

Table 3-4b. Suitable Habitat Condition for Mixed Conifer Fire Climax

	Mixed Conifer Fire Climax Stand Composition									
DFC	Canopy Cover	Canopy Layers	Total Mean		Sapling/ Poles 1.0-8.9"	Small 9.0-14.9"	Small 2 15.0-20.9"	Medium 1 21-24.9"	Medium 2 25-31.9"	Large >31.9"
10-20% (Fire Climax)	30-50%	=1	TPA	35+ ±20%	0-130 ±50%	0-35 ±50%	10 ±50%	7 ±50%	11 ±20%	7 ±20%
			Range	*23-42*	*0-195*	*0-52*	*5-15*	*3-11*	*9-13*	*6-8*
			BA	144	10 total		18	20	47	49
			Range	*115-173*	*5-15*		*9-27*	*10-30*	*38-56*	*39-59*
			Stand SDI	195+	22	95	28	31	68	68
			Range	*141-373*	*0-44*	*0-72*	*14-42*	*13-48*	*56-80*	*58-77*
			Focal And Indicator species, Special Features and Key Tree Species							
			Focal and Indicator species: Suitable habitat for bald eagle nesting, white-headed woodpecker, flamulated owl, northern goshawk foraging.							
			Special Features: White-headed woodpecker: prefer open nest stands with 12 large (=21"dbh) ponderosa pine per acre. **Bald Eagle**: Ensure large ponderosa pine and Douglas fir trees of the upper canopy provide an open flight path from the tree. Maintain large trees and snags along riparian edges and adjacent uplands that provide panoramic views of the lakes and open exposure on at least one side. **Northern goshawk**: maintain a diversity of large trees scattered throug the stands, especially near small breaks oin the canopy and ecotone between upland and riparian. **Northen spotted owl**: provide for dispersal where stands or portions of stands are needed to link dispersal habitat							
			Key Tree Species: Ponderosa pine, Douglas-fir large tree component. Sugar Pine, lodgepole pine, Western White pine species diversity							

SNAGS						DOWN WOOD				
>9.9" And <20 dbh	>19.9" dbh	Total/Acre > 9.9"dbh	WL tolerance level	% of PAG based on Total/Acre|>19.9"dbh		tons/acre	% cover >5" dbh	# of 16" dbh whole tree/acre DF (PP)	WL tolerance level	% of landscape
			<30%	72	83				<30%	39
5-11	1-4	6-15	30%	16	11	4-8	1-2%	6-12 (6-11)	30%	50
5-9	5-9	10-18	50%	10	5	8-25	2-6%	12-36 (12-34)	50%	10
14-26	9-10	23-36	80%	2	1	25-42	6-10%	36-60 (34-59)	80%	1
				100	100					100

Snag and down wood tolerance levels are from the combined narratives in DecAID 2.0 of EMC S/M and L and PP/DF O, S/M and L structural stages. % of PAG is from the watershed reference condition which combined DecAID information with HRV information from the Odell Pilot Watershed Analysis. See Appendix C Snag and Down Log for information on the development of reference condition

***Snags:** Do not conduct activities that manage for <30% tl. **In treatment areas manage for a minimum 10 snags /acre >9"dbh with at least 5 of those greater than 19.9"dbh.** A total of 12% of the MCD_PP/DF Fire Climax area should have at least 5 snags > 19.9 regardless of the number <19.9. Preserve higher density clumps where they exist. Higher productivity sites manage for the higher snag densities. Higher numbers are from dense clumps extrapolated to a per acre basis. Stand replacement events and small high density pockets are expected to meet the 80% tolerance level.

****Down Wood:** Do not conduct activities that manage for < 30% tl. Across the PAG manage for larger diameter material where ever posssible. **In treatment units manage for a minimum average of 15 tons/acre >5"dbh, including high density clumps >25 tons/acre on 2% of each treatment units.** See Appendix A to determine # of pieces/acre at different diameters. If down wood densities preclude reaching stand objectives, hard hard down logs (class 1,2) can be moved to facilitate treatment.

Dead wood analysis needs to be completed on a larger scale than the LSR. Densities below those given above does not necessarily preclude management. Actions must be justified.

Table 3-4c. Suitable Habitat Condition for Ponderosa Pine Fire Climax

	Ponderosa Pine Fire Climax Stand Composition									
DFC	Canopy Cover	Canopy Layers	Total Mean		Sapling/ Poles 1.0-8.9"	Small 9.0-14.9"	Small 2 15.0-20.9"	Medium 1 21-24.9"	Medium 2 25-31.9"	Large >31.9"
40-80% (Fire Climax)	30-50%	=1	TPA	35+ ±20%	0-130 ±50%	0-35 ±50%	10 ±50%	7 ±50%	11 ±20%	7 ±20%
			Range	*23-42*	*0-195*	*0-52*	*5-15*	*3-11*	*6-11*	*4-11*
			BA	144	10 total		18	20	47	49
			Range	*115-173*	*5-15*		*9-27*	*10-30*	*24-71*	*25-74*
			Stand SDI	195+	22	95	28	31	68	68
			Range	*27-216*	*0-44*	*0-72*	*14-42*	*13-48*	*34-102*	*34-102*
			Focal And Indicator species, Special Features and Key Tree Species							
			Focal and Indicator species: Suitable habitat for white-headed woodpecker, flamulated owl, bald eagle nesting, northern goshawk foraging.							
			Special Features: White-headed woodpecker: prefer open nest stands with 12 large (=21"dbh) ponderosa pine per acre. **Bald Eagle**: Ensure large ponderosa pine and Douglas fir trees of the upper canopy provide an open flight path from the tree. Maintain large trees and snags along riparian edges and adjacent uplands that provide panoramic views of the lakes and open exposure on at least one side. **Northern goshawk**: maintain a diversity of large trees scattered throug the stands, especially near small breaks oin the canopy and ecotone between upland and riparian. **Northen spotted owl**: provide for dispersal where stands or portions of stands are needed to link dispersal habitat							
			Key Tree Species: Ponderosa pine, Douglas-fir large tree component. Sugar Pine, lodgepole pine, Western White pine species diversity							

SNAGS						DOWN WOOD				
>9.9" And <20 dbh	>19.9" dbh	Total/Acre > 9.9"dbh	WL tolerance level	% of PAG based on Total/Acre|>19.9"dbh		tons/acre	% cover >5" dbh	# of 16" dbh whole tree/acre DF (PP)	WL tolerance level	% of landscape
			<30%	72	83				<30%	39
5-11	1-4	6-15	30%	16	11	4-8	1-2%	6-12 (6-11)	30%	50
5-9	5-9	10-18	50%	10	5	8-25	2-6%	12-36 (12-34)	50%	10
14-26	9-10	23-36	80%	2	1	25-42	6-10%	36-60 (34-59)	80%	1
				100	100					100

Snag and down wood tolerance levels are from the combined narratives in DecAID 2.0 of EMC S/M and L and PP/DF O, S/M and L structural stages. % of PAG is from the watershed reference condition which combined DecAID information with HRV information from the Odell Pilot Watershed Analysis. See Appendix C Snag and Down Log for information on the development of reference condition

***Snags:** Do not conduct activities that manage for <30% tl. **In treatment areas manage for a minimum 10 snags /acre >9"dbh with at least 5 of those greater than 19.9"dbh.** A total of 12% of the MCD_PP/DF Fire area should have at least 5 snags > 19.9 regardless of the number <19.9. Preserve higher density clumps where they exist. Higher productivity sites manage for the higher snag densities. Higher numbers are from dense clumps extrapolated to a per acre basis. Stand replacement events and small high density pockets are expected to meet the 80% tolerance level.

****Down Wood:** Do not conduct activities that manage for < 30% tl. Across the PAG manage for larger diameter material where ever posssible. **In treatment units manage for a minimum average of 15 tons/acre >5"dbh, including high density clumps >25 tons/acre on 2% of each treatment units.** See Appendix A to determine # of pieces/acre at different diameters. If down wood densities preclude reaching stand objectives, hard hard down logs (class 1,2) can be moved to facilitate treatment.

Dead wood analysis needs to be completed on a larger scale than the LSR. Densities below those given above does not necessarily preclude management. Actions must be justified.

Table 3-4d. Suitable Habitat Condition for Lodgepole Pine.

Stand Composition: MSAs **A, B, BB, C, E, and K** are higher elevation and would be managed at the lower end of the range where tree >15"dbh would be rare to nonexistant. MSAs **AA, D,F,H, L, M, and R** are lower elevation where trees > 21 would be rare to nonexistant, trees in the other categories would be midrange. MSAs **J, X, Y, and Z** are riparian and capable of producing the larger diameters, with the majority of trees in the larger three categories.

DFC	Canopy Cover	Canopy Layers	Total Mean		Sapling/ Poles 1.0-8.9"	Small 9.0-14.9"	Small 2 15.0-20.9"	Medium 1 21-24.9"	Medium 2 25-31.9"	Large >31.9"
30-70% (Climatic)		=1+D24	TPA	356	270	60	20	6		
			Range	*282-444*	*116-384*	*32-84*	*0-24*	*0-16*		
			BA	136	39	55	25	17		
			Range	*66-190*	*32-62*	*25-56*	*0-42*	*0-46*		
			Stand SDI	260	84	95	42	26		
			Range	*134-358*	*64-131*	*44-100*	*0-67*	*0-69*		

Focal And Indicator species, Special Features and Key Tree Species

Focal and Indicator species: Black-backed woodpecker, northern goshawk, great gray owl, American marten, northern spotted owl dispersal

Special Features: Black-backed woodpecker: Maintain trees with heart rot, gall rust cankers, trunk scars or mistletoe as a stand component. Retain areas of dead or burned trees <7 years old for foraging and roosting. Great gray owl: Young require dense cover and/or leaning trees to escape predation. Northern goshawk: Maintain a diversity of large trees scattered trhough the stands, especiallyh near small breaks in the canopy and adjacent to riparian. Northern spotted owl: provide for dispersal habitat where stands or parts of stands are needed to maintain connectivity.

Key Tree Species: lodgepole pine, with shasta red fir, and western white pine at higher elevations, ponderosa pine at lower elevations and eagleman spruce in riparian areas.

SNAGS*						**DOWN WOOD****				
>9.9" And <20 dbh	>19.9" dbh	Total/Acre > 9.9"dbh	WL tolerance level	% of PAG based on Total/Acre	|>19.9"dbh	tons/acre	% cover >5" dbh	# of 10"dbh whole tree/acre LP	WL tolerance level	% of landscape
			<30%	50	68				<30%	30
5	2	7	30%	20	10	5-11	2-4%	18-40	30%	40
9	2-4	11-13	50%	20	20	11-16	4-6%	40-60	50%	20
23	5	28	80%	10	2	16-26	6-10%	60-100	80%	10
				100	100					100

Snag and down wood tolerance levels are from the combined narratives in DecAID 2.0. of LP O and S structural stages. % of PAG is based on the watershed reference condition which combined DecAID information with HRV information from the Odell Pilot Watershed Analysis. See Appendix C Snag and Down Log for how watershed reference conditions were determined.

***Snags:** Do not conduct activities that manage for <30% tl. **In treatment areas manage for a minimum of 13 snags /acre of the largest available.** Strive for having a minimum of 30% of the PAG with at least 2 snags > 19.9 regardless of the number of snags <19.9. As much as possible manage the PAG for a mosaic of high density stands within a matrix of low to moderate density stands. Higher productivity sites manage larger diameter snags. Stand replacement events, small high density pockets and riparian areas are expected to meet the 80% tolerance level.

****Down Wood:** Do not conduct activities that manage for < 30% tl. Across the PAG manage for larger diameter material where ever posssible. **In treatment units manage for a minimum average of 11 tons/acre >5"dbh, including high density clumps >25 tons/acre on 2% of each treatment units.** See Appendix A to determine # of pieces/acre at different diameters. If down wood densities preclude reaching stand objectives, hard down logs (class 1,2) can be moved to facilitate treatment.

Dead wood analysis needs to be completed on a larger scale than the LSR. Densities below those given above does not necessarily preclude management. Actions must be justified.

Table 3-4e. Suitable Habitat Condition for Mountain Hemlock

	Mountain Hemlock Stand Composition									
DFC	Canopy Cover	Canopy Layers	Total Mean		Sapling/ Poles 1.0-8.9"	Small 9.0-14.9"	Small 2 15.0-20.9"	Medium 1 21-24.9"	Medium 2 25-31.9"	Large >31.9"
50-70% (Climatic)	0-70%	2.-3	TPA	275	160	17	24	24	25	25
			Range	*220-230*	*128-192*	*14-20*	*19-29*	*19-29*	*20-30*	*20-30*
			BA	433	25	13	42	69	107	177
			Range	*346-520*	*20-30*	*10.-16*	*34-50*	*55-76*	*86-128*	*142-212*
			Stand SDI	620	53	23	66	101	148	234
			Range	*411-744*	*47-72*	*18-26*	*46-70*	*67-102*	*95-142*	*138-208*
			Focal And Indicator species, Special Features and Key Tree Species							
			Focal and Indicator species: Suitable Habitat for wolverine and high elevation species including American marten and boreal owl. Spotted owl dispersal habitat							
			Special Features: Retain > 40% of forest in mature/old growth for linkage, blocks of mature/old growth must be linked to provide connectivity							
			Key Tree Species: western white-pine - blister rust, shasta red fir - heart-rot							

SNAGS*						**DOWN WOOD****				
>9.9" And <20 dbh	>19.9" dbh	Total/Acre > 9.9"dbh	WL tolerance level	% of PAG based on Total/Acre|>19.9"dbh		tons/acre	% cover >5" dbh	# of 16" dbh whole tree/acre MH, DF (LP)	WL tolerance level	% of landscape
			<30%	29	36		<3		<30%	19
7-8	3-4	10-12	30%	25	46	13-27	3-6%	19-39 (16-34)	30%	43
11-18	4-6	15-24	50%	31	14	27-36	6-8%	36-50 (34-45)	50%	25
14-17	5-10	19-32	80%	15	4	36-45	8-10%	50-65 (45-55)	80%	13

Snag and down wood tolerance levels are from the narratives in DecAID 2.0, combined MMC S/M with L structural stages. % of PAG is based on the watershed reference condition which combined DecAID information with HRV information from the Odell Pilot Watershed Analysis. See Appendix C Snag and Down Log for how watershed reference conditions were determined.

***Snags:** Do not conduct activities that result in <30% tl. Strive for given distribution. **In treatment units, manage for a minimum of 15 snags /acre >9"dbh with at least 4 of those greater than 19.9"dbh.** Preserve higher density clumps where they exist. A total of 46% of the MH area should have at least 4 snags > 19.9 regardless of the number <19.9. Generally younger stands will have the bulk of the small snags, where old growth stands would have fewer small snags and more of the larger snags. Higher productivity sites manage for the have higher snag densities. Higher numbers are from dense clumps extrapolated to a per acre basis. Stand replacement events and small high density pockets are expected to meet the 80% tolerance level.

****Down Wood:** Do not conduct activities that manage for < 30% tl. Across the PAG manage for larger diameter material where ever posssible. **In treatment units manage for a minimum average of 27 tons/acre > 5" dbh, including high density clumps >36 tons/acre on 2% of each treatment unit.** See Appendix A to determine # of pieces/acre at different diameters. If down wood densities preclude reaching stand objectives, hard down logs (class 1,2) can be moved to facilitate treatment.

Dead wood analysis needs to be completed on a larger scale than the LSR. Densities below those given above does not necessarily preclude management. Rationale must be given for actions.

Table 3-4f. Suitable Habitat Condition for Unique Habitats.

	Englemann Spruce/Lodgepole									
DFC	Canopy Cover	Canopy Layers	Total Mean		Sapling/ Poles 1.0-8.9"	Small 9.0-14.9"	Small 2 15.0-20.9"	Medium 1 21-24.9"	Medium 2 25-31.9"	Large >31.9"
	50-100%	2-3	TPA	275	170	40	25	15	15	10
			Range	*220-330*	*136-204*	*32-48*	*20-30*	*12-18*	*12-18*	*8-12*
			BA	277	24	31	44	43	64	71
			Range	*222-322*	19-29	25-37	*35-53*	*34-53*	*51-77*	*57-85*
			Stand SDI	418	50	55	69	63	89	=75
			Range	*334-502*	*40-60*	*44-66*	*55-83*	*37-89*	*71-107*	*60-90*
			Focal And Indicator species, Special Features and Key Tree Species							
			Focal and Indicator species: Riparian species, neotropical migratorty birds, bats							
			Special Features: Maintain a diversity of understory shrubs, grasses, sedges, herbs.							
			Key Tree Species: Englemann Spruce, Lodgepole Pine Aspen, Alder, Cottonwood							

SNAGS*						**DOWN WOOD****				
>9.9" And <20 dbh	>19.9" dbh	Total/Acre > 9.9"dbh	WL tolerance level	% of PAG based on Total/Acre|>19.9"dbh		tons/acre	% cover >5" dbh	# of 10"dbh whole tree/acre LP	WL tolerance level	% of landscape
			<30%	50	68				<30%	30
5	2	7	30%	20	10	5-11	2-4%	18-40	30%	40
9	2-4	11-13	50%	20	20	11-16	4-6%	40-60	50%	20
23	5	28	80%	10	2	16-26	6-10%	60-100	80%	10
				100	100					100

Snag and down wood tolerance levels are from the combined narratives in DecAID 2.0. of LP O and S structural stages. % of PAG is based on the watershed reference condition which combined DecAID information with HRV information from the Odell Pilot Watershed Analysis. See Appendix C Snag and Down Log for how watershed reference conditions were determined.

***Snags:** Do not conduct activities that manage for <50% tl. **In treatment areas manage for a minimum of 13 snags /acre of the largest available.** These stands are riparian and on average should meet the 80% tolerance levels.

****Down Wood:** Do not conduct activities that manage for < 30% tl. Across the PAG manage for larger diameter material where ever posssible. **In treatment units manage for a minimum average of 16 tons/acre >5"dbh, including high density clumps >25 tons/acre on 2% of each treatment units.** See Appendix A to determine # of pieces/acre at different diameters. If down wood densities preclude reaching stand objectives, hard down logs (class 1,2) can be moved to facilitate treatment.

Dead wood analysis needs to be completed on a larger scale than the LSR. Densities below those given above does not necessarily preclude management. Actions must be justified.

Aspen	When regeneration is no longer occuring manipulation whould occur in a mosaic pattern throughout the stands. Expand existing stands where ever the potential exists.
Meadows	When tree encroachment reaches a 39% loss of meadow habitat when compared to 1959 photos, meadow restoration would occur
Willows	When willow patches reach 80% decandence, treatment of 20% of the willows would occur. This would be randowm shrubs throughout the patch.

MANAGING FOR THE DEAD WOOD COMPONENT

Tables 3-4a through 3-4f summarize the levels of snags and coarse woody debris needed to provide the desired suitable habitat conditions by PAG, unless the area is being managed for fire behavior modification (Tables 3-6 through 3-8). Retain dead wood in actively managed stands at a level that represents the species composition of the original stands. Retained material should be among the largest available. Listed below is guidance in project implementation to help obtain and sustain the desired habitat conditions.

Management of Dead Wood in Existing Regenerated Areas (i.e. clearcuts)
Manage regenerated areas such that natural mortality will occur to create the desired dead wood size and components over time. In the near-term (first few decades), retain 15-20 percent of the area in an unthinned condition within small tree thinning units to allow natural disturbance processes to potentially recruit some dead wood. Recruitment of dead wood could also be accomplished by retaining some thinned trees on the ground, and piles. In subsequent decades, bringing the dead wood component into these areas can be accomplished by varying thinning at variable densities. Also, seek opportunities to manage higher densities of woody debris along the boundaries and within adjacent stands, and by retention of cull decks.

Management of Dead Wood in Forested Areas and Riparian Areas That Are Passively Managed
Active snag or down wood creation is not recommended unless there are other objectives for active management. Allow natural mortality to occur to provide snags and future down woody debris.

Management of Dead Wood in Forested Areas That Are Actively Managed
All actively managed stands need to comply with the following guidelines:

- Retain dead wood that represents the species composition of the original stand.
- Retain material among the largest available on the site to meet dead wood requirements.
- Retain adequate green tree replacements to provide future dead wood at levels specified in Tables 3-4a through 3-4f unless the area is being managed for fire behavior modification (Tables 3-6 through 3-8).
- If snags must be felled during harvest operations, retain them on site as coarse woody debris.
- If actively managed stands are below the minimum snag levels as specified in Tables 3-4a through 3-4f, increase the levels where possible. This could be accomplished as funding allows and by various methods such as use of Knudsen-Vandenberg (KV) funds, prescriptive underburning, retention of trees damaged during thinning activities, or by retention of overstory trees of declining health.
- If operationally feasible and risk reduction objectives can be met, retention of the higher levels of down wood is usually desired.
- If levels of down wood for suitable habitat are below those specified in Tables 3-4a through 3-4f or Tables 3-6 through 3-8 in the Fire Behavior Modification Areas, increase levels where economically and physically possible through retention of cull logs, redistribution, an increase in standing snag levels, or retention of landing material. Do not fall live trees if the sole objective is to meet down woody debris requirements.
- Down wood does not necessarily have to be distributed evenly across actively-managed areas. They can be retained in patches or clumps, or moved as needed to increase distribution or clump density. If risk reduction objectives for down wood cannot be met using the minimum guidelines, the following methods can be utilized:
  --- *Retain sufficient clumps of downed wood unit-wide to come as close as practical to specifications of Table 3-4 unless the area is identified for fire behavior modification (Table 3-6 through 3-8).*

  --- *Spatially isolate larger areas of hazard. In this context, hazard can refer to long-term forest health, or risk associated with large-scale stand replacement as a result of wildfire. Note: Disturbance may be characteristic for lodgepole pine, but not desired.*

Management of Dead Wood within the Davis Lake Area within the Fire Perimeter

At this time, removal of additional dead wood is considered hazard mitigation for public safety and current standards are generally a distance of a tree length and one half from major roads and developed recreation sites. This area overlaps cultural resources, therefore, controls over minimizing soil disturbance are necessary. In the future, if analysis determines a need for additional hazard reduction to

protect people, facilities, or adjacent MSAs is necessary, then removal of dead wood would be appropriate under the C13-C16 guidelines. The Davis LSRA team acknowledges the need to avoid future conditions in the area that would be similar to those that contributed to the control problems associated with the Davis Fire.

Enhancement Activities Risk Reduction USING Silviculture (C-12 through C-13)

Based on the existing conditions and functions within each Management Strategy Area, the LSR team has identified appropriate and inappropriate areas in which to manipulate the existing vegetative condition in order to retain a functional LSR in both the short- and long-terms. The following provides an overview of the protection strategies for the lodgepole and mixed conifer/ponderosa pine PAGs. There is one exception; MSA B (mountain hemlock for wolverine and high elevation species), is likely within its historic range of variability and represents the desired balance of vegetative conditions. Risk reduction activities can occur where it incidentally overlaps an adjacent MSA to make a reasonable unit boundary. Site-specific opportunities and constraints are identified for each MSA in Chapter 4.

Small diameter fuel reduction activities (12 inch diameter limit except in NRF, which is 8 inches was approved in the Davis Fire Recovery Project EIS (USDA Forest Service, 2004) for MSAs H, L, M, N, O and V along Highway 46 and is consistent with this LSRA and has concurrence from the Regional Ecosystem Office.

The following prioritization (Table 3-5 and following discussion) includes active management to accelerate the development of suitable climatic-climax habitat for the spotted owl and development and maintenance of a fire-climax condition in BEMAs and other appropriate areas. Priorities were based on the existing condition of the habitat within MSAs with owl home ranges (Priority 1) and all other mixed conifer/ponderosa pine plant association MSAs (Priority 2). See individual MSAs for specific rationale. Refer to Figure 3-10 for fire suppression priorities.

Table 3-5. LOS Risk Reduction and Enhancement in Forested Areas by MSA.

Priority 1	Priority 2
C, E, K, T, W, AA, BB	Q, S, V, F

Selective thinning, tree culturing (risk reduction) and planting in the understory (enhancement) are the primary activities for forested areas that do not meet the characteristics of suitable LOS habitat.

Selective Thinning for Risk Reduction

Selective thinning would be appropriate in previously harvested stands within the mixed conifer PAGs where the overstory has been eliminated and the understory is primarily comprised of true fir and lodgepole. This differs from tree culturing where large trees remain. Selective thinning would be prescribed to move the stands toward suitable LOS habitat for the emphasis species as quantified in Tables 3-4a through 3-4f. Treatments would either move toward a multi-story structure to attain the climatic-climax condition or a single-story fire-climax condition. Ponderosa pine and Douglas-fir would be favored for retention in all mixed conifer and ponderosa pine PAGs.

Tree Culturing for Risk Reduction

Tree culturing consists of removing all competing trees for a distance around existing large trees to help sustain them throughout the short and long-term. This activity would favor large and fire resistant ponderosa pine and Douglas-fir in the mixed conifer PAGs to reduce risk from fire. This activity is most appropriate in stands managed to attain the fire-climax condition and bald eagle habitat. Diversify the structure of stands and accelerate the growth of future large trees by using tree culturing prescriptions to attain suitable climatic-climax habitat.

Prescriptions should be designed to modify the form of potential bald eagle nest trees to develop lateral branches capable of supporting nests in the future. This may involve the removal of all competing trees for a distance around large ponderosa pine and Douglas-fir so that lateral branches are not shaded by competing vegetation.

Protection of Large Trees for Risk Reduction

Protection of large trees (greater than 21 inches in diameter) is of paramount importance in the Davis LSR. Harvest of these trees will be avoided, if possible. Suitable conditions for the removal of large trees are anticipated to be rare. The following describes circumstances when cutting or killing large trees (21 inches in diameter or greater) may occur within the LSR:

Advanced logging Systems
Large trees may be killed and left standing or felled in the case of safety concerns or skyline corridor clearing. To the extent possible, these trees would not be included in the treatment objectives for the site.

Overstory Removal
Where trees highly infected with dwarf mistletoe may occur and conditions are such that the developing understory (of the same species) in areas greater 10 acres would be substantially delayed or potentially eliminated from achieving LOS objectives. Each large tree will be considered individually. These are stands where typically a shelterwood prescription has been used and the developing understory is particularly vulnerable. At this time, there are no stands within the LSR that have been identified in this condition. The goal would not be to eliminate dwarf mistletoe from the stands.

Partial Cutting
Do not remove trees over 21 inches in diameter unless there are two or more trees 21" or larger remaining within 50 feet of the tree to be cut. The following are cases and subsets of partial cutting where large trees may need to be removed:

--- Stands with stocking above UMZ in trees 21 inches in diameter and larger and the smallest trees in that size class will need to be cut/killed to obtain desired stocking levels;
--- Mixed species stands where true firs are removed to reduce host trees for western spruce budworm;
--- Stands where a multi-story condition is desired, such as for great gray or spotted owls, and it is necessary to remove large trees to maintain smaller trees in the stand; and
--- In areas where the more vulnerable understory is at risk to achieving LOS status within a reasonable timeframe as determined by the LSR team, remove scattered mistletoe-infected trees in relatively mistletoe-free stands to prevent spread of the disease. Low levels of mistletoe would remain in the stands.

---Maintain stand characteristics of clumpiness where it exists.

Risk Reduction Using Silviculture Common to All PAGS

- To maintain connectivity of LOS habitat, which is essential and a primary consideration, incorporate areas where no management occurs on 15-30 percent of all stands. This also would help preserve biological legacies, retain biodiversity, and enhance dispersal for a variety of plant and animal species. In areas where fire behavior is to be modified by small diameter fuels reduction, retention areas would not apply because they would defeat the objective.

- In actively-managed stands, manipulate tree densities and tree species mixes appropriate to the site. The objective would be to reach the UMZ and commercial thinning size at approximately the same time in order to be the most economically efficient.
- Maintain or enhance a diversity of species and structural composition within activity units and across the landscape.
- In mixed conifer units where the desired condition is climatic-climax suitable habitat, maintain no more than 50 percent of the trees in true firs.
- In mixed conifer units where the desired condition is fire-climax suitable habitat, maintain ponderosa pine and Douglas-fir as the primary stand components.
- Manage stands to allow development of endemic levels of mistletoe, heart rot, and tree deformity to provide wildlife habitat.
- Refer to "Managing for the Dead Wood Component" in this chapter for information concerning dead wood recruitment in regenerated areas.
- To maintain connectivity, limit active management in areas where there is riparian-associated vegetation unless there is a compelling rationale for reducing the risk of a disturbance. If the vegetation (live and/or dead) represents upland conditions, it is more appropriate to focus active management for risk reduction – especially adjacent to high use areas such as campgrounds or recreation residences. This is regardless if it is within a riparian buffer, or not.
- Do not actively manage unique habitats such as lava pressure ridges greater than 200 square feet in size.

Lodgepole Pine Risk Reduction Strategy

Passive Management in Lodgepole Pine

In a passive management scenario, large blocks of habitat would be retained "as is" and allowed to progress through stand development without mechanical manipulation. These areas generally have had little active management in the past. For example an existing Old Growth Management Area in MSA - Y comprises one such block of mature lodgepole. The high water table and presence of Odell Creek create unique riparian habitats within this MSA. It also is of low risk to a stand replacement wildfire. At this time, only risk reduction activities tied to a larger landscape-scale strategy for fuels modification are identified in this block because of its current function within the LSR. Passive management would apply to most of MSAs Y, Z, E, A, B, and the Designated Old Growth Area in MSA M.

Risk Reduction Using Silviculture in Lodgepole PAGS

Figure 3-2 displays the Lodgepole Pine Plant Association, Fire Behavior modification Blocks, and the Davis Fire by MSA. In the 1995 Davis LSRA, the desired condition of lodgepole pine PAGs that occupy the La Pine Basin surrounding Davis Lake was to have approximately 50 percent of the area in large contiguous blocks (1000 or more acres) of suitable climatic lodgepole habitat. This would be at any point in time. This rotation of large blocks was to ensure the presence of effective lodgepole habitat throughout the short and long-term.

Lodgepole PAGs provide for black-backed woodpeckers nesting and foraging, big game cover and forage and northern spotted owl dispersal. Whether this habitat is effective for this range of species can be variable. Approximately 1,000 acres were to be actively managed to develop a contiguous block of suitable habitat in the long-term. In practice, the original LSRA conditions to be met for snags and down wood precluded meeting fuels reduction objectives. An amendment was requested in 2002 and finalized in 2004 to alleviate this conflict. Unfortunately, the 2003 Davis Fire burned much of the amended area planned for fuels reduction before it was accomplished.

The "revised" desired condition for Lodgepole pine PAGs is to provide suitable habitat for various species through passive and active management. This is a change because the 1995 version of the LSRA recommended more of a "hands off" approach. Short-term goals focus on fuels modification/reduction, reestablishing stands within the Davis Fire, and thinning of small trees in existing plantations to develop owl dispersal habitat. The long-term goal is to have stands of mature (7 inches in diameter and greater) lodgepole with a minimum 30 percent live crown ratio scattered across the landscape in such a way to provide connectivity. In existing LOS stands, the silviculturist and the biologist need to work closely to develop prescriptions to maintain dispersal habitat, where that is the goal. Prescriptive vegetation management might include large-scale individual tree selection or group selection to achieve and maintain pockets of large lodgepole on more than 50 percent of the landscape. Suitable habitat descriptions are given in Table 3-4d and in the specific MSAs in Chapter 4.

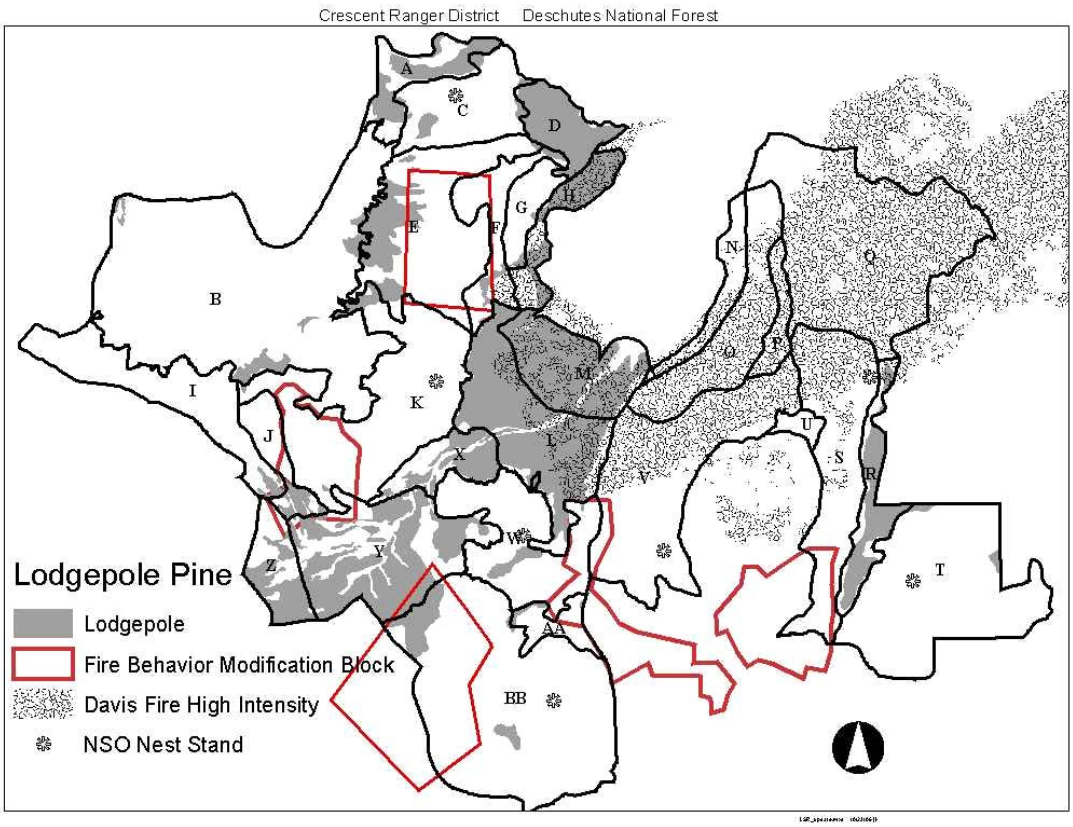


Figure 3-2. Lodgepole pine plant associations and fire modification blocks.

Most of the remaining lodgepole areas are highly fragmented and have experienced a significant amount of overstory loss due to bark beetle attack at epidemic proportions, salvage and wildfire. These areas need to be actively managed to reach long-term goals for owl dispersal and keeping 50 percent of the area in mature lodgepole (potential LOS) at any one time**.** A prescription for group or individual tree selection in addition to some fuel modification activities (which could be accomplished by a variety of methods, including salvage) would maintain or set stands on a course to attain the habitat conditions described in Table 3-2. Activities are triggered within the parameters set forth in the "Managing for the Dead Wood Component" described in this chapter and guidelines in the Northwest Forest Plan (C-13). Active management would be applied to the lodgepole pine component in MSAs C, D, L, M, R, W, X and BB.

Mixed Conifer/Ponderosa Pine Risk Reduction Strategy

Active Management (Risk Reduction) in Mixed Conifer/Ponderosa Pine PAGs in Climatic-Climax and Fire-Climax Conditions

Based on recommendations from the forest team to attain a sustainable balance of late-successional suitable habitat within the mixed conifer/ponderosa pine PAGs, approximately 25 percent should be in the climatic-climax condition and 15 percent in the fire-climax condition (Table 3-1). Mixed Conifer Wet is a very small subset of the total acres in the Mixed Conifer PAG, currently has approximately 60 percent in the climatic-climax condition, and is considered sustainable at this time.

Within the mixed conifer and ponderosa pine PAGS, the Davis Fire can be characterized as burning in an uncharacteristic manner, as evidenced by large blocks (thousands of acres) that were returned to a stand initiation phase. There was little burning of mixed intensities to create a mosaic of conditions, which is usually characteristic to these stands in greater proportions. Post-Davis Fire, approximately 8,488 acres (17 percent of the entire LSR) within the Davis LSR functions as climatic-climax suitable habitat. Less than 6 percent (3,000 acres) of the area is currently considered to be in the fire-climax condition.

A passive management scenario, including fire exclusion, has allowed mixed conifer stands in the area to progress towards a climatic-climax condition. After the Davis Fire, the majority of the remaining live stands continue to be at high risk of losing their late and old-structured components (large diameter ponderosa pine and Douglas-fir) to an uncharacteristic event. In addition to the Davis Fire, recent wildfires in LSRs around the forest such as the 2002 Eyerly and Cache Mountain, 2003 B&B and Link, and 2006 Black Crater and Lake George have emphasized this risk associated with wildfire. The most time-sensitive components (i.e. large trees) if lost, are not easily replaced due to a species shift and shortage of replacement trees of adequate size and/or species composition. Currently, white fir and lodgepole comprise the majority of second-story vegetation and are not considered suitable replacement trees.

It is recognized that these existing conditions developed over several decades. In most cases, returning the desired percentage of these stands to a tree density below the upper management zone will require a similar amount of time and involve several entries or activity cycles.

The following parameters are provided to guide the transition of the existing condition to a sustainable balance of LOS conditions **within the mixed conifer PAGs** (Table 3-1):

- In general, any harvest activity that removes more than one third of the existing basal area can leave a stand susceptible to windthrow and may even have unintended consequences by temporarily reducing growth of the residual stands due to the sudden exposure of shade needles to more intense sunlight. Because most of the imminently susceptible stands will need more than 1/3 of the existing basal area removed to attain the desired UMZ, staged activities that do not remove the needed basal area all at once will be needed over the next 20 years.

- It is acknowledged that the following areas will remain imminently susceptible to insect attack and/or wildfire in order to maintain a functional LSR in the short-term for known old growth dependent species. For the next 20 years unless stands begin to lose desired structural components at catastrophic levels, retain a passive management scenario in:

  -- Nesting, roosting, foraging habitat within the home range radius (1.2 mile) of the known spotted owl nest sites;

-- MSAs I, J and V which currently serve as key connectivity areas within the LSR and surrounding landscape for the northern spotted owl;

-- Existing designated Old Growth Management Areas allocated by the Deschutes National Forest Land and Resource Management Plan (LMRP) will follow strategic guidelines for achieving late and old forested conditions set forth in this LSRA, therefore are consistent with the goals set forth in the LMRP; and

-- Riparian Reserves except for restoration opportunities identified within this document.

The exception to a passive management scenario outside of catastrophic loss would be for those activities associated with strategic fuels reduction within identified Fire Behavior Modification Areas and along major roads (two and four digit). These areas are described with the rationale, triggers, and prescriptions later in this chapter.

Within these parameters, original recommendations were to begin immediately to reduce the existing percentage of mixed conifer stands determined to be imminently susceptible to insect attack and/or wildfire. Based on the 1995 Forest Overview Team's recommendations, the existing 53.5 percent of mixed conifer acres in the climatic-climax condition would be reduced to approximately 40 percent. Originally, 13.5 percent, or approximately 3,900 acres of existing climatic-climax habitat, was in immediate need of active management and should occur within the next 20 years in conjunction with risk reduction activities adjacent to the LSR. To further stratify when these stands should be actively managed, 25-50 percent of 3,900 acres was to be accomplished within five years to provide immediate and effective protection against a catastrophic loss of LOS. This would have resulted in a maximum of 1,950 (of 3,900) acres of existing climatic-climax suitable habitat being treated between 1995 through 2001. The remaining 50-75 percent of the area in need of risk reduction was to occur over the following 15 years as appropriate, based on monitoring results.

The objective at the time was to transition the 3,900 acres to stand densities below the upper management zone (greater than100 percent UMZ) and restore 10 percent of the mixed conifer dry PAG to a fire-climax condition over time. Much of this was accomplished over the years between 1995 and 2003. It was accomplished with 2 projects: Seven Buttes and Seven Buttes Return. However, before Seven Buttes Return was completely implemented, the 2003 Davis Fire burned 11,820 acres of the LSR and 3,959 acres of climatic climax habitat was lost. This event set the stage for updating the LSRA.

The rationale that framed the original 1995 Davis LSRA and subsequent decisions to actively manage imminently susceptible stands remains valid today. There is a need to be strategic with active management to reduce the risk of uncharacteristic or undesired disturbance processes in order to keep large trees on the landscape and retain and cycle NSO habitat on the landscape. For a simplified example of NRF cycling, see Appendix B. Although a summary of past accomplishments in these stands may appear to be a start in the right direction, there is much more to be completed and these stands are dynamic and have been growing and accumulating biomass in the last 10 or more years. Table 3-5 displays priority LOS Risk Reduction and Enhancement in Forested Areas by MSA and the existing condition.

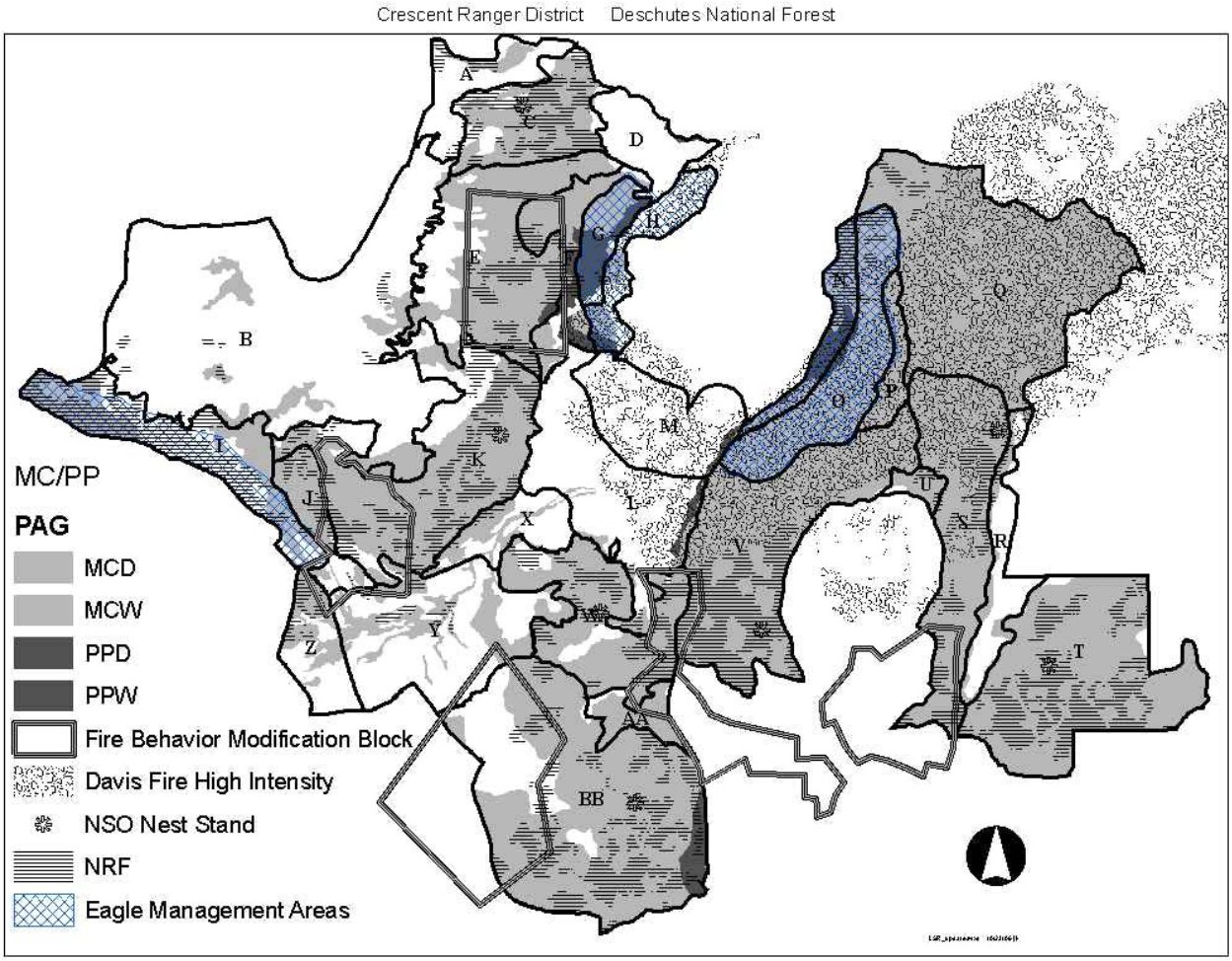


Figure 3-3. Mixed Conifer/Ponderosa Pine.

The following four scenarios describe how the management of the landscape will accomplish these objectives to retain large trees on the landscape and to cycle climatic-climax habitat around the landscape. For more detail on when these scenarios would be triggered, see Chapter 4 under Management Objectives.

Scenario A Risk Reduction: This would be the primary treatment strategy in stands managed for the northern spotted owl and associated species.

This scenario is described as 90 percent of the UMZ, multi-story. Actively manage stands currently at high risk in order to lower the existing tree density to 90 percent of the UMZ. An average of one-third of the basal area will be removed per entry. The highest possible quality of existing climatic-climax habitat will be retained. Trees should be removed from most or all of the size classes (depending on the existing stand structure) in such a way that all of the existing canopy layers would remain. The largest trees in each canopy layer would usually remain and would not be removed, except in exceptions specified in this

chapter under the heading "Risk Reduction to Protect Large Trees." Most of the mixed conifer wet and dry stands outside the Bald Eagle Management Area (BEMA) would be included in this scenario.

Figure 3-4. Example of 90% UMZ, Multi-story (Scenario A).

Following active management, some stands (particularly in productive sites in the mixed conifer wet PAG) may remain classified as NRF habitat following treatment. This is dependent on stand densities prior to treatment, levels of large down wood and snags retained during the operation, and residual understory (i.e. seedlings, saplings, pole-sized and understory trees).

The majority of the actively managed stands *will not retain all* of the habitat components and structure that are believed important for the life cycle and reproductive success of spotted owls. On average, stands will lack the canopy cover and vertical structure that characterize suitable NRF habitat. It is also likely that some of the dead wood component would be removed and may impact the spotted owl prey base availability in the short-term. After implementation is complete, stands are expected to retain greater than or equal to 30 percent canopy cover and will remain in a multi-storied forested condition with a substantial large tree component.

Generally, these stands will remain as high quality foraging habitat and modeling has shown they have the potential to grow back the structure (canopy cover) and understory necessary to meet suitable NRF habitat conditions again in approximately two decades.

Scenario B Risk Reduction: This would be the primary strategy in stands managed for fire-climax associated species, such as the bald eagle.

This scenario is described as 90 percent of the UMZ, single-story. Actively manage by reducing the stand density currently at high risk in order to obtain 90 percent of the UMZ. On average, one third of the basal area will be removed per entry. This prescription would maximize the removal of understory trees. Overstory trees will be removed, only if necessary to maintain the health and vigor of the largest trees on the landscape. The intent of this scenario is to retain the overstory canopy and a seedling/sapling layer.

Most of the mixed conifer-dry and ponderosa pine stands in the BEMAs would be included in this scenario.

Figure 3-5. Example of 90% UMZ, Single Story (Scenario B).

Following treatment(s), stands will meet criteria for dispersal habitat and are expected to serve a dispersal function for spotted owls. Foraging habitat for spotted owls is generally characterized by two canopy layers. Treated stands will lack the canopy cover and vertical structure that provides thermal regulation benefits and predator protection for owls. Although owls may utilize this habitat type for foraging, it is not expected to provide "good foraging habitat". The area will function as sustainable and functional bald eagle habitat.

Scenario C Risk Reduction: This would be the primary treatment strategy in stands managed for the northern spotted owl and associated species and planned for long-term and/or replacement habitat development.

This scenario is described as 67 percent of the UMZ, multi-story. Treat stands currently at high to moderate risk in order to lower the existing tree density to 67 percent of the UMZ. An average of 30-45 percent of the basal area will be treated per entry. Trees should be removed from most or all of the size classes (depending on the existing stand structure) in such a way that all of the existing canopy layers would remain. Mixed conifer wet and dry and ponderosa pine stands outside the BEMA would be included in this scenario to develop resistant stands in the short-term in order to obtain suitable habitat in the long-term. Some lodgepole pine stands important as dispersal habitat could also be included in this scenario. Many of these stands would currently be considered suitable climatic-climax habitat.

Figure 3-6. Example of 67% UMZ, Multi-story (Scenario C).

Following active management, stands will remain in a multi-storied condition with a substantial large-tree component. However, they will not provide the canopy cover or vertical structure characteristic of suitable NRF habitat or high-quality foraging habitat for the northern spotted owl for two to four decades.

The difference with this prescription compared to the 90 percent UMZ, a larger component of structure and understory are removed. Stands are classified as foraging habitat until three to four decades, when modeling has shown sufficient structure and understory has grown back necessary to meet suitable NRF habitat conditions again.

Scenario D Risk Reduction: This would be the primary treatment strategy in stands managed for the fire-climax associated species, such as the bald eagle, and planned for long-term and/or replacement habitat development.

This scenario is described as 67 percent of the UMZ, single-story. Actively manage stands currently at high to moderate risk in order to lower the existing tree density to 67 percent of the UMZ. An average of 30 to 45 percent of the basal area will be removed per entry. Trees would be removed from the understory with some of the smaller overstory removed if necessary to achieve long-term objectives of developing and keeping large trees that are mostly fire-tolerant with replacements of various age classes. The intent of this scenario would be to retain the existing overstory canopy and some of the seedling/sapling layer. Most of the mixed conifer dry and ponderosa pine stands in the BEMAs and some lodgepole pine stands would be included in this scenario.

Figure 3-7. Example of 67% UMZ, Single Story.

Following active management, stands will minimally meet dispersal habitat criteria and function for the northern spotted owl, however they will provide functional, sustainable bald eagle habitat.

Fuels Reduction Activities

Part of the overall strategy for maintaining LOS is to reduce the risk of another problem fire such as the Davis Fire. Analysis of the Davis Fire conditions and pattern of spread was studied. Strategic placement of areas where the fuel profile is modified and maintained would influence the size and intensity of fires on a landscape scale. Ultimately, the goal is to reduce the risk of loss of existing habitat. The success of this strategy depends upon building on the active management that has already occurred in the area to create larger blocks. Figure 3-8 identifies areas for placement of the strategic fire behavior modification areas. In addition to these areas, the strategy would include hazard abatement along major (two and four digit) roads where small diameter tree thinning and reduction of ground and ladder fuels would occur for approximately 100 feet.

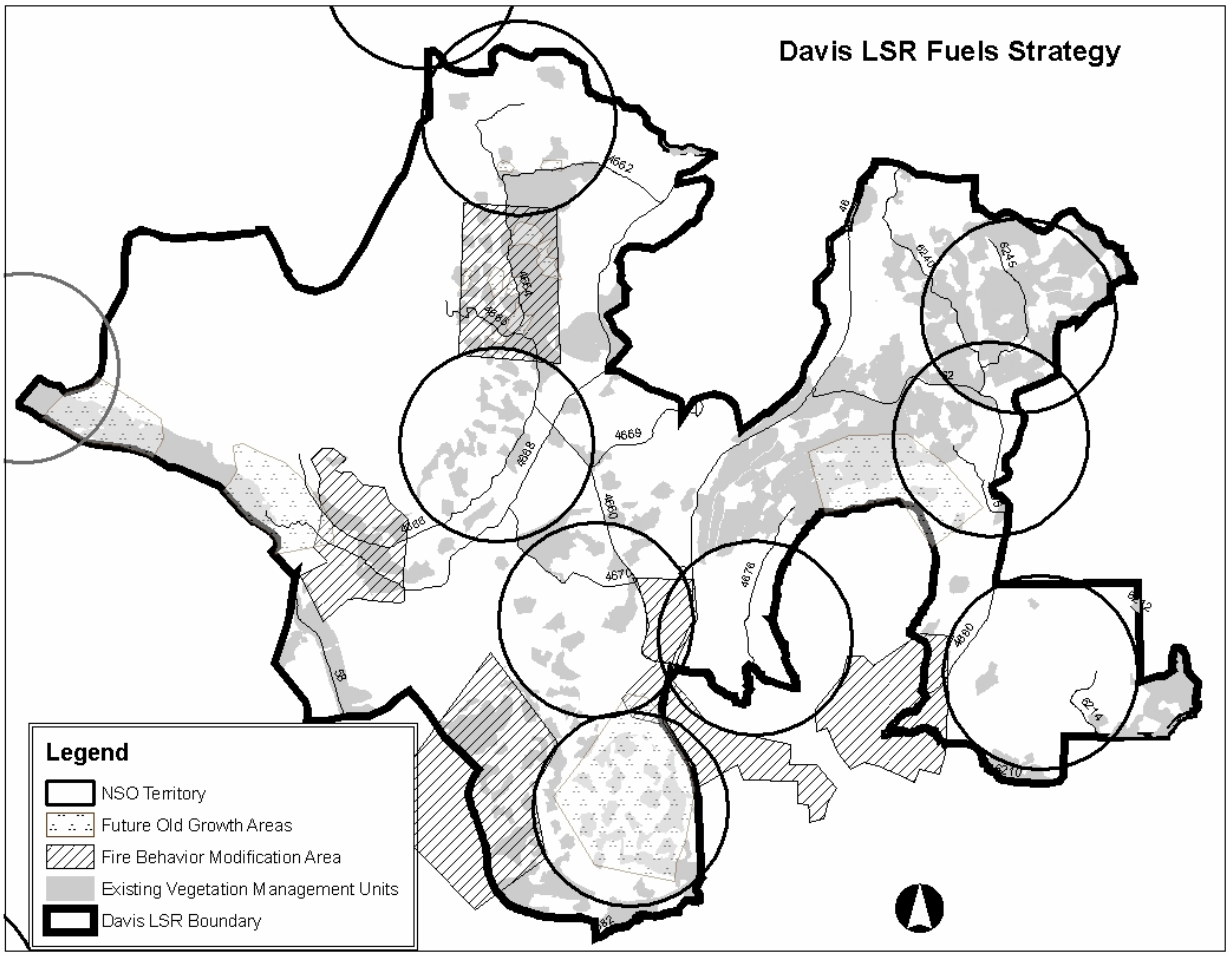


Figure 3-8. Fuels Strategy for the Davis LSR Assessment.

LSRA Fire Behavior Modification (FBM) areas

Use the Finney concept for fuels reduction activities in FBM areas (1,500-2,700 acre blocks). The goal is to reduce problem fire behavior and effects over 20 percent of the entire LSR in order to be effective. The Finney concept is based on a fire behavior and economical perspective, where treatments are most efficacious as they approach the 20 percent level over the entire block and then economically diminishes (bang for the buck) as additional acres are treated. This can be achieved using several tools, including commercial timber contracts, taking advantage by linking to previous activity areas, and small diameter thinning and fuels reduction where a less intensive action is desired. Factors to consider when identifying an area to modify fire behavior should include: locations of past activity, stand types, resources of concern (such as private property and NSO home ranges), value of adjoining areas, jurisdictional boundaries, strategic locations including natural barriers, and size needed to impede a problem fire pathway. The areas are then maintained through time. ***It is more important where fuels modification occurs on the landscape rather than how much.***

The prescriptions for these areas would retain and maintain fire resistant species such as ponderosa pine and large Douglas-fir, where a sustained crown fire event is unlikely; thus allowing firefighters a better opportunity to stop the fire from getting larger. The goal is to have a diversity of all size classes, if present. The following are examples of fuels prescriptions for NRF and NON-NRF that reduce the problem fire potential by isolating the canopy in areas where a less intensive treatment is desired. When

complete, all activity-generated and natural fuel levels in these areas would be reduced to meet Tables 3-8 through 3-10 for down wood:

NRF habitat:
Thin all trees less than or equal to 3 inches in diameter to 18 foot by 18 foot spacing. Prune all limbs up to 8 feet above ground level. After implementation, it remains NRF habitat.

Near-NRF or dispersal habitat:
Thin all trees less than or equal to 6 inches in diameter to 20 foot x 20 foot spacing.

These tables and the following figures (Figures 3-9 - 3-11) display the fuel parameters to modify fire behavior and to be maintained through time by Fire Climax, Climatic Climax, and Lodgepole Plant Association Group conditions. The preceding prescriptions would be utilized in areas identified as strategic (Figure 3-8), dependent upon the desire to maintain the stand in NRF, near-NRF, or dispersal habitat at a particular place on the landscape. In order to maintain fuels at the desired level and to remain effective through time, prescribed burning as a maintenance tool in the fire climax group would be needed every 8-12 years after an appropriate National Environmental Policy Act (NEPA) review. Also, it is estimated thinning would occur of small trees 6 inches in diameter or less in all groups, with handpiling and disposal every 15-20 years. Existing limbed trees would remain effective as crown base heights rise each year with tree growth. However, smaller trees selected for retention would need to be pruned, usually with each thinning entry.

Note that the following three modification areas are not necessarily expected to meet Tables 3-4a through 3-4f minimums for down logs.

Table 3-6. Fire Behavior Modification Parameters for Fire Climax Conditions.

PP/DF and EMC Managed for Fire Climax *Pile and disposal *Underburn	**Min-Max tons/acre**	**PP % Down Wood Cover**	**Whole PP trees/acre (dbh) Example***
0-3"	0-1.6	0-0.4	NA
3.1-9"	0-1.3	0-0.3	0-12 (8")
9.1-20"	4-6.3	0.9-1.4	6-8 (16")
>20	8-13.5	1.9-3.1	5-8 (22")
Total ≥9" dbh**	12-19.8	2.8-4.2	11-16 (16-22")

*Given as an example. Down wood left will have varying diameters and species dependent upon stand composition. Whole trees per acre will vary. Total tons/acre should be met using largest material available.

**Because these units will be maintained with fire, down wood under 9" inches dbh is not expected to remain and down wood needs would be met by larger material.

Low value of 2.8% is 30-50% tolerance interval for EMC and 50-30% PPDF. High value of 5.2% is 80%-100% tolerance interval for PP/DF and 30-80% EMC. Information is based on inventory data from unharvested plots with measurable down wood tables EMC_ECB_S or L.inv_10 and PPDF_S or L.inv-10, in DecAID 2.0.

Figure 3-9. Example of Fire Behavior Modifications for Fire Climax Conditions.

Table 3-7. Fire Behavior Modification Parameters for Climatic Climax (NRF or Near-NRF Habitat) Conditions.

EMC and MMC Managed for Climatic Climax *Handpile/grapple pile *Dispose piles *Minor fire creep associated with burning	**Min-Max tons/acre**	**MMC [EMC] % Down Wood Cover**	**Whole DF trees/acre (dbh) Example***
0-3"	0-5.4	0-1.2 [0-1.3]	NA
3.1-9"	0-5	0-1.1 [0-1.2]	0-40 (8")
9.1-20"	5-22.7	1.1-5 [1.2-5.4]	7-32 (16")
>20	6.0-9	1.3-2 [1.4-2.1]	4-6 (22")
Total	11-42.1	2.4-8.3 [2.6-10]	11-38 (16-22")

*Given as an example. Down wood left will have varying diameters and species dependent upon stand composition. Whole trees per acre will vary. Total tons/acre should be met using largest material available.

MCD Low value of 2.6% cover is 30-50% tolerance interval, the high 10% cover is 80% tolerance level. MMC low value of 2.4 is below the 30% tolerance level, high of 8.3% is above the 80% tl for small structure and 50-80% tolerance interval for large structure. Information is based on inventory data from unharvested plots with measurable down wood tables EMC_ECB_S or L.inv_10 and MMC_S or L.inv_10 in DecAID 2.0

Figure 3-10. Example of Fire Behavior Modification Parameters for Climatic Climax Conditions.

Table 3-8. Fire Behavior Modification Parameters for Lodgepole Pine.

LP *Handpile/grapple pile *Dispose of piles *Minor fire creep associated with burning	Min-Max tons/acre	LP % Down Wood Cover	Whole LP trees/acre (dbh) Example*
0-3"	0-5.4	0-2	NA
3.1-9"	0-5	0-1.9	0-30 (8")
>9	7-31.7	2.6-12	17-75 (12")
Total	7-42.1	2.6-15.9	17-105 (8-12")

*Given as an example. Down wood retained will have varying diameters and species dependent upon stand composition. Whole trees/acre will vary. Total tons per acre should be met using largest material available.

For LP, the low value of 2.6% cover is below the 30% tolerance level, the high value of 15.9% exceeds the 80% tolerance level. Information is based on inventory data from unharvested plots with measurable down wood tables LP_S.inv_10 in DecAID 2.0

Figure 3-11. Example of Fire Behavior Modification Parameters for Lodgepole Pine.

Table 3-9 displays the priorities for implementing areas of fuel modification, stratified by MSA. Priorities were set by Plant Association Group, missed fire return intervals (how far from the regime), topography as it relates to potential for another problem fire event, and where protection is most needed for adjacent assets such as communities and NSO home ranges. Priority 1 is where the highest protection can be afforded ("bang for the buck") within the next 5 years (2007-2012), and Priority 2 would be for 2013-2018, when vegetative conditions on the landscape are expected to elevate the risk.

Table 3-9. Fuels Treatments to Establish Fire Behavior Modification Blocks.

Priority 1 MSAs	Priority 2 MSAs
J, K, L, S, T, V, W,Y, Z, AA	E, F, BB

Salvage Activities after a Stand Replacement Event (ROD, C-13 through C-16).

Salvage Activities Common to All

- Planned activities must meet criteria specified on C-13 through C-16 of the Northwest Forest Plan ROD. Salvage should not occur on disturbed sites smaller than 10 acres or where canopy cover is $\geq$ 40% (ROD C-14).
- Scale and Intensity: The Objective on any salvage activity would be to return to LOS habitat for the emphasis species as soon as possible while reducing risk and meeting the needs of fire dependent species. Specificity regarding how much to salvage, snag density, and retention patches will vary dependent upon the scale and intensity of the fire, its effects, and the MSA emphasis species. The current body of science on post-fire environments is evolving, therefore, utilizing the best and most recent science (i.e. DecAID Post-fire Habitats) is important. The following can be used as guidelines:

  --- Meeting the needs of fire-dependent species may be accomplished on a portion or all of the burned area.
  --- Retain standing, live overstory trees on site to the greatest extent possible to serve as a live stand component currently and as a source of dead wood in the future.
  --- No salvage activity should occur on stands with less than 50% mortality to provide habitats with high snag densities and a live component.
  --- Retain areas where no salvage occurs to achieve diversity which includes patches with a high density of snags.
  --- Future down wood is also a consideration when deciding how many snags to retain in activity units.
  --- In post-fire environments, retain all pre-fire snags and down wood to provide a soft snag and down wood component (Classes 2 and 3).
  --- Retain at least one small (about 5 feet tall, 10 feet long, 10 feet wide; 100 square feet) grapple pile per acre and one landing pile (average 9 feet tall, 15 feet long, 15 feet wide) per 100 acres to provide habitat for marten and its prey. Marten piles should have an abundance of protruding logs to serve as subnivian (under the snow) access points. Also, to enhance habitat for prey, include some dirt and litter.
  --- Reference "Fire Behavior Modification Areas" in this Chapter for direction on prescriptions if the event overlaps an area strategic for risk reduction.

Salvage Activities after a Stand Replacement Event Specific for Lodgepole Pine

Research at this time (Sallabanks et al. 2001, Saab and Dudley 1998, Saab et al. 2002) suggest black-backed woodpecker populations increase during the 5-7 year time period, then decline as insect populations decline. Focus activities on breaking up the continuity of fuels or providing fuel breaks to achieve risk reduction objectives. Also, reforestation may be needed in key owl dispersal corridors where natural regeneration has not taken place. The following criteria are to be incorporated:

- It is acknowledged those disturbances processes (boom/bust cycles) are very important for dependent species in lodgepole pine. This plant association should function within historic parameters (i.e. operate as close to "normal"). Fuels reduction activities are only appropriate around high risk areas such as campgrounds and where they threaten adjacent MSAs.
- High densities of snags and/or down wood need to be maintained in proper percent of the lodgepole pine PAG to meet Table 3-4d, unless it is a strategic fire behavior modification area (Table 3-8).
- Recognize most design features for ground disturbing activity within the Davis Lake area must consider cultural resources.

- See the "Management of Dead Wood Section" for potential triggers for future risk reduction activities around the Davis Lake area within the fire perimeter after the year 2010.

Salvage Activities after a Stand Replacement Event Specific for Mixed Conifer and Ponderosa Pine

Salvage activities in stands that experience a stand replacement event are appropriate within the Davis LSRA in mixed conifer and ponderosa pine stands under the following guidelines:

- The main objective is to accelerate achievement of LOS conditions. Typically, this would be in areas where there was stand replacement and loss of seed source. Natural regeneration of the desired species for long-term LSR objectives would be delayed by at least 100 years. Salvage activities would promote the long-term survival and growth of new conifers by bringing fuel loads to a sustainable level for eastside forests that reduces the likelihood of stand-replacement fire in newly regenerated stands, particularly during the early stages of stand development.
- In stands where there is a need to protect the public or remaining suitable habitat within or surrounding the LSR from future uncharacteristically severe fire**.**
- In stands where there may be a need to bring fuel loads to a level that allows reintroduction of fire at the appropriate stages for the vegetation type.

Enhancement Activities

The focus of the enhancement activities in stands younger than 80 years old is to accelerate tree growth as a means to return to LOS more quickly by thinning small trees in regenerated areas such as past clearcuts, shelterwoods, and seed tree harvest units. This also includes regenerating stands within the 2003 Davis Fire, in addition to prescribed fire in the appropriate time and place. Also, in lodgepole pine stands, density reduction activities allow stands to acquire fuller crowns for owl dispersal habitat and to develop and maintain a viable lodgepole LOS forest to rotate across the landscape for other dependent species. However, in some areas, selected regenerated areas may be more valuable in a prolonged unthinned condition to provide for habitat for species that depend upon those conditions (e.g., cover in big game fawning and calving areas). Table 3-10 summarizes priorities for LOS enhancement in regenerated areas.

Priority #1: The top priority for active management within regenerated areas was assigned to MSAs containing owl activity centers. The order of the owl MSAs is based on the amount of existing nesting, roosting, and foraging habitat in owl home ranges. Small diameter thinning of regenerated areas will result in more rapid development of dispersal and suitable NRF habitat than would occur with a passive management approach. In general, maximize prescriptions for tree growth while maintaining stand diversity. In consideration of growth maximization, other resource priorities such as cover in critical deer and elk fawning and calving areas may take precedence.

Priority #2: Second priority was assigned to areas that are currently highly fragmented but potentially can provide important habitat links in the mixed conifer PAGs.

Priority #3: The third priority was assigned to highly fragmented MSAs in the lodgepole pine PAGs.

Table 3-10. LOS Enhancement in Regenerated Areas by MSA.

Priority #1	Priority #2	Priority #3
C, K, W, Q, S, BB	**E, T, AA**	**L, M, R, X**

Thinning in Young Plantations Common to All PAGS

- In existing young plantations, thin small-diameter trees for rapid development of the canopy. The goal is to achieve spotted owl dispersal habitat quicker than would occur with a passive management scenario.
  --- For example, in lodgepole pine, focus on the short-term goal of dispersal habitat (30 percent live tree crown ratio and 7 inches in diameter) with a long-term goal of achieving stands of mature (8 inches in diameter and greater) lodgepole with 50 percent live crown ratio scattered across the landscape.
- Generally, prescriptions should maximize tree growth while maintaining stand diversity.

Thinning in Lodgepole Pine for Owl Dispersal

MSAs A, D, L, M, R, W, X, Y, and Z are identified for management to develop dispersal habitat to connect between home ranges within the LSR. There are basically two types of forest in this plant association: young lodgepole pine plantations lacking elements of structural diversity, and mature stands with decadence and reverting to an early successional stage. In both cases, thinning allows owls to fly through the crowns. One exception to thinning in lodgepole pine plantations would be within the Key Elk Area within the Davis Fire Area, where delay is necessary until adjacent reforested stands can provide cover.

More discussion of thinning in mature stands for owl dispersal can be found under the heading "Risk Reduction Using Silviculture in Lodgepole Pine PAGS". See Chapter 4 for specific rationales.

Regeneration of Lodgepole Pine within the Davis Fire Area

Focus of reforestation on owl dispersal corridors where natural regeneration has not taken place. Other restoration activities to incorporate:

- Maintain/enhance unique habitats in areas where the Davis Fire removed encroaching vegetation into meadows and stands of aspen.
- Maintain a diversity of species within riparian areas including spruce and hardwoods.

Underburning in all PAGS except Lodgepole Pine

- In stands which are emphasizing fire-resistant species such as ponderosa pine and Douglas-fir (such as in the Davis Fire) and in areas where tree species diversity is desired, underburning is appropriate once they have grown to sufficient size to be relatively fire resistant. This would probably occur sometime within the next 20 to 40 years. Underburning can be used to maintain and favor these species until such time as it is determined that an understory should develop for multi-storied stand objectives.

Planting in the Understory of Mixed Conifer

Species diversity can be enhanced through the technique of planting shade tolerant species that have longer lifespans. Plant Douglas-fir when the canopy cover is less than 35 percent in portions of the mixed conifer PAGs. Plant blister rust-resistant white pine in mountain hemlock root rot pockets and other suitable areas to ensure that white pine is present in the LSR in the future.

OTHER ACTIVITIES

Fire Suppression

A fire strategy was developed that considers and prioritizes suppression activities (or tactics) by MSA in such a way to provide guidance that minimizes potential adverse effects to the most important values at risk while adhering to the main goals. The protection of human life and property will always be the number one priority. The following provides guidance for the appropriate suppression response:

- Each MSA is prioritized for suppression by resource consideration.
- Minimize the expenditures of suppression costs when feasible.
- A map of the LSR resources by MSA and management allocation will be updated yearly and available to district suppression personnel at the appropriate scale to overlay on a fire map. The resources to list include owl activity centers, bald eagle nest sites, riparian, NRF, habitat connectivity and cultural resources.
- Utilize the most knowledgeable and available District Resource Advisors when suppression actions lend an opportunity.
- For fires that require a Wildland Fire Situation Analysis, specific suppression actions are detailed by alternative with consequences. Otherwise, limit the fire spread by the use of Minimum Impact Suppression Tactics (MIST) and guidance found in the Deschutes National Forest Fire Management Action Plan.

Chapter 4 provides site-specific direction in choosing the most effective suppression actions weighed against the least amount of adverse effects to the resources identified in the MSAs. Strategies may vary depending on fire intensity, resource value priorities, and the predicted and observed fire behavior. The following discussion uses examples of tactics to consider.

- In this chapter, areas have been identified where fuels need to be modified and maintained in a strategic manner. Use these areas as an opportunity for locating and securing a control line.
- Contain a fire and any spot fire with minimum control lines needed which can be reasonably expected to check the fire's spread under prevailing and predicted conditions. For example, instead of a dozer line in or near a sensitive resource, burning out from a road or landform may be just as effective with potentially less deleterious effects. Or, in rare occasions, securing the perimeter of a fire may be achieved with no established control line if the right weather conditions and ground features are available.
- Complete the control line around a fire and/or any spot fires including interior islands to be saved; burn out any unburned areas adjacent to the fire side of the control line; and cool down all hotspots that are immediate threats to the control line, until the line can reasonably be expected to hold under foreseeable conditions.

Table 3-11 displays fire suppression priorities for the Davis LSR.

Table 3-11. Fire Suppression Priorities.

Priority 1 MSAs	Priority 2 MSAs	Priority 3 MSAs
A, C, E, F, H, I, J, K, N, V, Z, BB	**B, D, G, L, O, R, X, Y**	**M, P, S, T, U, W, AA**

- **Priority 1:** Improvements and investments other than private property, such as developed campgrounds. Also, owl activity centers, eagle nest stands, and cultural resources around Davis Lake.
- **Priority 2:** Habitat connectivity, riparian zones and stands classified as NSO Nesting, Roosting, and Foraging.
- **Priority 3** all other areas.

Animal Damage Management

Animal damage management activities may be appropriate to protect desired habitat components within the LSR where damage levels are greater than endemic proportions. NEPA analysis for such activities would include a discussion of both biological and artificial control methods. Do not consider animal damage control methods that are not determined neutral or beneficial to LOS associated wildlife species.

Within the Davis Fire area, if reforestation success is jeopardized by pocket gophers or competition with grasses and the planting unit has potential for a small meadow habitat, consider suspending tree planting to allow the grasses and forbs to dominate the site.

Soil Restoration

Soil productivity is measured on a unit by unit basis and adheres to Forest Plan Standards and Guidelines. Table 3-12 displays priorities for restoration by MSA, plus the number of acres of subsoiling that has taken place. A rating of high means more than 20 percent of the MSA has soils in a detrimental condition, moderate – 10 to 19 percent, and low – less than 10 percent.

Table 3-12. Priority for Soil Restoration by MSA.

MSA	Priority for Restoration	Subsoiling Acres Completed
D	High	7
Q	High	52
AA	Moderate	0
BB	Moderate	0
C	Moderate	0
F	Moderate	120
G	Moderate	220
O	Moderate	0
P	Moderate	0
R	Moderate	0
S	Moderate	0
V	Moderate	0
W	Moderate	0
A	Low	0
B	Low	0
E	Low	20
H	Low	1.2
I	Low	0
J	Low	0
K	Low	0
L	Low	0
M	Low	0
N	Low	0
T	Low	214
U	Low	0
X	Low	0
Y	Low	0
Z	Low	0

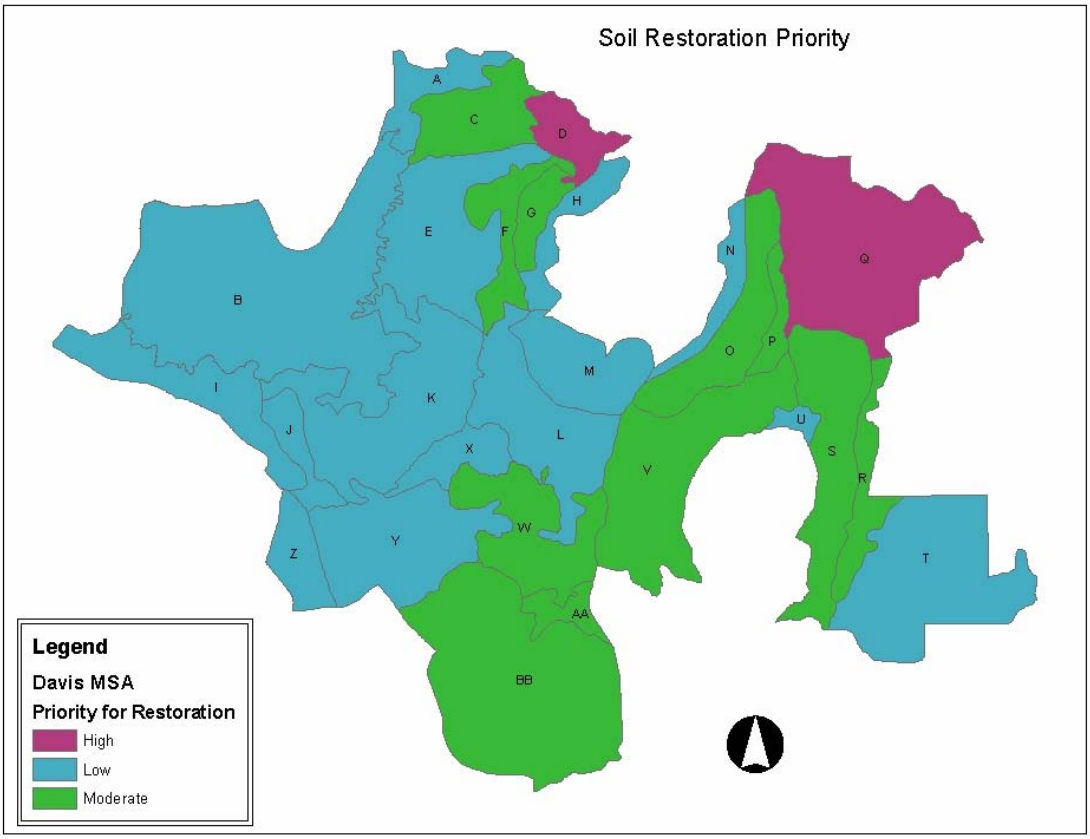


Figure 3-12. Priorities for Soil Restoration by MSA.

Travel and Access Management

In general, the existing levels of access are not considered to be a major issue across the LSR; however, total road densities are. While access is controlled through open and closed roads in many cases to reduce potential disturbance to wildlife, road densities remain high in many MSAs. This reduces the amount of habitat available, and reduces effectiveness provided by LOS forest through increased edge.

Road densities that reflect existing access decisions displayed in the "Objective Road Density" column in Table 3-13. "Operational" open road densities refer to the roads currently in use. "Total" road densities include all roads regardless of open or closed. A roads analysis was completed for the Davis Fire area and is incorporated, although on temporary basis. The current process to implement the Travel Management Rule is likely to make recommended access in the Davis Fire permanent once the process is complete. The final column in the table represents the densities of only major routes or two-digit and four-digit roads.

The following is designed to implement the strategy for access within the Davis LSR:

-- Do not construct roads within the LSR for silvicultural, salvage, and other activities unless potential benefits outweigh habitat impairment. If new roads are necessary to implement a

practice that is otherwise in accordance with these guidelines, they will be kept at a minimum, be routed through non-late successional habitat where possible, and designed to minimize adverse impacts. Equal number of miles of road should be obliterated so the total density of roads do not exceed maximum recommendations. Alternative access methods, such as aerial logging, should be considered to provide access for activities in reserves. (NWFP C-16).

--Temporary roads are to be rehabilitated (including revegetation) following post harvest activities.

-- Road maintenance may include felling hazard trees along right-of-ways. Medium to large trees equal to or greater than 20 inches in diameter are to be retained on site. Smaller material may be removed once a down wood analysis has been completed and sufficient down wood for focal species has been determine to exist. (NWFP C-16).

-- Road management will be in compliance with all requirements specified in the Aquatic Conservation Strategy. Specific mitigations are identified in NWFP C-32 and 33.

-- Open road density in the LSR continue to be reduced to the minimal level needed to provide access for fire protection and administrative needs. Roads Analysis needs to be completed on the remaining portion of the LSR to determine actual levels needed.

The target "open road" density:
Overall open road density of the LSR is not to exceed 1 mi/mi² with no single MSA exceeding 1.5 mi/mi². The exceptions would be in those MSAs where road densities can not be reduced to 1.5 mi/mi² due to the size of the MSA and the number of major roads in them that cannot be closed.

The target "total road" or "objective" density:
Overall, total road density of the LSR is not to exceed 2.0 mi/mi², with no single MSA exceeding 2.5 mi/mi². The exception would be those smaller MSAs (identified in a roads analysis) where major roads and those closed (Maintenance Level 1) make further reductions not feasible. A factor that should be considered is access on closed roads for potential fire suppression actions.

--All winter and summer motorized access is to be on designated routes (only) by the year 2013. No additional trails are to be created. Disturbance, displacement and reduction of habitat due to trails often occur with off-road motorized vehicles, including snowmobiles (Graves and Reams 2001, Stokowski and LaPointe 2000).

The MSAs listed for travel and access management were selected based upon the existing level of roads and human uses and the perceived importance of the potential impacts of this structure and activity on LOS species. See individual MSAs in Chapter 4 for specific rationale.

Table 3-13. Road Densities by MSA in Miles per Square Mile.

MSA	Objective Road Density	Operational Road Density	Total Road Density	Open Road Density (Davis Fire Roads Analysis)	Minimum (If only two-digit and four-digit roads are open)
A	1.36	1.36	1.36	--	0
AA	2.88	2.78	4.13	--	1.03
B	0	0	0	--	0
BB	2.09	2.12	4.33	--	0.93
C	2.32	2.46	2.76	--	1.16
D	2	2	3.16	--	1.66
E	1.9	2.53	5.67	--	1.14
F	1.27	3.13	8.08	--	0.68
G	2.08	2.59	7.98	--	0.99
H	1.63	1.89	2.36	--	1.56
I	0.2	0.24	0.48	--	0.2
J	2.5	2.53	5.67	--	1.74
K	2	2.51	5.66	--	0.88
L	1.97	2.18	3.25	--	1.69
M	2.33	2.33	3.71	2.18 **1/**	1.39
N	5.22	5.22	5.22	4.08	1.32
O	2.99	4.46	7.9	1.92	1.44
P	2.78	2.97	6.15	1.87	0.83
Q	2.56	3.32	4.99	1.74	1.23
R	2.56	3.49	4.09	--	1.9
S	1.93	3.39	5.77	1.34	0.8
T	1.72	2.36	3.07	--	0.44
U	4.1	4.1	4.1	2.22	0
V	3.02	2.94	5.44	1.66	1.11
W	2.35	2.7	6.3	--	1.26
X	2.27	2.08	3.18	--	2.08
Y	0.91	0.88	1.57	--	0.29
Z	3.15	3.25	5.86	--	1.66
1/ Also Total Road Density					

Invasive Plant and Non-Native Animal Species Management

Chapter 2 includes a detailed discussion on known sites of invasive plant species, prevention methods, standards and guidelines, and status of the sub-regional invasive plant EIS for central Oregon.

Prevention is the number one priority for introduction of invasive plants. Where there are known sites, the objective is to aggressively control and/or eliminate all known sites within MSAs (Figure 3-13),

where treatment options are effective (i.e. reed canarygrass). Reed canary grass is extremely difficult to control with methods available at this time.

Standard and Guideline C-19 of the ROD provides direction for introduction of non-native species into LSRs. In general, it should not be proposed. If it is, complete an assessment of the impacts and avoid any introduction that would retard or prevent achievement of LSR objectives.

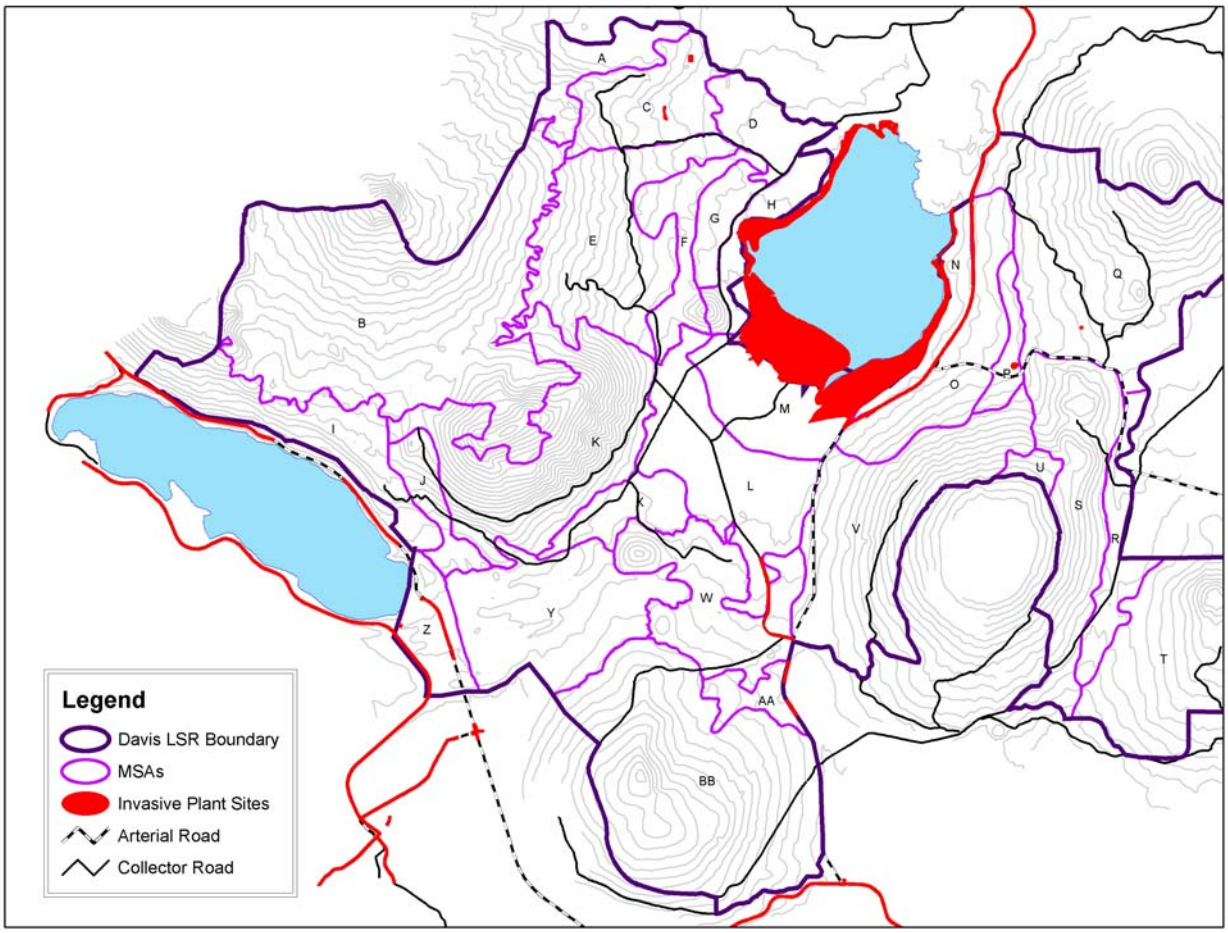


Figure 3-13. Invasive Plant Management.

Survey and Manage/Threatened, Endangered, and Sensitive Plant Inventory

There are three known survey and manage sites within the Davis LSR: *Tritomaria exsectiformis* in MSA M, *Ramaria rubripermanens* in MSA I, and *Chaenotheca subroscida* in MSA K. There are no known federally listed threatened or endangered sites for plants on the R6 sensitive list, or plants proposed for listing, within the Davis LSR. Tables 2-7 and 2-8 in Chapter 2 displays a listing of species that are documented or suspected to occur on the Deschutes National Forest by MSA and PAG.

Bryophyte, Lichen, and Mollusk Inventory

Table 2-8 in Chapter 2 identifies Survey and Manage Vascular Plants, Bryophytes, Lichens, and Fungi with Category A or C status that require pre-disturbance surveys.

The Crater Lake Tightcoil (*Pristiloma arcticum crateris)* is the only invertebrate Survey and Manage species with potential to occur within the LSR, although none have been identified within the LSR. These are also category A and require pre-disturbance surveys. Since this is a riparian-associated species, all MSAs have the potential in moist conifer forests and among mosses and other vegetation near wetlands, springs, seeps and riparian areas, above 610 m. (2000 feet) elevation and within 10 meters of water.

Fungi

Arboreal rodents are important links to ecosystem productivity through their consumption of fungi and consequent dispersal of spores and nitrogen-fixing bacteria. Research indicates that several important prey species of the northern spotted owl utilize a variety of fungi species in their diet (J.F. Lehmkuhl et al. 2004, Cork and Kenagy 1989, Maser et al. 1985, Maser et al. 1978). Rosenter (1995) indicated that the primary prey species for the owl, the northern flying squirrel, utilizes fungi almost exclusively.

The Crescent and the adjacent Chemult Ranger District sell approximately 600-700 permits for matsutake harvest on a typical year. The Special Forest Products section of the ROD (C-18) states “evaluate whether activities have adverse effects on LSR objectives... Where these activities are extensive (e.g. collection of... fungi), it will be appropriate to evaluate whether they have significant effects on late successional habitat. Restrictions may be appropriate in some cases.”

At this time there is not enough information available to determine if commercial and personal matsutake mushroom collection would have a “significant effect on late successional habitat.”

Because existing research indicates a potential detrimental impact on LOS associated species, it is believed that this activity is not neutral or beneficial to LOS species or habitat. Consequently, no commercial or personal matsutake mushroom collection shall occur within the Davis LSR, since it is allocated as a reserve within the context of the larger landscape where such activities will continue. Also, most of the primary habitat for matsutake harvest remains open for harvest and outside the LSR boundary in the Crescent Lake area.

Other Special Forest Products

The Crescent Ranger District evaluates the appropriateness of “other” special forest products utilization on a site-specific basis to determine the consistency with the objectives of this LSR. Collection of special forest products are approved on a case by case basis. For example, the district has allowed harvest of Christmas trees in regenerated areas with spacing criteria because it has been determined to generally be a neutral or beneficial effect to LOS species. However, collection of prince’s pine could have a potentially negative impact and therefore will not be allowed.

Education

Actively seek opportunities to educate the public on the function and need for a LSR, the role of fire in the ecosystem, and consequences of fire exclusion. Provide educational brochures, interpretive signs, and interactive presentations about the LSR to the public.

Rehabilitation and Restoration

Focus rehabilitation and restoration activities on maintaining or enhancing LOS character following the guidelines in the Northwest Forest Plan and objectives for each MSA. Examples of beneficial rehabilitation and restoration activities include: 1) Invasive plant control; 2) rehabilitation of suppression activities, such as contouring hand or dozer line and covering it with debris, for hydrologic and visual purposes; 3) restoration of meadow habitats surrounding Davis Lake; 4) aspen stand enhancement; 5) planting riparian vegetation and placement of instream wood into Odell Creek.

MONITORING, EVALUATION, and RESEARCH

The following is a list of recommended information gathering activities within all or portions of the LSR:

Davis Late Successional Reserve Recovery within the Davis Fire Area

The objective is to determine if selected elements desired for Late Successional Reserve recovery are achieved in the timeframes expected. The monitoring elements are snag persistence, fuels hazard, invasive plant proliferation, *Tritomaria exsectiformis* persistence, conifer regeneration success by species, and insect availability for dependent avian species. The area of consideration is within the Davis Fire Activity units. Twenty (20) photopoints within the fire perimeter and LSR were established and should be continued. Each plot is stratified by plant association group, topography, control versus non-control, fire severity, and fire intensity.

The methodology is for annual field observance of photopoints established in locations that are easily accessible using Global Positioning technology. Duration will be at least for five years and the results collated at that time.

Plots were located to collect the following information:

- Snags and down wood – Is the fall rate and persistence of snags greater than 20” dbh affected by adjacent salvage activities? What is the fall rate in various environmental conditions including aspect, topography, and elevation by species?
- Fuels – What is the fuel profile and is it within parameters that would allow future application of prescribed fire within appropriate areas (i.e. 15-25 tons per acre)? Methods are used that allow efficient data collection, such as the GTR PNW-52 photo series.
- Invasive Plants – Are existing infestations expanding and are there new infestations of invasive plant species? What are the techniques being implemented to prevent the introduction of new infestations and control the expansion of existing populations?
- Survey and Manage Plant Species (*Tritomaria exsectiformis*) – Is this liverwort occurrence maintaining persistence and vigor?
- Conifer establishment – Evaluating both natural and planted conifers, are we achieving rates of growth and species diversity desired for late successional objectives? In appropriate areas, are we on track for careful introduction of prescribed fire at year 40?
- Insect availability – What is the foraging potential and insect availability by species that colonize standing and down dead wood at various times through successional stages? This was stratified by snag density, location, size, and species.

Davis Fire Riparian Vegetation Recovery

The objective is to monitor the recovery of riparian vegetation to determine if it returns in a timely manner, or whether artificial planting of appropriate species is needed. Seven photopoints were established along Odell Creek between the mouth and Forest Road 4660. These photopoints were installed as recommended by the BAER Team to monitor vegetative recovery within the riparian area. The sites will be visited twice a year for a duration of two years. Currently, vegetation recovery is occurring at a rate that does not need intervention, except for Engelmann spruce. Seedlings are being grown and will be planted in 2008.

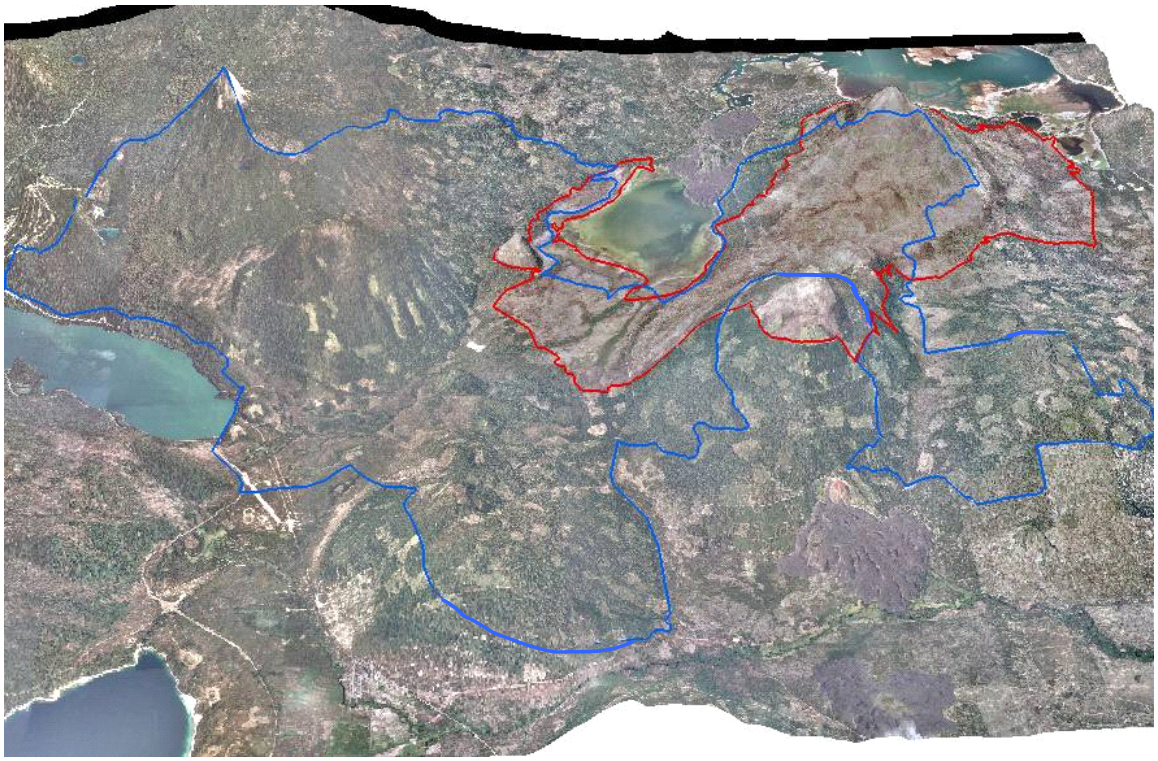
In addition to the riparian vegetation monitoring, photopoints have been established and are being monitored on a yearly basis to document effectiveness of fish habitat enhancement structures placed in the creek after the Davis Fire.

NSO and Fire Behavior Modification

There is an identified need for information regarding how owls interact with vegetation manipulation; specifically activities that are designed to modify fire behavior in key places on the landscape and maintained through time.

CHAPTER 4 - MANAGEMENT STRATEGY AREAS

- **EXISTING CONDITION**
- **CRITERIA FOR DEVELOPING APPROPRIATE TREATMENTS**
- **MANAGEMENT OPTIONS**
- **MONITORING, RESEARCH AND EVALUATION**



INTRODUCTION

Chapter 3 sets the overall context for management within the LSR. This chapter expands on the overview information and applies it to the individual management strategy areas (MSAs) as appropriate. There are twenty-eight MSAs within 6 habitat areas delineated within this 48,890-acre LSR. For each habitat area and MSA, the existing condition for wildlife, botany, invertebrates, forest dynamics, and fire has been documented. The desired condition, objective, management options for the short and long term, and monitoring and evaluation elements have also been identified and documented.

To understand how each MSA functions from a social perspective, refer the Odell Pilot Watershed Analysis which describes the social component in terms of expectations; human settlements influencing the MSA; the history of Forest Service management within the MSA; access and travel; scenic values; recreational use; commercial use and commodities; and heritage resources.

Habitat Areas
o Mixed conifer for northern spotted owl
MSA: C, E, F, K, P, Q, S, T, U, V, W, BB, AA

o Mixed conifer for bald eagle and NSO
MSA: I, J, O

o Lodgepole for black-backed woodpecker and connectivity for northern spotted owls
MSA: A, D, R

o Mixed conifer/lodgepole/ponderosa for bald eagle, great gray owl, and/or black-backed woodpecker
MSA: G, H, N

o Lodgepole/mixed conifer riparian for black-backed woodpecker and/or riparian species and connectivity for northern spotted owls
MSA: L, M, X, Y, Z

o Mountain hemlock for wolverine and high elevation species

MSA: B

CRITERIA FOR DEVELOPING APPROPRIATE TREATMENTS

This document is an interpretation of the Northwest Forest Plan (NWFP). Additional management criteria are included in the NWFP that have not been reiterated in this assessment. All activities occurring within the Davis LSR need to be consistent with the applicable NWFP Standards and Guidelines.

The desired condition, objective, and management activities are based on intent of the NWFP and the level of information available on the LSR's existing condition. These were made for each individual MSA in context with the LSR as a whole. For example, the intensity of activity may be more conservative in MSA - V as compared to MSA - Q based on the existing condition and function of habitat.

These are not National Environmental Policy Act (NEPA) decisions. Site-specific analysis is needed before any management options can be implemented and may provide additional information on the existing condition which could modify which management options would be implemented. Specific treatment objectives would be selected by the project level interdisciplinary teams and would need to consider the context of the proposed treatment within the LSR and the landscape as a whole. The criteria for developing appropriate treatments specified herein have been reviewed by the Regional Ecosystem Group and activities that are specified have been exempted from further review.

Following is how NRF was used in this analysis. A full glossary is included in the front of the document.

NRF
Nesting, roosting and foraging habitat for the northern spotted owl in complex, multi-stored stands. This assessment utilizes the Deschutes National Forest GIS layer in all quantifications of existing NRF,

capable NRF and all habitat calculations. This GIS layer uses the following stand characteristics to delineate NRF:

Forest stands, below 6,000 ft elevation, (regardless of plant association), having a total canopy cover greater than or equal to 40 percent AND a canopy cover of at least 5 percent among trees >21" dbh were labeled as NRF. This definition assumes that the stand is multi-storied and contains some large trees. This is the standard Deschutes National Forest GIS layer, created utilizing the 1995 Photo Interpretation (PI) layer updated with the activities and fire layers and Digital Elevation Model layer (DEM). This mapping likely overestimates the amount of habitat that is available for spotted owl NRF because it does not include more finite variables that are important to habitat such as snags.

Modeled NRF

Modeling was used to determine the changes in NRF over time as well as the effects of management activities over time. Stand exams from 1995 through 2000 were used to provide stand characteristics and Most Similar Neighbor (MSN) utilized to populate that data into stand polygons across the Crescent Ranger District including the Davis LSR. Stands were "grown" using the Forest Vegetation Simulator (FVS) with the Fires and Fuels Extension (FFE) to a base year of 2006 to determine current condition. FVS-FFE was used to model the changes at 10 year intervals. Modeled NRF uses a number of components grouped into 3 attributes to qualify:

> ***Structure*** - Forest stands below 6,000 ft elevation must have a total canopy cover greater than or equal to 40 percent, AND a presence of snags over 16 inches in diameter, AND at least 8 ponderosa pine and/or Douglas-fir greater than 21 inches in diameter, AND a presence of ponderosa pine, white fir or Douglas-fir greater than 36 inches in diameter.
>
> ***Overstory*** – There must be 8 trees per acre over 21 inches in diameter, AND of those trees, Douglas-fir, white fir, mountain hemlock, and/or Engelmann spruce must dominate.

Understory – There must be at least 82 trees per acre under 21 inches in diameter, AND of those trees, Douglas-fir, white fir, mountain hemlock, and/or Engelmann spruce must dominate.

These habitat characteristics were developed from vegetative survey plots at owl nest stands on the Crescent Ranger District. Because this definition focuses on the characteristics of the nest stands it most likely under-estimates total nesting roosting and foraging habitat.

Near-NRF

Forested habitat that has large trees and most of the critical elements of NRF but falls just short of meeting understory and/or canopy cover needed for NRF habitat, but can grow into NRF habitat generally within 20 years or less. This habitat type was given a name by the team to fit the assumptions that had been carried through active management in Seven Buttes and Seven Buttes Return, to recognize risk reduction activities do not eliminate stands from being NRF habitat over the long-term, just the short-term.

In order to model these stands and confirm the 20-year assumption, the same data as Modeled NRF was used. Near-NRF was defined as having 25 to 40 percent canopy cover AND meeting two of the three stand attributes, and of the two attributes one had to be the large tree components. Modeling through FVS indicates that stands recovered approximately 5 percent canopy cover per decade and could recover missing understory attributes within 20 years or shorter.

Cycling of NRF

Figures 4-1 and 4-2 show NRF capable plant associations and existing NRF and near-NRF to display opportunities to cycle NRF on the landscape.

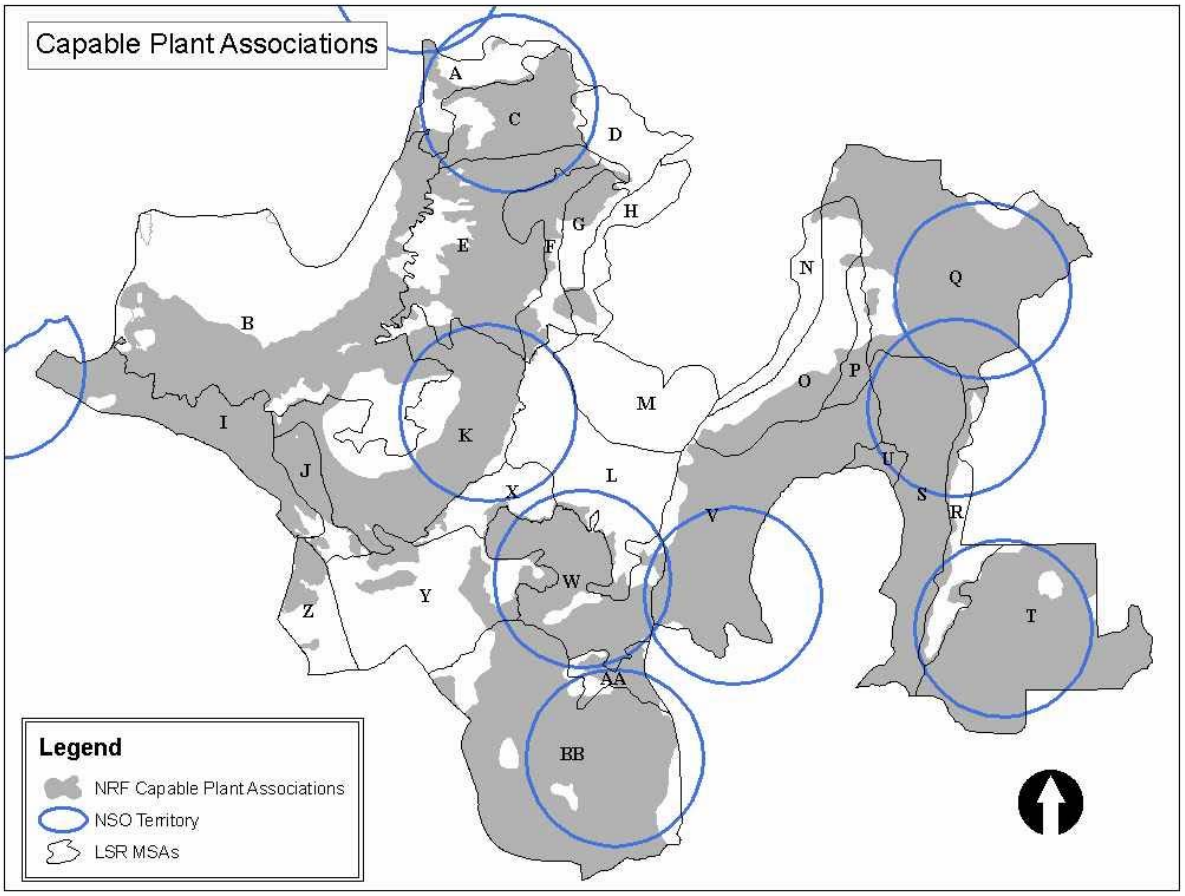


Figure 4-1. NRF Capable Plant Associations.

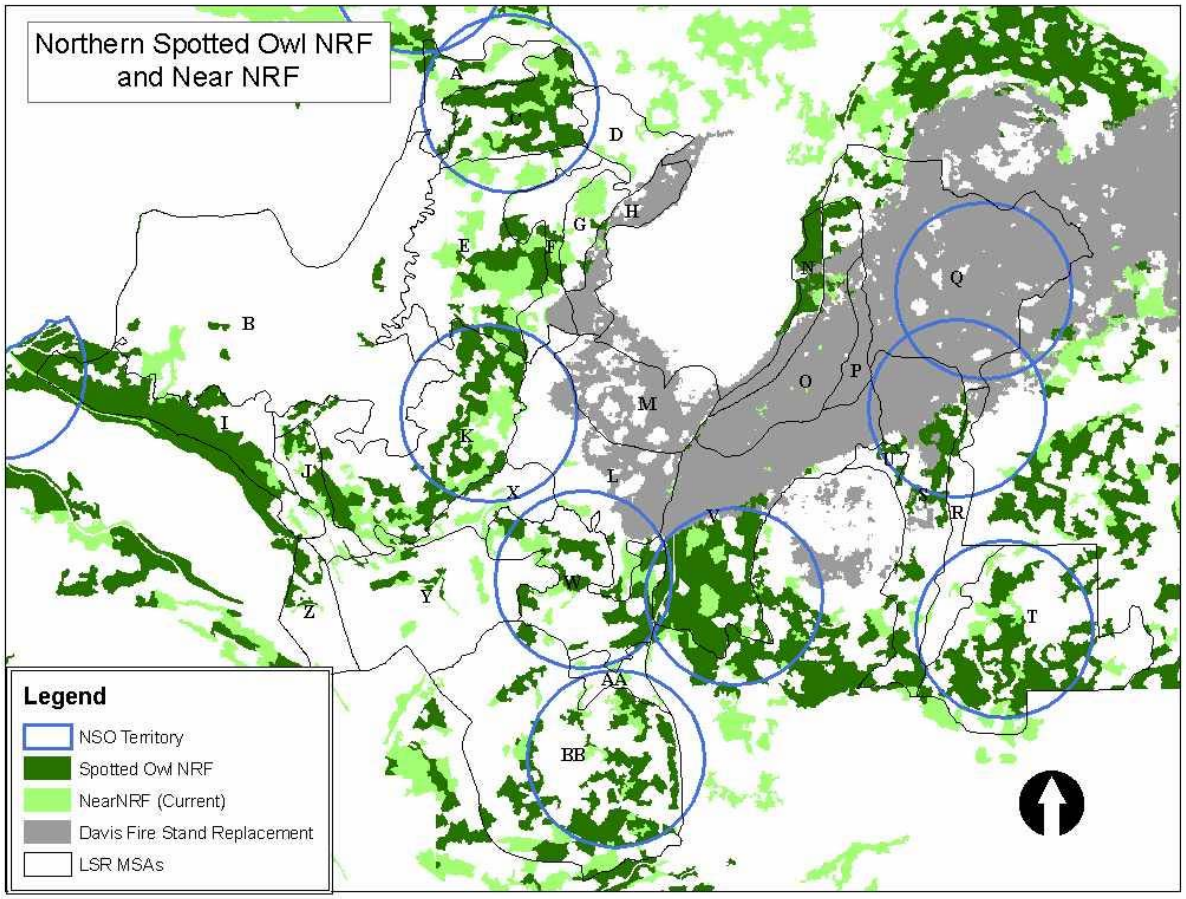


Figure 4-2. Existing NRF and Near-NRF.

Mixed Conifer for Northern Spotted Owl

MSA: C, E, F, K, P, Q, S, T, U, V, W, BB, AA

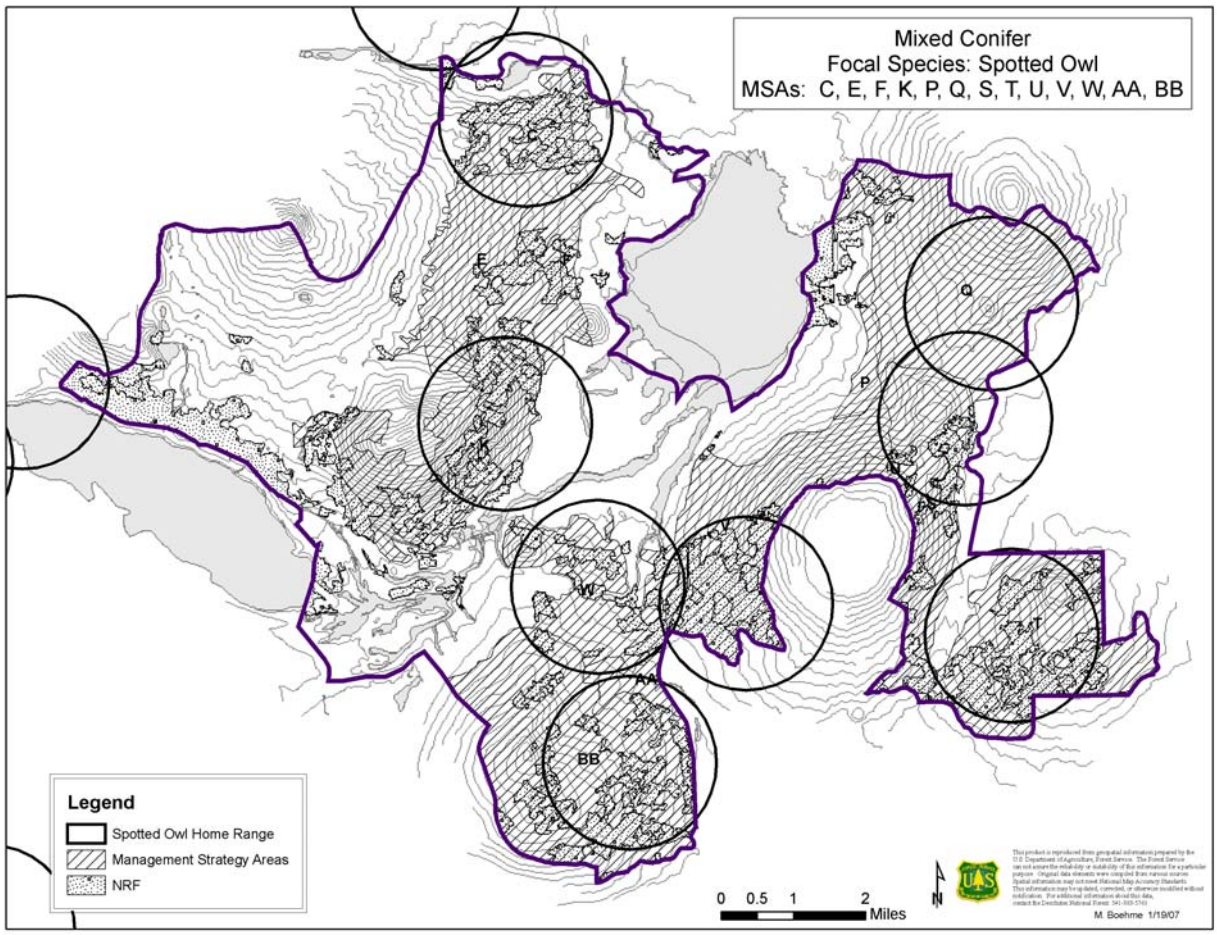


Figure 4-3. Mixed conifer for northern spotted owl; MSAs C, E, F, K, P, Q, S, T, U, V, W, AA, BB.

EXISTING CONDITION

Wildlife

***Emphasis Species* -- Northern Spotted Owl**

These MSAs contain the bulk of spotted owl habitat, activity centers for 8 spotted owl pairs, and all or parts of 10 home ranges. Documentation of owl use in the area exists from 1989-2006. The area is important for this species, because it constitutes a North-South as well as East-West link for dispersal and genetic exchange between adjacent pairs and LSRs.

Selected Other Species

- Pileated woodpecker and northern goshawk nesting habitat
- Potential fisher habitat and travel corridor
- Big Game in MSA F, where there is a designated Key Elk area
- Moore Creek in MSA C contains potential habitat for bats, neotropical migratory birds and amphibians.
- Flammulated owl and white-headed woodpecker in MSA F in the ponderosa pine plant association group.

Stand Contiguity

Currently, across the MSA group, 37 percent exists in an early seral condition due to past regeneration harvest and the stand replacement portion of Davis Fire. The fire created large blocks of early-successional forest covering much of MSAs P (100 percent), U (100 percent), Q (91 percent), S (62 percent) and V (56 percent). While the fire created larger blocks of habitat in early-successional stages in the eastern portion of the LSR, it eliminated spotted owl habitat and connectivity through that area. Late- and old-successional forest occurs on 70 percent of the MSAs outside the fire and 52 percent for the entire MSA group. Outside the fire area, scattered openings of early seral conditions from past regeneration harvest has created a patchwork of old growth forest, potentially reducing the habitat effectiveness of the MSA for spotted owls and other interior species. This is especially pronounced in MSAs E, W, BB, and K. The largest contiguous blocks of LOS are in MSAs C, T and in the southern half of V. The owls are vulnerable to both predators and competitors as a result of patchiness of stands. For a complete breakdown of vegetative structure by plant association group, there is more discussion to follow.

Total road density is considered high within this MSA group (Table 4-1). The lowest density is 2.76 mi/mi² in MSA C and the highest density is in MSA F with 8.08 mi/mi², affecting amount and quality of habitat available. Potential for reducing roads exists.

Table 4-1. Total Road Density in Miles per Square Mile in Mixed Conifer for Northern Spotted Owl.

MSA	Total Road Density	Minimum (If only two-digit and four-digit roads are open)
AA	4.13	1.03
BB	4.33	0.93
C	2.76	1.16
E	5.67	1.14
F	8.08	0.68
K	5.66	0.88
P	6.15	0.83
Q	4.99	1.23
S	5.77	0.8
T	3.07	0.44
U	4.1	0
V	5.44	1.11
W	6.3	1.26

Old Growth Management Areas are located in MSAs C and K (which also overlaps MSA L). It is 300 acres in MSA C and 126 of 252 acres in MSA K, not all of which is considered LOS at this time.

Northern Spotted Owl NRF Habitat

LOS does not necessarily equate to northern spotted owl habitat. LOS is defined as dominance of large trees and does not necessarily contain the sufficient components of NRF, such as canopy cover and multi-layered conditions. NRF habitat was determined at the forest level. This MSA group contains 73 percent (6,445 acres) of the entire NRF habitat within the LSR (8,847 acres).

Table 4-2 displays the distribution of NRF between the MSAs. The largest blocks of NRF occur across MSAs T (1,046 acres), and V (1,004 acres). In addition, the table displays a high potential for development of NRF habitat across all the MSAs as “capable” plant associations (24,510 acres) dominate this MSA group. Of those total “capable” acres, stand replacement occurred on approximately 32 percent (6,400 acres), represented by shaded cells. See Appendix D for distribution of NRF in all 54 plant associations.

Table 4-2. Distribution of NRF within Capable Plant Associations for the NSO Group.

	MSA	C			E			F			K		
	Acres /*Acres Burned**	1,267/0			2,501/0			842/*88* 10%			3,211/0		
PAG	**PA**	Capable Acres	NRF Acres	% Existing /Capable	Capable Acres	NRF Acres	% Existing /Capable	Capable Acres	NRF Acres	% Existing /Capable	Capable Acres	NRF Acres	% Existing /Capable
MCD	CRS1-11				253	25	10%				730	293	40%
	CWC2-11										1121	400	36%
	CWH1-11				562	235	42%	133	54	41%	166	70	42%
	CWS1-14												
	CWS1-15	892	468	52%	1110	148	13%	461	37	8%	1	1	100%
MCD Total		**892**	**468**	52%	**1,925**	**408**	21%	**594**	**91**	15%	**2,018**	**764**	38%
MHD	CMS1-11	124	110	89%	10			0	0	0%	343	157	46%
MHD Total		**124**	**110**	89%	**10**	**1**	10%	**0**	**0**		**343**	**157**	46%
MCW Total		**12**	**8**	67%	**0**	**0**	0%	**0**	**0**		**1**	**0**	0%
ALL OTHERS **		0	0		0	2		0	30		0	31	
	TOTAL	**1,028**	**586**	57%	**1,935**	**411**	21%	**594**	**121**	20%	**2,362**	**952**	40%
	% of MSA	81%	46%		77%	16%		71%	14%		74%	30%	

	MSA	P			Q			S			T		
	Acres /*Acres Burned** %	339 / *321* 95%			4,138 / *3,485* 84%			2,128 / *781* 37%			3,166/0		
PAG	**PA**	Capable Acres	NRF Acres	% Existing /Capable	Capable Acres	NRF Acres	% Existing /Capable	Capable Acres	NRF Acres	% Existing /Capable	Capable Acres	NRF Acres	% Existing /Capable
MCD	CRS1-11							366	61	17%			
	CWC2-11				358	67	19%						
	CWH1-11	133	0	0%	234	21	9%	1,301	309	24%	2,271	908	40%
	CWS1-14										78	16	21%
	CWS1-15	63	0	0%	3,128	0	0%	458	113	25%	965	122	13%
MCD Total		**196**	**0**	**0%**	**3,720**	**88**	2%	**2,125**	**483**	23%	**3,314**	**1,046**	32%
MHD	CMS1-11	157	0	0%	0	0	0%	0	0	0%	0	0	0%
MHD Total		**157**	**0**	**0%**	**0**	**0**	0%	**0**	**0**	0%	**0**	**0**	0%
MCW Total		**0**	**0**	**0%**	**0**	**0**	0%	**0**	**0**	0%	**0**	**0**	0%
ALL OTHERS			0			2							
	TOTAL	**353**	**0**	**0%**	**3,720**	**90**	2%	**2,125**	**483**	23%	**3,314**	**1,046**	32%
	% of MSA	104%	0.0%		90%	2%		100%	23%		105%	33%	

	MSA	U			V			W			AA		
	Acres /*Acres Burned** %	159/*4* *2%*			3,009/*1,512* *50%*			1,825/0			369/0		
PAG	**PA**	Capable Acres	NRF Acres	% Existing /Capable	Capable Acres	NRF Acres	% Existing /Capable	Capable Acres	NRF Acres	% Existing /Capable	Capable Acres	NRF Acres	% Existing /Capable
MCD	CRS1-11	138	29	21%	412	16	4%						
	CWC2-11												
	CWH1-11	4	1	25%	2,131	728	34%	1,263	379	30%	252	7	3%
	CWS1-14				278	236	85%	242	52	21%			
	CWS1-15							7	0	0%			
MCD Total		**142**	**30**	21%	**2,821**	**980**	35%	**1,512**	**431**	29%	**252**	**7**	**3%**
MHD	CMS1-11	**0**	**0**	0%	2	0	0%	77	46	60%	0	0	0%
MHD Total		12	0	0%	**2**	**0**	0%	**77**	**46**	60%	**0**	**0**	**0%**
MCW Total		**12**	**0**	0%	**0**	**0**	0%	**0**	**0**	0%	**0**	**0**	**0%**
ALL OTHERS **						24			33			5	
	TOTAL	**154**	**30**	19%	**2,823**	**1,004**	36%	**1,589**	**510**	32%	**252**	**12**	**5%**
	% of MSA	97%	19%		94%	33%		87%	28%		68%	3%	

	MSA	BB		
	Acres /*Acres Burned**	4,869/0		
PAG	**PA**	Capable Acres	NRF Acres	% Existing /Capable
MCD	CRS1-11	1,402	311	22%
	CWC2-11			
	CWH1-11	2,037	716	35%
	CWS1-14	308	43	14%
	CWS1-15			
MCD Total		**3,747**	**1,070**	29%

***acres burned within the Davis Fire**

Snags and Down Woody Debris

The major habitat type in the MSA group is eastside mixed conifer (EMC). Across the larger watershed[13], snag densities are at the high end, or exceed reference conditions in the size class greater than or equal to 10 inches. All other densities are generally within reference conditions (Table 4-3). While snag densities for snags greater than or equal to 20 inches are within reference condition, they are near minimum conditions in the 4-6 through 10-18 snags per acre. See Appendix C for a description of the snag and down log analysis.

Table 4-3. Distribution of Snags in MSAs C, E, F, K, P, Q, S, T, U, V, W, BB, and AA.

Distribution of Snags ≥10" (25.4cm) dbh in EMC			
Density	% of Area		
Snags per Acre	Ref. (Min.)	Ref. (Max.)	Existing
0	18	24	10
0-6	27	31	18
6-12	15	17	28
12-24	16	23	22
24-36	6	10	7
36+	5	7	16

The reference condition was developed from information using DecAID tables {unharvested plots for snags ≥10" (25.4cm) dbh}. They were: EMC_ECB_O.Inv-14., EMC_ECB_S.Inv-14, EMC_ECB_L.Inv-14. It was then modified with HRV information found in the Odell Pilot WA. Existing condition was imputed using stand exam data in INFORMS.

Distribution of Snags ≥20" (50.8cm) dbh in EMC			
Density	% of Area		
Snags per Acre	Ref. (Min.)	Ref. (Max.)	Existing
0	5	63	17
0-2	2	26	48
2-4	3	26	15
4-6	2	18	4
6-10	2	20	6
10-18	1	10	4
18+	0	3	5

The reference condition was developed from information using DecAID tables {unharvested plots for snags ≥20" (50.8cm) dbh}. They were: EMC_ECB_O.Inv-15., EMC_ECB_S.Inv-15, EMC_ECB_L.Inv-15. it was then modified with HRV information found in the Odell Pilot WA. Existing condition was imputed using stand exam data in INFORMS.

Down wood densities across the watershed in EMC are within reference conditions except at the high stand densities where they are low (Table 4-4). In the portions of the Davis Fire where no active management has occurred, high densities of snags that fall would eventually meet or exceed reference conditions.

Table 4-4. Distribution of Down Wood in MSAs C, E, F, K, P, Q, S, T, U, V, W, BB, and AA.

% of Landscape for EMC dwd ≥6" (15.24cm) dbh			
Density	% of Area		
% Cover	Ref. Min.	Ref. Max.	Existing
0	22	30	11
0-4	53	54	69
4-8	13	19	18
8-10	2	3	1
>10	1	3	1

Information was used from DecAID tables (unharvested plots for down wood ≥5" (12.7cm) dbh). They were: EMC_ECB_O.Inv-16., EMC_ECB_S.Inv-16, EMC_ECB_L.Inv-16. It was then modified with HRV information found in the Odell Pilot WA.

<u>Botanical</u>

Fungi -- Potential habitat for listed fungi species in this MSA group occurs in these PAGs: Lodgepole High Elevation, Mixed Conifer Wet, and Mixed Conifer Dry. There is potential habitat for *Gastroboletus*

[13] Subwatersheds that were partially or completely within the LSR were used for the larger landscape to give sufficient scale to compare with reference conditions developed with information from DecAID.

subalpinus, Rhizopogon truncatus, Clavariadelphus ligula, Mycena overholtisii, in MSA C, E, F, K, Q, S, T, U, V, W, AA, and BB; and *Ramaria amyloidea* and *Ramaria rubripermanens* in MSA E, S, T, V, W, AA, BB.

Mosses, Liverworts, and Lichens -- Potential habitat exists for listed moss, liverwort, and lichen species along Moore Creek and Odell Creek and its tributaries. There are no known moss or liverwort sites within this MSA group and only one pin lichen site -- *Chaenotheca subroscida* in MSA K along an unnamed tributary to Odell Creek.

Vascular Plants – There are no known sites for any survey and manage or Regional Sensitive vascular plant species within the LSR. Probability for any occurrence is low in this MSA group except for *Castilleja cholorotica*, where there is moderate probability since suitable habitat includes ponderosa pine, lodgepole or mixed conifer forest openings.

Invasive Plant Species -- There is potential habitat for invasive plant species along roads and in harvest units throughout this MSA group. There are no known sites in MSA F, K, U, and V. There are known invasive plant species in MSA C (tansy ragwort), E (bull thistle and common mullein), P (tansy ragwort, bull thistle, common mullein, Q (Dalmatian toadflax), S (bull thistle and common toadflax), T (bull thistle), W (spotted knapweed and bull thistle), AA (spotted and diffused knapweeds, Canada thistle, bull thistle, St. Johnswort, and common mullein) and BB (spotted knapweed, Canada thistle, bull thistle, St. Johnswort, butter and eggs, Russian thistle, field bindweed, and common mullein).

See Botanical section Chapter 2 for additional information.

Invertebrates/Mollusks

There is potential habitat for special status mollusks in Moore Creek in MSA C. There are no known sites in the Davis LSR. See Invertebrate section in Chapter 2 for additional information.

Aquatics

This MSA group has very little surface water. Bobby Lake, in the mountain hemlock high elevation, and intermittent Moore Creek are the only locations water where aquatic resources would need to be considered.

Forest Dynamics

Across the landscape within the mixed conifer dry plant association group, the true-fir component has increased dramatically in recent times. This condition is found largely within the stands classified as suitable for spotted owl nesting, roosting and foraging. Because of the dry site and stand conditions, these stands are at the highest risk of being lost to a large-scale disturbance process. Some of the most desired characteristics of these stands, such as fire resistant large ponderosa pine and Douglas-fir, are placed at elevated risk from wildfire because the increasing true fir component creates a structure that allows ground fires to reach the crowns.

Not enough trees of the desired species exist in the understory to adequately replace the larger trees that are being lost to density-related mortality. Stands that historically were dominated by mostly large pines and Douglas-fir (greater than 21 inches in diameter) are now dominated by smaller, less desirable tree species such as the true firs, which are less resistant to disturbance. Existing overstory ponderosa pine and Douglas-fir, with a lesser component of sugar and white pine, are losing competition from a dense understory of true firs. Affecting regeneration and growth, these conditions have caused a shift in species in the understory, mostly consisting of true fir and lodgepole pine.

True firs need to remain as part of the vegetative structure. They would be managed at densities that would allow adequate numbers of the early seral species (ponderosa pine and Douglas-fir) to develop and grow at sufficient levels to replace the overstory trees as they die off. To minimize potential loss to budworm and bark beetles, the true fir components in managed stands would be kept to less than 50 percent of the conifer stocking levels, especially in the mid and understories.

PAG(s) and Structural Stages

This MSA group is dominated by mixed conifer (89 percent). There are small amounts of ponderosa pine (1 percent), lodgepole pine (5 percent) and mountain hemlock (5 percent) plant associations within this MSA group. Out of the total 27,823 acres, 52 percent (14,391 acres) is LOS, 11 percent (3,132 acres) is in mid-successional stage, and 37 percent (10,300 acres) is early-successional structure. Table 4-5 displays the structural breakdown by individual MSA.

Table 4-5. Plant Association Group and Structural Stages for MSAs C, E, F, K, P, Q, S, T, U, V, W, BB, and AA.

Plant Groups	Structural Stage	C	E	F	K	P	Q	S	T	U	V	W	AA	BB	TOTAL
Mixed conifer	Early	227	213	103	329	339	3,759	1,327	623	143	1,675	419	73	626	9,856
	Mid	85	271	88	288	0	53	149	368	0	140	178	51	516	2,187
	LOS	704	1,441	403	1,871	0	326	652	2,119	0	1,194	1,038	199	2,690	12,637
	TOTAL	**1,016**	**1,925**	**594**	**2,488**	**339**	**4,138**	**2,128**	**3,110**	**143**	**3,009**	**1,635**	**323**	**3,832**	24,680
Ponderosa Pine	Early	0	2	61	0	0	0	0	0	0	0	0	3	37	103
	Mid	0	4	33	0	0	0	0	0	0	0	0	1	36	74
	LOS	0	16	69	0	0	0	0	0	0	0	0	4	120	209
	TOTAL	**0**	**22**	**163**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**193**	386
Lodgepole	Early	22	28	25	5	0	0	0	15	0	0	33	7	70	205
	Mid	27	285	39	68	0	0	0	12	0	0	33	16	142	622
	LOS	77	229	21	20	0	0	0	29	0	0	46	15	98	535
	TOTAL	**126**	**542**	**85**	**93**	**0**	**0**	**0**	**56**	**0**	**0**	**112**	**38**	**310**	1,362
Mountain Hemlock	Early	2	0	0	16	0	0	0	0	16	0	9	0	93	136
	Mid	11	5	0	81	0	0	0	0	0	0	10	0	142	249
	LOS	112	7	0	533	0	0	0	0	0	0	59	0	299	1,010
	TOTAL	**125**	**12**	**0**	**630**	**0**	**0**	**0**	**0**	**16**	**0**	**78**	**0**	**534**	1,395
NonForest	**TOTAL**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
MSA Total Acres		**1,267**	**2,501**	**842**	**3,211**	**339**	**4,138**	**2,128**	**3,166**	**159**	**3,009**	**1,825**	**369**	**4,869**	27,823

=MSAs that are part of the 2003 Davis Fire Area

Summary of Trends

- Fire exclusion combined with little or no management activity has put the large trees at risk.
- Severe competition with understory true fir and lodgepole pine has made the overstory trees highly susceptible to insect attack.
- The extremely dense mid and understories are almost exclusively comprised of true fir and lodgepole pine.
- These mid and understories have developed into dense ladder fuels threatening survival of fire resistant overstory trees.
- The few ponderosa pine and Douglas-fir in the mid and understories are severely suppressed with little potential to respond to release from competition and grow to dominant overstory size.
- Without replacement trees of the same species these overstory trees could not be replaced for several centuries.
- Due to high densities in the mid and understories, these stands will lose the overstory trees in the event of fire or insect infestations greater than endemic levels.
- At least three centuries would be required for these stands to return to their present condition and structure following a disturbance event.

Soil Conditions

Most of the MSAs in this group have a "moderate" rating for detrimental soils conditions from past management activities. MSAs C, F, P, S, V, W, AA and BB have 10 to 19 percent of the MSA with detrimental soils conditions from past management activities. MSA Q has a "high" rating due to more than 20 percent of the MSA with detrimental soils conditions. The remaining MSAs (E, K, T, and U) have a rating of "low," or less than 10 percent of the MSA with detrimental soil conditions.

Access

Motorized vehicles are allowed on all open roads and designated routes. Open road densities (Operational) range from 2.1 to 4.1 mi/mi². Operationally open roads densities exceed objectives or recommendations in all MSAs. Currently, there is a process to implement the Travel Management Rule which would designate motorized access and close off-trail travel. It is expected to be completed in 2008.

Over the snow vehicles, bicycles, or other mechanized wheel vehicles are allowed off the road outside the Davis Fire Closure area. In 2004, snowmobile trails were created to create through routes and restrict snowmobile use to designated routes only. This reduced winter use on Davis Mt., Hamner and Odell Buttes. Hiking, cross-country skiing, and horseback riding currently have no restrictions.

Table 4-6. Open Road Densities in Miles per Square Mile in Mixed Conifer for Northern Spotted Owl.

MSA	Objective Open Road Density	Operational Open Road Density	Davis Fire Roads Analysis Open Road Density
AA	2.88	2.78	--
BB	2.09	2.12	--
C	2.32	2.46	--
E	1.9	2.53	--
F	1.27	3.13	--
K	2	2.51	--
P	2.78	2.97	1.87
Q	2.56	3.32	1.74
S	1.93	3.39	1.34
T	1.72	2.36	--
U	4.1	4.1	2.22
V	3.02	2.94	1.66
W	2.35	2.7	--

Fire Management – The following fire facts are listed by MSA:
MSA C
TOTAL ACRES: 1,270
ELEVATION RANGES: 4500-5000 FT.
LOCATION BY LANDMARK: Moore Creek
ADJACENT MSAs: A, B, D & E
SPECIAL AREAS OF CONCERN – northern spotted owl activity centers, riparian area (Moore Creek),
PAGs: LPD, MCD, MHD

Table 4-7. Historic Fire Regime and Current Condition Class for MSA C.

PAG	Fire Regime	Condition Class
LPD	**III**	**III**
MHD	**V**	**I**
MCD	**III**	**III**

HAZARD ANALYSIS
Considered high: Fire exclusion has contributed to stand conditions, coupled with advantageous weather, likely to cause another problem fire similar to the Davis Fire. A dense understory has created vertical continuity of fuels, allowing surface fires to develop into active crown fires more easily than during historic conditions.

RISK ANALYSIS
Considered low: Lightning and human-caused ignitions have occurred within this area, however the risk is low compared to other MSAs due to the remoteness and low level of human activity in the area.

SUPPRESSION PRIORITY (Resources being protected)

Priority 1: a) Owl activity centers, large trees and NRF
Priority 2: Moore Creek riparian zone primarily in the higher elevations, primary wildlife connectivity as identified in Chapter 2

There are no strategic fuels activities identified for this MSA at this time.

MSA E
TOTAL ACRES: 2,501
ELEVATION RANGES: 4600-4800
GEOGRAPHIC LOCATION: Ranger Butte
ADJACENT MSAs: B, C, F, & K
SPECIAL AREAS OF CONCERN: Northern spotted owl activity center, large trees, NRF; Remaining portion of the Maiden Peak trail from old Davis Lake Ranger Station
PAGs: LPD, MCD

Table 4-8. Historic Fire Regime and Current Condition Class for MSA E.

PAG	Fire Regime	Condition Class
MCD	III	II
PPD	I	III

HAZARD ANALYSIS
Considered moderate: A dense understory has created vertical continuity of fuels, allowing surface fires to develop into active crown fires more easily than during historic conditions. The trend for average fire intensity is increasing.

RISK ANALYSIS
Considered low compared to other MSAs because remoteness and level of human activity. Lightning and human ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: a) Owl activity centers, large trees, NRF, historic Maiden Peak trail (ground disturbance from suppression activity is the concern)

Priority 2: Primary wildlife connectivity as identified in Chapter 2

Estimated "fuels only" activities: This MSA has been identified for strategic fire behavior modification.
Treatment acres: 647 acres
Treatment type: Small tree thinning, pruning, non-mechanical piling and disposal
Proposed Treatment yr: 2010 Thin, 2011 Handpile, 2012 Handpile disposal
Estimated cost: 2010 - $58,000, 2011 - $65,000, 2012 - $16,000
Total: $139,000

MSA F
TOTAL ACRES: 841
ELEVATION RANGES: 4600-4800 FT.
GEOGRAPHIC LOCATION – Ranger Butte
ADJACENT MSAs: C, D, E, & L
SPECIAL AREAS OF CONCERN – Remaining portion of the Maiden Peak trail from old Davis Lake Ranger Station
PAGs: MCD, PPD

Table 4-9. Historic Fire Regime and Current Condition Class for MSA F.

PAG	Fire Regime	Condition Class
MCD	III	II
PPD	I	III

HAZARD ANALYSIS - Considered moderate: A dense understory has created vertical continuity of fuels, allowing surface fires to develop into active crown fires more easily than during historic conditions. The trend for average fire intensity is increasing.

RISK ANALYSIS – Considered low compared to other MSAs because remoteness and level of human activity.
Lightning and human ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected) -
Priority 1: a) Owl activity centers, large trees, historic Maiden Peak trail where ground disturbance from suppression activity is the main concern
Priority 2: Riparian areas associated with Ranger Creek, primary wildlife connectivity as identified in Chapter 2

Estimated "fuels only" activities: This MSA has been identified as strategic for fire behavior modification.
Treatment acres: 85
Treatment type: small tree thinning, pruning, non-mechanical piling, disposal
Proposed Treatment yr: 2010 Thin, 2011 Handpile, 2012 Handpile burn
Estimated cost: 2010 - $7,500, 2011 - $8,500, 2012 - $2,000
Total: $18,000

MSA K
TOTAL ACRES: 3,210
ELEVATION RANGES: 4800-6800 FT.
GEOGRAPHIC LOCATION: Maklaks Mountain
ADJACENT MSAs: B, E, J, L, X, Y, & Z
SPECIAL AREAS OF CONCERN: Owl activity centers, large trees and NRF
PAGs: MCD, MCW

Table 4-10. Historic Fire Regime and Current Condition Class for MSA K.

PAG	Fire Regime	Condition Class
MCD/MCW	III	II

HAZARD ANALYSIS - Considered high: Fire exclusion has contributed to stand conditions, coupled with advantageous weather, likely to cause another problem fire similar to the Davis Fire. A dense understory has created vertical continuity of fuels, allowing surface fires to develop into active crown fires more easily than during historic conditions. The trend for average fire intensity is increasing.

RISK ANALYSIS – Considered moderate, topography and level of human activity elevates this MSA from low.
Lightning and human-caused ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected):
Priority 1: Owl activity centers, large trees, and NRF
Priority 2: Riparian zones (Ranger Creek), primary wildlife connectivity as identified in Chapter 2

Estimated "Fuels Only" Activities: This MSA has been identified for strategic fire behavior modification.
Treatment acres: 764
Treatment type: Small tree thinning, pruning, non-mechanical piling and disposal, prescribed underburning
Proposed Treatment yr: 2014 Thinning, 2014 Handpile, 2015 Handpile burn
Estimated cost: 2014 - $148,980, 2015 - $19,100
Total: $168,080

MSA P
TOTAL ACRES: 339
ELEVATION RANGES: 5000-5300 FT.
GEOGRAPHIC LOCATION: 62 Road
ADJACENT MSAs: O, Q, S, & V
SPECIAL AREA OF CONCERN: Regeneration in the Davis Fire
PAGs: MCD

Table 4-11. Historic Fire Regime and Current Condition Class for MSA P.

PAG	Fire Regime	Condition Class
MCD	III	I

HAZARD ANALYSIS – Considered low due to the 2003 Davis Fire. The hazard is estimated to increase in five to ten years when the snags begin to fall, causing potential rise in estimated fire intensity and resistance to control.

RISK ANALYSIS – Considered low at present time due to low ground fuels and ignition source.

SUPPRESSION PRIORITY (Resources being protected):
Priority: Existing snags and regeneration within the Davis Fire

There are no "fuels only" activities identified for this MSA at this time.

MSA Q
TOTAL ACRES: 4,113
ELEVATION RANGES: 4600-5200 FT.
GEOGRAPHIC LOCATION: Davis Mountain
ADJACENT MSAs: O, P, & S
SPECIAL AREAS OF CONCERN: Remaining live tree component and NRF on northwest slope of Davis Mountain.
PAGs: MCD

Table 4-12. Historic Fire Regime and Current Condition Class for MSA Q.

PAG	Fire Regime	Condition Class
MCD	III	I (90%)/ II (10%)

HAZARD ANALYSIS - Considered low due to the 2003 Davis Fire. The hazard is estimated to increase in five to ten years on 90 percent of the MSA when the snags begin to fall, causing potential rise in estimated fire intensity and resistance to control.

RISK ANALYSIS – Considered low at present time due to low ground fuels and ignition source.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: a) Remaining NRF on the East/Northeast slope of Hamner
Priority 2: Primary wildlife connectivity as identified in Chapter 2

There are no "fuels only" activities identified for this MSA at this time.

MSA S
TOTAL ACRES: 2,128
ELEVATION RANGES: 5000-5400 FT.
GEOGRAPHIC LOCATION: Saddle Butte
ADJACENT MSAs: P, Q, R, U & V
SPECIAL AREAS OF CONCERN: Remaining NRF on the East/Northeast slope of Hamner
PAGs: MCD

Table 4-13. Historic Fire Regime and Current Condition Class for MSA S.

PAG	Fire Regime	Condition Class
MCD	III	I (50%)/ 111 (50%)

HAZARD ANALYSIS: Considered high in the remaining portion (60 percent) that did not burn in the Davis Fire. Fire exclusion has contributed to stand conditions, coupled with advantageous weather, likely to cause another problem fire similar to the Davis Fire. A dense understory has created vertical continuity of fuels, allowing surface fires to develop into active crown fires more easily than during historic conditions. The trend for average fire intensity is increasing.

RISK ANALYSIS: Considered moderate due to a high level of access and topography. Lightning and human-caused ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Large trees and NRF, and regeneration within Davis Fire
Priority 2: Primary wildlife connectivity as identified in Chapter 2

Estimated "fuels only" activities: The lower portion of MSA S has been identified as strategic for fire behavior modification.
Treatment acres: 262
Treatment type: Small tree thinning, pruning, non-mechanical piling and disposal, prescribed underburning
Proposed Treatment yr: 2009 Thinning, 2009 Handpile, 2010 Handpile burn
Estimated cost: 2009 - $52,400, 2010 - $6,550
Total: $58,950

MSA T
TOTAL ACRES: 3,166
ELEVATION RANGES: 4800-6000 FT.
GEOGRAPHIC LOCATION: Ringo Butte
ADJACENT MSAs: R, & S
SPECIAL AREAS OF CONCERN: NRF
PAGs: MCD

Table 4-14. Historic Fire Regime and Current Condition Class for MSA T.

PAG	Fire Regime	Condition Class
MCD	III	II

HAZARD ANALYSIS: This area is very similar to other areas in the LSR with NRF – large trees with a dense understory creating vertical continuity facilitating a less lethal ground fire to transition to a more lethal crown fire. Due to the size of the NRF patches and where they are on the landscape, this MSA is considered as moderate for hazard.

RISK ANALYSIS: Due to the access and human presence in this MSA, it is considered a moderate risk.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Owl activity centers and NRF
Priority 2: Primary wildlife connectivity as identified in Chapter 2

Estimated "Fuels Only" Activities: This MSA has been identified for fuels reduction activities along the boundary with private land.
Treatment acres: 54
Treatment type: Small diameter thinning, non-mechanical piling and disposal
Proposed Treatment yr: 2009
Estimated cost: 2009 - $10,800, 2010 - $1,350
Total: $12,150

MSA U
TOTAL ACRES: 192
ELEVATION RANGES: 5800-6000 FT.
GEOGRAPHIC LOCATION: Hamner Butte
ADJACENT MSAs: V & S
SPECIAL AREAS OF CONCERN: Remaining NRF
PAGs: MCD

Table 4-15. Historic Fire Regime and Current Condition Class for MSA U.

PAG	Fire Regime	Condition Class
MCD	**III**	**I**

HAZARD ANALYSIS: At this time, the overall risk is considered low due to stand replacement and the Davis Fire over 50 percent of the MSA. The hazard is estimated to increase in five to ten years when the snags begin to fall, causing potential rise in estimated fire intensity and resistance to control.

RISK ANALYSIS: This area has a low rating for risk at the present time.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Regeneration within the Davis Fire and remaining NRF
Priority 2: Primary wildlife connectivity as identified in Chapter 2

There are no estimated "fuels only" identified at this time in this MSA.

MSA V
TOTAL ACRES: 2,968
ELEVATION RANGES: 4600-5800 FT.
GEOGRAPHIC LOCATION: Hamner Butte
ADJACENT MSAs: L, M, O, & W
SPECIAL AREAS OF CONCERN: Regeneration within the Davis Fire and hazards associated with suppression on Cascade Lakes Highway (Highway 46)
PAGs: MCD

Table 4-16. Historic Fire Regime and Current Condition Class for MSA V.

PAG	Fire Regime	Condition Class
MCD	**III**	**I (40%)/II (60%)**

HAZARD ANALYSIS: This MSA is rated as moderate overall due to stand replacement on the Davis Fire on 40 percent of the area. The remaining hazard (60 percent) is typical for this group of MSA that feature NSO as the focal species: large trees and NRF with vertical continuity from stand density. Hazard ratings will increase as snags begin to fall in the Davis Fire, causing predicted fire behavior to be more intense with resistance to control.

RISK ANALYSIS: Risk is considered moderate due to access (Highway 46) and potential for human-caused ignitions.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Owl activity centers in the remaining portion of the MSA that did not burn, regenerating stands in the Davis Fire
Priority 2: Primary wildlife connectivity as identified in Chapter 2

This area has been identified as important and strategic in reducing risk to a NSO home range in the proximity.
Treatment acres: 468
Treatment type: Small diameter thinning, non-mechanical piling, disposal
Proposed Treatment yr: 2014 Thinning, 2014 Handpile, 2015 Handpile burn

Estimated cost: 2014 - $93,600, 2015 - $11,700
Total: $105,300

MSA W
TOTAL ACRES: 1,826
ELEVATION RANGES: 4800-5100 FT.
GEOGRAPHIC LOCATION: McCool Butte
ADJACENT MSAs: L, X, Y, AA, & BB
SPECIAL AREAS OF CONCERN: NRF and NSO home ranges
PAGs: MCD

Table 4-17. Historic Fire Regime and Current Condition Class for MSA W.

PAG	Fire Regime	Condition Class
MCD	III	II

HAZARD ANALYSIS: Hazard is considered high due to the stand condition typical for this group of MSAs – large trees, NRF, and vertical continuity of fuels. Another stand replacement event from a problem fire would be high in these areas under favorable weather conditions.

RISK ANALYSIS: Due to access from Cascade Lakes Highway and human presence, the risk of an ignition is considered moderate.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Owl activity centers, Doug's viewpoint/interpretive stop on Highway 46, regeneration on the West side of the highway outside of the Davis Fire.
Priority 2: Primary wildlife connectivity as identified in Chapter 2

Estimated "fuels only" activities: This area has been identified as important and strategic in reducing risk to two overlapping NSO home ranges in the proximity.
Treatment acres: 468
Treatment type: Small diameter thinning, non-mechanical piling, disposal
Proposed Treatment yr: 2014 Thinning, 2014 Handpile, 2015 Handpile burn
Estimated cost: 2014 - $93,600, 2015 - $11,700
Total: $105,300

MSA AA
TOTAL ACRES: 355
ELEVATION RANGES: 4600-4800 FT.
GEOGRAPHIC LOCATION: Royce Mountain
ADJACENT MSAs: W, & BB
SPECIAL AREAS OF CONCERN: Road 46, NRF
PAGs: MCD

Table 4-18. Historic Fire Regime and Current Condition Class for MSA AA.

PAG	Fire Regime	Condition Class
MCD	III	III

HAZARD ANALYSIS: Hazard is considered high due to the stand condition typical for this group of MSAs – large trees, NRF, and vertical continuity of fuels. Another stand replacement event from a problem fire would be high in these areas under favorable weather conditions.

RISK ANALYSIS: Due to access provided by roads to Cascade Lakes Highway and Davis Lake combined with human presence, the risk of ignition is considered high.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Owl activity centers and regeneration outside of the Davis Fire

Priority 2: Primary wildlife connectivity as identified in Chapter 2

Estimated "fuels only" activities: This are has been identified as important and strategic in reducing risk to two overlapping NSO home ranges in the proximity.
Treatment acres: 84
Treatment type: Small diameter thinning, non-mechanical piling, disposal
Proposed Treatment yr: 2010 Thinning, 2010 Handpile, 2011 Handpile burn
Estimated cost: 2010 - $16,800, 2011 - $2,100
Total: $18,900

MSA BB
TOTAL ACRES: 4,789
ELEVATION RANGES: 4600-5900 FT.
GEOGRAPHIC LOCATION: Royce Mountain
ADJACENT MSAs: AA, &W
SPECIAL AREAS OF CONCERN: NSO home ranges, hazards associated with suppression and Cascade lakes Highway
PAGs: MCD

Table 4-19. Historic Fire Regime and Current Condition Class for MSA BB.

PAG	Fire Regime	Condition Class
MCD	III	III

HAZARD ANALYSIS: Hazard is considered high due to the stand condition typical for this group of MSAs – large trees, NRF, and vertical continuity of fuels. Another stand replacement event from a problem fire would be high in these areas under favorable weather conditions.

RISK ANALYSIS: Due to access provided by roads to Cascade Lakes Highway and Davis Lake combined with human presence, the risk of ignition is considered high.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Owl activity centers and regeneration outside of the Davis Fire
Priority 2: Primary wildlife connectivity as identified in Chapter 2

Estimated "fuels only" activities: This are has been identified as important and strategic in reducing risk to two overlapping NSO home ranges in the proximity.
Treatment acres: 546
Treatment type: Small diameter thinning, non-mechanical piling, disposal
Proposed Treatment yr: 2010 Thinning, 2010 Handpile, 2011 Handpile burn
Estimated cost: 2010 - $109,200, 2011 - $13,650
Total: $122,850

Table 4-20. Existing Condition for MSAs C, E, F, K, P, Q, S, T, U, V, W, AA, and BB.

MANAGEMENT STRATEGY AREA - EXISTING CONDITION														
	C	E	F	K	P	Q	S	T	U	V	W	AA	BB	MSA Group
Total Acres	1,270	2,501	841	3,210	339	4,113	2,128	3,166	192	2,968	1,826	355	4,789	27,698
Elevation Range (ft)	4,500-5,000	4,600-4,800	4,600-4,800	4,800-6,800	5,000-5,300	4,600-5,200	5,000-5,400	4,800-6,000	5,800-6,000	4,600-5,800	4,800-5,100	4,600-4,800	4,600-5,900	4,800-6,800
PAGS -- Mixed Conifer 89%, Ponderosa Pine 1%, Lodgepole Pine 5%, Mountain Hemlock 5%														
Land Allocation -- General Forest, Old Growth, Dispersed Recreation, Scenic Views														
Landscape Area(s) -- Central Conifer Association (Odell WA)														
Wildlife -- Northern Spotted Owl, northern goshawk, pileated woodpecker, fisher, marten, bats, NTMB's, amphibians														
Botanical --Known site of *Chaenotheca subroscida* in MSA K. Potential habitat for *Gastroboletus subalpinus, Rhizogobon truncatus, Clavariadelphus ligula, Mycena overholtisii*, *Ramaria amyloidea and Ramaria rubripermanens, Chaenotheca subroscida*														
early seral %	20%	10%	22%	11%	100%	91%	62%	20%	100%	56%	25%	22%	17%	37%
LOS (%)	70%	68%	59%	75%	0%	8%	31%	68%	0%	40%	63%	59%	66%	52%
Forest Density	High	High	Mod.	High	Low	Low	Low	High	Low	Mod	High	High	High	High
Soil Restoration Priority	Mod.	Low	Mod.	Low	Mod.	High	Mod.	Low	Low	Mod.	Mod.	Mod.	Mod.	Mod.
Fire Hazard	High	Mod.	Mod.	High	Low	Low	High	Mod.	Low	Mod.	High	High	High	High
Fire Risk	Low	Low	Low	Mod.	Low	Low	Mod.	Mod.	Low	Mod.	Mod.	High	High	Mod.
Total Road Density	2.76	5.67	8.08	5.66	6.15	4.99	5.77	3.07	4.1	5.44	6.3	4.13	4.33	High
Activities -- Snowmobile trail, hunting, big trees, driving for pleasure, Metolius-Windigo Horse trail, birding, research														
Commodities -- Wood products														

CRITERIA FOR DEVELOPING APPROPRIATE TREATMENTS

Desired Condition

Develop and maintain a mosaic of mostly multi-storied (Climatic Climax), LOS forested conditions with interspersed single and multi-story canopies (Fire Climax) and mid- and late-structural stages throughout the MSA group. Manage stands to retain the large tree component and to obtain, or move, towards a "rotating" mixture of NRF and near-NRF habitat. Descriptions are located in Chapter 3. It is acknowledged that NRF habitat would be at a higher risk to disturbance processes.

In stands that have lower site potential which are PAGS for Ponderosa Pine and Mixed Conifer Dry other than NRF capable plant associations (generally in MSA F, K, P), manage to obtain or move toward the conditions for suitable mixed conifer dry/ponderosa pine fire climax and maintain a single-storied LOS forest condition where overstory ponderosa pine/Douglas-fir or ponderosa pine/sugar pine contain dominant or co-dominate trees greater than 35 inches in diameter.

Develop and maintain Fire Behavior Modification areas in MSAs E, F, J, K, L, S, V, W, Y, Z, AA and BB to be effective in reducing the potential large-scale loss of owl habitat, and large tree components. As changes in the landscape occur, additional strategic areas may be identified.

Objective

Short-term (0-50 years) --

- Aggressively control or eliminate invasive plants in MSAs where they exist, according to current direction in regional and sub-regional invasive plant EISs.
- Abate hazardous fuels along major (two and four digit) roads.
- Accelerate development of LOS conditions within regenerated areas.
- Reduce potential of a "problem fire" through development and maintenance of strategic areas where fire behavior is modified and maintained.
- Manage Davis Fire area for accelerated growth, with the goal to put fire in its proper role where appropriate and enhance NSO dispersal habitat, except in existing snag retention areas[14] where no active management has occurred. Dispersal habitat will be the first to develop. To maintain a range of diverse conditions, reforest the snag retention areas and then adopt a passive management scenario with fire exclusion in those areas.

  Rationale: Davis Fire Area will not become NRF habitat during the life of this document. However, development of LOS under historic fire regimes is likely to be more successful in the long-term, similar to historic conditions nest stands developed on Davis Mountain. Areas where a passive management scenario was used after the Davis Fire provide for diversity with high densities of snags (currently), down wood, and a live tree component through time.

- Outside of the Davis Fire area, move toward those conditions described in Table 3-3. This MSA group can contribute to the bulk of NRF (climatic climax) as well as fire climax.

  Rationale: It is believed that this group of MSAs outside of the Davis Fire area can sustain between 15-30 percent in NRF (climatic-climax) condition. This determination was based upon the existing site potential, existing NRF habitat, and the home range of known owl pairs that occur in this MSA group. It is recognized that initially, some NRF may be reduced in strategic areas where fire behavior is modified through time, to facilitate the process of NRF cycling on the landscape. Activities must be analyzed at the LSR scale to fit these strategies, with monitoring and adaptive management actions as needed.

Long-term (50+ years):

[14] Snag retention areas where part of the design criteria for areas of salvage in the Davis Fire Recovery Project. Each unit of salvage included a minimum of 15% in a condition of high snag densities and a passive management scenario.

- Develop dispersal habitat through the Davis Fire area.
- Use fire to mimic historic regimes as appropriate using prescribed or fire-use fire.
- Outside of the Davis Fire area, maintain those conditions described in Table 3-3 for emphasis of selected species.

  Rationale: In the long-term, this MSA group should be in a condition where it can successfully cycle NRF habitat on the landscape using strategic areas where modified fire behavior provides a level of risk reduction to the most vulnerable stands. The team recognizes that the Davis Fire area will not have the stand conditions to provide NRF for two centuries or more.

MANAGEMENT OPTIONS AND TREATMENT TRIGGERS OR EVALUATION POINTS

Risk Reduction Activities through Management of Forested Areas

The risk reduction strategy includes those areas of this MSA group where the desired condition exists and is believed to be sustainable, pursue a passive management scenario in the short-term. The rationale for activities within NSO home ranges: Low percentage of NRF habitat and current fragmentation within the home range radius (1.2 mi.) make further degradation of habitat undesirable in the short-term. Known preventive measures for reduction of problem fire events, such as small diameter fuels reduction, would not decrease the suitability of the habitat for emphasis species. It is believed that the potential benefits of risk reduction justify small diameter fuels reduction in existing habitat. Otherwise:

- Actively manage and maintain strategic areas where fire behavior is modified as described in Chapter 3, Fuels Strategy. If the stand is within a NSO home range and is classified as NRF, it is appropriate to utilize low impact fuels and silvicultural activities as long as it retains NRF habitat post implementation.
- In dense, multi-storied stands, where the basal area is dominated by small diameter trees, the goal may be for two objectives: a) to reduce density of the smaller size classes and to enhance LOS elements right away; or b) accelerate the development to achieve LOS status in the future. In either objective, it is appropriate to use silvicultural prescriptions to reduce density and to lessen the likelihood of an uncharacteristic and undesired disturbance process. If it is outside a NSO home range, it is appropriate to manipulate the stand to where it may or may not qualify as NRF, as long as the overall objective is to reduce risk with associated benefits of enhancing and/or developing LOS characteristics.

  If a stand is within a NSO home range and it does not qualify as NRF, it is appropriate to manipulate with the objectives stated above. Utilize the guidelines listed in Chapter 3 for multi-story treatment (Scenarios “A” 90 percent UMZ and “C” 67 percent UMZ).

- Outside of NSO home ranges, If the desired structural components of multi-storied and/or LOS stands are being lost at undesired (may or may not be characteristic) levels, but the stand has not completely lost the elements to be classified as LOS (i.e. active management would ensure the protection of LOS conditions), silvicultural activities are appropriate. Within NSO home ranges under this scenario, utilize a passive management approach until the elements of LOS are lost. Guidelines are listed in Chapter 3 for the multi-story treatment scenarios (Scenarios “A” 90 percent UMZ and “C” 67 percent UMZ).
- In Ponderosa Pine PAG where it may be more appropriate for bald eagles and white-headed woodpeckers, especially if bald eagle roosting habitat is nearby, it is appropriate to apply Scenario B (90 percent UMZ Fire Climax) or Scenario D (67 percent UMZ Fire Climax) to obtain a mix of both climatic climax and fire climax conditions on the landscape. Emphasize the following areas:
  - --- Presence of DF or PP greater than 35 inches in diameter
  - --- Areas with current bald eagle or white-headed woodpecker nesting opportunities/potential
  - --- Locations strategic for fire behavior modification

Snags and Down Woody Debris
Within the context of individual stand site potential, maintain coarse woody debris and snags at levels indicated in the Suitable Habitat Condition tables 3-4 and Additional Guidance for Dead Wood Management section located in Chapter 3 except in hazard abatement areas along major roads where Tables 3-6 through 3-8 apply. (Short and Long-term)

Fuels Management

- In addition to identified fire behavior modification areas, abate hazardous fuels along major (two and four digit) roads by thinning small diameter trees and reducing ground and ladder fuels for approximately 100 feet.
- Continue small diameter fuel reduction identified in the Davis Fire Recovery Project EIS.

Salvage Activities After a Stand Replacement Event
If a wide-scale stand replacement event results in conditions that can no longer achieve LOS status within a century, regardless of outside or within NSO home ranges, salvage activities may be appropriate if the overall objective is to accelerate achievement of LOS status. Guidance can be found in Chapter 3 under the heading "Stand Replacement Events" and "Suitable Habitat Condition".

Rationale: Salvage activities would promote the long-term survival and growth of new conifers by bringing fuel loads to a sustainable level for eastside forests that reduces the likelihood of stand-replacement fire in newly regenerated stands, particularly during the early stages of stand development.

Enhancement Activities and Other Activities for Management of Regenerated Areas for All Groups
Throughout the MSA group, emphasize management of regenerated stands to accelerate growth as a means to return to LOS more quickly. Refer to the LOS Enhancement Strategies section located in Chapter 3 which describes appropriate treatments. Deviation may occur on a site-specific basis to meet specific wildlife objectives, e.g. to maintain hiding cover in deer and elk fawning and calving grounds on a short and long-term basis.

Fire Suppression
A fire strategy was developed that considers and prioritizes suppression activities (or tactics) by MSA in such a way to provide guidance that minimizes potential adverse effects to the most important values at risk while adhering to the main goals. The protection of human life and property will always be the number one priority. The following provides guidance for the appropriate suppression response:

- Protect NSO home ranges from fires in this MSA group.
- Limit the fire spread by the use of Minimum Impact Suppression Tactics (MIST) and guidance found in the Deschutes National Forest Fire Management Action Plan.
- Minimize the expenditures of suppression costs when feasible.
- Utilize the most knowledgeable and available District Resource Advisors when suppression actions lend an opportunity.

Riparian Areas
Manage areas consistent with the Aquatic Conservation Strategy and Odell Pilot Watershed Analysis.

Soils

- Protect and enhance long-term site productivity.
- Restore areas with detrimental soil conditions from past management activities focus on MSA Q as highest priority (52 acres of potential rehabilitation), followed by MSAs C, F (120 acres of potential rehabilitation), P, S, V, W, AA, and BB.

Wildlife and Botanical
Habitat protection takes precedence over the protection of individual plants or animals with the exception of known sites of species listed in Table 1-1 of the 2001 Survey & Manage ROD in the Northwest Forest Plan.

Invasive Plants
Aggressively control or eliminate invasive plants, according to current direction in regional and sub-regional invasive plant EISs in MSAs C (tansy ragwort), E (bull thistle, common mullein), P (tansy ragwort, bull thistle, common mullein), Q (Dalmatian toadflax), S (bull thistle, common toadflax), T (bull thistle), W (spotted knapweed, bull thistle), AA (spotted and diffuse knapweeds, Canada and bull thistles, St. Johnswort, common mullein) and BB (spotted knapweed; Canada, Russian, and bull thistles; St. Johnswort; butter and eggs; field bindweed; common mullein).

Access
At this time, recommendations for access management within the LSR were made in Seven Buttes Return Decision Notice and FONSI and the Davis Fire Recovery Project EIS. Some of the recommendations have been implemented, either on a temporary or permanent basis. It is anticipated the Travel Management Rule process on the forest will likely adopt and make permanent access as discussed in both decisions. A roads analysis is to be completed and implemented for the entire LSR to achieve recommended target road densities for this MSA group. In addition, continue processes for consolidating motorized recreational use (summer and winter) to designated roads and trails. As funding allows:

- Monitor use of the MSAs by forest carnivores. If the presence of fisher or wolverine is confirmed, prioritize optimizing habitat for these species over human recreational use. The potential for conflict with human use exists (primarily) during winter.
- Monitor motorized winter use, i.e. ATVs and snowmobiles.

MONITORING, EVALUATION, AND RESEARCH

- Conduct annual monitoring of spotted owl activity. Monitor occupancy and reproductive status of known sites.
- Pursue research in spotted owl use of “near-NRF” and fuels treatment areas.

As funding allows:

- Survey to confirm the presence and/or habitat utilization of white-headed woodpeckers and flammulated owls.
- Survey for additional presence of northern spotted owl outside of known areas.

Mixed Conifer for Bald Eagle and Northern Spotted Owl

MSAs: I, J, O

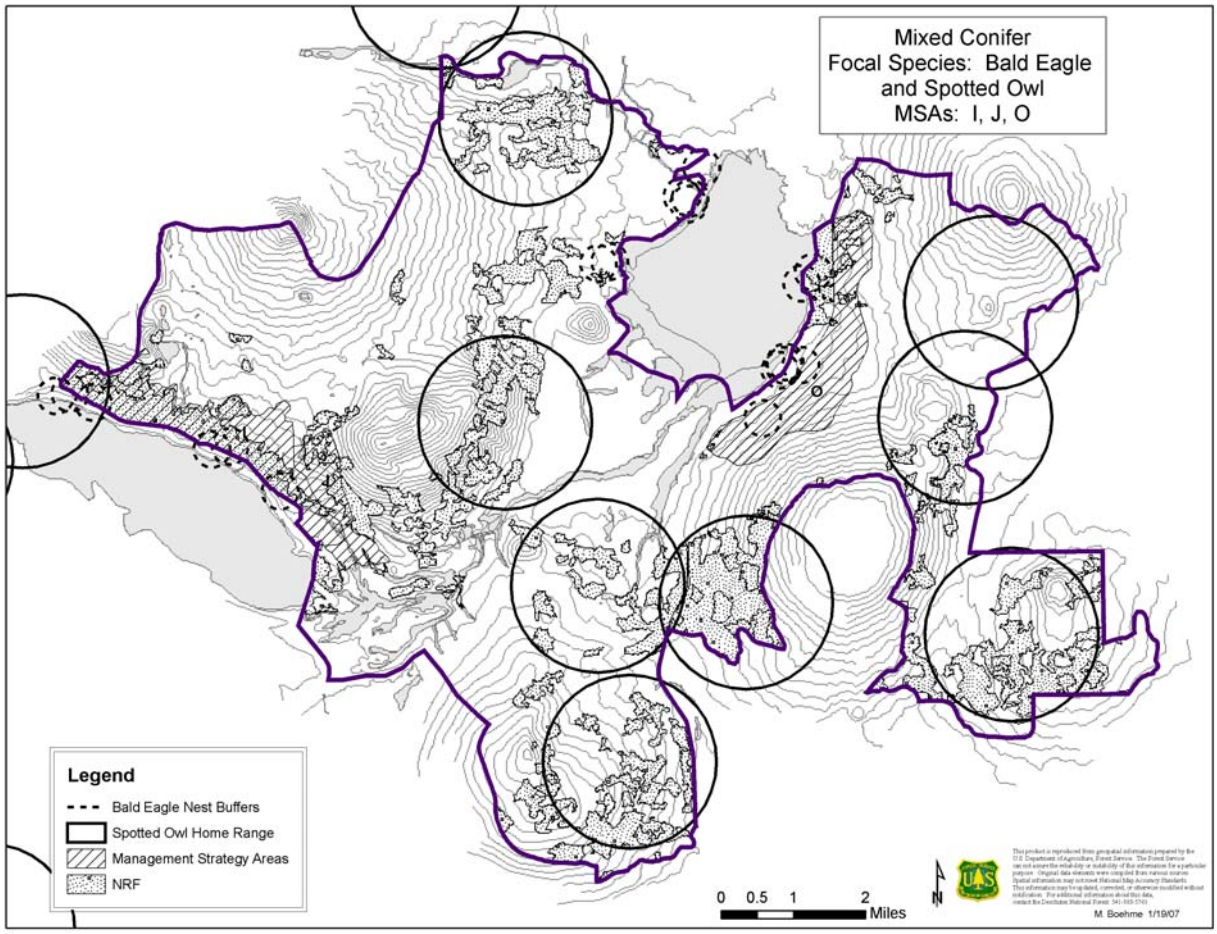


Figure 4-4. Mixed conifer for bald eagles and spotted owls; MSAs I, J, O.

EXISTING CONDITION

Wildlife

***Emphasis Species* -- northern bald eagle and northern spotted owl**

Collectively, these three MSAs contain 3,618 acres of which 2,563 acres (71 percent) are allocated for Bald Eagle Management Areas. Six bald eagle nesting territories are found in these MSAs, including four in MSA I and J along Odell Lake and two territories on the east side of Davis Lake that are utilizing MSAs N and O. Bald eagle nesting on Odell Lake and Davis Lake has been documented since 1973 (Isaacs and Anthony 2006). Bald eagle management plans were completed for nesting territories on Davis Lake and Wickiup Reservoir in 1996 and for the territories on Odell and Crescent Lakes in 1999.

One spotted owl activity center is located in MSA I which is an important east-west link for dispersal and genetic exchange between spotted owls on the Deschutes and Willamette National Forests. There are no spotted owl activity centers or home ranges that incorporate MSA O. Prior to the Davis Fire, MSA O was dominated by LOS habitat. Currently LOS habitat is confined to the northern portion of the MSA. While

tree planting has occurred in the fire area of MSA O, it will be centuries before LOS habitat conditions return.

Selected Other Species

- Osprey - The MSAs contain four known osprey nests.
- Pileated woodpecker – Late-successional mixed conifer habitats provide habitat and the species has been documented to occur in MSA I.
- MSAs I and J provide important late-successional mixed conifer habitat connectivity for forest carnivore species including marten and potentially for fishers.

LOS

MSAs I and J are relatively intact due to a low level of roads and abundant riparian habitat. At the present time there are only 37 acres (less than 2 percent) of early seral habitat in these two MSAs. The Davis Fire created a largely consolidated block of early-seral habitat totaling 1,353 acres (89 percent) in MSA O. While the fire acted to "block up" early seral habitat in MSA O, it eliminated spotted owl habitat and reduced LOS connectivity through that area.

At the present time there are 1,868 acres of LOS habitat, 51 percent of the total acreage in the three MSAs. MSA I has 1,287 acres of LOS (83 percent of the MSA), MSA J contains 412 acres of LOS (78 percent of the MSA) and MSA O has 169 acres of LOS (11 percent of the MSA). MSAs I and J are basically functioning as intended for focal species and selected other species. MSA O will provide habitat for early-successional associated species for the next several decades or until replanted trees begin to shade out grasses and herbaceous species. With appropriate management, nesting habitat for bald eagles and northern spotted owls will likely take at least two centuries to develop within the Davis Fire portion of MSA O.

Total road densities vary widely within this MSA group (Table 4-21). The lowest road density is 0.48 mi/mi² in MSA I and the highest is in MSA O with 7.9 mi/mi² affecting the amount and quality of habitat available. Potential for reducing roads exists.

Table 4-21. Total Road Density in Miles per Square Mile in Mixed Conifer for Bald Eagle and Spotted Owl.

MSA	Total Road Density	Minimum (If only two-digit and four-digit roads are open)
I	0.48	0.2
J	5.67	1.74
O	7.9	1.44

Northern Bald Eagle Habitat

Bald eagle nesting territories are normally associated with lakes, reservoirs, or rivers. Nests are usually located in large conifers in uneven-aged, multi-storied stands with old-growth components (Anthony et al. 1982). Factors such as tree height, diameter, tree species, position on the landscape, distance from water, and distance from disturbance also appear to influence nest selection. Nest trees usually provide an unobstructed view of the associated body of water. Live, mature trees with deformed tops are often selected for nesting. East of the Cascade Mountains in Oregon, bald eagles prefer nesting in ponderosa pine trees that average 46 inches in diameter (range from 21-76 inches) and tend to be larger than the surrounding trees (Anthony et al. 1982). Bald eagles often construct several nests within a territory and alternate between them from year to year. Snags, trees with exposed lateral branches, or trees with dead tops are often present in nesting territories and are used for perching or as points of access to and from the

nest. Such trees also provide vantage points from which territories can be defended. Generally, late and old structure live ponderosa pine and Douglas-fir trees are the species used for bald eagle nesting on the Crescent Ranger District. However, several bald eagle pairs are still occupying nest trees that were killed by the Davis Fire.

Bald eagle roosting tends to occur in late and old structure multi-storied stands where canopy layering provides greater thermal protection during inclement weather events. There are no known bald eagle winter roost sites on the Crescent Ranger District but Isaacs (personal communication 2004) stated that bald eagles tend to roost near nest stands. One fall roost was confirmed on Odell Lake (outside the Davis LSR) in October 2003 (Isaacs, personal communication 2003). This roost site is near a documented nest stand but it is unknown if this site is occupied as a roost through the winter months.

Northern Spotted Owl NRF Habitat

LOS does not necessarily equate to northern spotted owl habitat. Habitat was determined at the forest level. This MSA group contains 13 percent (1,178 acres) of the NRF habitat within the LSR (8,847 acres).

Table 4-22 displays the distribution of NRF between the MSAs. There are approximately 1,178 acres of NRF across this MSA group, with approximately 934 acres in I, 132 acres in J, and 112 acres in O.

The table also shows the potential for development of NRF habitat is high across all the MSAs, as capable plant associations dominate this MSA group. However, MSA O experienced a stand replacement burn on approximately 21 percent (537 acres) of the total capable habitat (2,589 acres) within this MSA group.

Table 4-22. Distribution of NRF within Capable Habitat for MSAs I, J, and O.

NRF	MSA	I			J			O		
	Acres /Acres Burned*	1,614			530			1,527 / *1,219*		
PAG	**PA**	Capable	Existing	% Existing /Capable	Capable	Existing	% Existing /Capable	Capable	Existing	% Existing /Capable
MCD	CRS1-11	786	344	44%	320	74	23%			
	CWC2-11				65	47	72%	17	6	35%
	CWH1-11	12	5	42%	20	2	10%	572	44	8%
	CWS1-14									
	CWS1-15							32	0	0%
MCD Total		**798**	**349**	44%	**405**	**123**	30%	**621**	**50**	8%
MCW Total		**48**	**42**	88%	**9**	**2**	22%	**0**	**0**	
MHD	CMS1-11	704	543	77%	4	4	100%	0	0	
MHD Total		**704**	**543**	77%	**4**	**4**	100%	**0**	**0**	
ALL OTHERS						3			62	
Total NRF		**1,550**	**934**	60%	**418**	**132**	32%	**621**	**112**	18%

***Stand Replacement** MSAs that are a part of Davis Fire

Snags and Down Woody Debris

The major habitat type in this MSA group is eastside mixed conifer (EMC). Across the watershed[15] for this habitat type, high snag densities per acre exceed reference conditions for the greater than 10 inch and greater than 20 inch size classes. For the low and mid range densities per acre, both size classes are generally within reference conditions, although the greater than 20 inch size class is at the low end of reference. There will be a gradual decrease in snag densities in MSA O over the next several decades as snags created in the Davis Fire continue to fall.

[15] Subwatersheds that were partially or completely within the LSR were used for the larger landscape to give sufficient scale to compare with reference conditions developed with information from DecAID.

Table 4-23. Distribution of Snags for MSAs I, J, and O.

Distribution of Snags ≥10" (25.4cm) dbh in EMC			
Density	% of Area		
Snags per Acre	Ref. (Min.)	Ref. (Max.)	Existing
0	18	24	10
0-6	27	31	17
6-12	15	17	28
12-24	16	23	22
24-36	6	10	6
36+	5	7	17
Reference Condition developed from information from DecAID tables (unharvested plots for snags ≥10" dbh (25.4cm) EMC_ECB_O.Inv-14., EMC_ECB_S.Inv-14, EMC_ECB_L.Inv-14, and modified with HRV information found in the Odell Pilot WA. Existing condition imputed stand exam data with INFORMS			

Distribution of Snags ≥20" (50.8cm) dbh in EMC			
Density	% of Area		
Snags per Acre	Ref. (Min.)	Ref. (Max.)	Existing
0	5	63	17
0-2	2	26	48
2-4	3	26	15
4-6	2	18	5
6-10	2	20	6
10-18	1	10	5
18+	0	3	5
Reference condition developed from information from DecAID tables (unharvested plots for snags ≥20" dbh (50.8cm) EMC_ECB_O.Inv-15., EMC_ECB_S.Inv-15, EMC_ECB_L.Inv-15, and modified with HRV information found in the Odell Pilot WA. Existing condition imputed stand exam data with INFORMS			

Down wood is currently present over a greater proportion of the landscape as compared to the reference condition. At the lowest levels of percent cover, the existing condition meets or exceeds the reference condition. At the mid-level (4-8 percent cover), the existing condition is far below the reference. None of the existing landscape meets what is considered a high level of down wood, compared to the reference condition. Over the next several decades, down wood percent cover will tend to increase in MSA O as existing snags in the Davis Fire continue to fall. See Appendix C for development of these tables.

Table 4-24. Distribution of Down Wood for MSAs I, J, and O.

% of Landscape for EMC down wood ≥6" (15.24cm) dbh			
Density	% of Area		
% Cover Down Wood	Ref. Min.	Ref. Max.	Existing
0	22	30	8
0-4	53	54	90
4-8	13	19	1
8-10	2	3	0
>10	1	3	0
Information from DecAID tables (unharvested plots for down wood ≥5" dbh (12.7cm) EMC_ECB_O.Inv-16., EMC_ECB_S.Inv-16, EMC_ECB_L.Inv-16, and modified with HRV information found in the Odell Pilot WA.			

Botanical

Fungi

Habitat for special status fungal species in this MSA group occurs in these PAGs: Mountain Hemlock, Lodgepole Dry, Mixed Conifer Wet, Mixed Conifer Dry, and Ponderosa pine. There is a documented site of *Ramaria rubripermanens* in MSA I. Other fungal species confirmed to occur on the Crescent Ranger District but not within the Davis LSR include *Gastroboletus subalpinus, Rhizopogon truncatus, Rhizopogon atroviolaceus, Clavariadelphus ligula, Chalciporus piperatus*, and *Ramaria amyloidea*. Habitat for these species is present and these species may occur within the Davis LSR.

Mosses, Liverworts, and Lichens
Potential habitat exists for special status mosses, liverworts, and lichens in riparian areas except MSA O where the potential is low for lichens. There are no known moss or liverwort sites within this group of MSAs although *Schistostega pennata* and *Tritomaria exsectiformis* have been documented to occur on the Crescent Ranger District.

Vascular Plants
There are no known sites for any special status or Regional Sensitive vascular plant species within the Davis LSR. Probability for any occurrence is low in this MSA group except for *Castilleja cholorotica*, where there is moderate probability since suitable habitat includes ponderosa pine, lodgepole or mixed conifer forest openings. The probability is also moderate for *Rorippa columbiae,* which has been found on two sites outside the Davis LSR.

Invasive Plant Species
Invasive plants documented along Highway 58 adjacent to MSA I include spotted, diffuse, and meadow knapweeds; Dalmatian toadflax, butter and eggs, Canada thistle, bull thistle, Scot's broom, St. Johnswort, tansy ragwort, common mullein, and kochia. Within MSA O, bull thistle and common mullein are documented within tree plantations. Forest Road 46 forms the boundary between MSAs N and O and spotted and diffuse knapweeds, Canada thistle, bull thistle, Scot's broom, Klamath weed, ox-eye daisy, and common mullein have all been documented to occur. There are no known sites in MSA J.

See Botanical section Chapter 2 for additional information.

Invertebrates

Mollusks
There is potential habitat for special status mollusks in riparian zones of MSA I and J. One known site of *Pristiloma arcticum crateris* is documented at the confluence of Princess Creek and Odell Lake just outside the LSR boundary. There are no known sites in the Davis LSR.

See the Invertebrate section in Chapter 2 for additional information.

Forest Dynamics
Across the landscape within the mixed conifer dry plant association group, the true-fir component has increased dramatically in recent times. This condition is found largely within the stands classified as suitable for spotted owl nesting, roosting and foraging. Because of the dry site and stand conditions, these stands are at the highest risk of being lost to a large-scale disturbance process. Some of the most desired characteristics of these stands, such as fire resistant large ponderosa pine and Douglas-fir, are placed at elevated risk from wildfire because the increasing true fir component creates a structure that allows ground fires to reach the crowns.

PAG(s) and Structural Stages
This MSA group is dominated by mixed conifer (76 percent) and a majority (51 percent) of the MSA group is classified as late and old structure (LOS). Out of the total 3,671 acres, 1,868 acres (51 percent) is LOS, 403 acres (11 percent) is considered mid-successional, and 1,398 acres (38 percent) is defined as early-successional habitat. There is no ponderosa pine habitat present in this group of MSAs, and only 165 acres of lodgepole pine represents less than 5 percent of the total acreage in this MSA group.

Table 4-25. PAGs and Structural Stages in Mixed Conifer for Bald Eagle and Spotted Owl.

PAG	Structural Stage	I	J	O	Total	% PAG	%Total MSA Group
Mixed conifer	Early	28	7	1353	1388	50%	
	Mid	204	43	5	252	9%	
	LOS	614	364	169	1147	41%	

	TOTAL	**846**	**414**	**1527**	**2787**		76%
Ponderosa Pine	Early	0	0	0	0		
	Mid	0	0	0	0		
	LOS	0	0	0	0		
	TOTAL	**0**	**0**	**0**	**0**		0%
Lodgepole	Early	2	1	0	3	2%	
	Mid	40	65	0	105	64%	
	LOS	13	44	0	57	35%	
	TOTAL	**55**	**110**	**0**	**165**		4%
Mountain Hemlock	Early	7	0	0	7	1%	
	Mid	46	0	0	46	6%	
	LOS	660	4	0	664	93%	
	TOTAL	**713**	**4**	**0**	**717**		20%
Non Forest	**TOTAL**	**0**	**2**	**0**	**2**		0%
Total Acres		**1614**	**530**	**1527**	**3671**		

MSAs that are a part of Davis Fire

Summary of Trends

- MSAs I and J provide a continuation of the east/west link of mixed conifer habitats between eastside and westside forests. This is the only link for many miles to the north and south, so protect and enhance it to the greatest extent possible.
- MSAs I and J have had little active management. Both areas have missed one or more fire return intervals and the hazard to adjacent recreational residences and the Maklaks NSO home range is considered high.
- Susceptibility to stand replacement events caused by insects, disease, and fire is increasing on most of the areas where no active management has occurred.
- Mixed conifer dry stands, where true firs are the prime mid and understory component, are particularly at risk for stand replacement events from disturbance processes. These ecosystems are unstable, highly susceptible to disturbance events, and less resilient in responding and/or recovering. Although at risk, the true fir component makes these stands desirable as LOS.
- MSA O includes part of the Davis Lake East BEMA. Prior to the Davis Fire, it was characterized by large, open-grown ponderosa pine and Douglas-fir with an understory of true firs, lodgepole pine, and isolated mountain hemlock. The majority of the Davis Fire acreage in MSA O was replanted with ponderosa pine and Douglas-fir seedlings as preferred species for long-term objectives. It will require several centuries of appropriate management before these stands become multi-storied LOS for bald eagle roosting and/or northern spotted owl NRF habitats.

Soil Conditions

The majority of the soils in this MSA group have a “low” rating on detrimental soils conditions from past active management in MSA I and J. However, there is a “moderate” rating for MSA O where 10-19 percent of the MSA is considered to have a detrimental soil condition.

Access

MSAs I and J are partially overlap the Maiden Peak Inventoried Roadless Area. There are trails in the area, including the Pacific Crest Trail. Motorized vehicles are prohibited on all trails. Snowmobiles, bikes, and other mechanized vehicles are only allowed on designated routes. Open roads densities (Operational) range from 0.24 to 4/46 mi/mi² (Table 4-26). MSA O open road densities exceed objectives and recommended levels. Motorized vehicles are allowed on all open roads and designated routes, however central Oregon is currently undertaking a comprehensive process to designate motorized access and close off-trail travel. This is expected in 2008.

Table 4-26. Open Road Densities in Miles per Square Mile in Mixed Conifer for Bald Eagle and Spotted Owl.

MSA	Objective Open Road Density	Operational Open Road Density	Davis Fore Roads Analysis Open Road Density
I	0.2	0.24	--
J	2.5	2.53	--
O	2.99	4.46	1.92

Fire Management -- MSA I
TOTAL ACRES: 1,561
ELEVATION RANGES: 4800-5600 FT.
LOCATION BY LANDMARK: Maklaks Mtn./Odell Lake
ADJACENT MSAs: B & J
SPECIAL AREAS OF CONCERN: Willamette Pass Ski Area, Princess Creek Campground, Sunset Cove Campground, recreation residences at Odell Lake, and the ODOT maintenance facility (all adjacent to the LSR boundary); and NSO home ranges and bald eagle nests.
PAGs: MCD, MCW, MHD

Table 4-27. Historic Fire Regime and Current Condition Class for MSA I.

PAG	Fire Regime	Condition Class
MCD/MCW	**III**	**II**
MHD	**V**	**I**

HAZARD ANALYSIS
This MSA is considered "high" due to a very dense understory with large trees, creating vertical continuity of fuels from ground to crown. This is the situation in the mixed conifer and in the mountain hemlock Plant Association Groups where they intermix. Currently, there is ongoing and planned work adjacent to the LSR around recreation residences at Odell Lake to reduce risk from a wildfire. It is anticipated that overall, the hazard rating will remain "high" after project completion, however the risk to adjacent recreation residences will be lowered.

RISK ANALYSIS
This MSA is considered a "moderate" mostly due to the amount of human influence from recreation and a major transportation route (Highway 58). The District has experienced human and lightning-caused ignitions in the area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Recreation residences, Willamette Pass, ODOT maintenance station and campgrounds at Odell Lake.
Priority 2: Bald eagle nests, NSO home ranges
Priority 3: Riparian areas and NSO connectivity to the Willamette NF.

Currently, there are no "fuels only" activities specified at this time. Fuels reduction activities around structures are being implemented with the Rosedell and Lakeside WUI Categorical Exclusions.

MSA J
TOTAL ACRES: 531
ELEVATION RANGES: 5400-6000
GEOGRAPHIC LOCATION: Odell Lake
ADJACENT MSAs: B, I, and K
SPECIAL AREAS OF CONCERN: Willamette Pass Ski Area (adjacent to the LSR boundary), Designated Old Growth Management Area, NSO home ranges

PAGs: MCD, LPD

Table 4-28. Historic Fire Regime and Current Condition Class for MSA J.

PAG	Fire Regime	Condition Class
MCD	III	II
LPD	III	II

HAZARD ANALYSIS – This MSA is rated "moderate" with a dense understory and a moderate amount of ground fuel. The highest hazard is within the lodgepole plant association group and is in a strategic place in the LSR for fire behavior modification.

RISK ANALYSIS – The risk is considered "low" due to limited access and isolation from the MSA with greater human presence. Lightning and human ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Adjacent structures in MSA I
Priority 2: NSO home ranges
Priority 3: Riparian areas and east/west connectivity to the Willamette NF for NSO

Estimated "Fuels Only" activities: This area has been determined to be strategic for fuel modification in the lodgepole pine Plant Association Group.
Treatment acres: 157
Treatment type: Small diameter thinning, non-mechanical piling, disposal
Proposed Treatment yr: 2012 Thin, 2012 Handpile, 2013 Handpile burn
Estimated cost: 2012 - $31,400, 2013 - $4,600
Total: $36,000

MSA O
TOTAL ACRES: 1,526
ELEVATION RANGES: 4600-5000 FT.
GEOGRAPHIC LOCATION: Forest Roads 46 & 62
ADJACENT MSAs: N, P and V
SPECIAL AREAS OF CONCERN: NRF Habitat
PAGs: MCD

Table 4-29. Historic Fire Regime and Current Condition Class for MSA O.

PAG	Fire Regime	Condition Class
MCD	III	I (80%) / II (20%)

HAZARD ANALYSIS
This MSA is rated moderate to low for hazard, due to approximately 80 percent within the Davis Fire. It is estimated that within five to ten years, the hazard rating would increase due to falling snags and subsequent predicted fire behavior and resistance to control.

RISK ANALYSIS
This MSA is considered a "moderate" risk rating. Although this MSA is considered a very low risk for ignition due to its position on the landscape, lack of access (Davis Fire Closure), and human presence, the adjoining MSA N contains Lava Flow Campground as a potential source of ignition. In addition, the unburned portion of MSA N provides fuel continuity combined with favorable topography into MSA O.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Regeneration in the Davis Fire
Priority 2: Remaining NRF habitat

Estimated "fuels only" activities: These are activities identified within the Davis Fire Recovery Project to modify fire behavior and to enhance scenic views along Highway 46.

Treatment acres: 547
Treatment type: Thinning, Handpile, Handpile burn, Utilization
Proposed Treatment yr: 2014 - Thinning, 2014 Handpile, 2015 Handpile burn
Estimated cost: 2014 - $109,400, 2015 - $13,675
Total: $123,075

Table 4-30. Existing Condition for MSAs I, J, O.

MANAGEMENT STRATEGY AREA - EXISTING CONDITION				
	I	J	O	MSA Group
Total Acres	1,561	531	1,526	3,671
Elevation Range (ft)	4,800-5,600	5,400-6,000	4,600-5,000	4,600-6,000
PAGs -- Mixed Conifer 76%, Mountain Hemlock 19%, and Lodgepole 5%				
Land Allocations -- BEMA, General Forest, Intensive Recreation, Dispersed Recreation, Scenic Views, Old Growth				
Landscape Area(s) -- Central Conifer Association (Odell WA)				
Wildlife species: northern spotted owl, northern bald eagle, marten, pileated woodpecker				
Botanical - Known site of *Ramaria rubripermanens* in MSA I. Potential habitat for *Gastroboletus subalpinus, Rhizopogon truncatus, Rhizopogon atroviolaceus, Clavariadelphus ligula, Chalciporus piperatus,* and *Ramaria amyloidea.*				
early seral %	2%	2%	89%	38%
LOS (%)	80%	78%	11%	51%
Forest Density	High	High	Low	
Soil Restoration Priority	Low	Low	Mod.	
Fire Hazard	High	Mod.	Low	
Fire Risk	Mod	High	Low	
Total Road Density	0.48	5.67	7.9	High
Activities -- Cross-country ski trails, Rosary Lake Trail, hunting, large tree viewing				
Commodities -- Wood products				

CRITERIA FOR DEVELOPING APPROPRIATE TREATMENTS

Desired Condition

Provide a contiguous, multi-storied LOS forested condition (Climatic Climax) in the mixed conifer and mountain hemlock PAGs to allow species dispersal between the Willamette and Deschutes National Forests (MSA I and J). This condition would maintain nesting and roosting habitat for the northern spotted owl and northern bald eagle. Within MSA O, the long-term desired condition is a mix of LOS habitats including single-storied stands for bald eagle nesting (Fire Climax) and multi-storied stands that could provide bald eagle roosting areas as well as northern spotted owl NRF habitat. Use silvicultural and/or fuels treatments to manage for an overstory of ponderosa pine and Douglas-fir with dominant or co-dominant trees greater than 35 inches in diameter.

Allow for mostly a passive management scenario in MSAs I and J except to implement strategic fire behavior modification in MSA J as needed to reduce risk of large-scale loss of LOS stands. Develop and maintain a mosaic of multi-storied, LOS forested habitats for northern spotted owls and northern bald eagles. Within MSA O, develop fuels and silvicultural prescriptions to maximize the growth of regeneration in the Davis Fire portion of the MSA. In the remainder of MSA O, allow a passive management scenario to continue in the LOS stands that are present, except for risk reduction and scenic view enhancement activities identified within the Davis Fire Recovery Project along Highway 46.

Objective

Short-term (0-50 years) –

- Aggressively control or eliminate invasive plants in MSAs where they exist, according to current direction in regional and sub-regional invasive plant EISs.
- Abate hazardous fuels along major (two and four digit) roads.
- Allow LOS stands in MSA I and J to function as natural, relatively passively managed, mixed conifer and mountain hemlock ecosystems to provide contiguous habitat for bald eagles, spotted owls, and other species.
- Prioritize reduction of habitat fragmentation and accelerate development of LOS conditions within regenerated areas.
- Reduce fire risk to adjacent MSAs through development and maintenance of a fire behavior modification area in MSA J.
- Conduct and maintain fuels reduction (small diameter thinning) surrounding the structures adjacent to Highway 58 outside the LSR to reduce the risk of wildfire entering into MSAs I and J.
- Manage the Davis Fire area for accelerated growth and appropriate fire regimes except in existing snag retention areas.

  Rationale: Low percentage of NRF habitat over the entire LSR and current fragmentation make further degradation of habitat, particularly in MSA I and J, undesirable in the short-term. Known preventive measures for reduction of risk, such as small diameter fuels reduction around structures at Odell Lake (I) and strategic modification of fuels in J, are the only appropriate activities at this time because they would not decrease the suitability or connectivity of the habitat for emphasis species.

Long-term (50+ years) –

- Develop and maintain a minimum of 70 percent of the MSA group in LOS habitat of which would be maintained as climatic-climax and fire-climax, contributing to meeting the conditions described in Table 3-3. This strategy recognizes that only 51 percent of the MSA group is currently functioning as LOS habitat, of which the majority is in MSAs I and J. The development of LOS conditions in the Davis Fire portion of MSA O will take several centuries to achieve and would include both fire-climax and climatic-climax conditions.

  Rationale: It is believed that these MSAs have potential to develop approximately 70 percent of suitable LOS mixed conifer and mountain hemlock climatic-climax and fire-climax conditions. This determination was based on the site potential, the existing, and the desired conditions for

these PAGs. It is also recognized that this process is dynamic; natural processes (i.e. fire, insects, and diseases) will likely occur over this time period and reduce LOS, while other stands are growing into suitable LOS habitat.

MANAGEMENT OPTIONS AND TREATMENT TRIGGERS OR EVALUATION POINTS

Risk Reduction Activities through Management of Forested Areas

In areas of the MSA group where the Desired Condition exists and is believed to be sustainable, only small diameter thinning and fuels reduction around structures and strategic fuels modification is appropriate. Otherwise:

- Actively manage and maintain strategic areas (MSA J) where fire behavior and spread is modified as described in Chapter 3, Fuels Strategy. If the stand is within a NSO home range and is classified as NRF, it is appropriate to utilize low impact fuels and silvicultural activities as long as it retains NRF habitat post implementation.
- In addition to identified fire behavior modification areas, abate hazardous fuels along major (two and four digit) roads by thinning small diameter trees and reducing ground and ladder fuels for approximately 100 feet.
- In dense, multi-storied stands, where the basal area is dominated by small diameter trees, the goal may be for two objectives: a) to reduce density of the smaller size classes and to enhance LOS elements right away; or b) accelerate the development to achieve LOS status in the future. In either objective, it is appropriate to use silvicultural prescriptions to reduce density and to lessen the likelihood of an uncharacteristic and undesired disturbance process. If it is outside a NSO home range, it is appropriate to manipulate the stand to where it may or may not qualify as NRF, as long as the overall objective is to reduce risk with associated benefits of enhancing and/or developing LOS characteristics.

  If a stand is within a NSO home range and it does not qualify as NRF, it is appropriate to manipulate with the objectives stated above. Utilize the guidelines listed in Chapter 3 for multi-story treatment (Scenarios “A” 90 percent UMZ and “C” 67 percent UMZ).

  Rationale for activities within NSO home ranges: Low percentage of NRF habitat and current fragmentation within the home range radius (1.2 mi) make further degradation of habitat undesirable in the short-term. Known preventive measures for reduction of problem fire events, such as small diameter fuels reduction, would not decrease the suitability of the habitat for emphasis species. It is believed that the potential benefits of risk reduction justify small diameter fuels reduction in existing habitat.

- Outside of NSO home ranges, If the desired structural components of multi-storied and/or LOS stands are being lost at undesired (may or may not be characteristic) levels, but the stand has not completely lost the elements to be classified as LOS (i.e. active management would ensure the protection of LOS conditions), silvicultural activities are appropriate. Within NSO home ranges under this scenario, utilize a passive management approach until the elements of LOS are lost. Guidelines are listed in Chapter 3 for the multi-story treatment scenarios (Scenarios “A” 90 percent UMZ and “C” 67 percent UMZ).

Snags and Down Woody Debris

Within the context of individual stand site potential, maintain coarse woody debris and snags at levels indicated in the Suitable Habitat Condition tables 3-4 and Additional Guidance for Dead Wood Management section located in Chapter 3 except in hazard abatement areas along major roads where Tables 3-8 through 3-10 apply. (Short and Long-term)

Fuels Management

In addition to fire behavior modification in MSA J, continue small diameter fuel reduction and hazard abatement in MSA O along Highway 46 as identified within the Davis Fire Recovery Project EIS.

Salvage Activities After a Stand Replacement Event

If wide-scale loss of habitat occurs and the stand characteristics of the replacement event can no longer achieve LOS status within a century, regardless of outside or within NSO home ranges, salvage activities may be appropriate if the overall objective is to accelerate achievement of LOS status. Guidance can be found in Chapter 3 under the heading "Stand Replacement Events" and "Suitable Habitat Condition".

Rationale: Salvage activities would promote the long-term survival and growth of new conifers by reducing fuel loads to a sustainable level for eastside forests that reduces the likelihood of stand-replacement fire in newly regenerated stands, particularly during the early stages of stand development.

Enhancement Activities and Other Activities for Management of Regenerated Areas for All Groups

Emphasize management of regenerated stands to accelerate growth as a means to return to LOS more quickly. Refer to the LOS Enhancement Strategies section located in Chapter 3 which describes appropriate treatments. Deviations from these methods may occur on a site-specific basis to meet specific wildlife objectives, e.g. hiding cover in deer and elk fawning and calving grounds. (Short and Long-term)

Fire Suppression

A fire strategy was developed that considers and prioritizes suppression activities (or tactics) by MSA in such a way to provide guidance that minimizes potential adverse effects to the most important values at risk while adhering to the main goals. The protection of human life and property will always be the number one priority. The following provides guidance for the appropriate suppression response:

- Protect Willamette Pass Ski area and recreation residences along Highway 58.
- Protect Princess Creek and Sunset Cove campgrounds.
- Protect known bald eagle nests along Highway 58 and the east side of Davis Lake.
- Protect northern spotted owl home ranges.
- Minimize the loss of LOS habitats.
- Limit the fire spread by the use of Minimum Impact Suppression Tactics (MIST) and guidance found in the Deschutes National Forest Fire Management Action Plan.
- Minimize the expenditures of suppression costs when feasible.
- Utilize the most knowledgeable and available District Resource Advisors when suppression actions lend an opportunity.

Riparian Areas

Manage areas consistent with the Aquatic Conservation Strategy and Odell Pilot Watershed Analysis.

Soils

Protect and enhance long-term site productivity. (Short and Long-term)

Wildlife and Botanical

Emergency habitat protection (i.e. fire suppression) takes precedence over protection of individual special status plants or animals in coordination with local district resource specialists.

Invasive plants

- Aggressively control or eliminate invasive plants according to current direction in regional and sub-regional invasive plant EISs in MSAs I (spotted, diffuse and meadow knapweeds; Dalmatian toadflax; butter and eggs; Canada and bull thistles; Scot's broom; Klamath weed; tansy ragwort; common mullein; kochia), and O (spotted and diffuse knapweeds, Canada and bull thistles, Scot's broom, Klamath weed, ox-eye daisy, common mullein).

Access

A roads analysis is necessary. Reduce current levels of density and access on roads through roads analysis to target levels in Chapter 3. Maintain existing access on trails, unless monitoring indicates that they have detrimental impacts to LOS plant and/or animal species.

Monitor -- Use of the MSA group by forest carnivores as funding is available.

Monitor -- Motorized closure areas in the Davis Fire and snowmobile use during the winter months.

MONITORING, EVALUATION, AND RESEARCH

- Conduct annual monitoring of spotted owl and bald eagle activity. Monitor site occupancy, nesting, and reproductive success.

- Pursue research in spotted owl use of "near-NRF" and fuels treatment areas.

Lodgepole for Black-backed Woodpecker and Connectivity

MSAs: A, D, R

Figure 4-5. Lodgepole Pine for BBWP; MSAs A, D, R

EXISTING CONDITION

Wildlife

***Emphasis Species* -- Black-Backed Woodpecker**

The majority of the habitat in these MSAs is current and potential black-backed woodpecker habitat. The black-backed woodpecker primarily utilizes LOS stands in the lodgepole pine plant association group (PAG). These three MSAs are characterized as scattered and isolated in the Lodgepole pine plant Association Group (less than 1,000 acre blocks in LOS each). It is recognized that adjoining MSAs provide the contiguous blocks of habitat needed by these species.

Selected Other Species

- Intersects home ranges of three known northern spotted owl pairs and connectivity areas.
- Great gray owl habitat.
- Potential marten habitat and wildlife travel corridor.

- Moore Creek contains potential habitat for bats, neotropical migratory birds, and amphibians.
- Northern goshawk home range territory.

Early Seral/LOS
Currently across the MSA group, 24 percent exists in an early-successional condition due to past regeneration harvest and the stand replacement portion of the Davis Fire. Late- and old-successional forest occurs in 41 percent of the MSA group. For a complete breakdown of vegetative structure by plant association group, more discussion follows.

Total road densities vary from moderate to high within this MSA group (Table 4-31). The lowest road density is 1.36 mi/mi² in MSA A and the highest is in MSA R with 4.09 mi/mi² affecting the amount and quality of habitat available. Potential for reducing roads exists.

Table 4-31. Total Road Density in Miles per Square Mile in Lodgepole for Black-backed Woodpecker and Connectivity.

MSA	Total Road Density	Minimum (If only two-digit and four-digit roads are open)
A	1.36	0
D	3.16	1.66
R	4.09	1.9

Black-Backed Woodpecker Habitat
Dead or live trees with dead heartwood provide nesting and feeding sites. The strongest Oregon nesting habitat associations are in (1) lodgepole pine forest, (2) ponderosa-lodgepole pine on pumice, and (3) edges of recently harvested and burned forest (Adamus et al. 2001, Beal and McAtee 1912, DeGraff et al. 1980, Forbush and May 1955, Johnsgard 1979, Miller 1999, Shunk 2004, Thomas et al. 1979). Black-backed woodpeckers prefer generally higher snag densities. Tolerance levels in DecAid specify 50 percent of the individuals studied utilize snags greater than 10 inches in diameter at snag densities greater than 13.5 snags per acre; and 80 percent at densities greater than 29 snags per acre (Mellen et al 2006). Within this MSA group, most of the 997 acres of habitat is thought to provide for black-backs at the 30-50 percent tolerance interval of 2.5-13.5 snags per acre. Only 53 acres of MSA R is in Davis Fire and provides little burned habitat.

Snags and Down Woody Debris
The major habitat type in the MSA group is Lodgepole Pine Dry (LPD). Across the larger watershed[16], high snag densities are at the low end of the reference condition. Acres of medium snag densities are at the high end or exceeding the reference conditions of snags greater than or equal to 10 inches in diameter. See appendix C for a description of snag and down log analysis. Densities for snags greater than or equal to 20 inches in diameter range from very low to within reference conditions over much of the area. The higher densities within reference conditions are likely due to riparian areas, where the biological capability allows lodgepole pine to grow to larger sizes (Table 4-32).

Table 4-32. Distribution of Snags for MSAs A, D, and R.

[16] Subwatersheds that were partially or completely within the LSR were used for the larger landscape to give sufficient scale to compare with reference conditions developed with information from DecAID.

Distribution of Snags ≥10" (25.4cm) dbh in LPD			
Density	% of Area		
Snags per Acre	Ref. (Min.)	Ref. (Max.)	Existing
0	21	34	10
0-6	11	19	41
6-12	11	20	32
12-24	10	15	10
24-36	4	10	5
36+	4	9	3

Reference Condition developed from information from DecAID tables (unharvested plots for snags ≥10" dbh (25.4cm) LP_S/M.Inv-14, and modified with HRV information found in the Odell Pilot WA. Existing condition imputed stand exam data with INFORMS

Distribution of Snags ≥20" (50.8cm) dbh in LPD			
Density	% of Area		
Snags per Acre	Ref. (Min.)	Ref. (Max.)	Existing
0	36	80	44
0-2	4	8	51
2-4	5	10	2
4-6	1	4	1
6-10	1	2	1
10-18	0	1	1
18+	0	0	0

Reference condition developed from information from DecAID tables (unharvested plots for snags ≥20" dbh (50.8cm) LP_S/M.Inv-15, and modified with HRV information found in the Odell Pilot WA. Existing condition imputed stand exam data with INFORMS

Across the landscape in LPD, down wood densities exceed reference conditions at the low densities and do not meet reference conditions for medium and high down wood densities. As snags fall in the portion of Davis Fire where no salvage occurred, levels would meet or exceed reference conditions (Table 4-33).

Table 4-33. Distribution of Down Wood for MSAs A, D, and R.

% of Landscape for LPD dwd ≥6" (15.24cm) dbh			
Density	% of Area		
% Cover	Ref. Min.	Ref. Max.	Existing
0	4	14	22
0-4	37	55	74
4-8	14	23	4
8-10	4	7	0
10-16	4	8	0

Information from DecAID tables (unharvested plots for down wood ≥5" dbh (12.7cm) LP_S.Inv-16, and modified with HRV information found in the Odell Pilot WA.

Botanical

Fungi

In this MSA group, potential habitat for special status fungal species in this MSA group occurs in these PAGs: lodgepole high elevation, lodgepole dry, lodgepole wet, mixed conifer dry, mixed conifer wet, and ponderosa pine. Potential habitat for *Rhizopogon truncatus* occurs in MSAs D and R.

Mosses, Liverworts, and Lichens

Potential habitat exists for special status moss, liverwort, and lichen species along Moore Creek. There are no known moss, liverwort, or lichen sites within this MSA group.

Invasive Plant Species
There are known invasive plant species in this MSA group. Bull thistle and common toadflax are found in MSA R along road 62. There is potential habitat for invasive plant species along roads and in harvest units throughout this MSA group.

See Botanical section Chapter 2 for additional information (Tables 2-7 and 2-8).

Invertebrates

Mollusks
Potential habitat for special status mollusks exists in Moore Creek. There are no known sites in the Davis LSR.

For more information, reference the Invertebrate section in Chapter 2.

Forest Dynamics

PAG(s) and Structural Stages
This MSA group is dominated by lodgepole pine (72 percent) with a majority (76 percent) of mid- and late-successional structure. Out of the total 2,204 acres, 44 percent (964 acres) is LOS, 37 percent (816 acres) is mid-successional stage and 18 percent (409 acres) is early-successional structure. There are small amounts of mixed conifer (17 percent), ponderosa pine (1 percent) and mountain hemlock (10 percent) plant associations within this MSA group. The following Table 4-34 displays percentage of MSAs A, D, and R by Plant Association Group and Structure for connectivity discussions.

Table 4-34. Percentage of MSA Group by PAG and Structure.

PAG	Structural Stage	A	D	R	TOTAL	% of MSA Group
Mixed conifer	Early	1	5	72	78	
	Mid	34	2	42	78	
	LOS	73	6	143	222	
	TOTAL	**108**	**13**	**257**	**378**	**17%**
Ponderosa Pine	Early	0	0	0	0	
	Mid	0	4	0	4	
	LOS	0	15	0	15	
	TOTAL	**0**	**19**	**0**	**19**	**1%**
Lodgepole	Early	13	140	162	315	
	Mid	281	196	194	671	
	LOS	134	313	156	603	
	TOTAL	**428**	**649**	**512**	**1589**	**72%**
Mountain Hemlock	Early	16	0	0	16	
	Mid	63	0	0	63	
	LOS	139	0	0	139	
	TOTAL	**218**	**0**	**0**	**218**	**10%**
Non Forest	**TOTAL**	**0**	**0**	**0**	0	
Total Acres		**754**	**681**	**769**	**2204**	

Note: Shaded areas represent the Davis Fire which burned portions of both MSAs, however, a very small portion of MSA D and MSA R (northern extent) is within the fire area.

Table 4-35. Distribution of NRF within Capable Plant Associations for MSAs A, D, and R.

NRF	MSA	A			D			R		
	Acres /Acres Burned*	754			681 / *6*			769 / *53*		
PAG	**PA**	**Capable**	**Existing**	% Existing /Capable	**Capable**	**Existing**	% Existing /Capable	**Capable**	**Existing**	% Existing /Capable
MCD	CRS1-11							13	6	46%
	CWC2-11									
	CWH1-11							244	34	14%
	CWS1-14									
	CWS1-15	10	7	72%	12	3	25%			
MCD Total		**10**	**7**	**70%**	**12**	**3**	**25%**	**257**	**40**	**16%**
MCW Total		**96**	**31**	**32%**	**1**	**0**	**0%**	**0**	**0**	**0%**
MHD	CMS1-11	218	65	30%	0	0	0%			
MHD Total		**218**	**65**	**30%**	**0**	**0**	**0%**	**0**	**0**	**0%**
ALL OTHERS		0	12							
Total NRF		**324**	**115**	**35%**	**13**	**3**	**23%**	**257**	**40**	**16%**

***Stand Replacement** In Davis Fire

Summary of Trends

MSA A

- The lodgepole pine areas have experienced little active management. This trend is expected to continue into the foreseeable future.
- Forested stands are moving towards late seral stages except where mountain pine beetles have moved lodgepole pine stands towards earlier seral stages.
- Stand structures are becoming more complex as forested stands move towards later seral stages and as lodgepole stands develop multiple layers as a result of beetle activity.
- Susceptibility to stand replacement events caused by insect, disease, and fire is increasing on most of the passively-managed stands.
- Mixed conifer dry stands where true firs are the prime understory component, are particularly at risk for stand replacement events from disturbance processes. These stands are desirable as LOS stands, however, they are unstable, highly susceptible to change events, and less resilient in responding/recovering from large-scale disturbance events.

MSAs D and R

- Lodgepole pine areas have experienced extensive active management.
- Forested stands are moving towards late seral stages except where mountain pine beetles and/or the Davis Fire have moved lodgepole pine stands towards earlier seral stages.
- Large tree-dominated stands have been reduced through both active management and competition between overstory trees with the ingrowth of pole-sized smaller trees. This trend is continuing, especially in the ponderosa stands where lodgepole pine is becoming established and competing with the overstory ponderosa pine to a level where the overstory is at risk to stress and subsequent insect attack.
- Susceptibility to stand replacement events caused by a disturbance event is increasing on most of the passively-managed and unburned stands.
- Stand structures are becoming more complex as forested stands move towards later seral stages and as lodgepole stands develop multiple layers as a result of beetle activity.

Soils
MSA A is considered low priority for soil restoration as it has less than 10 percent of the area in detrimental soils conditions from past management activities. No soil restoration activities have occurred.

MSA D is considered a high priority for soil restoration as it has more than 20 percent of the area in detrimental soils conditions from past management activities. Soil restoration activities have occurred over 7 percent of the area.

MSA R is considered a "moderate" priority for soil restoration and has between 10-19 percent of the area in detrimental soils conditions from past management activities. No soil restoration activities have occurred.

Access
Motorized vehicles are allowed on all open roads and designated routes. Open road densities (Operational) range from 2.1 to 4.1 mi/mi² (Table 4-36). Operationally, open roads densities exceed objectives or recommendations in MSA R. Over the snow vehicles, or other mechanized wheel vehicles are allowed off the road outside the Davis Fire Closure area. However, the desire is to eventually restrict them to designated routes throughout the LSR. There are no restrictions to horseback riding and cross-country skiing.

Table 4-36. Open Road Densities in Miles per Square Mile.

MSA	Objective Open Road Density	Operational Open Road Density	Davis Fire Roads Analysis Open Road Density
A	1.36	1.36	--
D	2	2	--
R	2.56	3.49	--

Fire Management -- MSA A

TOTAL ACRES: 769
ELEVATION RANGES: 4800-5200FT
GEOGRAPHIC LOCATION: Moore Creek
ADJACENT MSAs: C & B
SPECIAL AREAS OF CONCERN: Moore Creek riparian resources, NSO activity center and NRF.
PAGs: LPD, MHD, MCW

Table 4-37. Historic Fire Regime and Current Condition Class for MSA A.

PAG	Fire Regime	Condition Class
LPD	III	II
MCW	III	II
MHD	V	I

HAZARD ANALYSIS - The decadence in the lodgepole pine PAG is the greatest factor in rating this MSA as "moderate."

RISK ANALYSIS – The risk for this MSA is considered "low" due to limited access and human presence. Lightning and human-caused ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: NSO activity centers and associated NRF
Priority 2: Moore Creek riparian areas and wildlife connectivity as identified in Chapter 2.

There are no "fuels only" activities identified at this time. It is not identified as strategic for fire behavior modification.

MSA D
TOTAL ACRES: 675
ELEVATION RANGES: 4400-4600 FT.
GEOGRAPHIC LOCATION: Moore Creek
ADJACENT MSAs: C, F, E, G & H
SPECIAL AREAS OF CONCERN: Riparian area associated with Moore Creek, Designated Old-Growth Management Area
PAGs: PPD, LPD

Table 4-38. Historic Fire Regime and Current Condition Class for MSA D.

PAG	Fire Regime	Condition Class
LPD	III	II
PPD	III	III

HAZARD ANALYSIS
The decadence in the lodgepole pine Plant Association Group is the greatest factor in rating this MSA as "moderate".

RISK ANALYSIS
The risk for this MSA is considered "low" due to limited access and human presence. A lava flow bordering the southern extent contributes to the isolation. Lightning and human-caused ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: NSO activity centers and associated NRF, Designated Old Growth Management Area
Priority 2: Moore Creek riparian areas and wildlife connectivity as identified in Chapter 2, big game calving and fawning, especially within the wet lodgepole pine plant association.

There are no "fuels only" activities identified at this time.

MSA R
TOTAL ACRES: 768
ELEVATION RANGES: 5000-5200 FT.
GEOGRAPHIC LOCATION: - Saddle Butte
ADJACENT MSAs: Q, S, & T
SPECIAL AREAS OF CONCERN: NRF & NSO connectivity
PAGs: LPD

Table 4-39. Historic Fire Regime and Current Condition Class for MSA R.

PAG	Fire Regime	Condition Class
LPD	III	III

HAZARD ANALYSIS
The decadence in the lodgepole pine Plant Association Group is the greatest factor in rating this MSA as "moderate". The Davis Fire burned a very small portion of the northern extent.

RISK ANALYSIS
The risk for this MSA is considered "low". Although there is more access than provided MSAs A and R, the topography and level of human presence contribute to this rating. Lightning and human-caused ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: NSO activity centers
Priority 2: Regenerating stands which contribute to future NSO connectivity in this MSA.

There are no "fuels only" activities identified at this time. It is not identified as strategic for fire behavior modification.

Table 4-40. Summary of Current Condition for MSAs A, D, R.

MANAGEMENT STRATEGY AREA - EXISTING CONDITION			
	A	D	R
Total Acres	769	675	768
Elevation Range (ft)	4,800-5,200	4,400-4,600	5,000-5,200
PAGS -- Mixed Conifer 17%, Ponderosa Pine1%, Lodgepole Pine 72%, Mountain Hemlock 10%			
Land Allocation -- General Forest, Designated Old Growth Area, Scenic Views, Dispersed Recreation			
Landscape Area -- Central Conifer Association (Odell WA)			
Wildlife -- northern spotted owl, northern goshawk, pileated woodpecker, American marten, bats, NTMBs, amphibians, black backed woodpecker, osprey, great blue heron			
Botanical --Potential habitat for *Rhizopogon truncatus* occurs in MSAs D, and R			
early seral %	4%	21%	30%
LOS %	46%	46%	39%
Forest Density	High	High	Mod.
Soil Restoration Priority	Low	High	Mod.
Fire Hazard	Mod.	Mod.	Mod.
Fire Risk	Low	Low	Low
Total Road Density	1.36	2	2.56
Activities -- Moore Creek Trail, Metolius-Windigo horse trail, Snowmobile trail traverses area, hunting, scenic views			
Commodities -- Wood products, special forest products			

CRITERIA FOR DEVELOPING APPROPRIATE TREATMENTS

Desired Condition

MSAs A and R
Provide a sustainable LOS forest ecosystem through time that supports the diverse species associated with these MSAs. Use adjoining MSAs and lodgepole pine plant associations outside the LSR to provide the contiguous habitat needed by the black-backed woodpecker. Manage to provide and maintain a healthy riparian system according to the Aquatic Conservation Strategy.

MSA D
In stands that have the site potential, manage to obtain or move towards the conditions for suitable ponderosa pine fire-climax while meeting the following characteristics:

1) Dominant or co-dominant trees are greater than 35 inches in diameter;
2) Have a limb structure that will support a nest and provide a view of the primary foraging area;
3) Stand size, density, and canopy sufficient to provide a visual buffer from human disturbance and protection from nest and nest trees blowing down (Anthony and Isaacs 1989); and
4) Suitable replacement trees are developing in the stands.

Objective

Short-term (0-30 years) in all areas:

- Aggressively control or eliminate invasive plants in all MSAs where they exist, according to current direction in regional and sub-regional invasive plant EISs.
- Abate hazardous fuels along major (two and four digit) roads.

Short-term (0-30 years), within the area to the **west of the Davis Fire**:

- Provide adequate habitat to support emphasis and selected species;
- Reduce potential for adverse fire effects to the adjacent MSAs;
- Reduce habitat fragmentation as soon as possible and accelerate development of dispersal habitat within regenerated areas; and
- Provide habitat connectivity between NRF habitat and NSO home ranges.

Short-term (0-30 years), for **areas within the Davis Fire**:

- Provide restoration opportunities to enhance the return of forested conditions to provide a vegetative structure suitable for the variety of wildlife uses mentioned in Chapter 3;
- Provide optimal habitat, within limitations of the existing condition, for emphasis and selected species;
- Accelerate development of LOS conditions within regenerated areas for NSO dispersal habitat; and
- Optimize the development of LOS lodgepole pine in the regenerated stands in the key elk areas identified in Chapter 3.

Long-term (30+ years), **within areas inside and outside of the Davis Fire**:

- Provide a large contiguous block of LOS lodgepole pine through time that alternates between the various MSAs (A, D, R and adjoining). Other portions should be in earlier seral stages to provide a cycling of these conditions on the landscape through time.
- Maintain the different portions of the MSAs on different cycles of usually 3-5 decades apart.
- Use passive management in all current LOS lodgepole pine areas, except where risk reduction activities are needed for adjacent MSAs.

Rationale: The LSRA team believes that this strategy would be the most viable option to ensure maintenance of the lodgepole habitat across the landscape in the long-term. Most all regenerating areas would have an emphasis to reduce habitat fragmentation and provide future NSO dispersal habitat, therefore, to provide the large, contiguous (1,000 acres or greater) habitat for the black-backed woodpecker. Adjoining MSAs and adjacent lodgepole pine plant associations outside the LSR would be used to provide the rotation through time.

MANAGEMENT OPTIONS AND TREATMENT TRIGGERS OR EVALUATION POINTS

Risk Reduction Activities through Management of Forested Areas

- For lodgepole pine, allow large contiguous patches to go through normal disturbance cycling to provide optimal habitat for emphasis and selected species. The exception would be in MSA R, where an area of lodgepole pine creates a hazard to an upland home range on Hamner, Ringo and Saddle Butte NSO Home Ranges. Implement risk reduction activities to reduce fuels hazard by removing down, dead lodgepole within the following parameters:
  -- Actively manage only the portions needed to be effective fuels modification area of the MSAs in the next 30 years.
  -- Prioritize areas that have the greatest potential to provide fire protection for targeted areas to protect.
  -- Retain levels of down woody debris consistent with the levels indicated in Table 3-10.
  -- Retain slash and landing piles sufficient for marten habitat. (Long-term -- throughout the MSAs)

- In the mixed conifer, where the Desired Condition exists and is believed to be sustainable, passive management is appropriate at this time, especially within NSO home ranges. The exception is if in the future these areas are identified as strategic for fire behavior modification, then the following would apply:

  --- The option for stand management of current NRF status within the home range radius of the spotted owl is as follows: Only low impact activities (such as small diameter thinning) that retain NRF habitat are appropriate, unless stands begin to lose the desired structural components at catastrophic levels. (Short-term)

  Rationale: Low percentage of NRF habitat and early seral conditions within the home range radius make further degradation of habitat undesirable in the short-term. Known preventive measures for reduction of problem fire events, such as small diameter fuels reduction and small diameter thinning, would not decrease the suitability of the habitat for emphasis species. It is believed that the potential benefits of risk reduction outweigh a small change to NRF habitat.

Snags and Down Woody Debris

- Within the context of individual stand site potential, maintain coarse woody debris and snags at levels indicated in the Suitable Habitat Condition tables 3-4 and Additional Guidance for Dead Wood Management section located in Chapter 3, except in hazard abatement areas along major roads where Tables 3-8 through 3-10 apply. (Short and Long-term)

- It is expected that when the long-term objectives for this MSA are met, natural processes will make snag and down woody debris management unnecessary. (Long-term)

Fuels Management
Abate hazardous fuels along major (two and four digit) roads by thinning small diameter trees and reducing ground and ladder fuels for approximately 100 feet.

Salvage After a Stand Replacement Event
Guidance can be found in Chapter 3 under the heading "Salvage Activities after Stand Replacement Events" and "Suitable Habitat Condition":

- In lodgepole pine, delay risk reduction/salvage activities for the first 5-7 years after the event to maintain for the black-backed woodpecker habitat unless the newest science suggests otherwise.
- In mixed conifer and ponderosa pine, if wide-scale loss of habitat occurs and the stand characteristics of the replacement event can no longer achieve LOS status within a century, regardless of outside or within NSO home ranges, salvage activities may be appropriate if the overall objective is to accelerate achievement of LOS.

  Rationale: Salvage activities would promote the long-term survival and growth of new conifers by bringing fuel loads to a sustainable level for eastside forests that reduces the likelihood of stand-replacement fire in newly regenerated stands, particularly during the early stages of stand development. (Short and Long-term)

Enhancement Activities and Other Activities for Management of Regenerated Areas for All Groups
Throughout the MSA group, emphasize management of regenerated stands to accelerate growth as a means to provide dispersal habitat and LOS conditions more quickly. Refer to the LOS Enhancement Strategies section located in Chapter 3 which describes appropriate activities. Deviations from these methods may occur on a site-specific basis to meet specific wildlife objectives, e.g. to provide hiding cover in deer and elk fawning and calving grounds and/or strategic fire behavior modification. (Short and Long-term)

Fire Suppression
A fire strategy was developed that considers and prioritizes suppression activities (or tactics) by MSA in such a way as to provide guidance that minimizes potential adverse effects to the most important values at risk while adhering to the main goals. The protection of human life and property will always be the number one priority. The following provides guidance for the appropriate suppression response:

- Protect adjacent NSO home ranges from fires in this MSA group.
- Consider adjacent NSO home ranges in fire suppression strategy and tactics.
- Protect fawning/calving areas from fire, especially in the wet lodgepole pine PAG
- Limit the fire spread by the use of Minimum Impact Suppression Tactics (MIST) and guidance found in the Deschutes National Forest Fire Management Action Plan.
- Minimize the expenditures of suppression costs when feasible.
- Utilize the most knowledgeable and available District Resource Advisors when suppression actions lend an opportunity.

Riparian Areas
Manage areas consistent with the Aquatic Conservation Strategy and Odell Pilot Watershed Analysis. If there is an opportunity to maintain or enhance meadow resources in MSAs A or D around Moore Creek, prescribed burning and/or removal of encroaching trees is appropriate.

Soils
MSA D is the highest priority for soil restoration followed by MSA R.

Wildlife and Botanical
In coordination with local district resource specialists, emergency habitat protection (i.e., fire suppression) takes precedence over the protection of individual special status plants or animals.

Invasive Plants

- Promote use of weed-seed-free-feed to prevent the introduction and spread of invasive plants on the Metolius-Windigo Trail.
- Aggressively control or eliminate bull thistle along Road 62 in MSA R

Access
Seek opportunities to reduce the level of access by using a roads analysis to target levels in Chapter 3. Maintain existing access on trails, unless monitoring indicates that they have detrimental impacts to LOS plant and/or animal species. Restrict motorized summer and winter use to existing designated trails.
.

MONITORING, EVALUATION, AND RESEARCH

Conduct annual monitoring of spotted owl presence and reproductive success.

The following opportunities for evaluation and research would be conducted as funding is available:

- Conduct surveys to confirm presence and/or habitat utilization of the black-backed woodpecker.
- Conduct surveys to monitor carnivore use of the area.

Mixed conifer/lodgepole/ponderosa for bald eagle, great gray owl, and/or black-backed woodpecker

MSA: G, H, N

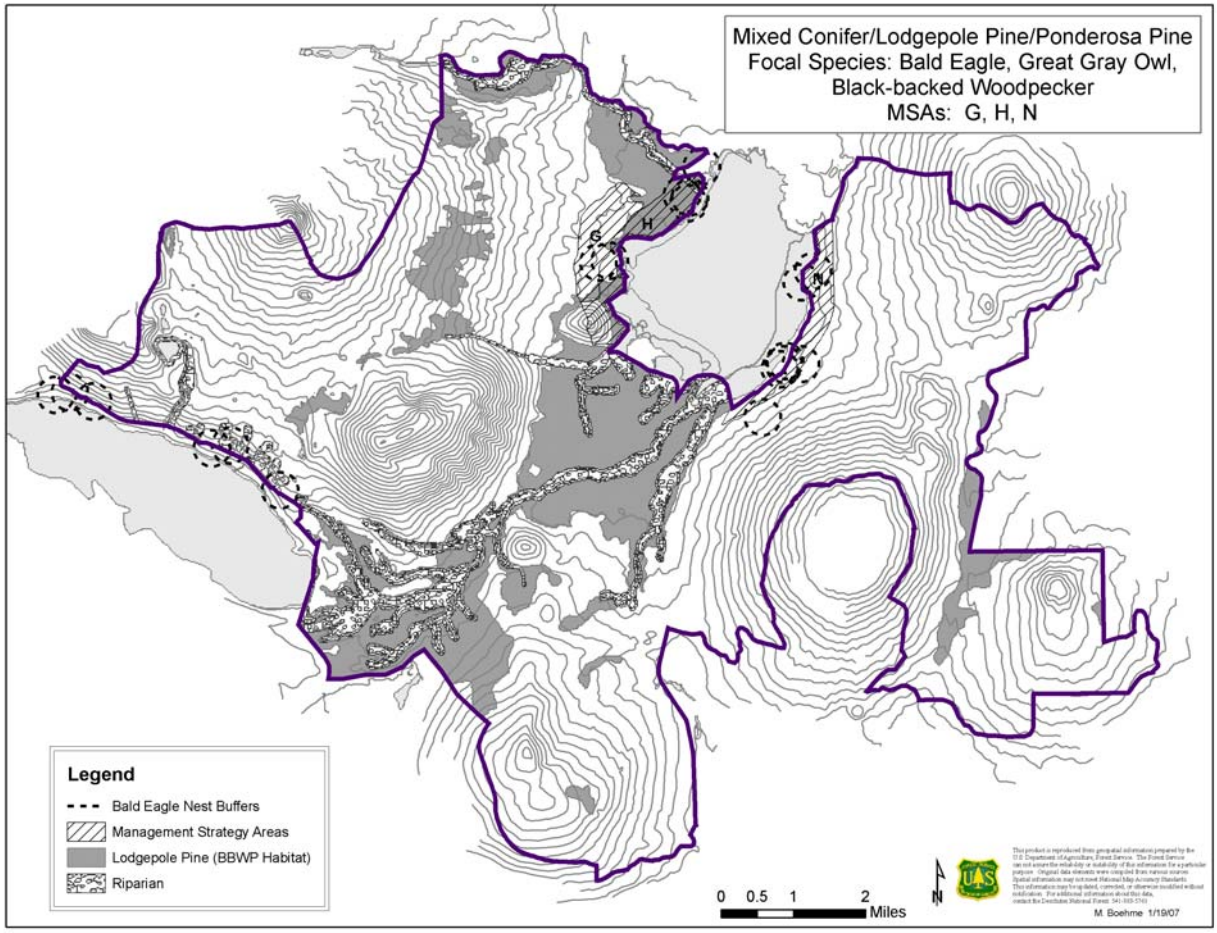


Figure 4-6. Mixed conifer/lodgepole/ponderosa pine for bald eagle, great gray owl and black-backed woodpecker.

EXISTING CONDITION

Wildlife

***Emphasis Species* -- bald eagle, great gray owl, and/or black-backed woodpecker**
These MSAs contain Bald Eagle Management Areas (BEMA), great gray owl habitat, and black-backed woodpecker habitat. The BEMA has potential nest, foraging, and perch sites. The black-backed woodpecker primarily utilizes late- and old-growth stands in the lodgepole pine PAG.

Selected Other Species

- Spotted owl habitat
- Flammulated Owl habitat
- Potential habitat for bats, neotropical migratory birds, and amphibians

Early Seral Condition

Currently across the MSA group, 1,088 acres (67 percent) exists in an early-seral condition due to past regeneration harvest and the stand replacement portion of Davis Fire. Late- and old-successional forest conditions occur in 24 percent of the MSA group. Road density is considered high. MSA G has 57 acres (12 percent) in early seral and was not burned by the Davis Fire. Nearly 100 percent of MSA H reverted to an early seral condition as a result of the fire, and for MSA N, 398 acres (77 percent). For a complete breakdown of vegetative structure by plant association group, more discussion follows.

Total road densities vary greatly within this MSA group (Table 4-41). The low is 2.36 mi/mi² in MSA H and the high in MSA G with 7.98 mi/mi² affecting the amount and quality of habitat available. Potential for reducing road density exists.

Table 4-41. Total Road Density in miles/square mile in Mixed Conifer/Lodgepole/Ponderosa Pine.

MSA	Total Road Density	Minimum (If only two-digit and four-digit roads are open)
G	7.98	0.99
H	2.36	1.56
N	5.22	1.32

Northern Bald Eagle Habitat

Bald eagles prefer to nest, perch, and roost primarily in old-growth and mature stands of conifers or hardwoods. Eagles usually select the oldest and tallest trees that have good visibility, an open structure, and are near prey. They use Odell Creek as a corridor between Odell and Davis Lakes.

Northern Spotted Owl Habitat

Very little habitat for the NSO exists or is capable (47 and 289 acres, respectively). For this MSA group, dispersal and connectivity is important.

Table 4-42. Distribution of NRF within Capable Plant Associations for MSAs G, H, and N.

NRF	MSA	G			H			N		
	Acres /*Acres Burned**	466			639 / *512*			515 / *243*		
PAG	**PA**	Capable	Existing	% Existing /Capable	Capable	Existing	% Existing /Capable	Capable	Existing	% Existing /Capable
MCD	CRS1-11									
	CWC2-11									
	CWH1-11	4	0	0	78	0	0%	12	12	100%
	CWS1-14									
	CWS1-15	195	2	1%						
MCD Total		**199**	**2**	1%	**78**	**0**	0%	**12**	**12**	100%
MCW Total		**0**	**0**	0%	**0**	**0**	0%	**0**	**0**	0%
MHD	CMS1-11		0	0%						
MHD Total		**0**	**0**	0%	**0**	**0**	0%	**0**	**0**	0%
ALL OTHERS			20						13	
Total NRF		**199**	**22**	11%	**78**	**0**	0%	**12**	**25**	208%
***Stand Replacement**			In Davis Fire							

Great Gray Owl Habitat
Great Gray Owls prefer dense forests interspersed with open meadows, clearings, or bogs.

Black Backed Woodpecker Habitat
Black-backed woodpeckers prefer dead or live trees with dead heartwood for nesting and feeding sites. The strongest Oregon nesting habitat associations are in (1) lodgepole pine forest, (2) ponderosa-lodgepole pine on pumice, and (3) edges of recently harvested and burned forest (Adamus et al. 2001, Beal and McAtee 1912, DeGraff et al. 1980, Forbush and May 1955, Johnsgard 1979, Miller 1999, Shunk 2004, Thomas et al. 1979.)

Snags and Down Woody Debris
The major habitat type in the MSA group is eastside mixed conifer (EMC). Across the larger watershed[17], the percentage of acres in high snag densities is at the high end of the reference condition. Medium snag density areas are at the high end or exceed the reference conditions in snags greater than or equal to 10 inches in diameter. Snag density areas for snags greater than or equal to 20" dbh are within reference condition or exceeding reference conditions at extremely low density areas. Medium and high snag density areas are within reference conditions or exceed reference conditions for snags greater than or equal to 20 inches in diameter. See Appendix C for description of snag and down log analysis.

Table 4-43. Distribution of Snags in MSAs G, H, and N.

Distribution of Snags ≥10" (25.4cm) dbh in EMC			
Density	% of Area		
Snags per Acre	Ref. (Min.)	Ref. (Max.)	Existing
0	18	24	10
0-6	27	31	17
6-12	15	17	28
12-24	16	23	22
24-36	6	10	6
36+	5	7	17

Reference Condition developed with information from DecAID tables (unharvested plots for snags ≥10" dbh (25.4cm) EMC_ECB_O.Inv-14., EMC_ECB_S.Inv-14, EMC_ECB_L.Inv-14, and modified with HRV information found in the Odell Pilot WA. Existing condition imputed stand exam data with INFORMS

Distribution of Snags ≥20" (50.8cm) dbh in EMC			
Density	% of Area		
Snags per Acre	Ref. (Min.)	Ref. (Max.)	Existing
0	5	63	17
0-2	2	26	48
2-4	3	26	15
4-6	2	18	5
6-10	2	20	6
10-18	1	10	5
18+	0	3	5

Reference condition developed with information from DecAID tables (unharvested plots for snags ≥20" dbh (50.8cm) EMC_ECB_O.Inv-15., EMC_ECB_S.Inv-15, EMC_ECB_L.Inv-15, and modified with HRV information found in the Odell Pilot WA. Existing condition imputed stand exam data with INFORMS

Across the landscape in EMC, down wood density areas are below reference conditions at all densities except 0-4 percent density per acre where it exceeds reference condition. As snags fall in the portion of the Davis Fire that was not salvaged, conditions are expected to meet or exceed reference conditions.

[17] Subwatersheds that were partially or completely within the LSR were used for the larger landscape to give sufficient scale to compare with reference conditions developed with information from DecAID.

Table 4-44. Distribution of Down Wood in MSAs G, H, and M.

% of Landscape for EMC dwd ≥6" (15.24cm) dbh			
Density	% of Area		
% Cover	Ref. Min.	Ref. Max.	Existing
0	22	30	8
0-4	53	54	90
4-8	13	19	1
8-10	2	3	0
>10	1	3	0
Information from DecAID tables (unharvested plots for down wood ≥5" dbh (12.7cm) EMC_ECB_O.Inv-16., EMC_ECB_S.Inv-16, EMC_ECB_L.Inv-16, and modified with HRV information found in the Odell Pilot WA.			

Botanical

Fungi

Potential habitat for listed fungi species in this MSA group occurs in these PAGs: lodgepole high elevation, lodgepole dry, lodgepole wet, mixed conifer dry, mixed conifer wet, and ponderosa pine. Potential habitat for *Clavariadelphus ligula, Mycena overholtsii, Ramaria amyloidea,* and *Ramaria rubripermanens*, occurs in MSA N. Potential habitat for *Rhizopogon truncatus* occurs in MSAs G and H.

Mosses, Liverworts, and Lichens

Potential habitat exists for listed moss, liverwort, and lichen species within this MSA group, although there are no known sites.

Invasive Plant Species

There are known invasive plant species in this MSA group. Reed canarygrass occurs along the Davis lake shoreline in MSA H. Spotted and diffuse knapweeds, Canada thistle, bull thistle, Scot's broom, St. Johnswort, ox-eye daisy, and common mullein occur in MSA N along road 46. There is potential habitat for invasive plant species along roads and in harvest units throughout this MSA group.

See Botanical section in Chapter 2 for additional information.

Invertebrates

Mollusks

Potential habitat for listed mollusks (Crater Lake Tightcoil) in Moore Creek, although there are no known sites in the Davis LSR. See Invertebrate section in Chapter 2 for additional information.

Forest Dynamics

PAG(s) and Structural Stages

This MSA group is a mix of eastside mixed conifer (41 percent) lodgepole pine (30 percent), and ponderosa pine (29 percent) plant association groups. Within the MSA group, 24 percent is in late-successional, 8 percent is in mid-successional, and 67 percent is in early-successional stages.

Table 4-45. Plant Association Group and Structural Stages for MSAs G, H, and N.

		G	H	N	Total (acres)	% PAG	% MSA
Mixed conifer	Early	17	130	220	367	56%	
	Mid	57	0	3	60	9%	
	LOS	128	0	106	234	35%	
	TOTAL	**202**	**130**	**329**	661		41%
Ponderosa Pine	Early	35	48	178	261	56%	
	Mid	62	0	0	62	13%	
	LOS	135	2	8	145	31%	
	TOTAL	**232**	**50**	**186**	468		29%
Lodgepole	Early	5	455	0	460	94%	
	Mid	11	0	0	11	2%	
	LOS	16	0	0	16	3%	
	TOTAL	**32**	**455**	**0**	487		**30%**
Mountain Hemlock	Early	0	0	0	0	0%	
	Mid	0	0	0	0	0%	
	LOS	0	0	0	0	0%	
	TOTAL	**0**	**0**	**0**	0	0%	
Non Forest	**TOTAL**	**0**	**4**	**0**	4		**0%**
Total Acres		**466**	**639**	**515**	1620		

Summary of Trends
MSA Group

- Forested stands are moving towards later seral stages except where mountain pine beetles have moved lodgepole pine stands towards early-seral stage.
- Stand structures are becoming more complex as forested stands move towards later seral stages and as lodgepole, mixed conifer and ponderosa stands develop multiple layers.
- Susceptibility to stand replacement events caused by insect, disease, and fire is increasing on most of the stands that have not been actively managed.
- Mixed conifer dry stands, where true firs are the prime understory component, are particularly at risk for stand replacement events from disturbance processes. Although they are desirable as LOS stands, they are unstable, highly susceptible to change events, and less resilient in responding/recovering from large-scale events.

MSA G
Large tree-dominated stands have been reduced through harvest activities and competition of overstory trees with ingrowth of pole-sized understory. This trend is continuing, especially in the ponderosa stands where lodgepole pine is becoming established and competing with the overstory ponderosa pine to the point that much of the overstory is at risk of being lost to stress and subsequent insect attack.

MSA H

- Large tree-dominated stands have been reduced through the Davis Fire, harvest activities and competition of overstory trees with ingrowth of pole-sized understory. This trend is continuing, especially in the mixed conifer dry stands where lodgepole pine is becoming established and competing with the overstory ponderosa pine to the point that much of the overstory is at risk of being lost to stress and subsequent insect attack.

- Lodgepole pine areas have experienced stand replacement wildfire (Davis Fire). In the remaining unburned portion, the Davis Fire Recovery Project identified areas for small diameter thinning along the 4660 Road to strategically reduce risk and to accelerate achievement of LOS characteristics.

MSA N (BEMA)

- Large tree-dominated stands have been reduced through the Davis Fire, harvest, and competition of overstory trees with ingrowth of pole-sized understory. This trend is continuing in the mixed conifer dry stands, where lodgepole pine is becoming established and competing with the overstory ponderosa pine and Douglas-fir to the point that much of the overstory is at risk of being lost to stress and subsequent insect attack.
- Understory stands are very dense, creating initial stages of an overstory in decline. Competition is evident across the MSA. Damage agents include bark beetles, root rot, and fir engraver beetles, and they are beginning to affect the overstory ponderosa pine and Douglas-fir.

Soils
MSA G is considered a "moderate" priority for soil restoration with 10-19 percent of the area in a detrimental condition from past management activities. Soil restoration has occurred on 220 acres.

MSAs H and N are considered a "low" priority for restoration with less 10 percent of the area in a detrimental condition from past management activities. Very little soil restoration has occurred in both MSAs.

Access
Motorized vehicles are allowed on all open roads and designated routes. Over the snow vehicles and mechanized wheel vehicles are allowed off road outside the Davis Fire Closure area. The desire is for designated ATV and snowmobile trails (only) as routes through the LSR. Horseback riding and cross-country skiing is not restricted.

Early Seral

Access
Motorized vehicles are allowed on all open roads and designated routes. Open road densities (Operational) range from 1.89 to 5.22 mi/mi² (Table 4-46). Operationally open road densities exceed objectives or recommendations in all MSAs. Over the snow vehicles and mechanized wheel vehicles are allowed off road outside the Davis Fire Closure area. The desire is for designated ATV and snowmobile trails (only) as routes through the LSR. Horseback riding and cross-country skiing is not restricted.

Table 4-46. Open Road Densities in Miles per Square Mile in Mixed Conifer/Lodgepole/Ponderosa.

MSA	Objective Open Road Density	Operational Open Road Density	Davis Fire Roads Analysis Open Road Density
G	2.08	2.59	--
H	1.63	1.89	--
N	5.22	5.22	4.08

<u>Fire Management</u> -- MSA G
TOTAL ACRES: 466
ELEVATION RANGES: 4400-4600 FT.
GEOGRAPHIC LOCATION: Ranger Butte
ADJACENT MSAs: D, F, & H
SPECIAL AREAS OF CONCERN: Adjacent developed and dispersed recreation in MSA H at Davis Lake
PAGs: PPD

Table 4-47. Historic Fire Regime and Current Condition Class for MSA G.

PAG	Fire Regime	Condition Class
PPD	I	III

HAZARD ANALYSIS
The hazard in this MSA is considered high because the dense understory and fuel loading under large ponderosa pine overstory.

RISK ANALYSIS
The risk is considered low due to the adjacent MSA (H) is in an early-successional stage with low hazard and the low level of human presence. Lightning and human-caused ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: bald eagle nests
Priority 2: NSO connectivity as identified in Chapter 2

Estimated "fuels only" activities: This MSA has been identified for fire behavior modification as prescribed in the Davis Fire Recovery Project EIS for strategic risk reduction and acceleration of LOS characteristics.
Treatment acres: 85
Treatment type: Small diameter thinning, non-mechanical piling and disposal
Proposed Treatment yr: 2010 Thin, 2011 Handpile, 2012 Handpile burn
Estimated cost: 2010 - $7,500, 2011- $8,500, 2012 - $2,000
Total: $18,000

MSA H
TOTAL ACRES: 626
ELEVATION RANGES: 4400-4500 ft.
GEOGRAPHIC LOCATION: Ranger Butte/Moore Creek
ADJACENT MSAs: D, G & M
SPECIAL AREAS OF CONCERN: Bald Eagle Management Area, East and West Davis Campgrounds (adjacent to the LSR boundary).
PAGs: MCD, LPD

Table 4-48. Historic Fire Regime and Current Condition Class for MSA H.

PAG	Fire Regime	Condition Class
LPD	III	II
MCD	III	II
PPD	I	I

HAZARD ANALYSIS
This MSA overall hazard is considered "low". This area is within the perimeter of the Davis Fire. West of Road 4660, remaining unburned portions are in a dense stand condition with considerable down material. The area east of Road 4660 has returned to a Fire Regime I, Condition class I as a result of wildfire.

RISK ANALYSIS
Overall risk of ignition in this area is considered low until 2010, when the return of vegetation return and accelerated snag fall elevates the risk.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Bald Eagle Management Area and Moore Creek Trail NSO activity center
Priority 2: Riparian habitat associated with Moore and Ranger Creeks, NSO connectivity as detailed in Chapter 2.
Priority 3: Developed and dispersed recreation sites surrounding Davis Lake

No "fuels only" activities have been identified at this time.

MSA N
TOTAL ACRES: 521
ELEVATION RANGES: 4400-4600 FT.
GEOGRAPHIC LOCATION: Davis Lake
ADJACENT MSAs: O
SPECIAL AREAS OF CONCERN: North and South Lava Flow campgrounds, northern bald eagle nests, NRF

Table 4-49. Historic Fire Regime and Current Condition Class for MSA N.

PAG	Fire Regime	Condition Class
MCD	III	I (80%) / II (20%)
PPD	I	III

HAZARD ANALYSIS – At this time, there is a moderate hazard. Although the Davis Fire reduced much of the hazard, the remaining stands surrounding the Lava Flow Campground are dense and have an elevated crown fire potential.

RISK ANALYSIS – Risk for this MSA is considered moderate because of the level of human activity associated with the campground.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Lava Flow Campground
Priority 2: Northern bald eagle nests and regeneration within the Davis Fire
Priority 3: NSO connectivity as identified in Chapter 2.

Estimated "fuels only" activities: The Davis Fire Recovery Project EIS identified areas along Highway 46 for small diameter fuel reduction and prescribed burning for strategic risk reduction and for stand development with the appropriate fire regime.
Treatment acres: 107
Treatment type: Small diameter thinning, non-mechanical piling and disposal
Proposed Treatment yr: 2014 Thinning, 2014 Handpile, 2015 Handpile burn
Estimated cost: 2014 - $21,400, 2015 - $2,675
Total: $24,075

Table 4-50. Summary of Existing Condition for MSAs G, H, and N.

MANAGEMENT STRATEGY AREA - EXISTING CONDITION			
	G	H	N
Total Acres	466	626	521
Elevation Range (ft)	4,400-4,600	4,400-4,500	4,400-4,600
PAGS - Mixed Conifer Dry, Lodgepole Wet, Lodgepole Dry, and Ponderosa Pine Dry			
Land Allocation -- BEMA, General Forest, Special Interest Area, Davis Lake, Scenic Views, and Intensive Recreation			
Landscape Area(s) -- Central Conifer Association (Odell WA), Davis Lake (Odell WA),			
Wildlife -- Flammulated owl, white-headed woodpecker, marten, bats, NTMBs, amphibians, black-backed woodpecker, deer, and elk			
Botanical -- Potential habitat for listed fungi species in this MSA group occurs in these PAGs: lodgepole high elevation, lodgepole dry, lodgepole wet, mixed conifer dry, mixed conifer wet, and ponderosa pine dry. Potential habitat for *Clavariadelphus ligula, Mycena overholtsii, Ramaria amyloidea,* and *Ramaria rubripermanens* occurs in MSA N. Potential habitat for *Rhizopogon truncatus* occurs in MSA G and H.			
early seral %	12%	99%	77%
LOS %	29%	0%	22%
Forest Density outside Davis Fire	High	High	High
Soil Restoration Priority	Mod.	Low	Low
Fire Hazard	High	Low	Moderate
Fire Risk	Low	Low	Moderate
Total Road Density	2.08	1.63	5.22
Activities -- Snowmobile trail traverses area, known matsutake mushroom picking site, hunting, driving for pleasure			
Commodities -- Wood products, special forest products such as fungi			

CRITERIA FOR DEVELOPING APPROPRIATE TREATMENTS

Desired Condition

Develop and maintain a mosaic, multi-storied, LOS forested condition throughout the MSA group. Manage stands to obtain or move towards a "rotating" mixture of NRF and near-NRF habitat (descriptions located in Chapter 3). Lava Flow campground risk is such that an ignition originating from the campground has a low probability of becoming a stand replacement wildfire in the remaining large trees surrounding the campground and upslope.

Objective

Short-term (0-30 years) **in all areas**

- Aggressively control or eliminate invasive plants in all MSAs where they exist, according to current direction in regional and sub-regional invasive plant EISs.
- Abate hazardous fuels along major (two and four digit) roads.

Short-term (0-30 years), within the area to the **west of the Davis Fire**.

- Provide adequate habitat to support emphasis and selected species.
- Reduce potential for fire effects in the adjacent MSAs.

- Reduce early seral conditions as soon as possible and accelerate development of LOS conditions within regenerated areas.
- Provide habitat connectivity between the eastern and western halves of the LSR.

Short-term (0-30 years), **within areas in the Davis Fire**.

- Provide restoration opportunities to enhance the return of forested conditions to provide a vegetative structure suitable for the variety of wildlife uses mentioned in Chapter 3.
- Provide optimal habitat, within limitations of the existing condition, for emphasis and selected species.
- Accelerate development of LOS conditions within regenerated areas.
- Optimize the development of LOS lodgepole pine and NSO dispersal in regenerated stands.

Long-term (30+ years), **within areas inside and outside of the Davis Fire**.

- Provide a large contiguous block of LOS lodgepole through time that alternates between the various MSAs, i.e. while a given portion is in LOS, other portions should be in earlier seral stages to provide a cycling of these conditions on the landscape through time.
- Maintain the different portions of the MSAs on different cycles of usually 3-5 decades apart.
- Use a passive management scenario in forested and regeneration areas, except where activities are needed to help reduce risk to adjacent MSAs.

Rationale: The LSRA team believes that this strategy would be the most viable option to ensure maintenance of the lodgepole habitat across the landscape in the long-term. Most all regenerating areas would have an emphasis to reduce habitat fragmentation on and provide future NSO dispersal habitat, to provide the large, contiguous (1,000 acres or greater) habitat for the black-backed woodpecker. Adjoining MSAs would be used to provide the rotation through time.

MANAGEMENT OPTIONS AND TREATMENT TRIGGERS OR EVALUATION POINTS

Risk Reduction Activities through Management of Forested Areas

Lodgepole Pine Mature Stands
For lodgepole pine, allow large contiguous patches to go through normal disturbance cycling to provide optimal habitat for emphasis and selected species except where strategic fire behavior modification is desired (i.e. along road 4660). (Long-term – MSAs G and H)

Ponderosa Pine
In MSA G where the majority of the LOS exists, manage the stands with the goal for returning an appropriate fire regime. Design silvicultural prescriptions consistent with bald eagle management area objectives, to lessen the risk of an uncharacteristic disturbance event to protect surrounding MSAs.

Mixed Conifer
At this time, active management is only appropriate where fire behavior modification is strategic and necessary to protect surrounding MSAs. For example, reduction of stand density and modification of fuels would have the greatest potential surrounding Lava Flow Campground. The following parameters would apply:

- Design prescriptions to emphasize habitat for bald eagles

- Maintain a recreational spectrum of "Roaded-Natural" within the campground.
- Retain levels of down woody debris consistent with levels specified in Tables 3-4a or 3-4c, or Tables 3-8 and 3-9, Fuels Strategy.

Snags and Down Woody Debris
Within the context of individual stand site potential, maintain coarse woody debris and snags at levels indicated in the Suitable Habitat Condition tables 3-4 and Additional Guidance for Dead Wood Management section located in Chapter 3, except in hazard abatement areas along major roads where Tables 3-8 through 3-10 apply. (Short and Long-term)

It is expected that when the long-term objectives for this MSA are met, natural processes will make snag and down woody debris management unnecessary. (Long-term)

Fuels Management

- Abate hazardous fuels along major (two and four digit) roads by thinning small diameter trees and reducing ground and ladder fuels for approximately 100 feet.
- Continue small diameter fuel reduction identified in the Davis Fire Recovery Project EIS.

Salvage After a Stand Replacement Event
Guidance can be found in Chapter 3 under the heading "Salvage Activities after Stand Replacement Events" and "Suitable Habitat Condition":

- Within all MSAs, if wide-scale loss of habitat has occurred, salvage activities may be appropriate if the overall objective is to accelerate achievement of LOS status. Within the Mixed Conifer PAG, the trigger for salvage would be if achievement of LOS status is longer than 100 years. Within the lodgepole pine plant association, delay active management for 5-7 years for the black-backed woodpecker. (Short and Long-term)

  Rationale: Salvage activities would promote the long-term survival and growth of new conifers by bringing fuel loads to a sustainable level for eastside forests that reduces the likelihood of stand-replacement fire in newly regenerated stands, particularly during the early stages of stand development. (Short and Long-term)

Enhancement Activities and Other Activities for Management of Regenerated Areas for All Groups
Throughout the MSA group, emphasize management of regenerated stands to accelerate growth as a means to return to LOS more quickly and restoring the appropriate fire regime, where desired. These MSAs have a high level of visitation for recreation, therefore, in many areas, strategic fuels modification is appropriate. The Davis Fire Recovery EIS and ROD identified areas for thinning and fuels reduction adjacent to Highway 46 and Road 4660. Lava Flow Campground, where the Davis Fire did not burn, currently provides a pathway for stand replacement fire to upland MSAs O and Q, where remaining NSO habitat is vulnerable.

Deviations from these methods may occur on a site-specific basis to meet specific wildlife objectives, e.g. hiding cover in deer and elk fawning and calving grounds in MSA G and/or future identification of strategic areas for fire behavior modification. (Short and Long-term)

Fire Suppression
A fire strategy was developed that considers and prioritizes suppression activities (or tactics) by MSA in such a way to provide guidance that minimizes potential adverse effects to the most important values at

risk while adhering to the main goals. The protection of human life and property will always be the number one priority. The following provides guidance for the appropriate suppression response:

- Protect adjacent NSO home ranges from fires originating from this MSA group.
- Limit the fire spread by the use of Minimum Impact Suppression Tactics (MIST) and guidance found in the Deschutes National Forest Fire Management Action Plan.
- Minimize the expenditures of suppression costs when feasible.
- Utilize the most knowledgeable and available District Resource Advisors when suppression actions lend an opportunity.

Riparian Areas
Manage areas consistent with the Aquatic Conservation Strategy and the Odell Pilot Watershed Analysis.

Soils
Restore soils according to the priorities determined in the Odell Pilot Watershed Analysis.

Wildlife and Botanical
Emergency habitat protection (i.e., fire suppression) takes precedence over the protection of individual special status plants or animals in coordination with local district resource specialists.

Invasive Plants

- Promote use of weed-free-feed around Davis Lake to prevent the introduction and spread of invasive plants.
- Aggressively control or eliminate invasive plants according to current direction in regional and sub-regional invasive plant EISs in H (reed canarygrass at Davis Lake as effective methods are developed in the future), and N (spotted and diffuse knapweeds, Canada and bull thistles, Scot's broom, Klamath weed, ox-eye daisy, common mullein).

Access
Seek opportunities to reduce access using a roads analysis to target levels in Chapter 3. Maintain existing access on trails, unless monitoring indicates that they have detrimental impacts to LOS plant and/or animal species. Restrict motorized summer and winter use to existing designated trails.

MONITORING, EVALUATION, AND RESEARCH

Conduct annual monitoring of northern spotted owl activity. Monitor presence and reproductive success.

The following opportunities for evaluation and research would be conducted as funding is available:

- Conduct surveys to confirm presence and/or habitat utilization of the black-backed woodpecker.
- Conduct surveys to monitor carnivore use of the area.

Lodgepole/Mixed Conifer Riparian for Black-backed Woodpecker, Riparian Species and Connectivity for Northern Spotted Owl

MANAGEMENT STRATEGY AREAS – L, M, X, Y, Z

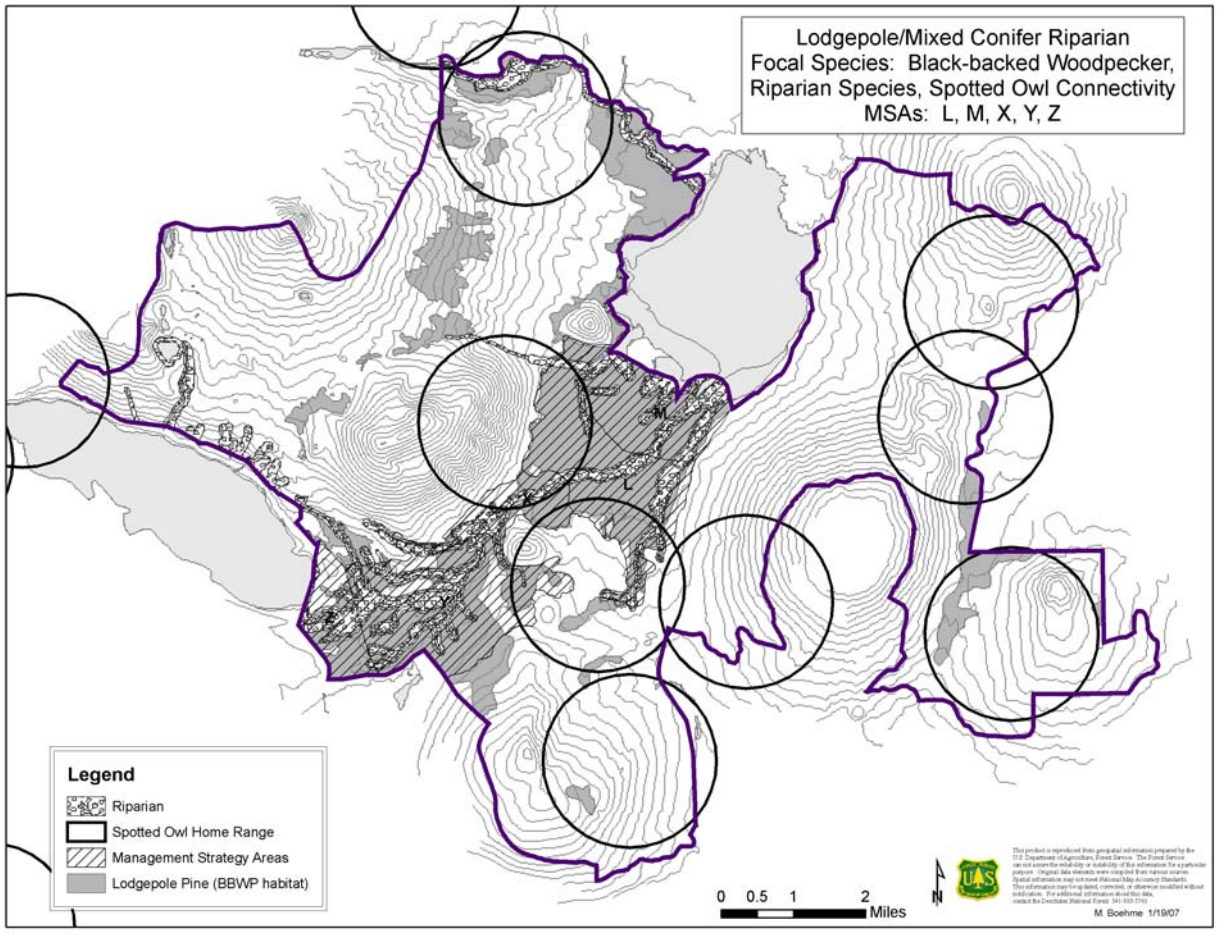


Figure 4-7. Lodgepole/Mixed Conifer Riparian for Black-backed Woodpecker, Riparian Species and Spotted Owl Connectivity; MSAs L, M, X, Y, Z.

EXISTING CONDITION

Wildlife

***Emphasis Species* -- Black-backed woodpecker and species associated with riparian habitat**

Riparian vegetation along creeks, especially Odell Creek, comprises a unique habitat type that is very limited and thus critical within the LSR. Species or species groups known or suspected to utilize the MSA include: elk, bats, great gray owls, Cascade frogs, tailed frogs (and other amphibians), Preble's shrew, neotropical migratory birds, bald eagles, osprey, black-backed woodpeckers, marten, redband trout and bull trout. Ranger Creek contains a historical sighting of tailed frogs and *Tritomaria exsectiformis*, a liverwort. This creek also has abundant beaver activity. Many of the species supported by this habitat are Threatened, Endangered, Sensitive, or Protected status.

The Odell gravel pit and the associated travel and noise adversely affect big game fawning/calving in these MSAs and the spotted owls in adjacent MSAs.

These MSAs in the lodgepole pine PAG provide existing and potential habitat for black-backed woodpeckers and species with similar habitat needs.

These MSAs contain the following land allocations from the LRMP with specific standards and guidelines: Key Elk Area and Old-Growth Management Area. MSA M is distinguished from other MSAs containing riparian habitat in the same PAG because it has a key elk area and serves as an important fawning/calving ground for deer and elk. Motorized summer and winter recreation use is being consolidated to designated roads and trails to reduce recreational impacts to wildlife.

Selected Other Species

Northern spotted owl – Potential NRF habitat occurs on 1,778 acres (24 percent) of this MSA group. Currently 281 acres are classified as NRF (Table 4-43). Most of the NRF and capable NRF is in MSAs X, Y and Z. Currently, due to patchiness of seral conditions and roads, this habitat does not function as nesting habitat but most likely serves as foraging and/or dispersal habitat. Two northern spotted owl home ranges overlap into this MSA group (McCool Butte and Maklaks, MSAs W and K). The potential of this MSA group is for dispersal habitat. It lies between the mixed conifer stands on the buttes in the LSR and is the only potential vegetative connection between the east and west portions of the LSR. The Davis Fire removed the vegetation on much of MSA M, so that area will not be useful dispersal habitat for the next few decades. Should other large fires occur, they will most likely result in more loss of dispersal habitat in these fire-intolerant lodgepole pine stands.

Table 4-51. Distribution of NRF within EMC for MSAs L, M, X, Y, Z.

MSA	L			M			X			Y			Z		
Acres /Acres Burned*	2147 / *665*			1376 / *871*			658			2414			698		
PA	Capable	Existing	% Existing /Capable	Capable	Existing	% Existing /Capable	Capable	Existing	% Existing /Capable	Capable	Existing	% Existing /Capable	Capable	Existing	% Existing /Capable
CRS1-11										301	17	6%	52	19	37%
CWC2-11							5	2	40%	4	0	0%	20	2	10%
CWH1-11	89	1	1%				51	9	18%	119	26	22%	142	66	46%
CWS1-14	28	34	121%				13	0	0%	67	2	3%			
CWS1-15	3	0	0%				2	0	0%						
	120	**35**	29%	**0**	**0**	0	**71**	**11**	15%	**491**	**45**	9%	**214**	**87**	41%
	14	**0**	0%	**0**	**0**	0	**105**	**1**	1%	**310**	**29**	9%	**96**	**1**	1%
CMS1-11	0	0	0%							38	25	66%	9	8	89%
	0	**0**	0%	**0**	**0**	0	**0**	**0**	0%	**38**	**25**	66%	**9**	**8**	89%
		2						29			8				
	134	**37**	28%	**0**	**0**	0	**176**	**41**	23%	**839**	**107**	13%	**319**	**96**	30%
		In Davis Fire Area													

Late and Old Structured Stands

Due to management activity and the Davis Fire (MSAs L and M), approximately 2,976 acres (41 percent) in this MSA group are classified as early and 1,956 acres (27 percent) are classified as late. For a breakdown by MSA, see Table 4-46.

Total road densities vary greatly within this MSA group (Table 4-52). The lowest road density is 1.57 mi/mi² in MSA Y and the highest is in MSA Z with 5.86 mi/mi² affecting the amount and quality of habitat available. Potential for reducing road density exists.

Table 4-52. Total Road Density in Miles per Square Mile in Lodgepole/Mixed Conifer Riparian.

MSA	Total Road Density	Minimum (If only two-digit and four-digit roads are open)
L	3.25	1.69
M	3.71	1.39
X	3.18	2.08
Y	1.57	0.29
Z	5.86	1.66

Snags and Down Woody Debris

The distribution of snags 10 inches in diameter and larger, is very close to the reference condition in the larger watershed[18]. For snags 20 inches in diameter and larger, this MSA group meets reference condition in most densities, but exceeds reference conditions at low density. Down wood within riparian areas should be retained with a passive management scenario.

Table 4-53. Distribution of Snags for MSAs L, M, X, Y, Z.

Distribution of Snags ≥10" (25.4cm) dbh in LP			
Density	% of Area		
Snags per Acre	Ref. (Min.)	Ref. (Max.)	Existing
0	21	34	10
0-6	11	19	41
6-12	11	20	32
12-24	10	15	10
24-36	4	10	5
36+	4	9	3
Reference condition from DecAID tables (unharvested plots for snags ≥10" dbh (25.4cm) LP_O.Inv-14, LP_S.Inv-14, and modified with HRV information from the Odell Pilot WA. Existing condition imputed stand exam data with INFORMS.			

Distribution of Snags ≥20" (50.8cm) dbh in LP			
Density	% of Area		
Snags per Acre	Ref. (Min.)	Ref. (Max.)	Existing
0	36	80	44
0-2	4	8	51
2-4	5	10	2
4-6	1	4	1
6-10	1	2	1
10-18	0	1	1
18+	0	0	0
Reference condition from DecAID tables (unharvested plots for snags ≥20" dbh (50.8cm) LP_O.Inv-15, LP_S.Inv-15, and modified with HRV information from the Odell Pilot WA. Existing condition imputed stand exam data with INFORMS.			

The distribution of down woody material in the larger landscape is in excess of reference conditions for acreage with lower ground coverage, and is below reference conditions for acreage with higher ground coverage.

[18] Subwatersheds that were partially or completely within the LSR were used for the larger landscape to give sufficient scale to compare with reference conditions developed with information from DecAID.

Table 4-54. Distribution of Down Wood for MSAs L, M, X, Y, Z.

% of Landscape for LP dwd ≥6" (15.24cm) dbh			
Density	% of Area		
% Cover	Ref. Min.	Ref. Max.	Existing
0	4	14	22
0-4	37	55	74
4-8	14	23	4
8-10	4	7	0
10-16	4	8	0
>16	0	0	0
Reference condition develop from information from DecAID tables (unharvested plots for down wood ≥5" dbh (12.7cm) LP_O.Inv-16, LP_S.Inv-16,and modified with HRV information found in the Odell Pilot WA. Existing condition imputed stand exam data with INFORMS.			

Botanical

Fungi
Potential habitat for special status fungal species is listed according to the following PAGs: Lodgepole Dry, Mixed Conifer Dry, and Ponderosa Pine.

Mosses, Liverworts, and Lichens
Potential habitat for special status moss, liverwort, and lichen species exists along Odell Creek in MSA L

Invasive Plants
No known invasive plant populations have been identified in MSAs X and Y. MSA L has known bull thistle populations along road 4660 and adjacent plantations. MSA M has reed canarygrass, bull thistle, and common mullein around the shoreline of Davis Lake. MSA Z has spotted and diffuse knapweeds, Canada thistle, bull thistle, Klamath weed, oxeye daisy, and Dalmatian toadflax populations identified at the east end of Odell Lake, along the section of Highway 58 that intersects the MSA and adjacent to the railroad.

See Botanical section for additional information. Refer to Tables 2-7 and 2-8 in Chapter 2.

Invertebrates

Mollusks
Potential habitat for listed mollusk species exists along the creeks. See Invertebrate section in Chapter 2 for additional information.

Forest Dynamics

Table 4-55. PAG(s) and Seral/Structural Stages for MSAs L, M, X, Y, Z.

PAG	MSA -->	L	M	X	Y	Z	Acres & % of MSA group		Acres & % of PAG	
Mixed Conifer	Early	65	7	19	84	60			235	14%
	Mid	54	0	32	209	39			334	21%
	LOS	102	0	232	508	211			1053	65%
	TOTAL	**221**	**7**	**283**	**801**	**310**	**1622**	**22%**		
Ponderosa Pine	Early	55	36	0	0	0			91	95%
	Mid	0	1	0	0	0			1	1%
	LOS	3	1	0	0	0			4	4%
	TOTAL	**58**	**38**	**0**	**0**	**0**	**96**	**1%**		
Lodgepole	Early	1067	1155	20	118	55			2415	46%
	Mid	408	17	238	1084	248			1995	38%
	LOS	341	25	117	303	68			854	16%
	TOTAL	**1816**	**1197**	**375**	**1505**	**371**	**5264**	**72%**		
Mountain Hemlock	Early	0	0	0	0	0			0	0%
	Mid	0	0	0	1	1			2	4%
	LOS	0	0	0	37	8			45	96%
	TOTAL	**0**	**0**	**0**	**38**	**9**	**47**	**1%**		
Non Forest	**TOTAL**	**52**	**134**	**0**	**70**	**8**	**264**	**4%**		
Total Acres		**2147**	**1376**	**658**	**2414**	**698**	**7293**	**100%**		

Summary of Trends

- During the decade of the 1980s, the western pine beetle (*Dendroctonus ponderosae*) outbreak killed most of the lodgepole pine overstories throughout much of Central Oregon. Thousands of acres of salvage activities in these stands have been completed since then, but many areas in the MSA group remain in a passive management scenario to benefit wildlife or where fuels reduction activities are not needed or feasible. These stands are characterized by heavy loadings of the remains of the fallen beetle-killed trees. The remaining overstories are often 8 inches in diameter or less, usually with very poor crowns, and with dense regeneration coming into the stands.
- In the moist areas, vegetation is characterized by lodgepole pine dominating the conifer component, often with Engelmann spruce present in areas with readily available surface or sub-surface moisture. Ground vegetation in these areas is characterized by sedges, grouse huckleberry, and various herbs and forbs associated with wetter sites.
- Riparian areas have a large component of Mixed Conifer Wet.
- Regenerated stands tend to be very dense, often with several thousand seedlings/saplings per acre.
- The current lodgepole pine portions of these MSAs are poor dispersal structure, but are the main old-growth associated species dispersal links between the Maklaks area and the Royce, Hamner, Davis, and Ringo Butte areas.
- MSA Y remains relatively avoided by human activity in the lodgepole pine stands. This is primarily because of access and limited opportunity or need for active management. The area is heavily dissected by wet areas and meadows.

- The lodgepole pine areas in MSAs L and M have had extensive management activity, and because of beetle activity, are expected to remain in need of active management into the foreseeable future.
- Forested stands are moving towards later seral stages except where mountain pine beetles have moved lodgepole pine stands towards earlier seral stages.
- Large-tree dominated stands have been reduced through both management activities and competition of overstory trees with ingrowth of pole-sized understory. This trend is continuing, especially in the ponderosa stands where lodgepole pine is becoming established and competing with the overstory ponderosa pine to the point where much of the overstory is at risk of being lost to insects or competition.
- Stand structures are becoming more complex as forested stands move towards later seral stages and as lodgepole stands develop multiple layers as a result of beetle activity.
- Susceptibility to stand replacement events caused by insects, disease, and fire is increasing on most of the passively-managed areas.
- Mixed conifer (dry) stands, where large trees dominate the overstory and true firs are the prime understory component, are desirable as LOS stands. They are particularly at risk for stand replacement events resulting from insects and disease. These ecosystems are unstable, highly susceptible to change events, and less resilient in responding/recovering from wide-scale events, since the critical component of large trees would take centuries to recover.

Fire Management – MSA L
TOTAL ACRES: 2,146
ELEVATION RANGES: 4800-6800 FT.
GEOGRAPHIC LOCATION: Maklaks Mtn.
ADJACENT MSAs: B, E, J, L, X, Y, & Z
SPECIAL AREAS OF CONCERN: Old-Growth Management Area, Key Elk Area, regeneration investments, cultural resources, and adjacent NSO home ranges
PAGs: LPD, MCD, PPW

Table 4-56. Historic Fire Regime and Current Condition Class for MSA L.

PAG	Fire Regime	Condition Class
MCD	III	II
LPD	III	I (60%) / II (40%)
PPW	I	I

HAZARD ANALYSIS
This MSA is rated with a "high" hazard. Although about one half of this MSA was consumed by the Davis Fire, the remaining portion is characterized as dense stands with vertical continuity higher than historical levels, facilitating crown fires under moderate weather conditions.

RISK ANALYSIS
The risk is rated "moderate" due to a flat topography and a relatively high amount of human presence/access. Lightning and human ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: NSO home ranges (2), Key Elk Area, cultural resources, regeneration investments
Priority 2: NSO Connectivity as identified in Chapter 2, riparian resources
Priority 3: Old Growth Management Area

Estimated "fuels only" activities: This area has been identified as strategic for protection of adjacent NSO home ranges in MSAs K and W.
Treatment acres: 389
Treatment type: Small diameter thinning, non-mechanical piling, disposal
Proposed treatment yr: 2014 Thinning, 2014 Handpile, 2015 Handpile burn
Estimated cost: 2014 - $77,800, 2015 - $9,725
Total: $175,500

MSA M
TOTAL ACRES: 1,364
ELEVATION RANGES: 4400-4500 FT.
GEOGRAPHIC LOCATION: Davis Lake
ADJACENT MSAs: H, L, N, & V
SPECIAL AREAS OF CONCERN: Regeneration investments, Key Elk Area – calving and fawning, cultural resources, Designated Old Growth Management Area

Table 4-57. Historic Fire Regime and Current Condition Class for MSA M.

PAG	Fire Regime	Condition Class
LPD	III	I

HAZARD ANALYSIS
At this time, due to the Davis Fire, the hazard rating is "low" until approximately 2010 when snag fall may require a change to the rating.

RISK ANALYSIS
Although human presence and access is high, the risk is classified as "low" at this time.

SUPPRESSION PRIORITY (Resources being protected)

Priority 1: NSO home ranges (2), Key Elk Area, cultural resources, regeneration investments
Priority 2: NSO Connectivity as identified in Chapter 2, riparian resources
Priority 3: Old Growth Management Area

Estimated "fuels only" activity: This MSA has not been identified as strategic for fuels reduction at this time. There is potential for risk reduction surrounding East and West Davis Campgrounds in the future when snag fall increases the hazard.

MSA X
TOTAL ACRES: 659
ELEVATION RANGES: 4500-5200 FT.
GEOGRAPHIC LOCATION: McCool Butte
ADJACENT MSAs: K, L, Y, & W
SPECIAL AREAS OF CONCERN: Adjacent NSO activities centers and NRF**,** Odell Creek riparian resources

Table 4-58. Historic Fire Regime and Current Condition Class for MSA X.

PAG	Fire Regime	Condition Class
MCD/MCW	III	II
LPD	III	III

HAZARD ANALYSIS
Stand condition and fuel loading contributes to a "moderate" rating. Previous active management in this MSA serves to create a break in the continuity of the hazard.

RISK ANALYSIS
Although access to the area is high, human presence is relatively low. The risk is considered "moderate". Lightning and human caused ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Adjacent NSO home ranges in MSAs K and W
Priority 2: Riparian resources associated with Odell Creek, NSO connectivity as identified in Chapter 2.

Estimated "fuels only" activities:
Treatment acres: 77
Treatment type: Small diameter thinning, non-mechanical piling, disposal, prescribed underburning
Proposed Treatment yr: 2014 Thinning, 2014 Handpile, 2015 Handpile burn
Estimated cost: 2014 - $15,400, 2015 - $1,925
Total: $17,325

MSA Y
TOTAL ACRES: 2,490
ELEVATION RANGES: 4600-5000 FT.
GEOGRAPHIC LOCATION: McCool Butte or Royce Mtn.
ADJACENT MSAs: K, X, Z, & BB
SPECIAL AREAS OF CONCERN: Adjacent NSO home range in MSA W and NRF, riparian resources associated with Odell Creek
PAGs: LPD, MCD, MSHB

Table 4-59. Historic Fire Regime and Current Condition Class for MSA Y.

PAG	Fire Regime	Condition Class
MCD	III	II
MSHB	II	III
LPD	I	III

HAZARD ANALYSIS
Stand condition and fuel loading contributes to a "moderate" rating. Previous active management in this MSA serves to create a break in the continuity of the hazard.

RISK ANALYSIS
Although access to the area is high, human presence is relatively low. The risk is considered "moderate". Lightning and human caused ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: Adjacent structures at Odell Lake and Crescent Lake Junction**, r**egeneration investments, NSO activity center on McCool Butte
Priority 2: Key Elk Area
Priority 3: Riparian resources associated with Odell Creek, NSO connectivity as identified in Chapter 2.

No "fuels only" activities have been identified at this time.

MSA Z
TOTAL ACRES: 597
ELEVATION RANGES: 4600-4800 FT.
GEOGRAPHIC LOCATION: East end of Odell Lake
ADJACENT MSAs: J, & Y
SPECIAL AREAS OF CONCERN: Crescent Lake Jct., East end Odell Lake Resort (all adjacent to the LSR boundary); and Odell Creek riparian resources.

Table 4-60. Historic Fire Regime and Current Condition Class for MSA Z.

PAG	Fire Regime	Condition Class
MCD	III	III

HAZARD ANALYSIS – Dense stand conditions contribute to a "moderate" rating, although the fuel bed is not considered uncharacteristic.

RISK ANALYSIS – Access from Highway 58 and human presence associated with recreation, contributes to a "moderate" rating. Lightning and human caused ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)
Priority 1: East end Odell Lake Resort, Railroad
Priority 2: Riparian resources associated with Odell Lake and Odell Creek, NSO connectivity as identified in Chapter 2.

There are no "fuels only" activities identified at this time.

Access
Motorized vehicles are allowed on all open roads and designated routes. Existing open road density (Operational) varies from 0.88 to 3.25. Currently, central Oregon is going through a process to designate permanent motorized access and close off-trail travel with the Travel Management Rule. It is expected to be completed by 2008.

Over the snow vehicles, bicycles, or other mechanized wheel vehicles are allowed off the road outside the Davis Fire Closure area. Designated snowmobile trails have been created as a step toward moving snowmobiles onto designated routes only. Hiking, cross-country skiing and horseback riding currently have no restrictions.

Table 4-61. Open Road Densities in Miles per Square Mile in Lodgepole/Mixed Conifer Riparian.

MSA	Objective Open Road Density	Operational Open Road Density	Davis Fire Roads Analysis Open Road Density
L	1.97	2.18	--
M	2.33	2.33	2.18
X	2.27	2.08	--
Y	0.91	0.88	--
Z	3.15	3.25	--

Table 4-62. Existing Condition for MSAs L, M, X, Y, Z.

MSA -->	L	M	X	Y	Z	MSA Group
Total Acres	2,147	1,376	658	2,414	698	7,293
Elevation Range (ft)	4,400-4,800	4,400-4,500	4,400-5,000	4,500-5,200	4,800-5,000	4,400-5,200
PAGS -- Mixed Conifer 22%, Ponderosa Pine 1%, Lodgepole Pine 72%, Mountain Hemlock 1%						
Land Allocation -- General Forest, Old Growth, Intensive Recreation, Dispersed Recreation, Scenic Views -R/FG, Scenic Views - PR/MG, Scenic Views - FG						
Landscape Area(s) -- West Odell Creek and East Odell Creek (Odell WA)						
Wildlife – Black-backed woodpecker, bald eagle, osprey, marten, northern spotted owl, bats, NTMBs, amphibians, deer, and elk.						
Botanical -- Potential habitat for special status species of fungus, bryophytes, and lichens. Currently, no known populations.						
early seral %	55%	87%	6%	8%	16%	38%
LOS %	21%	2%	53%	35%	41%	27%
Forest Density	High	Mod.	High	High	High	High
Soil Restoration Priority	Low	Low	Low	Low	Low	Low
Fire Hazard	High	Low	Mod.	Mod.	Mod.	Mod.
Fire Risk	Mod.	Low	Mod.	Mod.	Mod.	Mod.
Total Road Density	1.97	2.33	2.27	0.91	3.15	Mod.
Activities -- Snowmobile trail, hunting, big trees, driving for pleasure, Metolius-Windigo Horse trail, birding, research						
Commodities -- Wood products, fungi						

CRITERIA FOR DEVELOPING APPROPRIATE TREATMENTS

Desired Condition

Provide a sustainable LOS forest ecosystem through time that supports the diverse species associated with this MSA. Manage to provide and maintain a healthy riparian system according to the Aquatic Conservation Strategy and a viable LOS lodgepole pine component through time. The riparian areas have a large component of Mixed Conifer Wet and Engelmann spruce some ponderosa pine. Maintain existing Engelmann spruce component. Provide large contiguous blocks (1000 acres) of mature and decadent lodgepole for the black-backed woodpecker and marten that obtain or move towards the suitable habitat conditions described in Chapter 3. Refer to the Goals and Objectives listed for the East Odell Creek Landscape Area in the Odell Pilot Watershed Analysis.

Objective

Short-term (0-30 years) in all areas:

- Aggressively control invasive plants in all MSAs where they exist, according to current direction in regional and sub-regional invasive plant EISs.
- Abate hazardous fuels along major (two and four digit) roads.

Short-term (0-30 years), within the area to the **west and southwest of the Davis Fire**.

- Provide adequate habitat to support emphasis and selected species.

- Reduce potential for fire effects in the adjacent MSAs.
- Reduce habitat fragmentation and early seral conditions as soon as possible and accelerate development of LOS conditions within regenerated areas.
- Develop and maintain dispersal habitat for the NSO through MSA X.
- Provide habitat connectivity between the eastern and western halves of the LSR.

Short-term (0-30 years), **within areas in the Davis Fire**.

- Provide restoration opportunities to enhance the return of forested conditions to provide a vegetative structure suitable for the variety of wildlife uses mentioned in Chapter 3.
- Provide optimal habitat, within limitations of the existing condition, for emphasis and selected species.
- Accelerate development of LOS conditions within regenerated areas.
- Optimize the development of LOS lodgepole pine in the regenerated stands in the key elk areas identified in Chapter 3.

Long-term (30+ years), **In All Areas:**

- Provide a large contiguous block of LOS lodgepole through time that alternates between the various MSAs, i.e. while a given portion is in LOS, other portions should be in earlier seral stages to provide a cycling of these conditions on the landscape through time.
- Maintain the different portions of the MSAs on different cycles of usually 3-5 decades apart.
- Allow natural processes in forested and regeneration areas, except where risk reduction activities are needed to help reduce impacts on adjacent MSAs.

Rationale: The LSRA team believes that this strategy would be the most viable option to ensure maintenance of the lodgepole habitat across the landscape in the long-term. Most all regenerating areas would have an emphasis to accelerate growth and provide future NSO dispersal habitat; therefore, to provide the large, contiguous (1,000 acres or greater) habitat for the black-backed woodpecker, adjoining MSAs would be used to provide the rotation through time.

MANAGEMENT OPTIONS AND TREATMENT TRIGGERS OR EVALUATION POINTS

Risk Reduction Activities through Management of Forested Areas

Use a passive management scenario in areas of the MSA where the Desired Condition exists and is believed to be sustainable. In the long-term allow the large contiguous patches to go through normal lodgepole disturbance cycling to provide optimal habitat for emphasis and selected species. (Long-term -- throughout the MSAs including the areas of riparian and meadows)

Within NSO Home Ranges

- Only low impact fuels and silvicultural treatments that retain NRF habitat are appropriate unless stands begin to lose the desired structural components at catastrophic levels. (Short-term)
- If the desired structural components are being lost at catastrophic levels, appropriate management activities according to the guidelines listed in Chapter 3, for the PAG-appropriate treatment scenarios would only be implemented in the absence of active owl use. The purposes of the treatment would be to ensure the protection and/or return of late successional and old growth conditions and to increase resistance to wide-scale disturbance events. (Short and Long-term)

Rationale: Low percentage of NRF habitat and current early seral conditions within the home range radius make further degradation of habitat undesirable in the short-term. Known preventive measures for reduction of problem fire events such as small diameter fuels reduction and small diameter thinning would not decrease the suitability of the habitat for emphasis species. It is believed that the potential benefits of risk reduction justify small diameter fuels reduction in existing habitat.

- For management of NRF-capable stands (but are not currently NRF) within the home range radius of the northern spotted owl is as follows: Fuels and silvicultural activities for risk reduction in NRF habitat are appropriate especially in highly fragmented home ranges. (Short-term)
- In MSA L, an area of lodgepole pine creates a hazard to an upland home range on Maklaks. Implement risk reduction activities to reduce fuels hazard by removing down, dead lodgepole within the following parameters:
  -- Actively manage only the portions needed to be effective fuels modification area of the MSAs in the next 30 years.
  -- Prioritize areas that have the greatest potential to provide fire protection for targeted areas to protect.
  -- Retain levels of down woody debris consistent with the levels indicated in Table 3-10.
  -- Retain slash and landing piles sufficient for marten habitat.

Outside NSO Home Ranges

- For stands not capable of producing NRF, fuels and silvicultural treatments designed to protect and enhance dispersal structure are appropriate. (Short and long-term)

Snags and Down Woody Debris

- Within the context of individual stand site potential, maintain coarse woody debris and snags at levels indicated in the Suitable Habitat Condition tables 3-4 and Additional Guidance for Dead Wood Management section located in Chapter 3, except in hazard abatement areas along major roads where Tables 3-8 through 3-10 apply. (Short and Long-term)

- It is expected that when the long-term objectives for this MSA are met, natural processes will make snag and down woody debris management unnecessary. (Long-term)

Fuels Management

- In addition to identified fire behavior modification areas, abate hazardous fuels along major (two and four digit) roads by thinning small diameter trees and reducing ground and ladder fuels for approximately 100 feet.
- Continue small diameter fuel reduction identified in the Davis Fire Recovery Project EIS.

<u>Salvage After a Stand Replacement Event</u>

Guidance can be found in Chapter 3 under the heading "Salvage Activities after Stand Replacement Events" and "Suitable Habitat Condition":

- In lodgepole pine, delay risk reduction/salvage activities for the first 5-7 years after an event, to maintain for the black-backed woodpecker habitat unless the newest science suggests otherwise.
- In mixed conifer and ponderosa pine, if wide-scale loss of habitat occurs and the stand characteristics of the replacement event can no longer achieve LOS status within a century,

regardless of whether outside or within NSO home ranges, salvage activities may be appropriate if the overall objective is to accelerate achievement of LOS status.

Rationale: Salvage activities would promote the long-term survival and growth of new conifers by bringing fuel loads to a sustainable level for eastside forests that reduces the likelihood of stand-replacement fire in newly regenerated stands, particularly during the early stages of stand development. (Short and Long-term)

Enhancement Activities and Other Activities for Management of Regenerated Areas for All Groups
Throughout the MSA group, emphasize management of regenerated stands to accelerate growth as a means to provide dispersal habitat and LOS conditions more quickly. Refer to the LOS Enhancement Strategies section located in Chapter 3 which describes appropriate activities. Deviations from these methods may occur on a site-specific basis to meet specific wildlife objectives, e.g. to provide hiding cover in deer and elk fawning and calving grounds and/or strategic fire behavior modification. (Short and Long-term)

Fire Suppression
A fire strategy was developed that considers and prioritizes suppression activities (or tactics) by MSA in such a way to provide guidance that minimizes potential adverse effects to the most important values at risk while adhering to the main goals. The protection of human life and property will always be the number one priority. The following provides guidance for the appropriate suppression response:

- Protect adjacent NSO home ranges from fires in this MSA group.
- Consider adjacent NSO home ranges in fire suppression strategy and tactics.
- Protect fawning/calving areas from fire if conditions warrant.
- Limit the fire spread by the use of Minimum Impact Suppression Tactics (MIST) and guidance found in the Deschutes National Forest Fire Management Action Plan.
- Minimize the expenditures of suppression costs when feasible.
- Utilize the most knowledgeable and available District Resource Advisors when suppression actions lend an opportunity.

Riparian Areas and Fisheries
Protect and enhance habitat for bull trout in Odell Creek which is provided by the riparian areas and the forested stands surrounding them. Examples of conditions that would be detrimental to bull trout habitat include: activities that result in stream sedimentation and/or bank erosion, and activities that modify the overstory such that stream shade is decreased and water temperature is increased.

Soils
Priority for soil restoration in this MSA group is low.

Wildlife and Botanical
Emergency habitat protection (i.e., fire suppression) takes precedence over the protection of individual special status plants or animals in coordination with local district resource specialists.

Invasive Plants

- Promote use of weed-seed-free-feed to prevent the introduction and spread of invasive plants on the Metolius-Windigo Horse Trail.

- Aggressively control or eliminate invasive plants according to current direction in regional and sub-regional invasive plant EISs in MSAs L (bull thistle), M (reed canarygrass, bull thistle,

common mullein along Davis Lake shoreline), and Z (spotted and diffuse knapweeds, Canada and bull thistles, Klamath weed, ox-eye daisy, Dalmatian toadflax).

Access
Seek opportunities to reduce current access using a roads analysis to target levels in Chapter 3. Maintain existing access on trails, unless monitoring indicates that they have detrimental impacts to LOS plant and/or animal species. Restrict motorized summer and winter use to existing designated trails.

Commodities
The operation of the Odell Pit is not neutral, beneficial, or desirable for LOS associated species, however, it is not practical at this time to close or further restrict pit operations.

Rationale: Successful reproduction of spotted owls occurred in the vicinity of the pit while it was in full operation and the elk restriction was in place. The LSR team believes that the pit operation is not a significant impact to the function of the LSR for the spotted owl at this point.

MONITORING, EVALUATION, AND RESEARCH

The following opportunities for evaluation and research would be conducted as funding is available:

- Conduct surveys to confirm presence and/or habitat utilization of the black-backed woodpecker.
- Conduct surveys to monitor carnivore use of the area.

Mountain Hemlock for Wolverines

MSA: B

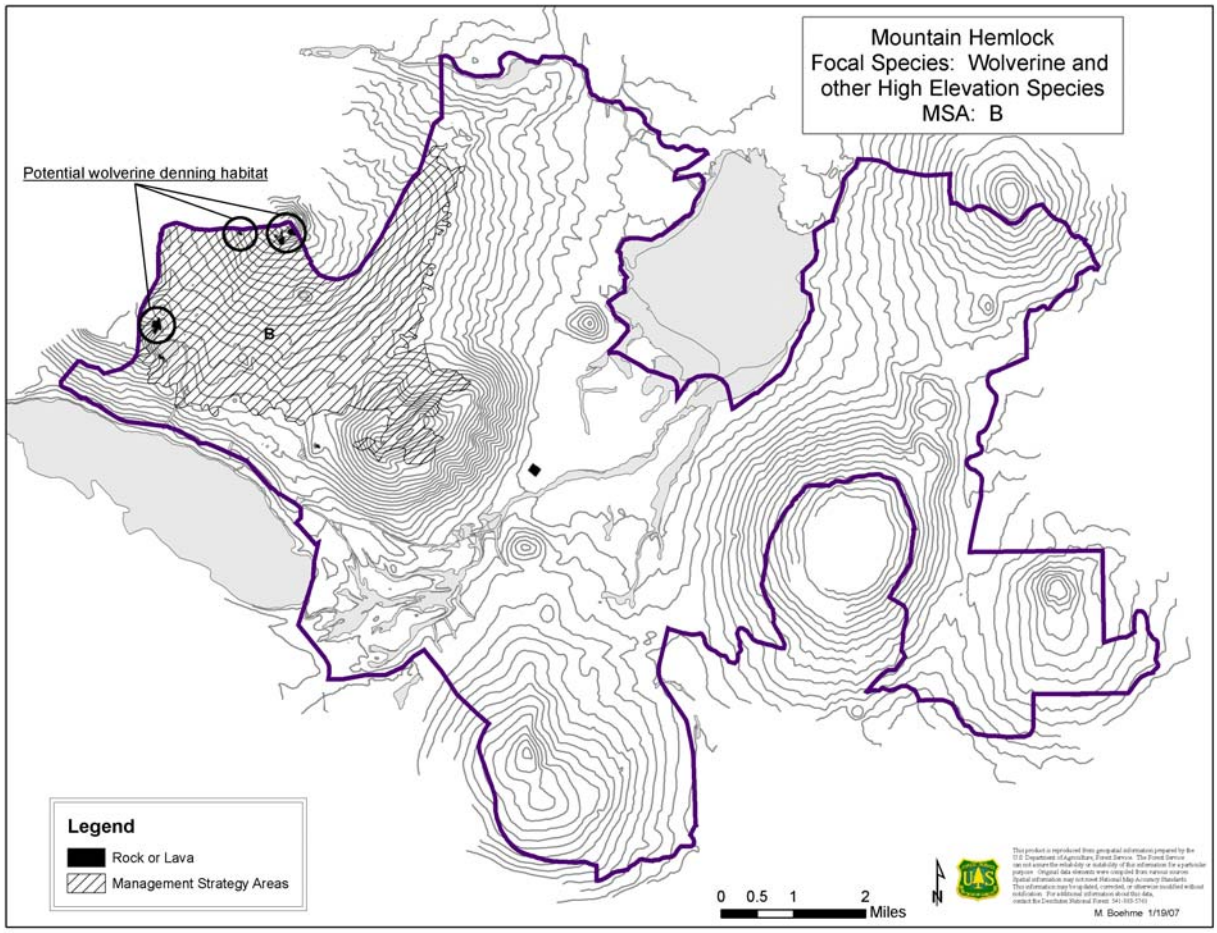


Figure 4-8. Mountain Hemlock for Wolverine; MSA B.

EXISTING CONDITION

Wildlife

***Emphasis Species* -- Wolverines**

This MSA contains unconfirmed wolverine sightings near Willamette Pass, on Maklaks Mountain, and near Crescent Creek. Potentially suitable, but limited, denning habitat may be found in the Maiden Peak Inventoried Roadless Area. Denning habitat has been described as high elevation rocky slopes or cirque basins on north and east slopes that have persistent snow into the spring and summer months. It is assumed that wolverines may travel through and/or forage infrequently at the lower elevations of the LSR, and utilize higher elevation habitat for most of their needs. Carnivore snow tracking, baited camera sets, and track plates have been used to detect American marten, fisher, and wolverine presence on the district with surveys occurring in 1994, 1995, 1996, and 1998. There was no detection of wolverines during that period.

Selected Other Species

- Potential marten habitat and travel corridors.
- Potential fisher habitat and travel corridors.
- Northern spotted owl dispersal habitat

LOS

Currently across the MSA, 1 percent exists in an early successional and 81 percent exists in late and old successional (LOS). No roads or past harvest activities affect this MSA.

Wolverine Habitat

The most common habitats are those that contain a high diversity of microhabitats and high prey populations. Wolverines tend to avoid areas with high temperatures (Ruggiero et al 1994). Wolverines are opportunistic and will forage on whatever is readily available. Small mammals, hares and berries comprise a large part of the diet in summer months, and large ungulates or carrion in winter (Ruggiero et al 1994). The most critical and limiting habitat for wolverines in this MSA seems to be acceptable denning habitat.

Northern Spotted Owl Habitat

This MSA does not contribute very much NRF habitat (109 acres) to the entire LSRA. It is found where mixed conifer is intermixed with mountain hemlock below 6,000 feet, on the fringes of Maklaks to the east and MSAs I and J adjacent to Odell Lake to the south. Everything else is considered dispersal habitat for an east/west connection to the Willamette National Forest.

Table 4-63. NRF in MSA B.

NRF	MSA	B		
	Acres	6507		
Plant Association Group	**Plant Association**	Capable	Existing	% Existing / Capable
MCD	CRS1-11	36	13	36%
	CWC2-11			
	CWH1-11			
	CWS1-14			
	CWS1-15	15	1	7%
MCD Total		**51**	**14**	27%
MCW Total		**0**	**0**	0%
MHD (below 6K' elev.)	CMS1-11	2602	94	4%
MHD Total		**2,602**	**94**	4%
ALL OTHERS			1	
Total		**2,653**	**109**	4%

Snags and Down Woody Debris

Background: Site visits to nearby mountain hemlock areas on the District revealed a large-scale stand replacement fire occurred sometime in the mid 1880s. The resultant stands are late in structure, but large, old trees and the decadence associated with time have not fully developed (Stone, personal communications, 2007). This is why distribution of down wood is relatively absent in the greater than or equal to 6 inch size class above the density 4-8 percent cover.

Across the watershed[19] in this habitat type, snag densities are within reference conditions for snags greater than or equal to 10 inches in diameter. (See Appendix C for description of snag and down log analysis). The percent of area for snags greater than or equal to 20 inches in diameter are within reference conditions at lower snag densities. At high snag densities they drop below the reference conditions.

Table 4-64. Distribution of Snags in MSA B.

Distribution of Snags in Mountain Hemlock (Montane Mixed Conifer)					
≥10" dbh			≥20" dbh		
Density	% of Area		Density	% of Area	
Snags per Acre	Reference	Existing	Snags per Acre	Reference	Existing
0	10	0	0	8	8
0-6	19	24	0-2	9	73
6-12	25	26	2-4	16	10
12-24	31	27	4-6	14	1
24-36	10	14	6-10	26	9
36+	5	8	10-18	11	0
			18+	4	0
Reference condition from DecAID tables (unharvested plots for snags ≥10" (25.4cm) dbh) MMC_O.Inv-14, MMC_S.Inv-14, MMC_L.Inv-14 and modified based on existing structure. There is no HRV for MH in Odell Pilot WA. Existing condition imputed stand exam data with INFORMS.			Reference condition from DecAID tables (unharvested plots for snags ≥20" (50.8cm) dbh) MMC_O.Inv-15, MMC_S.Inv-15, MMC_L.Inv-15, and modified based on existing structure. There is no HRV for MH in Odell Pilot WA. Existing condition imputed stand exam data with INFORMS.		

Table 4-65. Distribution of Down Wood.

% of Landscape for MMC Down wood ≥6" (15.24cm) dbh		
Density	% of Area	
% Cover	Ref. Based on %	Existing
0	19	2
0-4	43	97
4-8	25	1
8-10	5	0
10-16	8	0
>16	0	0
Reference condition developed from information from DecAID tables (unharvested plots for down wood ≥5" (12.7cm) dbh) MMC_O.Inv-16, MMC_S.Inv-16, MMC_L.Inv-16 and modified based on existing structure. Existing condition imputed from stand exam data with INFORMS.		

[19] Subwatersheds that were partially or completely within the LSR were used for the larger landscape to give sufficient scale to compare with reference conditions developed with information from DecAID.

Down wood densities across the landscape are within reference conditions except at the high densities where they are low due to the last disturbance event in the late 19th century.

Botanical

Fungi

Potential habitat for special status fungal species in this MSA is listed by PAG: Mountain Hemlock and Lodgepole Dry/Mountain Hemlock. Potential habitat exists for *Rhizopogon truncatus* and *Gastroboletus subalpinus*.

Mosses, Liverworts, and Lichens

Streams, springs, seeps may provide habitat in this MSA for special status mosses, liverworts, and lichens.

Vascular Plants

This MSA has no known sites for special status vascular plant species.

Invasive Plants – There are no known sites for invasive plants in this MSA. There is potential for invasive plants along trails and at trailheads. See Botanical section in Chapter 2 for additional information.

Invertebrates.

Mollusks

Potential habitat for special status mollusks in streams, springs, and seeps. There are no known sites in the Davis LSR. See Chapter 2 for additional information

Forest Dynamics

PAG(s) and Structural Stages

This MSA is dominated by Mountain Hemlock with a majority in late successional structure. Out of the total 6,492 acres, 81 percent is LOS and 1 percent is early-successional structure. There are small amounts of lodgepole pine and western white pine plant associations within this MSA.

Table 4-66. Percent Plant Association Group for Mountain Hemlock – High Elevation.

PAG	Structural Stage	B (acres)	% of PAG	% of MSA
Mixed conifer	Early	40	6%	
	Mid	233	37%	
	LOS	360	57%	
	TOTAL	**633**		**10%**
Ponderosa Pine	Early	0	0%	
	Mid	0	0%	
	LOS	0	0%	
	TOTAL	**0**		**0%**
Lodgepole	Early	8	3%	
	Mid	154	66%	
	LOS	72	31%	
	TOTAL	**234**		**4%**
Mountain Hemlock	Early	76	1%	
	Mid	962	17%	
	LOS	4,494	81%	
	TOTAL	**5,532**		**85%**
Non Forest	**TOTAL**	**108**		**2%**
Total Acres		**6,507**		**100%**

Summary of Trends

MHD – Mountain hemlock dry is most often found above about 6,000 feet in elevation. These stands are characterized by common presence of mountain hemlock, with Shasta fir, western white pine, and lodgepole pine intermixed.

- Root rot pockets (laminated root rot, *Phellinus weirii*) are common in these stands. Where such pockets have existed for more than a couple of decades, they are characterized by western white pine, lodgepole pine, and dense mountain hemlock regeneration. The pines are more resistant to the root rot than the mountain hemlock. The mountain hemlock tends to grow two or three decades and then succumbs to the root rot. These pockets tend towards increasingly heavy fuel loadings as the trees die and fall over.
- Areas outside of root rot pockets tend to be dominated by mountain hemlock or lodgepole pine. Mountain hemlock is usually of similar age, since these areas have a fire regime of several centuries without fire followed by large scale stand replacement fires (Agee, 1993; Dickman and Cook, 1989). Lodgepole pine is an aggressive invader in disturbed areas and may dominate near a lodgepole pine seed source.
- White pine blister rust is reducing/eliminating western white pine viability as a pioneering species in the root-rot pockets.

Soils

This MSA has less than 10 percent detrimental soil conditions from past management activities and no restoration/decompaction activities have been necessary.

Access
Most of this MSA is within the Maiden Peak Inventoried Roadless Area. There are trails throughout the area including the Pacific Crest Trail. Motorized vehicles are prohibited on all trails. Snowmobiles, bikes, and other mechanized wheeled vehicles are allowed only on designated routes. Cross-country skiing and horses are not restricted

Fire Management -- MSA B

TOTAL ACRES: 6,492
ELEVATION RANGES: 4800-5200 FT.
LOCATION BY LANDMARK: Rosary Lakes & Maiden Lake
ADJACENT MSAs: A, C, E, I, J & K
SPECIAL AREAS OF CONCERN: Willamette Pass Ski Area (adjacent to the LSR boundary) and NSO home range on Maklaks Mtn.
PAGs: LPD, MHD

Table 4-67. Historic Fire Regime and Current Condition Class for MSA B.

PAG	Fire Regime	Condition Class
LPD	III	
MHD	V	I

HAZARD ANALYSIS
Hazard is considered moderate and is mainly due to the dense pockets of lodgepole pine providing opportunity for ground fires to move to the crown. Most of the mountain hemlock is on the low end for snag densities and down wood and is operating within its historic fire return interval.

RISK ANALYSIS
The risk is considered high and is due to the human presence associated with Willamette Pass, down slope recreation residences along Odell Lake, Highway 58, and the Oregon Department of transportation work center. Lightning and human ignitions have occurred within this area.

SUPPRESSION PRIORITY (Resources being protected)

Priority 1: Adjacent structures including recreation residences, the ODOT maintenance yard, and Willamette Pass
Priority 2: The Maklaks NSO home range and associated habitat
Priority 3: Riparian resources and habitat connectivity as specified in Chapter 2

No "fuels only" activities have been identified at this time.

Table 4-68. Summary Existing Condition for MSA B.

PAGs	Mountain Hemlock Dry, Lodgepole Dry
Total Acres	6,492
Elevation Range	4,800 - 5,200
Land Allocation	Dispersed Recreation, BEMA, Scenic Views
Landscape Area	Mountain Hemlock (Odell WA)
Wildlife	Wolverine, American marten, fisher, black-backed woodpecker, northern spotted owl on Maklaks
Botanical	Potential habitat for: *Rhizopogon truncatus, Gastroboletus subalpinus*
LOS/Early Seral	81% LOS, 1% Early Seral

Insect and Disease Risk	Moderate
Forest Density	Moderate
Soil Restoration Priority	Low
Fire Hazard	Moderate
Fire Risk	High
Access	Total road density is "0"
Activities	Recreation Trails: Moore Creek. Maiden Lake, Maiden Peak, Pacific Crest Trails (Rosary Lakes)
Commodities	None

CRITERIA FOR DEVELOPING APPROPRIATE TREATMENTS

Desired Condition
Maintain the pristine quality of this area and allow "natural" processes to continue over the vast majority of this area. This may include fire use fires[20] in the future. Refer to the Goals and Objectives listed for the Mountain Hemlock Association Landscape Area in the Odell Pilot Watershed Analysis.

Objective
Emphasize native and naturalized terrestrial and aquatic biota using a passive management scenario. Habitat would be retained "as is" and allowed to progress through stand development without mechanical manipulation. Natural processes are the dominant features that shape the landscape and include fire and development of root rot pockets.

Management activities would be confined to small areas along the edges of this MSA to support strategic management objectives.

Rationale: Habitat gradients along the edge of the MSA and strategic location of fire behavior modification areas are examples of strategic management objectives that would meet overall LSR objectives.

MANAGEMENT OPTIONS AND TREATMENT TRIGGERS OR EVALUATION POINTS

Risk Reduction Activities and Management Options
As discussed in the Odell Watershed Analysis, MSA B seems to be functioning with little or no human influence. If large-scale loss of habitat occurs, it is considered part of natural processes within these ecosystems and a passive management scenario to enhance recovery would be anticipated in the short and long-term. Active management would be appropriate in this MSA where the objectives for stands in MSA K overlap (Maklaks Mtn.).

Snags and Down Woody Debris
Within the context of individual stand site potential, coarse woody debris and snags would be maintained by passive management that may or may not be at levels indicated in the Suitable Habitat Condition tables 3-4 and Additional Guidance for Dead Wood Management section located in Chapter 3 (Short and Long-term).

[20] The application of the appropriate management response to naturally ignited wildland fires to accomplish specific resource management objectives in predefined designated areas outlined in Fire Management Plans.

Enhancement and Other Activities

- Maintain a viable blister-rust resistant western white pine component in the ecosystem for vegetative species diversity in root rot pockets. (Short and Long-term)

- Plant resistant strains of western white pine to counteract white pine blister rust.

  --- Monitor- Survival of rust resistant western white pine seedlings planted in the spring of 1995. Evaluate the rust resistance of the outplanted seedlings over time. Determine which wildlife species use or depend on the white pine trees.

- If a fire use plan is developed, it would be appropriate in the context of the objectives for this MSA and the 1999 Odell Watershed Analysis.

- Maintain meadows from encroachment as needed. (Short and Long-term)

Fire Suppression
A fire strategy was developed that considers and prioritizes suppression activities (or tactics) by MSA in such a way to provide guidance that minimizes potential adverse effects to the most important values at risk while adhering to the main goals. The protection of human life and property will always be the number one priority. The following provides guidance for the appropriate suppression response:

- Protect Willamette Pass Ski area, recreation residences adjacent Highway 58, and the ODOT work center.
- Limit the fire spread by the use of Minimum Impact Suppression Tactics (MIST) and guidance found in the Deschutes National Forest Fire Management Action Plan.
- Minimize the expenditures of suppression costs when feasible.

Utilize the most knowledgeable and available District Resource Advisors when suppression actions lend an opportunity.

Riparian Areas
Manage areas consistent with the Aquatic Conservation Strategy and Odell Pilot Watershed Analysis.

Soils
All soils meet Deschutes National Forest and Regional Standards and Guidelines and no restoration measures are anticipated.

Wildlife and Botanical
Emergency habitat protection (i.e., fire suppression) takes precedence over the protection of individual special status plants or animals in coordination with local district resource specialists.

Access
Allow winter mechanized access on existing designated trails. Do not construct new trails unless the purpose is to replace an existing trail or use that is detrimentally impacting special status species and riparian habitats. Provide for summer mechanized access (mountain bikes only) on designated trails which are appropriately designed and constructed and minimize disturbance to selected wildlife.

MONITORING, EVALUATION, AND RESEARCH

The following opportunities for evaluation and research would be conducted as funding is available:

- Conduct surveys to confirm the presence and/or habitat utilization of neotropical migrants and black-back woodpeckers.

- Survey for the presence of forest carnivores, primarily wolverine, and fishers. If presence is confirmed, initiate a habitat utilization study and an evaluation of human impact(s).

Appendix A – Alternative Down Wood Sizes to Meet Percent Cover

Tons/acre | % cover

DF Snag numbers	DBH 6		8		10		12		14		16		18		20		22		24		26		28		30	
2	0.1	0.024	0.2	0.1	0.4	0.1	0.7	0.2	1.0	0.2	1.4	0.3	1.9	0.4	2.4	0.6	3.1	0.7	3.8	0.9	4.7	1.1	5.6	1.3	6.7	1.6
4	0.2	0.048	0.5	0.1	0.9	0.2	1.4	0.3	2.0	0.5	2.8	0.7	3.8	0.9	4.9	1.2	6.2	1.5	7.7	1.8	9.4	2.2	11.3	2.7	13.4	3.2
6	0.4	0.085	0.7	0.2	1.3	0.3	2.0	0.5	3.0	0.7	4.2	1.0	5.6	1.3	7.3	1.7	9.3	2.2	11.5	2.7	14.1	3.4	16.9	4.0	20.1	4.8
8	0.5	0.119	1.0	0.2	1.7	0.4	2.7	0.7	4.0	1.0	5.6	1.3	7.5	1.8	9.8	2.3	12.4	3.0	15.4	3.7	18.8	4.5	22.6	5.4	26.8	6.4
10	0.6	0.143	1.2	0.3	2.2	0.5	3.4	0.8	5.0	1.2	7.0	1.7	9.4	2.2	12.2	2.9	15.5	3.7	19.2	4.6	23.4	5.6	28.2	6.7	33.5	8.0
15	0.9	0.215	1.8	0.4	3.3	0.8	5.1	1.2	7.5	1.8	10.5	2.5	14.1	3.4	18.3	4.4	23.2	5.5	28.8	6.9	35.2	8.4	42.3	10.1	50.2	12.0
20	1.2	0.286	2.5	0.6	4.4	1.0	6.8	1.6	10.0	2.4	14.0	3.3	18.8	4.5	24.4	5.8	30.9	7.4	38.4	9.2	46.9	11.2	56.4	13.4	66.9	16.0
25	1.5	0.358	3.1	0.7	5.5	1.3	8.5	2.0	12.5	3.0	17.5	4.2	23.5	5.6	30.5	7.3	38.7	9.2	48.0	11.5	58.6	14.0	70.5	16.8	83.7	20.0
30	1.8	0.429	3.7	0.9	6.5	1.6	10.2	2.4	15.0	3.6	21.0	5.0	28.1	6.7	36.6	8.7	46.4	11.1	57.6	13.7	70.3	16.8	84.6	20.2	100.4	23.9
40	2.4	0.573	4.9	1.2	8.7	2.1	13.6	3.3	20.0	4.8	28.0	6.7	37.5	9.0	48.8	11.6	61.8	14.8	76.8	18.3	93.8	22.4	112.8	26.9		
50	3.0	0.716	6.2	1.5	10.9	2.6	17.1	4.1	25.1	6.0	35.0	8.3	46.9	11.2	61.0	14.6	77.3	18.4	96.1	22.9	117.2	28.0				
100	6.0	1.431	12.3	2.9	21.8	5.2	34.1	8.1	50.1	12.0	69.9	16.7	93.8	22.4	122.0	29.1										
200	12.0	2.863	24.6	5.9	43.6	10.4	68.2	16.3	100.2	23.9	139.8	33.3														
300	18.0	4.294	36.9	8.8	65.4	15.6	102.3	24.4																		
400	24.0	5.725	49.2	11.7	87.2	20.8																				
500	30.0	7.156	61.5	14.7	109.0	26.0																				

Tons/Acre and % Cover

PP Snag numbers	DBH 6		8		10		12		14		16		18		20		22		24		26		28		30	
2	0.1	0.02	0.2	0.05	0.4	0.1	0.7	0.2	1.0	0.2	1.5	0.3	2.0	0.5	2.7	0.6	3.4	0.8	4.3	1.0	5.3	1.2	6.4	1.5	7.7	1.8
4	0.2	0.04	0.4	0.1	0.8	0.2	1.3	0.3	2.0	0.5	2.9	0.7	4.0	0.9	5.3	1.2	6.9	1.6	8.6	2.0	10.6	2.4	12.8	2.9	15.3	3.5
6	0.3	0.07	0.6	0.1	1.2	0.3	2.0	0.5	3.1	0.7	4.4	1.0	6.1	1.4	8.0	1.8	10.3	2.4	12.9	3.0	15.9	3.7	19.2	4.4	23.0	5.3
8	0.4	0.09	0.9	0.2	1.6	0.4	2.7	0.6	4.1	0.9	5.9	1.4	8.1	1.9	10.7	2.5	13.7	3.2	17.2	4.0	21.2	4.9	25.7	5.9	30.7	7.0
10	0.5	0.1	1.1	0.2	2.0	0.5	3.3	0.8	5.1	1.2	7.4	1.7	10.1	2.3	13.3	3.1	17.1	3.9	21.5	4.9	26.5	6.1	32.1	7.4	38.3	8.8
15	0.7	0.2	1.6	0.4	2.9	0.7	5.0	1.1	7.7	1.8	11.0	2.5	15.1	3.5	20.0	4.6	25.7	5.9	32.3	7.4	39.7	9.1	48.1	11.1	57.5	13.2
20	1.0	0.2	2.1	0.5	3.9	0.9	6.6	1.5	10.2	2.3	14.7	3.4	20.2	4.6	26.7	6.1	34.3	7.9	43.0	9.9	53.0	12.2	64.2	14.7	76.6	17.6
25	1.2	0.3	2.7	0.6	4.9	1.1	8.3	1.9	12.8	2.9	18.4	4.2	25.2	5.8	33.4	7.7	42.9	9.9	53.8	12.4	66.2	15.2	80.2	18.4	95.8	22.0
30	1.4	0.3	3.2	0.7	5.9	1.4	10.0	2.3	15.3	3.5	22.1	5.1	30.3	7.0	40.0	9.2	51.4	11.8	64.5	14.8	79.4	18.3	96.2	22.1		
40	1.9	0.4	4.3	1.0	7.8	1.8	13.3	3.1	20.4	4.7	29.4	6.8	40.4	9.3	53.4	12.3	68.6	15.8	86.0	19.8	105.9	24.3				
50	2.4	0.6	5.4	1.2	9.8	2.3	16.6	3.8	25.6	5.9	36.8	8.5	50.5	11.6	66.7	15.3	85.7	19.7	107.6	24.7						
100	4.8	1.1	10.7	2.5	19.6	4.5	33.2	7.6	51.1	11.7	73.6	16.9	100.9	23.2												
200	9.6	2.2	21.4	4.9	39.2	9.0	66.4	15.3	102.2	23.5																
300	14.4	3.3	32.1	7.4	58.8	13.5	99.6	22.9																		
400	19.2	4.4	42.8	9.8	78.4	18.0																				
500	24.0	5.5	53.5	12.3	98.0	22.5																				

Tons/Acre and % Cover

LP Snag numbers	d.b.h.															
	6		**8**		**10**		**12**		**14**		**16**		**18**		**20**	
2	0.2	0.06	0.3	0.1	0.6	0.2	0.8	0.3	1.2	0.5	1.6	0.6	2.1	0.8	2.7	1.0
4	0.3	0.12	0.6	0.2	1.1	0.4	1.7	0.6	2.4	0.9	3.2	1.2	4.2	1.6	5.3	2.0
6	0.5	0.18	1.0	0.4	1.7	0.6	2.5	1.0	3.6	1.4	4.8	1.8	6.3	2.4	8.0	3.0
8	0.6	0.25	1.3	0.5	2.2	0.8	3.4	1.3	4.8	1.8	6.5	2.5	8.4	3.2	10.6	4.0
10	0.8	0.31	1.6	0.6	2.8	1.0	4.2	1.6	6.0	2.3	8.1	3.1	10.5	4.0	13.3	5.0
15	1.2	0.46	2.4	0.9	4.1	1.6	6.3	2.4	9.0	3.4	12.1	4.6	15.8	6.0	19.9	7.6
20	1.6	0.61	3.2	1.2	5.5	2.1	8.4	3.2	11.9	4.5	16.1	6.1	21.0	8.0	26.6	10.1
25	2.0	0.77	4.1	1.5	6.9	2.6	10.5	4.0	14.9	5.7	20.2	7.7	26.3	10.0	33.2	12.6
30	2.4	0.92	4.9	1.8	8.3	3.1	12.6	4.8	17.9	6.8	24.2	9.2	31.5	12.0	39.8	15.1
40	3.2	1.2	6.5	2.5	11.0	4.2	16.8	6.4	23.9	9.1	32.3	12.3	42.0	16.0	53.1	20.2
50	4.1	1.5	8.1	3.1	13.8	5.2	21.0	8.0	29.9	11.3	40.4	15.3	52.6	19.9	66.4	25.2
100	8.1	3.1	16.2	6.1	27.5	10.4	42.0	15.9	59.7	22.7	80.7	30.6	105.1	39.9	132.8	50.4
200	16.2	6.1	32.4	12.3	55.0	20.9	84.0	31.9	119.4	45.3	161.4	61.3				
300	24.3	9.2	48.6	18.4	82.5	31.3	126.0									
400	32.4	12.3	64.8	24.6	110.0	41.8										
500	40.5	15.4	81.0	30.7	137.5	52.2										

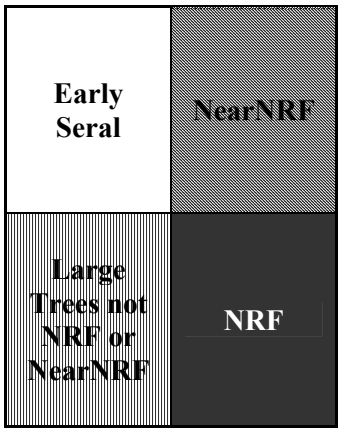
Tons/Acre and % Cover

Appendix B – Example of NRF Cycling and How it Was Modeled

A Simplified Example of NRF Cycling on the Landscape

As noted earlier, the large trees are key elements of the habitats of concern in this landscape because it takes so long to replace them if they die. So, the concept of cycling habitats around the landscape is to provide a reduction of the percentage of the landscape area at risk to loss of large trees. A simple "forest" model will be used to illustrate this concept.

LEGEND



- The white cells are early seral, i.e. regeneration cut areas, burned areas with stand replacement fires, etc.
- Vertical lined areas are areas with large trees, but not close to being NRF. These would be the ponderosa pine/sugar pine areas, areas where the stands have grown out of early seral, but aren't yet close to NRF, and/or areas where fire climax is the goal.
- Slanted lined areas are areas of Near-NRF, where NRF conditions would be anticipated being met in the next couple of decades.
- Dark areas are the areas of NRF.

All areas are shown for a given point in time. The first picture of our "forest" model is Figure B-1. It represents an imaginary landscape where all of the forest stands (each rectangle is a stand) are capable of growing NRF, but vary in habitat condition as shown in the legend, above.

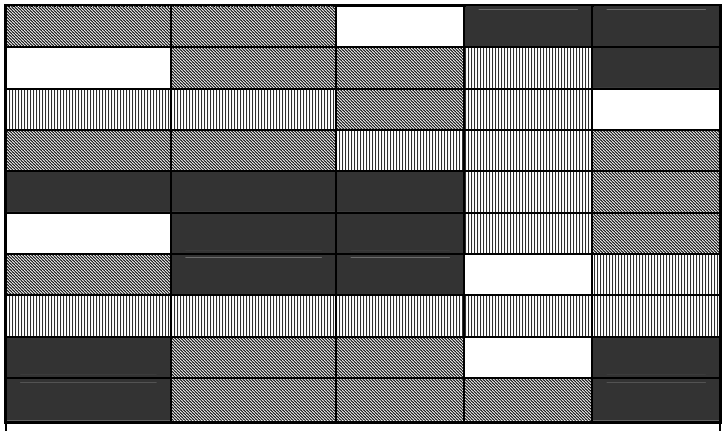


Figure B-1. The imaginary forest at time zero.

Then, disturbance events occur, forested stands keep growing, and in 20 years, our "forest" looks like Figure B-2. Notice how some of the Near-NRF grew to where it met the NRF conditions, and how some of the Early Seral grew to have large trees. Notice also how disturbance (let's say a fire) moved some of the Near-NRF to Early Seral, and how active management moved NRF to Near-NRF conditions.

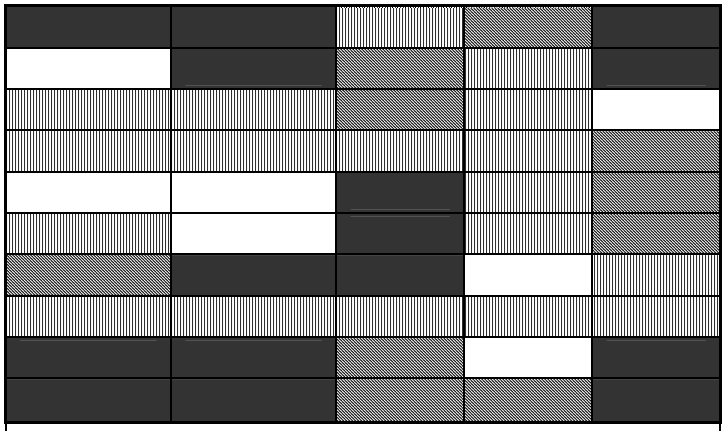


Figure B-2. The imaginary forest at 20 years.

Looking ahead to 40 years out, Figure B-3 gives us indications of continuing change as we recognized that beetles, fire, or some other natural disturbance event moved the NRF in row 5, column 3 into a different condition while some of the other stands grew closer or into NRF conditions.

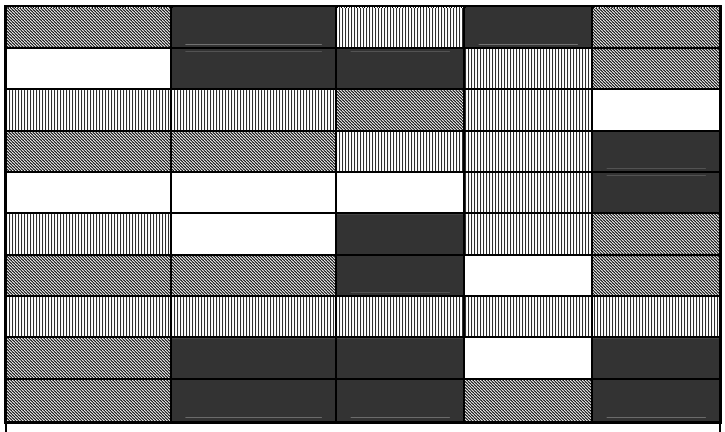


Figure B-3. The imaginary forest at 40 years.

The idea, then, is to use management activities in keep the landscape dominated by stands with large trees in a variety of structural conditions so that, as the vegetation changes through disturbance and growth, there are areas coming along to replace the areas that are susceptible to loss from disturbance agents, especially insects and fire killing the large tree components.

How NRF Was Modeled

The data is the product of INFORMS and FVS runs.
The data was run out 40 years with 10 year intervals:

1. Current – this is 2006 data.
2. PostHarv = Post harvest with this entry
3. 10Yr = 10 years out
4. 20Yr = 20 years out
5. 30Yr = 30 years out
6. 40Yr = 40 years out.

Additional harvests have been incorporated into the treatment analysis runs based on the vegetative response to treatments. The assumption is that when vegetation reaches the need for additional treatments, they will be done until that specific stand or area is needed to replace the denser, multi-storied forest conditions that currently provide late and old structured (climatic climax) habitat, but are at extreme risk of stand replacement events.

Nesting, roosting and foraging (NRF) was modeled over time. For this analysis, it is defined as NRF when the following are all true:

- canopy cover is greater than 40%,
- there is presence of snags greater than 16" dbh,
- there are at least 8 ponderosa pine or Douglas-fir greater than 21" dbh,
- there is a presence of Douglas-fir, ponderosa pine, or white fir greater than 36" dbh. The variable for this is large structure.
- Ponderosa pine, Douglas-fir, Engelmann spruce, and true firs must dominate the overstory basal area. The variable is OVERSTRY.
- Douglas-fir, true fir, mountain hemlock, and/or Engelmann spruce must dominate the understory basal area. The variable is UNDERSTORY.

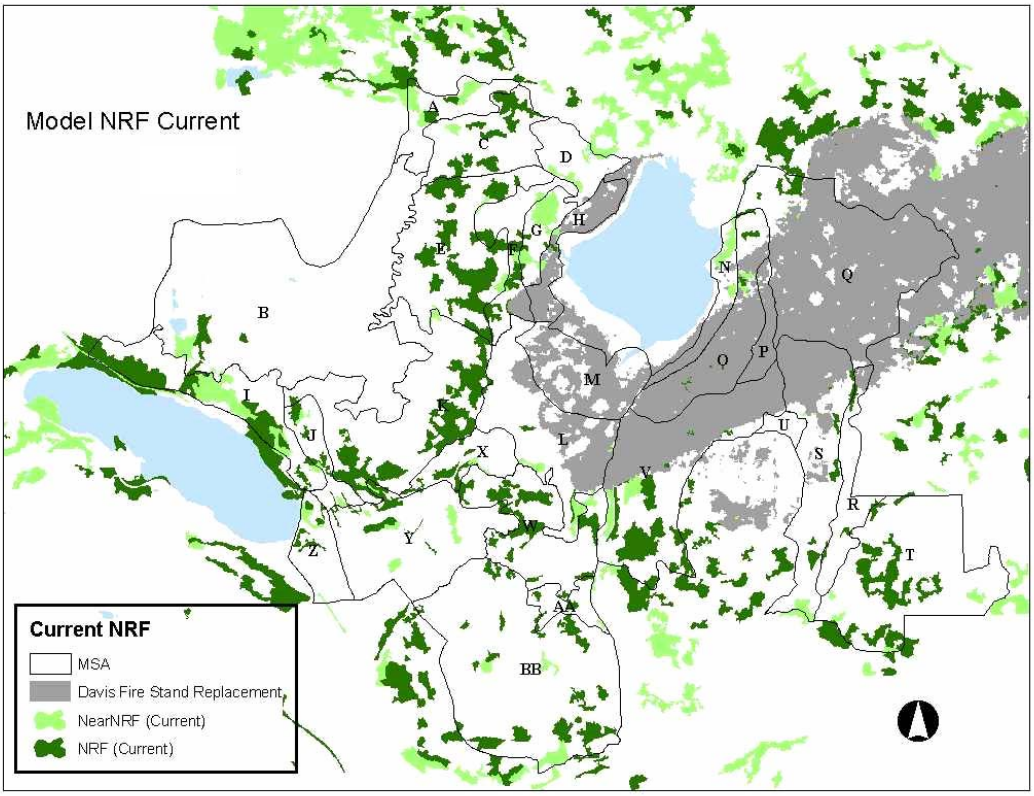
Near-NRF is defined as where two of the main components mentioned above are true, one of which must be large structure with at least 25% canopy cover.

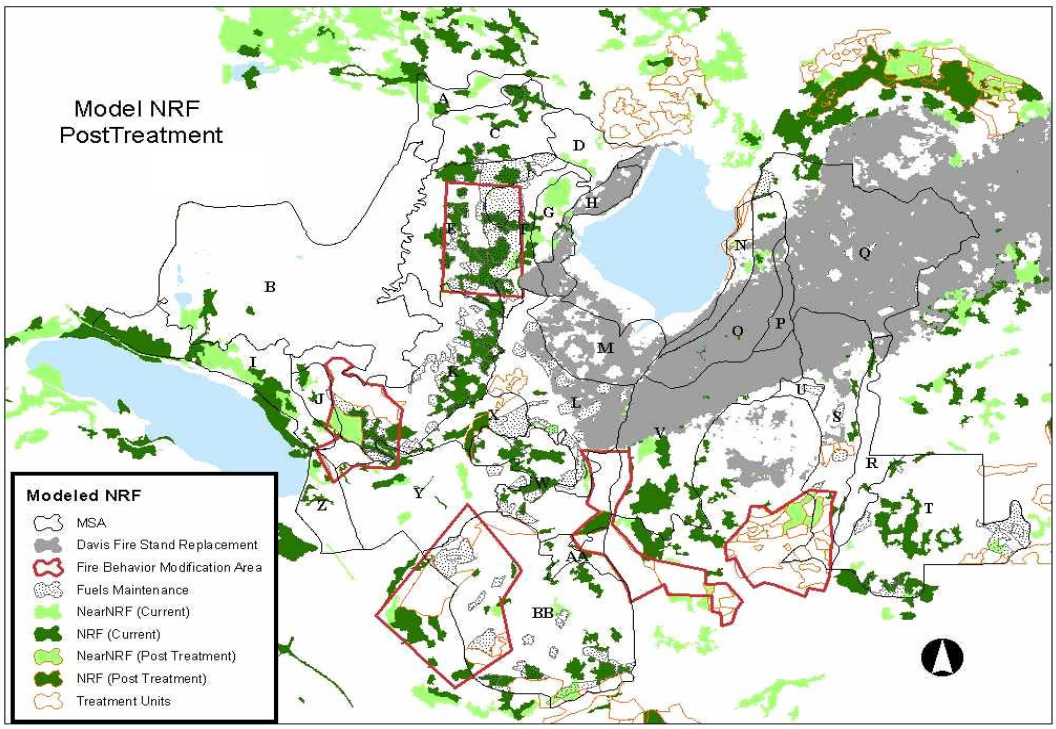
RESULTS

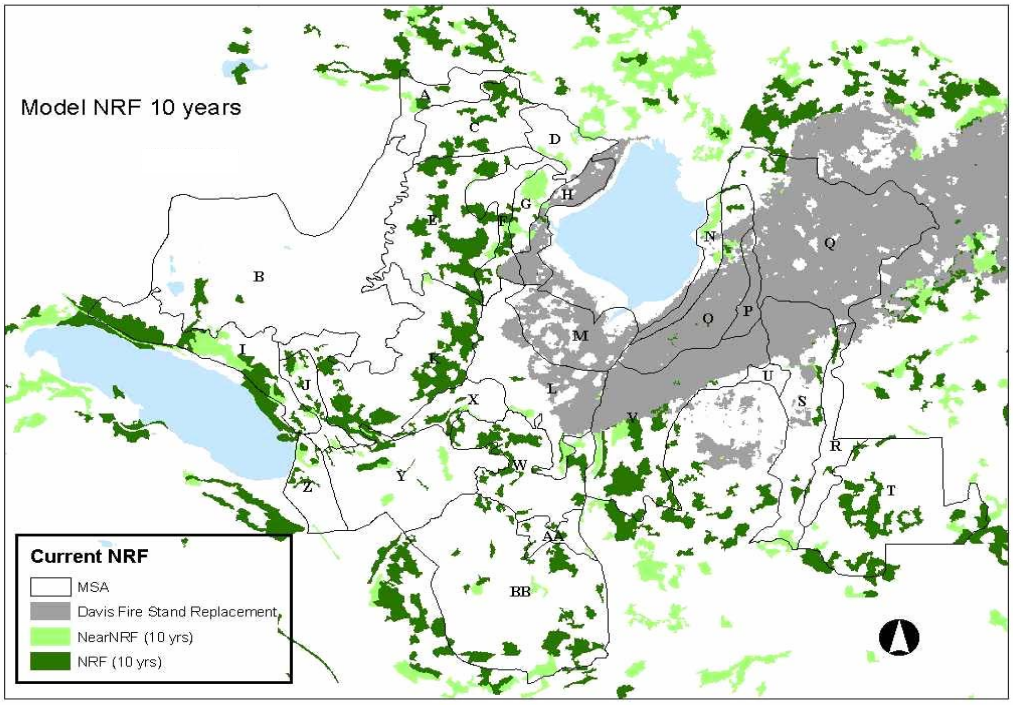
The following are the results of the modeling within the Davis LSR

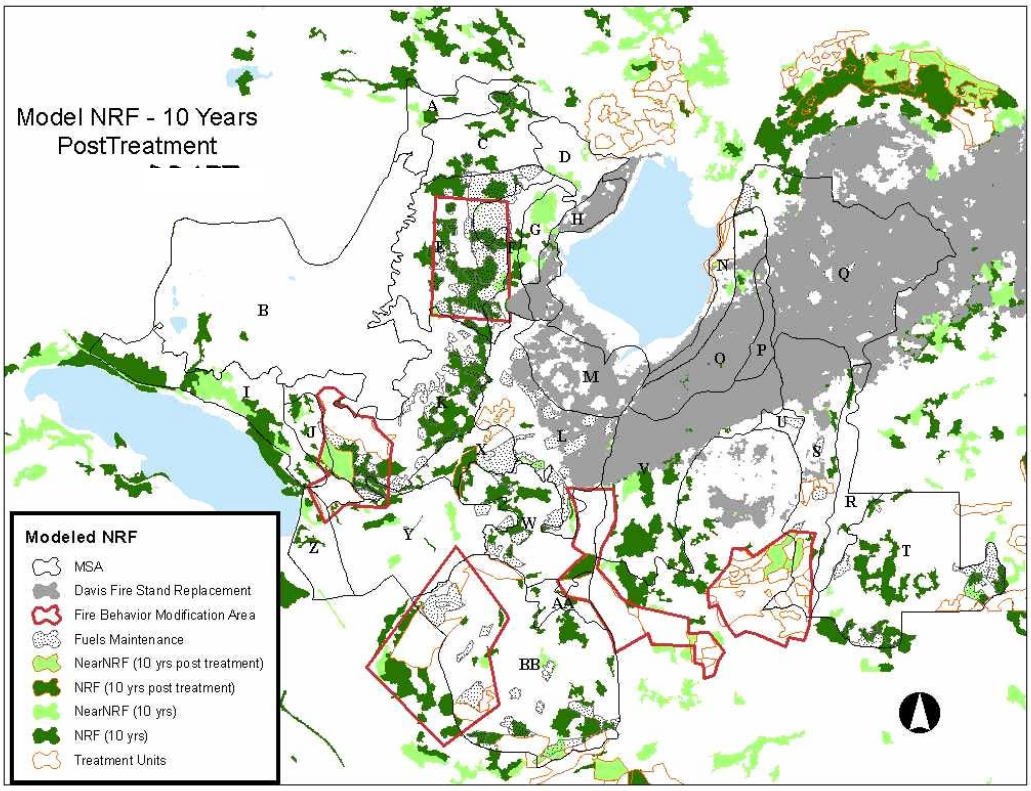
Model	Acres		Acres Post Harvest	
Year	NRF	Near NRF	NRF	Near NRF
Current	5,095	2,045	4,968	2,026
10 Year	5,477	1,964	5,273	1,945
20 Year	5,826	2,365	6,111	2,113
30 Year	6,164	2,845	6,439	3,006
40 Year	6,507	3,311	6,667	3,491

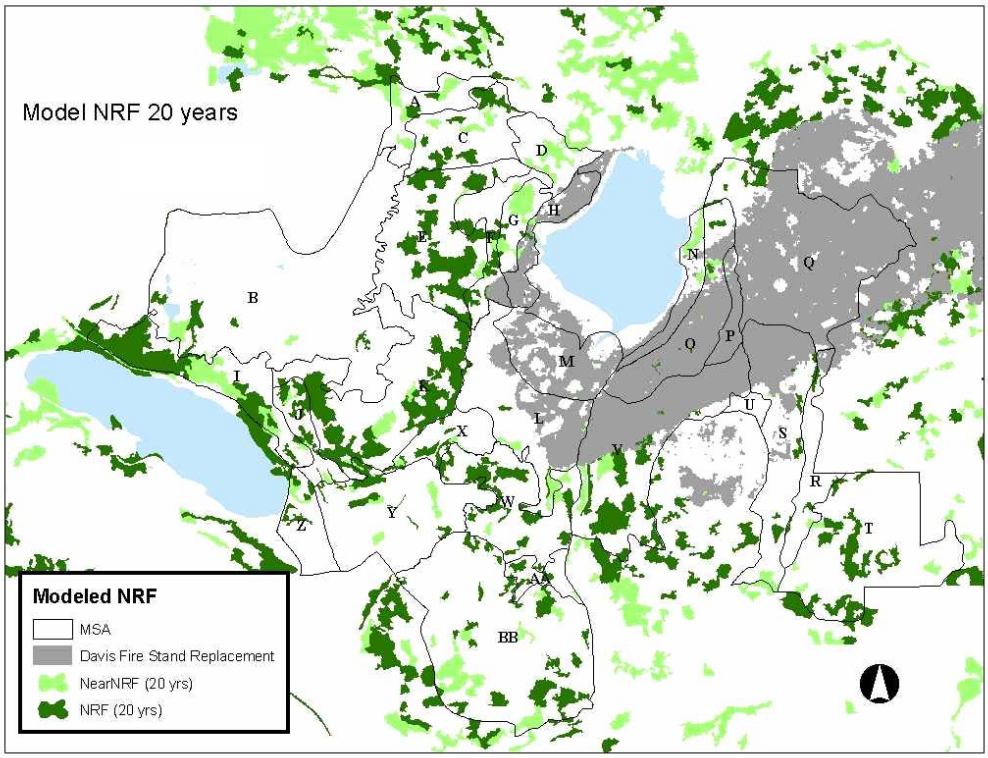
The modeling indicates 20 years after initial reduction, NRF levels have recovered and expanded. Even with additional thinning, NRF and near NRF habitat increases over time at a greater rate than a passive management scenario. The following is a pictorial display of the results of modeling changes over time.

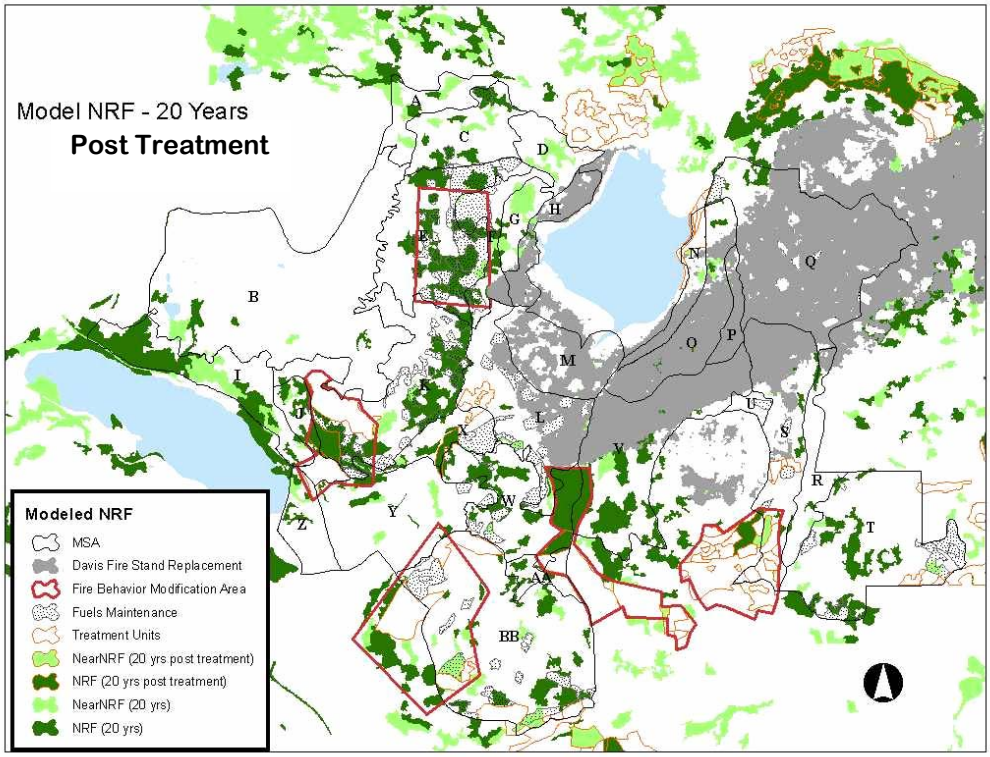

Model NRF Current
Current NRF
MSA
Davis Fire Stand Replacement
NearNRF (Current)
NRF (Current)

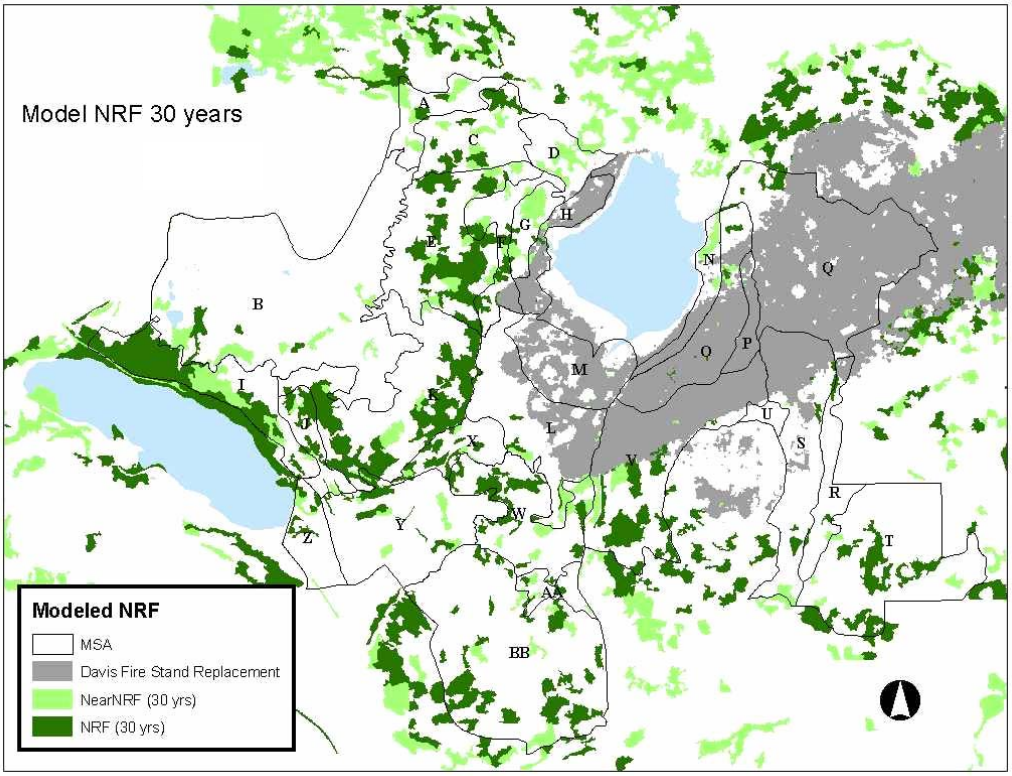

Model NRF
PostTreatment
Modeled NRF
MSA
Davis Fire Stand Replacement
Fire Behavior Modification Area
Fuels Maintenance
NearNRF (Current)
NRF (Current)
NearNRF (Post Treatment)
NRF (Post Treatment)
Treatment Units

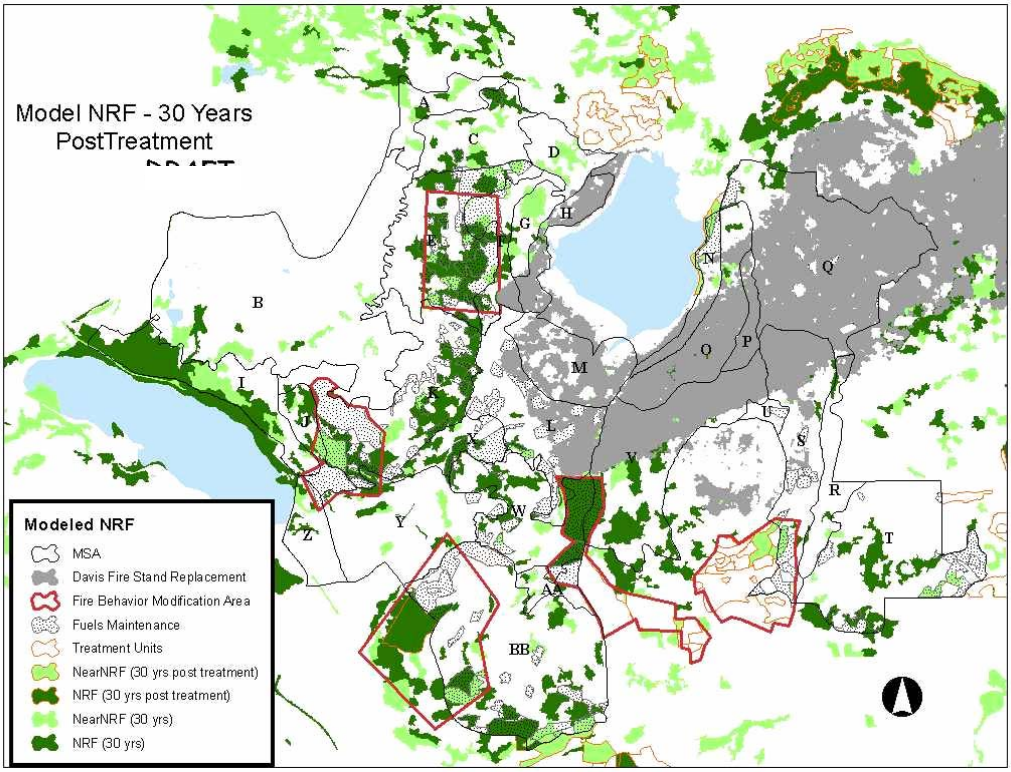

Model NRF 10 years
Current NRF
MSA
Davis Fire Stand Replacement
NearNRF (10 yrs)
NRF (10 yrs)

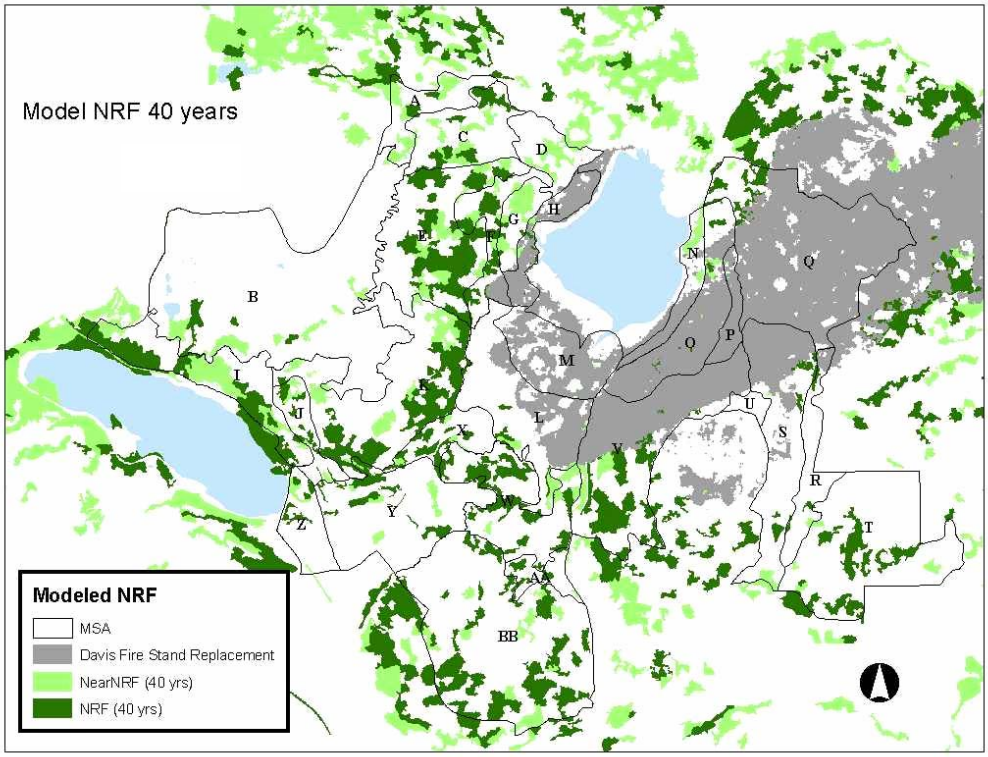

Model NRF - 10 Years
PostTreatment
Modeled NRF
MSA
Davis Fire Stand Replacement
Fire Behavior Modification Area
Fuels Maintenance
NearNRF (10 yrs post treatment)
NRF (10 yrs post treatment)
NearNRF (10 yrs)
NRF (10 yrs)
Treatment Units

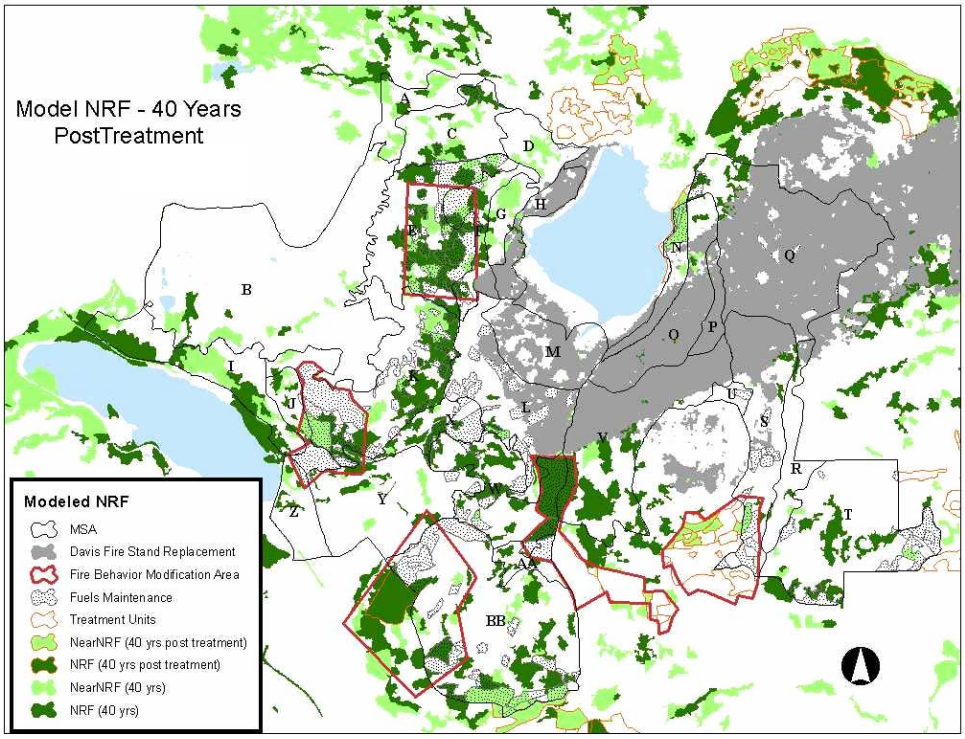

Model NRF 20 years
Modeled NRF
MSA
Davis Fire Stand Replacement
NearNRF (20 yrs)
NRF (20 yrs)


Model NRF - 20 Years
Post Treatment
Modeled NRF
MSA
Davis Fire Stand Replacement
Fire Behavior Modification Area
Fuels Maintenance
Treatment Units
NearNRF (20 yrs post treatment)
NRF (20 yrs post treatment)
NearNRF (20 yrs)
NRF (20 yrs)


Model NRF 30 years
Modeled NRF
MSA
Davis Fire Stand Replacement
NearNRF (30 yrs)
NRF (30 yrs)

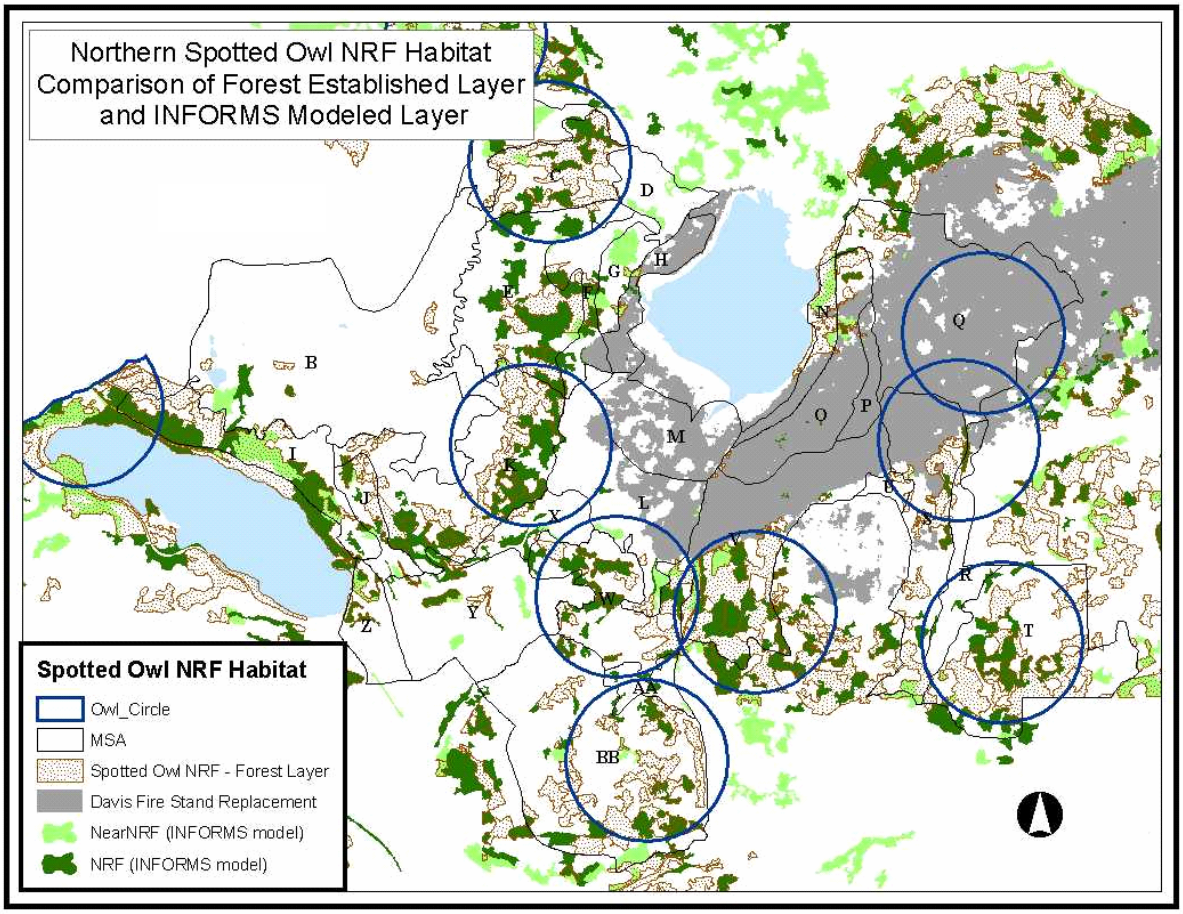

Model NRF - 30 Years
PostTreatment
Modeled NRF
MSA
Davis Fire Stand Replacement
Fire Behavior Modification Area
Fuels Maintenance
Treatment Units
NearNRF (30 yrs post treatment)
NRF (30 yrs post treatment)
NearNRF (30 yrs)
NRF (30 yrs)


Model NRF 40 years
Modeled NRF
MSA
Davis Fire Stand Replacement
NearNRF (40 yrs)
NRF (40 yrs)


Model NRF - 40 Years
PostTreatment
Modeled NRF
MSA
Davis Fire Stand Replacement
Fire Behavior Modification Area
Fuels Maintenance
Treatment Units
NearNRF (40 yrs post treatment)
NRF (40 yrs post treatment)
NearNRF (40 yrs)
NRF (40 yrs)

The method used for modeling NRF for this assessment does not match modeling completed by the Forest in determining NRF. For that process refer to the 2006 Programmatic BA (available at the Crescent Ranger District). The Forest process estimates over 8,400 acres NRF and does not considered the concept of near NRF. The method used in this analysis underestimates NRF, however given the assumptions of the model there is a demonstrated NRF recovery.

The following map shows the difference between the Forest layer and the current condition of the modeling used in this assessment.



Appendix C - Snag and Down Log

DEVELOPMENT OF DEADWOOD LEVELS FOR DAVIS LSR

Appropriate landscape for determining distribution of deadwood is 20,000 acres (Mellen 2006). Davis LSR does not contain sufficient habitat in PP/DF, MMC, and LP for a stand alone analysis in utilizing DecAID vegetation data. Subwatersheds that intersect the LSR were used as the landscape for all habitat types. Analysis of dead wood must be done at the larger landscape level (Figure C-1).

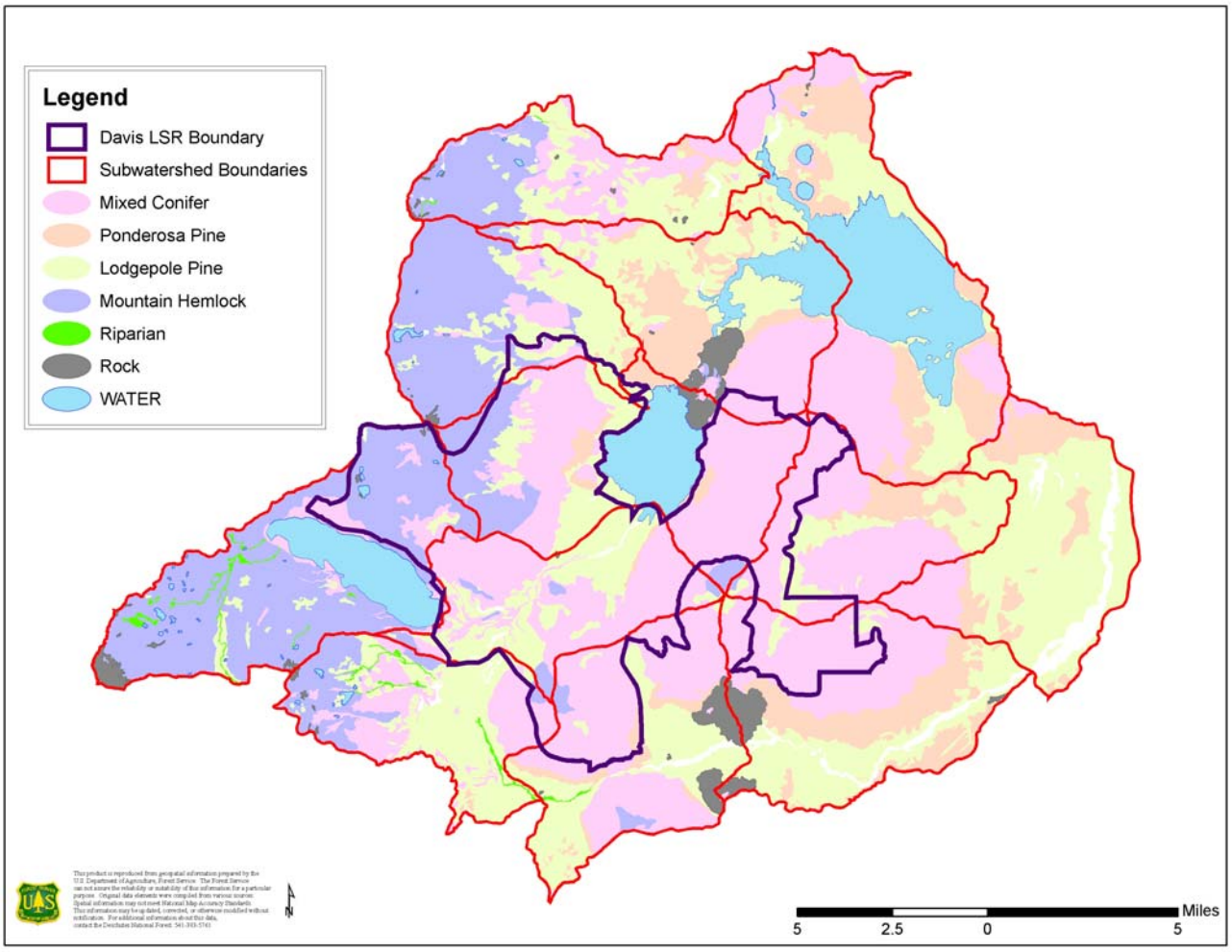


Figure C-1. Subwatersheds in the greater landscape area around Davis LSR.

The distribution on the larger landscape or reference condition, was determined using the levels in DecAID modified with HRV information. A combination of DecAID data at the small and large structural stages was used to determine the range of snag levels at the various tolerance levels. This information was taken from the narratives for each habitat type. The two were matched up as close as possible erring on the conservative side.

Determining snag densities from DecAID Narratives

The snag densities were determined using DecAID narrative information. This information is a synthesis of all available research data prior to 2006. For example, to determine the 80% tolerance level for Table 3-4a., Suitable Habitat Condition for Climatic Climax by MSA Group, information from the narratives in Eastside Mixed Conifer Eastside Cascades/Blue Mountains habitat type for small/medium and large structure was used. See Example A. The high density clumps provided the high end of the range (49/acre) and the low density clumps provided the low end of the range (16/acre). Since that total included the number of snags greater than or equal to 20 inches dbh, that number was used directly for the greater than 19.9 inch column and subtracted

from the total of the greater than 9.9 and less than 19.9 column (49-18=31). Notice that in the lower density clumps the snags greater than or equal to 20 inches dbh have a range of 4-6 per acre. The higher number, 6, was used for the low end of the range of total snags, but the lower number, 4, was subtracted from the total to get 14 as the low end of the range for snags between 9.9 and 20. The ranges included densities described for natural conditions as well as for the large structure so no adjustments were made. The same process was used for all tolerance levels for all habitat types and for all down wood levels.

Example A

EMC
SNAGS
80%
Small/Medium

The best available wildlife data indicate that to maintain snag densities in this vegetation condition at the 80% tolerance level, manage for high density clumps of snags that, when extrapolated to a per hectare basis, should average up to 120 snags/ha ≥ 25 cm dbh (49/acre ≥ 10 in) with about 45/ha (18/acre) of those snags ≥ 50 cm (20 in) dbh (Figures EMC_S/L.sp-5 and EMC_S/L.sp-7). Some snag clumps should be of lower density averaging 40 to 80 snag/ha >25 cm (16-32/acre ≥10 in) with about 10 to 15/ha (4-6/acre) of those snags ≥ 50 cm (20 in) dbh. Provide these high snag density areas in less fire-prone areas of the landscape that are moister with a moderate- or high-severity fire regime (See Considerations of Scale section above). On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 80% tolerance level for unharvested inventory plots with measurable snags is 62 snags ≥ 25.4 cm/ha dbh (25/acre ≥ 10.0 in), with 21 snags/ha ≥ 50.0 cm dbh (8.5/acre ≥ 19.7 in)) (Figures EMC_ECB_S.inv-2, EMC_ECB_S.inv-3).

Large

On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 80% tolerance level for unharvested inventory plots with measurable snags is 52 snags/ha ≥ 25.4 cm dbh (21/acre ≥ 10.0 in), and 22.5 snags/ha ≥ 50.0 cm dbh (9.1/acre ≥ 19.7 in)(Figures EMC_ECB_L.inv-2, EMC_ECB_L.inv-3)

SNAGS*					
>9.9" dbh and <20" dbh	>19.9" dbh	Total/Acre > 9.9"dbh	tolerance level	% of PAG based on Total/Acre|>19.9"dbh	
			<30%	45-55	60
4-6	5-10	9-16	30%	31-40	20
11-24	5-8	16-32	50%	6-10	10
14-31	6-18	16-49	80%	5-7	10

Determining Distribution from Reference Conditions

While the LSR needs to provide moderate to high densities of snags and down wood for old growth dependent species, we recognize that not all of the LSR can produce high densities of dead wood and the larger landscape needs to be included. Determining distribution or percent of the landscape of the various densities was not as straight forward a process as determining snag densities by tolerance levels. Reference conditions were used to determine the distribution of snags across the landscape and applied to the densities developed in the previous process.

Example B shows how the larger Watershed distribution of snags in Eastside Mixed Conifer Eastside Cascades/Blue Mountains habitat type is applied to the distribution portion of Table 3-4a. The density categories (snags/acre) didn't match up well with tolerance level densities, especially when the tolerance densities overlapped or were inclusive. The guiding principle was to achieve roughly the distribution between high, moderate, and low densities as presented in the watershed reference condition and to come as close to matching densities as possible.

Example B

Watershed Snag Reference Condition			
Distribution of Snags in EMC			
snags ≧10" dbh		snags ≧20" dbh	
Snags per Acre	% Area	Snags per Acre	% Area
0	18-24	0	31-42
0-6	27-31	0-2	12-19
6-12	15-17	2-4	14-18
12-24	16-23	4-6	9-13
24-36	6-10	6-10	10-15
36+	5-7	10-18	5-7
		18+	1-2
Reference condition from DecAID tables (unharvested plots for snags =10" (24.5cm) dbh) EMC_ECB_O.Inv-14, EMC_ECB_S.Inv-14, EMC_ECB_L.Inv-14 and modified with HRV information from the Odell Pilot WA.		Reference condition from DecAID tables (unharvested plots for snags =20" (50cm) dbh) EMC_ECB_O.Inv-15, EMC_ECB_S.Inv-15, EMC_ECB_L.Inv-15, and modified with HRV information from the Odell Pilot WA.	

SNAGS*				
>19.9" dbh	Total/Acre > 9.9"dbh	tolerance level	% of PAG based on Total/Acre>19.9"dbh	
		<30%	45-55	60
5-10	9-16	30%	31-40	20
5-8	16-32	50%	6-10	10
6-18	16-49	80%	5-7	10

For example, for total snags greater than 9 inches dbh where the density of less than 9 snags per acre is below the 30 percent tolerance level, the density used to determine distribution from the reference condition was 0-6 snags/acre.

The remaining density categories followed were developed following the distribution of the reference condition.

The inclusive nature of the 30 percent and 50 percent tolerance levels for snags greater than 19.9 meant looking at the percent of area developed for reference condition between 4 and 10 snags per acre. Roughly 30 percent of the landscape should have between 5 and 10 snags per acre greater than 19.9 inches dbh. The split was included to follow the same format as the remaining habitat types.

The same process was used for all habitat types and for down wood.

Determining a Reference Condition

The reference condition used for this analysis area was developed from DecAID and the Odell Pilot Watershed Analysis. DecAID synthesized data comes from established vegetations plots across all land ownerships in Oregon and Washington. Data from unharvested stands provides a reference condition in the various habitat types for distribution of snag and down wood size and densities across a large landscape. This data was used along with historical range of variability (HRV) information on structure stage from the Odell Pilot Watershed Analysis to develop the local HRV or reference condition of snag densities across a habitat type, with all structural stages lumped. The reference condition is compared to existing condition to determine how close existing conditions match with "historic". It is assumed that managing within HRV will provide for those species that existed in the past and survived to the present with those historical snag densities. Fire ecosystems have been altered due to fire exclusion over the years. Mellen et al. (2006) states dead wood levels may be above historical conditions due to fire suppression and increased mortality in some areas, and may be depleted below historical levels locally in other areas due to areas burned by intense fire or salvage and firewood cutting. The vegetation data is used for this analysis understanding that the information from unharvested plots may not accurately reflect "natural conditions". They are comparable to recent research (Harrod et al. 1998, Agee 2002) regarding historic dead wood densities and until new information becomes accessible, DecAID vegetation data provides the most current, empirical data on natural conditions available for dead wood evaluations.

In determining reference condition, information from the watershed analysis on structure stages was taken and lumped into more manageable groupings similar to those structural condition classes found in DecAID. Table C-1 is from Odell Pilot WA 1999 (Table 14 from the WA); it displayed HRV by structural stage and plant association group (PAG).

Table C-1. Historic Range of Variability (HRV) by Plant Association Group (PAG).

Structural Stage	*PLANT ASSOCIATION GROUP* (Percent for Plant Association Groups (PAG) on the Crescent District)						
	MH	PPD PPW	LPD	LPW	MCD	MCW	LPHD
ES	NE	0-20	0-70	0-30	0-20	0-10	0-30
EM	NE	5-30	0-10	0-50	15-50	0-15	0-25
MO	NE	13-50	0-20	0-20	15-50	5-20	5-50
MC	NE	0-10	0-50	5-50	7-20	8-20	0-10
MM	NE	15-60	0-10	5-50	10-55	10-40	0-25
LM	NE	0-20	0-10	0-80	8-30	10-40	0-20
LS	NE	20-50	0-30	0-60	15-60	10-40	10-40

NOTE: NE = No HRV has been established for this PAG. Each structural stage could be 0-100.

The PAGS were lumped into habitat types that match the DecAID Habitat types. **Lumped PAGs by DecAID Habitat types**

- Montane Mixed Conifer (MMC)
- Ponderosa Pine/Douglas-fir (PP/DF)
- Lodgepole Pine Forests and Woodlands (LP)
- Eastside Mixed Conifer Forest S Cascades/Blue Mnts (EMC)

WA	DecAID
MH	MMC
PPD/PPW	PP/DF
LPD LPW LPHD	LP
MCD	EMC
MCW	

Descriptions found at http://wwwnotes.fs.fed.us:81/pnw/DecAID/DecAID.nsf/QueryForm?OpenForm

Table C-2 shows structural stages from the WA (Table 15 from Odell Pilot WA) was then matched up with the structural stages from DecAID.

Table C-2. The following is a brief description of the codes used to define structural stages used for analyzing HRV and comparing existing conditions with historic conditions.

CODE	STRUCTURAL STAGE	DESCRIPTION
ES	Stand Initiation	One canopy stratum (may be broken or continuous), on dominant cohort of seedlings or saplings. Grass, forbs or shrubs may be present with seral trees.
EM	Understory Reinitiation	The overstory canopy is discontinuous. Two or more canopy layers are present. Overstory trees may be poles or of small or medium diameter. Understory trees are seedlings or poles.
MO	Stem Exclusion: Open Canopy	One discontinuous canopy stratum. One cohort of tree stems excluding competition. Trees may be poles of small or medium diameter. Understory shrubs, grasses, or forbs may be present.
MC	Stem Exclusion: Closed Canopy	Canopy layer is closed and continuous. One or more canopy strata may be present. Lower canopy strata, if present, is the same age as the upper stratum. Trees may be poles or small or medium diameter. Understory shrubs, grasses, or forbs may be present.
MM	Multi-stratum without Large Trees	The overstory canopy is discontinuous. Two or more canopy layers are present. Large trees are uncommon in the overstory. Horizontal and vertical stand structure and tree sizes are diverse. The stand may be a mix of seedlings, saplings, poles, or small or medium diameter trees.
LM	Multi-stratum with Large Trees	The overstory is broken or discontinuous. Two or more canopy layers are present. Medium and large sized trees dominate the overstory. Trees of all sizes may be present. Horizontal and vertical stand structure and tree sizes are diverse.
LS	Single Stratum with Large Trees	The single dominant stratum consists of medium sized or large trees. One or more cohort of trees may be present. An understory may be absent or consist of sparse or clumpy seedlings or saplings. Grasses, forbs, or shrubs may be present.

Table C-3 shows DecAID structural classes, which are found in the Structural Conditions Descriptions portion of DecAID.

Table C-3. DecAID Structural Classes.

DecAID Structural Condition Class	Definition - size class and tree stocking[1]	WHR Structural Conditions, Wildlife-Habitat Relationships in Oregon and Washington (O'Neil et al. 2001).
Post-fire	stand replacing fire; stocking and trees size variable; high snag densities	N/A
Open Canopy	tree stocking <10% or tree stocking >=10% and QMD 1-9 inches (2.5-	1 Grass/Forb Open, 2 Grass/Forb Closed, 3 Shrub/seedling Open, 4 Shrub/seedling Closed, 5 Sapling/Pole Open, 6 Sapling/Pole Moderate, 7 Sapling/Pole Closed
Small/medium Trees	tree stocking >=10% and QMD 10-19 inches (25.0-49.9 cm)	8 Small tree single story open, 9 Small tree single story moderate, 10 Small tree single story closed, 11 Medium tree multi-story open, 12 Medium tree multi-story moderate, 13 Medium tree multi-story closed, 17 Small tree multi-story open, 18 Small tree multi-story moderate, 19 Small tree multi-story closed, 20 Medium tree multi-story open, 21 Medium tree multi-story moderate, 22 Medium tree multi-story closed,
Larger Trees	tree stocking >=10% and QMD >=20 inches (50.0 cm)	14 Large tree single story open, 15 Large tree single story moderate, 16 Large tree single story closed, 23 Large tree multi-story open, 24 Large tree multi-story moderate, 25 Large tree multi-story closed, 26 Giant tree multi-story

The two were combined as follows:

Watershed Analysis Code	DecAID equivalent
ES	Open Canopy
EM	
MO MC	Small/medium Trees
MM	
LM LS	Larger Trees

The HRV Table 14, from the Odell Pilot WA is converted to habitat types by grouping PAGs and structural stages. The range of variability is determined by taking the lowest value and the highest value of the group. For example the lowest value for all of the PPD/PPW ES/EM or PP/DF habitat type, open stage is 0 the highest is 30, the range then would be 0-30 as shown in reference table.

	MMC	PP/DF	LP	MCD
Open	**0**	**0-30**	**0-70**	**0-50**
Small/medium	**0**	**0-60**	**0-50**	**7-55**
Larger	**0**	**0-50**	**0-30**	**8-60**

The maximum HRV value and the minimum HRV value of each structural group and each habitat type along with information from DecAID was used to develop a weighted range for the distribution of snags at various densities and two dbh categories across the landscape.

FOR EMC			Weighted Average of % of Landscape for snags 10"+ (24.5cm) dbh snag/acre (snags/ha)						
Assumption	Structure Class	HRV From Odell WA	0 (0)	0 - 6 (0-15)	6 - 12 (15-30)	12 - 24 (30-60)	24 - 36 (60-90)	36+ (90+)	Total
DecAID	O[1]	0-50	29	30	16	13	2	10	100
DecAID	S[2]	7-55	15	25	17	27	10	6	100
DecAID	L[3]	8-60	22	32	15	17	11	3	100
max O	O	50	14.5	15.0	8.0	6.5	1.0	5.0	50
max O	S	25	3.8	6.3	4.3	6.8	2.5	1.5	25
max O	L	25	5.5	8.0	3.8	4.3	2.8	0.8	25
max O	wt'd avg	100	23.8	29.3	16.0	17.5	6.3	7.3	100
max S	O	20	5.8	6.0	3.2	2.6	0.4	2.0	20
max S	S	55	8.3	13.8	9.4	14.9	5.5	3.3	55
max S	L	25	5.5	8.0	3.8	4.3	2.8	0.8	25
max S	wt'd avg	100	19.6	27.8	16.3	21.7	8.7	6.1	100
max L	O	15	4.4	4.5	2.4	2.0	0.3	1.5	15
max L	S	25	3.8	6.3	4.3	6.8	2.5	1.5	25
max L	L	60	13.2	19.2	9.0	10.2	6.6	1.8	60
max L	wt'd avg	100	21.3	30.0	15.7	18.9	9.4	4.8	100
min O	O	0	0.0	0.0	0.0	0.0	0.0	0.0	0
min O	S	55	8.3	13.8	9.4	14.9	5.5	3.3	55
min O	L	45	9.9	14.4	6.8	7.7	5.0	1.4	45
min O	wt'd avg	100	18.2	28.2	16.1	22.5	10.5	4.7	100
min S	O	33	9.6	9.9	5.3	4.3	0.7	3.3	33
min S	S	7	1.1	1.8	1.2	1.9	0.7	0.4	7
min S	L	60	13.2	19.2	9.0	10.2	6.6	1.8	60
min S	wt'd avg	100	23.8	30.9	15.5	16.4	8.0	5.5	100
min L	O	32	9.3	9.6	5.1	4.2	0.6	3.2	32
min L	S	60	9.0	15.0	10.2	16.2	6.0	3.6	60
min L	L	8	1.8	2.6	1.2	1.4	0.9	0.2	8
min L	wt'd avg	100	20.0	27.2	16.5	21.7	7.5	7.0	100
MAX % Landscape in dbh class			24	31	17	23	10	7	111
MIN % Landscape in dbh class			18	27	15	16	6	5	88

[1]Table EMC_ECB_O.Inv-14 unharvested plots for snags =10" (24.5cm) dbh

[2]Table EMC_ECB_S.Inv-14 unharvested plots for snags =10" (24.5cm) dbh

[3]Table EMC_ECB_L.Inv-14 unharvested plots for snags =10" (24.5cm) dbh

FOR LP			Weighted Average of % of Landscape for snags 10"+ (24.5cm) dbh snag/acre (snags/ha)						
Assumption	Structure Class	HRV From Odell WA	0 (0)	0 - 6 (0-15)	6 - 12 (15-30)	12 - 24 (30-60)	24 - 36 (60-90)	36+ (90+)	Total
DecAID	O[1]	0-70	38	21	15	14	6	6	100
DecAID	S[2]	0-50	26	13	23	16	12	10	100
DecAID	L[3]	0-30	No Data						0
max O	O	70	26.6	14.7	10.5	9.8	4.2	4.2	70
max O	S	30	7.8	3.9	6.9	4.8	3.6	3.0	30
max O	L	0							
max O	wt'd avg	100	34.4	18.6	17.4	14.6	7.8	7.2	100
max S	O	50	19.0	10.5	7.5	7.0	3.0	3.0	50
max S	S	50	13.0	6.5	11.5	8.0	6.0	5.0	50
max S	L	0							
max S	wt'd avg	100	32.0	17.0	19.0	15.0	9.0	8.0	100
max L	O	20	7.6	4.2	3.0	2.8	1.2	1.2	20
max L	S	50	13.0	6.5	11.5	8.0	6.0	5.0	50
max L	L	30							
max L	wt'd avg	100	20.6	10.7	14.5	10.8	7.2	6.2	70
min O	O	20	7.6	4.2	3.0	2.8	1.2	1.2	20
min O	S	50	13.0	6.5	11.5	8.0	6.0	5.0	50
min O	L	30							
min O	wt'd avg	100	20.6	10.7	14.5	10.8	7.2	6.2	70
min S	O	70	26.6	14.7	10.5	9.8	4.2	4.2	70
min S	S	0	0.0	0.0	0.0	0.0	0.0	0.0	0
min S	L	30							
min S	wt'd avg	100	26.6	14.7	10.5	9.8	4.2	4.2	70
min L	O	35	13.3	7.4	5.3	4.9	2.1	2.1	35
min L	S	65	16.9	8.5	15.0	10.4	7.8	6.5	65
min L	L	0							
min L	wt'd avg	100	30.2	15.8	20.2	15.3	9.9	8.6	100
MAX % Landscape in dbh class			34	19	20	15	10	9	107
MIN % Landscape in dbh class			21	11	11	10	4	4	60
[1]Table LP_O.Inv-14 unharvested plots for snags =10" (24.5cm) dbh			[2]Table LP_S.Inv-14 unharvested plots for snags			[3]No Data On Large			

FOR MMC			Weighted Average of % of Landscape for snags 10"+ (24.5cm) dbh snag/acre (snags/ha)						
Assumption	Structure Class	Existing % (No HRV)	0 (0)	0 - 6 (0-15)	6 - 12 (15-30)	12 - 24 (30-60)	24 - 36 (60-90)	36+ (90+)	Total
DecAID	O[1]	2	5	14	19	31	16	15	100
DecAID	S[2]	92	54	30	13	2	1	0	100
DecAID	L[3]	6	1	17	28	37	11	6	100
Existing	O	2	0.1	0.3	0.4	0.6	0.3	0.3	2.0
Existing	S	92	49.7	27.6	12.0	1.8	0.9	0.0	92.0
Existing	L	6	0.1	1.0	1.7	2.2	0.7	0.4	6.0
Existing	wt'd avg	100	49.8	28.9	14.0	4.7	1.9	0.7	100.0
[1]Table MMC_O.Inv-14 unharvested plots for snags ≥10" (24.5cm) dbh			[2]Table MMC_S.Inv-14 unharvested plots for snags ≥10" (24.5cm) dbh			[3]Table MMC_L.Inv-14 unharvested plots for snags ≥10" (24.5cm) dbh			

FOR PPDF			Weighted Average of % of Landscape for snags 10"+ (24.5cm) dbh (snags/ha)									snag/acre		
Assumption	Structure Class	HRV % From Odell WA	0	0-4	4-8	8-12	12-16	16-20	20-24	24-28	28-32	32-36	39+	**Total**
DecAID	O[1]	0-30	68	13	10	1	3	2	1	1	0	0	1	100
DecAID	S[2]	0-60	54	30	10	3	1	0	1	1	0	0	0	100
DecAID	L[3]	0-50	54	24	7	10	3	0	1	0	0	1	0	100
max O	O	30	20.4	3.9	3.0	0.3	0.9	0.6	0.3	0.3	0.0	0.0	0.3	30
max O	S	40	21.6	12.0	4.0	1.2	0.4	0.0	0.4	0.4	0.0	0.0	0.0	40
max O	L	30	16.2	7.2	2.1	3.0	0.9	0.0	0.3	0.0	0.0	0.3	0.0	30
max O	wt'd avg	100	58.2	23.1	9.1	4.5	2.2	0.6	1.0	0.7	0.0	0.3	0.3	100
max S	O	15	10.2	2.0	1.5	0.2	0.5	0.3	0.2	0.2	0.0	0.0	0.2	15
max S	S	60	32.4	18.0	6.0	1.8	0.6	0.0	0.6	0.6	0.0	0.0	0.0	60
max S	L	25	13.5	6.0	1.8	2.5	0.8	0.0	0.3	0.0	0.0	0.3	0.0	25
max S	wt'd avg	100	56.1	26.0	9.3	4.5	1.8	0.3	1.0	0.8	0.0	0.3	0.2	100
max L	O	15	10.2	2.0	1.5	0.2	0.5	0.3	0.2	0.2	0.0	0.0	0.2	15
max L	S	35	18.9	10.5	3.5	1.1	0.4	0.0	0.4	0.4	0.0	0.0	0.0	35
max L	L	50	27.0	12.0	3.5	5.0	1.5	0.0	0.5	0.0	0.0	0.5	0.0	50
max L	wt'd avg	100	56.1	24.5	8.5	6.2	2.3	0.3	1.0	0.5	0.0	0.5	0.2	100
min O	O	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
min O	S	55	29.7	16.5	5.5	1.7	0.6	0.0	0.6	0.6	0.0	0.0	0.0	55
min O	L	45	24.3	10.8	3.2	4.5	1.4	0.0	0.5	0.0	0.0	0.5	0.0	45
min O	wt'd avg	100	54.0	27.3	8.7	6.2	1.9	0.0	1.0	0.6	0.0	0.5	0.0	100
min S	O	30	20.4	3.9	3.0	0.3	0.9	0.6	0.3	0.3	0.0	0.0	0.3	30
min S	S	20	10.8	6.0	2.0	0.6	0.2	0.0	0.2	0.2	0.0	0.0	0.0	20
min S	L	50	27.0	12.0	3.5	5.0	1.5	0.0	0.5	0.0	0.0	0.5	0.0	50
min S	wt'd avg	100	58.2	21.9	8.5	5.9	2.6	0.6	1.0	0.5	0.0	0.5	0.3	100
min L	O	30	20.4	3.9	3.0	0.3	0.9	0.6	0.3	0.3	0.0	0.0	0.3	30
min L	S	60	32.4	18.0	6.0	1.8	0.6	0.0	0.6	0.6	0.0	0.0	0.0	60
min L	L	10	5.4	2.4	0.7	1.0	0.3	0.0	0.1	0.0	0.0	0.1	0.0	10
min L	wt'd avg	100	58.2	24.3	9.7	3.1	1.8	0.6	1.0	0.9	0.0	0.1	0.3	100
MAX % Landscape in dbh class			58	27	10	6	3	1	1	1	0	1	0	107
MIN % Landscape in dbh class			54	22	9	3	2	0	1	1	0	0	0	91

[1]Table PP/DF_O.Inv-14 unharvested plots for snags =10" (24.5cm) dbh

[2]Table PP/DF_S.Inv-14 unharvested plots for snags =10" (24.5cm) dbh

[3]Table PPDF_L.Inv-14 unharvested plots for snags =10" (24.5cm) dbh

The following summary of results was used in the analysis. Because there is no HRV for MMC existing structure was used. Ponderosa pine has a different split in categories for snags 10 inches and greater in diameter than the rest. This is due to the categories in DecAID.

Reference Range of Conditions	% of Landscape for snags ≥10" (24.5cm) dbh snag/acre (snags/ha)					
Habitat Type	0 (0)	0 - 6 (0-15)	6 - 12 (15-30)	12 - 24 (30-60)	24 - 36 (60-90)	36+ (90+)
EMC	18-24	27-31	15-17	16-23	6-10	5-7
LP	21-34	11-19	11-20	10-15	4-10	4-9
MMC	50	29	14	5	2	1
	0 (0)	0 - 4 (0-10)	4 - 12 (10-30)	12 - 24 (30-60)	24 - 36 (60-90)	36+ (90+)
PP/DF	54-58	22-27	12-16	3-5	0-1	0

Information from DecAID tables (unharvested plots for snags ≥10" dbh (24.5cm) PP/DF_O.Inv-14, PP/DF_S.Inv-14, PP/DF_L.Inv-14, EMC_ECB_O.Inv-14., EMC_ECB_S.Inv-14, EMC_ECB_L.Inv-14, LP_O.Inv-14, LP_S.Inv-14, MMC_O.Inv-14, MMC_S.Inv-14, MMC_L.Inv-14 and modified with HRV information found in the Odell Pilot WA

The same process was used for those snags greater than or equal to 20 inches dbh, with the following results. Tables used from DecAID and the ranges used to construct this table follow.

Reference Range of Conditions	% of Landscape for snags ≥20" (50.5cm) dbh snag/acre (snags/ha)						
Habitat Type	0 (0)	0-2 (0-5)	2-4 (5-10)	4-6 (10-15)	6-10 (15-25)	10-18 (25-45)	18+ (45+)
EMC	31-42	12-19	14-18	9-13	10-15	5-7	1-2
LP	36-80	4-8	5-10	1-4	1-2	0-1	0
MMC	23	14	22	13	16	11	2
PP/DF	67-75	15-20	6-11	1-2	1	0-1	0
Information from DecAID tables (unharvested plots for snags ≥20" dbh (50cm) PP/DF_O.Inv-15, PP/DF_S.Inv-15, PP/DF_L.Inv-15, EMC_ECB_O.Inv-15., EMC_ECB_S.Inv-15, EMC_ECB_L.Inv-15, LP_O.Inv-15, LP_S.Inv-15, MMC_O.Inv-15, MMC_S.Inv-15, MMC_L.Inv-15, and modified with HRV information found in the Odell Pilot WA							

The same process was used in determining a reference condition for down wood material. HRV from the Odell WA was taken to weight structural stages on the landscape. Tons/acre was calculated using conversions specific to the habitat type given in Table 1 of DecAID "Why percent cover?" section. These were calculated for down wood 5 and 20 inches in diameter and greater.

Reference Range of Conditions	Weighted Average of % of Landscape for dwd ≥5" (12.5cm) dbh % down wood cover *(ton/acre)*						
Habitat Type		0	0-4	4-8	8-10	10-16	>16
EMC	*(ton/acre)*	*(0)*	*(0-22)*	*22-44*	*44-54*	*>54*	
		22-30	53-54	13-19	2-3	1-3	
LP	*(ton/acre)*	*(0)*	*(0-13)*	*(13-26)*	*(26-40)*	*(40-53)*	*>(53)*
		4-14	37-55	14-23	4-7	4-8	0
MMC	*(ton/acre)*	*(0)*	*(0-22)*	*(22-45)*	*(45-56)*	*(56-90)*	*>(90)*
		9	48	25	8	7	3
PP/DF	(ton/acre)	*(0)*	*(0-21)*	*(21-42)*	*(42- 52)*	*>(52)*	
		36-43	55-61	3-4	0	0	
Information from DecAID tables (unharvested plots for down wood ≥5" dbh (12.5cm) PP/DF_O.Inv-16, PP/DF_S.Inv-16, PP/DF_L.Inv-16, EMC_ECB_O.Inv-16., EMC_ECB_S.Inv-16, EMC_ECB_L.Inv-16, LP_O.Inv-16, LP_S.Inv-16, MMC_O.Inv-16, MMC_S.Inv-16, MMC_L.Inv-16 and modified with HRV information found in the Odell Pilot WA							

Reference Range of Conditions	Weighted Average of % of Landscape for dwd ≥20" (50cm) dbh % down wood cover *(ton/acre)*						
Habitat Type		0	0-4	4-8	8-10	10-16	>16
EMC	*(ton/acre)*	*(0)*	*(0-22)*	*22-44*	*44-54*	*>54*	
		61-73	26-36	1-2	1-2	0	
LP	*(ton/acre)*	*(0)*	*(0-13)*	*(13-26)*	*(26-40)*	*(40-53)*	*>(53)*
		39-85	8-15	1-2	0	0	0
MMC	*(ton/acre)*	*(0)*	*(0-22)*	*(22-45)*	*(45-56)*	*(56-90)*	*>(90)*
		23	14	22	13	16	11
PP/DF	(ton/acre)	*(0)*	*(0-21)*	*(21-42)*	*(42- 52)*	*>(52)*	
		72-79	20-28	0-1	0	0	
Information from DecAID tables (unharvested plots for down wood ≥5" (12.5cm) dbh) PP/DF_O.Inv-17, PP/DF_S.Inv-17, PP/DF_L.Inv-17, EMC_ECB_O.Inv-17, EMC_ECB_S.Inv-17, EMC_ECB_L.Inv-17, LP_O.Inv-17, LP_S.Inv-17, MMC_O.Inv-17, MMC_S.Inv-17, MMC_L.Inv-17 and modified with HRV information from Odell Pilot WA.							

Watershed Snag Reference Condition			
Distribution of Snags in EMC			
snags =10" dbh		**snags =20" dbh**	
Snags per Acre	% Area	Snags per Acre	% Area
0	18-24	0	31-42
0-6	27-31	0-2	12-19
6-12	15-17	2-4	14-18
12-24	16-23	4-6	9-13
24-36	6-10	6-10	10-15
36+	5-7	10-18	5-7
		18+	1-2
Reference condition from DecAID tables (unharvested plots for snags =10" (24.5cm) dbh) EMC_ECB_O.Inv-14, EMC_ECB_S.Inv-14, EMC_ECB_L.Inv-14 and modified with HRV information from the Odell Pilot WA.		Reference condition from DecAID tables (unharvested plots for snags =20" (50cm) dbh) EMC_ECB_O.Inv-15, EMC_ECB_S.Inv-15, EMC_ECB_L.Inv-15, and modified with HRV information from the Odell Pilot WA.	

Watershed Down Wood Reference Condition					
Distribution of Down wood in EMC					
down wood = 5" dbh			**down wood =20" dbh**		
% Cover	Tons/acre	% Area	% Cover	Tons/acre	% Area
0	0	61-73	0	0	61-73
0-4	0-22	26-36	0-4	0-22	26-36
4-8	22-44	1-2	4-8	22-44	22-44
8-10	44-54	1-2	8-10	44-54	1-2
>10	>51	0	>10	>54	0
Information from DecAID tables (unharvested plots for down wood =5" (12.5cm) dbh) EMC_ECB_O.Inv-16, EMC_ECB_S.Inv-16, EMC_ECB_L.Inv-16 and modified with HRV information found in the Odell Pilot WA			Information from DecAID tables (unharvested plots for down wood =20" (50cm) dbh) EMC_ECB_O.Inv-17, EMC_ECB_S.Inv-17, EMC_ECB_L.Inv-17 and modified with HRV information from Odell Pilot WA.		

Watershed Snag Reference Condition			
Distribution of Snags in PP/DF			
snags =10" dbh		**snags =20" dbh**	
Snags per Acre	% Area	Snags per Acre	% Area
0	54-58	0	67-75
0-4	22-27	0-2	15-20
4-12	12-16	2-4	6-11
12-24	3-5	4-6	1-2
24-36	0-1	6-10	0-1
36+	0	10-18	0-1
Reference condition from DecAID tables (unharvested plots for snags =10" (24.5cm) dbh) PP/DF_O.Inv-14, PP/DF_S.Inv-14, PP/DF_L.Inv 14 and modified with HRV information from the Odell Pilot WA.		Reference condition from DecAID tables (unharvested plots for snags =20" (50cm) dbh) PP/DF_O.Inv-15, PP/DF_S.Inv-15, PP/DF_L.Inv-15, and modified with HRV information from the Odell Pilot WA.	

Watershed Down Wood Reference Condition					
Distribution of Down wood in PP/DF					
down wood = 5" dbh			**down wood =20" dbh**		
% Cover	Tons/acre	% Area	% Cover	Tons/acre	% Area
0	0	36-43	0	0	72-79
0-4	0-21	55-61	0-4	0-21	20-28
4-8	21-42	3-4	4-8	21-42	0-1
8-10	42-52	0	8-10	42-52	0
>10	>52	0	>10	>52	0
Information from DecAID tables (unharvested plots for down wood =5" (12.5cm) dbh) PP/DF_O.Inv-16, PP/DF_S.Inv-16, PP/DF_L.Inv-16 and modified with HRV information found in the Odell Pilot WA			Information from DecAID tables (unharvested plots for down wood =20" (50cm) dbh) PP/DF_O.Inv-17, PP/DF_S.Inv-17, PP/DFL.Inv-17 and modified with HRV information from Odell Pilot WA.		

Watershed Snag Reference Condition			
Distribution of Snags in MMC			
snags =10" dbh		**snags =20" dbh**	
Snags per Acre	% Area	Snags per Acre	% Area
0	10	0	8
0-6	19	0-2	9
6-12	25	2-4	16
12-24	31	4-6	14
24-36	10	6-10	26
36+	5	10-18	11
		18+	4
Reference condition from DecAID tables (unharvested plots for snags =10" (24.5cm) dbh) MMC_O.Inv-14, MMC_S.Inv-14, MMC_L.Inv-14 and modified with HRV information from the Odell Pilot WA.		Reference condition from DecAID tables (unharvested plots for snags =20" (50cm) dbh) MMC_S.Inv-15, MMC_L.Inv-15, and modified with HRV information from the Odell Pilot WA.	

Watershed Down Wood Reference Condition					
Distribution of Down wood in MMC					
down wood = 5" dbh			**down wood =20" dbh**		
% Cover	Tons/acre	% Area	% Cover	Tons/acre	% Area
0	0	19	0	0	36
0-4	0-22	43	0-4	0-22	46
4-8	22-45	25	4-8	22-45	14
8-10	45-56	5	8-10	45-56	2
10-16	56-90	8	10-16	56-90	2
>16	>90	0	>16	>90	0
Information from DecAID tables (unharvested plots for down wood =5" (12.5cm) dbh) MMC_O.Inv-16, MMC_S.Inv-16, MMC_L.Inv-16 and modified with HRV information found in the Odell Pilot WA			Information from DecAID tables (unharvested plots for down wood =20" (50cm) dbh) MMC_O.Inv-17, MMC_S.Inv-17, MMC_L.Inv-17 and modified with HRV information from Odell Pilot WA.		

Watershed Snag Reference Condition			
Distribution of Snags in LP			
snags =10" dbh		**snags =20" dbh**	
Snags per Acre	% Area	Snags per Acre	% Area
0	21-34	0	36-80
0-6	11-19	0-2	4-8
6-12	11-20	2-4	5-10
12-24	10-15	4-6	1-4
24-36	4-10	6-10	1-2
36+	4-9	10-18	0-1
Reference condition from DecAID tables (unharvested plots for snags =10" (24.5cm) dbh) LP_O.Inv-14, LP_S.Inv-14 and modified with HRV information from the Odell Pilot WA.		Reference condition from DecAID tables (unharvested plots for snags =20" (50cm) dbh) LP_O.Inv-15, LP_S.Inv-15, LP_L.Inv-15, and modified with HRV information from the Odell Pilot WA.	

Watershed Down Wood Reference Condition					
Distribution of Down wood in LP					
down wood = 5" dbh			**down wood =20" dbh**		
% Cover	Tons/acre	% Area	% Cover	Tons/acre	% Area
0	0	4-14	0	0	39-85
0-4	0-13	37-55	0-4	0-13	8-15
4-8	13-26	14-23	4-8	13-26	1-2
8-10	26-40	4-7	8-10	26-40	0
10-16	40-53	4-8	10-16	40-53	0
>16	>53	0	>16	>53	0
Information from DecAID tables (unharvested plots for down wood =5" (12.5cm) dbh) LP_O.Inv-16, LP_S.Inv-16, and modified with HRV information found in the Odell Pilot WA			Information from DecAID tables (unharvested plots for down wood =20" (50cm) dbh) LP_O.Inv-17, LP_S.Inv-17, and modified with HRV information from Odell Pilot WA.		

From DecAID narratives:
Habitat types and Small/Medium and Large Structure

EMC
SNAGS
80%
Small/Medium
The best available wildlife data indicate that to maintain snag densities in this vegetation condition at the 80% tolerance level, manage for high density clumps of snags that, when extrapolated to a per hectare basis, should average up to 120 snags/ha ≥ 25 cm dbh (49/acre ≥ 10 in) with about 45/ha (18/acre) of those snags ≥ 50 cm (20 in) dbh (Figures EMC_S/L.sp-5 and EMC_S/L.sp-7). Some snag clumps should be of lower density averaging 40 to 80 snag/ha >25 cm (16-32/acre ≥10 in) with about 10 to 15/ha (4-6/acre) of those snags ≥ 50 cm (20 in) dbh. Provide these high snag density areas in less fire-prone areas of the landscape that are moister with a moderate- or high-severity fire regime (See Considerations of Scale section above). On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 80% tolerance level for unharvested inventory plots with measurable snags is 62 snags ≥ 25.4 cm/ha dbh (25/acre ≥ 10.0 in), with 21 snags/ha ≥ 50.0 cm dbh (8.5/acre ≥ 19.7 in)) (Figures EMC_ECB_S.inv-2, EMC_ECB_S.inv-3).
Large
On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 80% tolerance level for unharvested inventory plots with measurable snags is 52 snags/ha ≥ 25.4 cm dbh (21/acre ≥ 10.0 in), and 22.5 snags/ha ≥ 50.0 cm dbh (9.1/acre ≥ 19.7 in)(Figures EMC_ECB_L.inv-2, EMC_ECB_L.inv-3)

50%
Small/Medium
The best available wildlife data indicate that to maintain snag densities in this vegetation condition at the 50% tolerance level, manage for high density clumps of snags that, when extrapolated to a per hectare basis, should average up to 80 snags/ha ≥ 25 cm dbh (32/acre ≥ 10 in) with about 20/ha (8/acre) of those snags ≥ 50 cm (20 in) dbh (Figures EMC_S/L.sp-5 and EMC_S/L.sp-7). Some snag clumps should be of lower density averaging 20 to 40 snag/ha >25 cm (8-16/acre ≥10 in) with about 5 to 10/ha (2-4/acre) of those snags ≥ 50 cm (20 in) dbh. Provide these high snag density areas in less fire-prone areas of the landscape that are moister with a moderate- or high-severity fire regime (See Considerations of Scale section above). On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 50% tolerance level for unharvested inventory plots with measurable snags is 31 snag/ha ≥ 25.4 cm dbh (12.5/acre ≥ 10.0 in) and 10.5 snags/ha ≥ 50.0 cm dbh (4.2/acre ≥ 19.7 in) (Figures EMC_ECB_S.inv-2, EMC_ECB_S.inv-3).
Large
On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 50% tolerance level for unharvested inventory plots with measurable snags is 22 snag/ha ≥ 25.4 cm dbh (9/acre ≥ 10.0 in) and 13 snags/ha ≥ 50.0 cm dbh (5.3/acre ≥ 19.7 in) (Figures EMC_ECB_L.inv-2, EMC_ECB_L.inv-3).

30%
Small/Medium/Large
The best available wildlife data indicate that to maintain snag densities in this vegetation condition at the 30% tolerance level, manage for high density clumps of snags that, when extrapolated to a per hectare basis, should average up to 40 snags/ha ≥ 25 cm dbh (16/acre ≥ 10 in) with about 10/ha (4/acre) of those snags ≥ 50 cm (20 in) dbh (Figures EMC_S/L.sp-5 and EMC_S/L.sp-7). On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 30% tolerance level for unharvested inventory plots with measurable snags is 16.5 snag/ha ≥ 25.4 cm dbh (6.7/acre ≥ 10.0 in) and 6.6 snags/ha ≥ 50.0 cm dbh (2.7/acre ≥ 19.7 in) (Figures EMC_ECB_S.inv-2, EMC_ECB_S.inv-3).

On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 30% tolerance level for unharvested inventory plots with measurable snags is 13 snags/ha ≥ 25.4 cm dbh (5.3/acre ≥ 10.0 in), of which 9/ha are ≥ 50.0 cm dbh (3.6/acre ≥ 19.7 in) (Figures EMC_ECB_L.inv-2 and EMC_ECB_L.inv-3).

Down wood
80%
Small/Medium
To provide down wood at the 80% tolerance level, based primarily on inventory data from unharvested plots with measurable down wood, manage for high-density areas of down wood at about 6% cover (Figures EMC_ECB_S.inv-10 and EMC_S.sp-10). Maintain some higher density clumps of down wood of above 10% cover for wildlife and fungi (Figure EMC_S.sp-10). Maintain these high down wood cover areas on parts of the landscape that are moister with a moderate- or high-severity fire regime.
Large
To provide down wood at the 80% tolerance level, manage for high-density areas of down wood at about 5% cover (Figures EMC_ECB_L.inv-10 and EMC_S/L.sp-10). Maintain some higher density clumps of down wood of above 10% cover for wildlife and fungi (Figure EMC_S/L.sp-10).

50%
Small/Medium
To provide down wood at the 50% tolerance level, based primarily on inventory data from unharvested plots with measurable down wood, manage for high-density areas of down wood at about 3% cover (Figure EMC_ECB_S.inv-10). Maintain some higher density clumps of down wood of about 4.5% to 13% cover for wildlife and fungi (Figure EMC_S.sp-10). Maintain these high down wood cover areas on parts of the landscape that are moister with a moderate- or high-severity fire regime.
Large
To provide down wood at the 50% tolerance level, manage for high-density areas of down wood at about 3% cover (Figure EMC_ECB_L.inv-10). Maintain some higher density pockets of down wood of about 4.5% to over 10% cover for wildlife and fungi (Figure EMC_S/L.sp-10).

30%
Small/Medium
To provide down wood at the 30% tolerance level, based primarily on inventory data from unharvested plots with measurable down wood, manage for high-density areas of down wood at about 2% cover. (Figure EMC_ECB_S.inv-10). Maintain some higher density clumps of down wood of about 4 to 6.5% cover for wildlife (Figure EMC_S.sp-10). Maintain these high down wood cover areas on parts of the landscape that are moister with a moderate- or high-severity fire regime.
Large
To provide dead wood at the 30% tolerance level, manage for areas of down wood at about 2% cover (Figure EMC_ECB_L.inv-10). Maintain some higher density pockets of down wood of about 4 to 6.5% cover for wildlife (Figure EMC_S/L.sp-10).

PP/DF
Snags
80%
Small/Medium/Large
The best available wildlife data indicate that to maintain snag densities in this vegetation condition at the 80% tolerance level, manage for high density clumps of snags that, when extrapolated to a per hectare basis, should average up to 120 snags/ha ≥ 25 cm dbh (49/acre ≥ 10 in) with about 45/ha (18/acre) of those snags ≥ 50 cm (20 in) dbh (Figures PPDF_S/L.sp-5 and PPDF_S/L.sp-5). Some snag clumps should be of lower density averaging 20 to 90 snag/ha >25 cm (8-36/acre ≥10 in) with about 10 to 15/ha (4-6/acre) of those snags ≥ 50 cm (20 in) dbh. There are only a few areas within the PPDF habitat type that will be capable of providing these high snag densities (Figures PPDF_S.inv-14 and PPDF_S.inv-15); provide these high snag density areas in less fire-prone areas of the landscape that are moister with a moderate- or high-severity fire regime (See Considerations of Scale section above).
Small/Medium
On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 80% tolerance level for unharvested inventory plots with measurable snags is 18 snags ≥ 25.4 cm/ha dbh (7.3/acre ≥ 10.0 in), with 6.2 snags/ha ≥ 50.0 cm dbh (2.5/acre ≥ 19.7 in))(Figures PPDF_S.inv-2 and PPDF_S.inv-3). The work of Harrod et al. (1998) support these snag levels from inventory data.
Large
On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 80% tolerance level for unharvested inventory plots with measurable snags is 33 snags/ha ≥ 25.4 cm dbh (13.3/acre ≥ 10.0 in), and 27 snags/ha ≥ 50.0 cm dbh (10.9/acre ≥ 19.7 in) (Figures PPDF_L.inv-2, PPDF_L.inv-3).

50%
Small/Medium/Large
The best available wildlife data indicate that to maintain snag densities in this vegetation condition at the 50% tolerance level, manage for high density clumps of snags that, when extrapolated to a per hectare basis, should average up to 75 snags/ha ≥ 25 cm dbh (30/acre ≥ 10 in) with about 19/ha (8/acre) of those snags ≥ 50 cm (20 in) dbh (Figures PPDF_S/L.sp-5 and PPDF_S/L.sp-5). Some snag clumps should be of lower density averaging 10 to 45 snag/ha >25 cm (4-18/acre ≥10 in) with about 5 to 10/ha (2-4/acre) of those snags ≥ 50 cm (20 in) dbh. There are only a few areas within the PPDF habitat type that will be capable of providing these high snag densities (Figures PPDF_S.inv-14 and PPDF_S.inv-15); provide these high snag density areas in less fire-prone areas of the landscape that are moister with a moderate- or high-severity fire regime (See Considerations of Scale section above).
Small/Medium
On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 50% tolerance level for unharvested inventory plots with measurable snags is 6.6 snags ≥ 25.4 cm/ha dbh (2.6/acre ≥ 10.0 in), with 2.7 snags/ha ≥ 50.0 cm dbh (1.1/acre ≥ 19.7 in))(Figures PPDF_S.inv-2 and PPDF_S.inv-3). The work of Harrod et al. (1998) support these snag levels from inventory data.
Large
On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 50% tolerance level for unharvested inventory plots with measurable snags is 15.6 snag/ha ≥ 25.4 cm dbh (6.3/acre ≥ 10.0 in) and 9.1 snags/ha ≥ 50.0 cm dbh (3.7/acre ≥ 19.7 in) (Figures PPDF_L.inv-2, PPDF_L.inv-3).

30%
Small/Medium/Large
The best available wildlife data indicate that to maintain snag densities in this vegetation condition at the 30% tolerance level, manage for high density clumps of snags that, when extrapolated to a per hectare basis, should average up to 37 snags/ha ≥ 25 cm dbh (15/acre ≥ 10

in) with about 9/ha (3.5/acre) of those snags ≥ 50 cm (20 in) dbh (Figures PPDF_S/L.sp-5 and PPDF_S/L.sp-5). Some snag clumps should be of lower density averaging 3 to 10 snag/ha >25 cm (1.2-4/acre ≥10 in) with about 1 to 3/ha (0.4-1.2/acre) of those snags ≥ 50 cm (20 in) dbh. There are only a few areas within the PPDF habitat type that will be capable of providing these high snag densities (Figures PPDF_S.inv-14 and PPDF_S.inv-15); provide these high snag density areas in less fire-prone areas of the landscape that are moister with a moderate- or high-severity fire regime (See Considerations of Scale section above).

Small/Medium

On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 30% tolerance level for unharvested inventory plots with measurable snags is 3.3 snags ≥ 25.4 cm/ha dbh (1.3/acre ≥ 10.0 in), with 2.6 snags/ha ≥ 50.0 cm dbh (1.1/acre ≥ 19.7 in))(Figures PPDF_S.inv-2 and PPDF_S.inv-3). The work of Harrod et al. (1998) support these snag levels from inventory data.

Large

On areas of the landscape where the objective is to manage for natural conditions of snag habitat, the 30% tolerance level for unharvested inventory plots with measurable snags is 11.5 snag/ha ≥ 25.4 cm dbh (4.6/acre ≥ 10.0 in) and 5.2 snags/ha ≥ 50.0 cm dbh (2.1/acre ≥ 19.7 in) (Figures PPDF_L.inv-2, PPDF_L.inv-3).

Down wood

80%

Small/Medium/Large

To provide down wood at the 80% tolerance level, based primarily on inventory data from unharvested plots with measurable down wood, manage for high-density areas of down wood at about 3% cover (Figure PPDF_S.inv-10). Maintain some higher density clumps of down wood of up to 10% cover for wildlife (Figure PPDF_S/L.sp-10). Maintain these high down wood cover areas on parts of the landscape that are moister with a moderate- or high-severity fire regime.

To provide down wood at the 80% tolerance level, based primarily on inventory data from unharvested plots with measurable down wood, manage for high-density areas of down wood at about 4% cover (Figure PPDF_L.inv-10). Maintain some higher density clumps of down wood of up to 10% cover for wildlife (Figure PPDF_S/L.sp-10).

50%

Small/Medium/Large

To provide down wood at the 50% tolerance level, based primarily on inventory data from unharvested plots with measurable down wood, manage for high-density areas of down wood at about 1.4% cover (Figure PPDF_S.inv-10). Maintain some higher density clumps of down wood of 5 to 7% cover for wildlife and fungi (Figure PPDF_S/L.sp-10).

To provide down wood at the 50% tolerance level, based primarily on inventory data from unharvested plots with measurable down wood, manage for high-density areas of down wood at about 2% cover (Figure PPDF_L.inv-10). Maintain some higher density clumps of down wood of 5 to 7% cover for wildlife and fungi (Figure PPDF_S/L.sp-10).

30%

Small/Medium

To provide down wood at the 30% tolerance level, based primarily on inventory data from unharvested plots with measurable down wood, manage for high-density areas of down wood at about 1% cover (Figure PPDF_S.inv-10). This is the same amount as used by golden-mantled ground squirrels (GMGS) at the 30% tolerance level.

Large

To provide down wood at the 30% tolerance level, based primarily on inventory data from unharvested plots with measurable down wood, manage for high-density areas of down wood at about 1% cover (Figure PPDF_L.inv-10).

LP

Snags

80%

Small/Medium (no data on LP Large)

To manage densities of snags at the 80% tolerance level based on data from unharvested inventory plots with measurable snags, provide for densities of about 68 snags/ha > 25.4 cm dbh (28/acre >10.0 in)), of which 16.4 snags/ha (6.6/acre) are > 50.0 cm (19.7 in) dbh on parts of the landscape (Figures LP_S.sp-1, LP_S.sp-2, LP_S.sp-3). To manage snag habitat for AMMA at the 80% tolerance level, provide for snag densities of at least 36 snags/ha (14.4/acre) of which 11.2 snags/ha (4.5/acre) are larger than 50 cm (20 in. dbh).

50%

Small/Medium (no data on LP Large)

To manage densities of snags at the 50% tolerance level based on data from unharvested inventory plots with measurable snags, provide densities of about 25 snags/ha > 25.4 cm dbh (10/acre >10.0 in)), of which 6.6 snags/ha (2.7/acre) are > 50.0 cm (19.7 in) dbh on parts of the landscape (Figures LP_S.sp-1, LP_S.sp-2, LP_S.sp-3). To manage snag habitat for AMMA at the 50% tolerance level, provide for snag densities of at least 32 snags/ha (13/acre) of which 10 snags/ha (4/acre) are larger than 50 cm (20 in. dbh).

30%
Small/Medium (no data on LP Large)
To manage densities of snags at the 30% tolerance level based on data from unharvested inventory plots with measurable snags, provide densities of about 18 snags/ha > 25.4 cm dbh (7.3/acre >10.0 in)), of which 4.4 snags/ha (2.0/acre) are > 50.0 cm (19.7 in) dbh on the landscape (Figures LP_S.sp-1, LP_S.sp-2, LP_S.sp-3). To manage snag habitat for AMMA at the 30% tolerance level, provide for snag densities of at least 29 snags/ha (12/acre) of which 9.2 snags/ha (3.7/acre) are larger than 50 cm (20 in. dbh).

Deadwood
80%
Small/Medium (no data on LP Large)
To manage down wood cover at the 80% tolerance level based on data from unharvested inventory plots with measurable down wood, provide 9 percent cover of down wood ≥ 12.5 cm diameter (4.9 in) on parts of the landscape. Even higher levels of down wood are likely to benefit and attract some species such as blacked back and three-toed woodpeckers (BBWO and TTWO). These high levels can be left opportunistically, but are likely not sustainable over the long-term on most of the landscape (Figure LP_S.inv-16).

50%
Small/Medium (no data on LP Large)
To manage down wood cover at the 50% tolerance level based on data from unharvested inventory plots with measurable down wood, provide 4.4 percent cover of down wood ≥ 12.5 cm diameter (4.9 in) should be maintained on parts of the landscape. Even higher levels of down wood are likely to benefit and attract some species such as blacked back and three-toed woodpeckers (BBWO and TTWO). These high levels can be left opportunistically, but are likely not sustainable over the long-term on most of the landscape (Figure LP_S.inv-16).

30%
Small/Medium (no data on LP Large)
To manage down wood cover at the 30% tolerance level based on data from unharvested inventory plots with measurable down wood, provide 2.7 percent cover of down wood ≥ 12.5 cm diameter (4.9 in) should be maintained on parts of the landscape. Clumps of up to 6% cover will benefit species such as blacked back and three-toed woodpeckers (BBWO and TTWO) (Goggans et al. 1988).

MMC
Snags
80%
Small/Medium
To manage snag habitat for AMMA at the 80% tolerance level, provide for snag densities of at least 36.0 snags/ha (14.4/acre) of which 11.2 snags/ha (4.5/acre) are larger than 50 cm (20 in. dbh). To provide den sites for AMMA areas of higher snag densities should occur on part of the landscape. Data from Wyoming indicate the 80% tolerance level for AMMA den sites is 115 snag/ha (46/acre) > 20 cm (8 in) dbh of which 38/ha (15/acre) are > 40 cm (16 in) dbh. Unharvested stands in the MMC_S vegetation condition in Oregon and Washington provides snag densities at or above this level on 4 to 8% of the landscape.

To manage densities of snags at the 80% tolerance level based on data from unharvested inventory plots with measurable snags, provide for densities of about 80 snags/ha ≥ 25.4 cm dbh (32/acre ≥10.0 in)), of which 23.6 snags/ha (9.5/acre) are ≥ 50.0 cm (19.7 in) dbh on parts of the landscape (Figures MMC_S.inv-15 and MMC_S.inv-16).
Large
To manage densities of snags at the 80% tolerance level based on inventory data provide for densities of about 66 snags/ha ≥ 25.4 cm dbh (27/acre ≥ 10 in)), of which 38 snags/ha (15/acre) are ≥ 50.0 cm (19.7 in) dbh on parts of the landscape (Figures MMC_L.inv-14 and MMC_L.inv-15).

50%
Small/Medium/Large
To manage densities of snags at the 50% tolerance level based on data from unharvested inventory plots with measurable snags, provide densities of about 41 snags/ha ≥ 25.4 cm dbh (16.6/acre ≥10.0 in)), of which 10.5 snags/ha (4.2/acre) are ≥ 50.0 cm (19.7 in) dbh on parts of the landscape (Figures MMC_S.inv-15 and MMC_S.inv-16). These snag densities are also similar to data for American marten (AMMA) from NE Oregon (Bull et al. 2005) (Figures MMC_S/L.sp-5 and MMC_S/L.sp-7). About a third of unharvested plots in the MMC_S vegetation condition provide snag densities above 60 snags/ha (24/acre) ≥ 25.4 cm (10 in) dbh of which 15 snags/ha (6/acre) are ≥ 50.0 cm (19.7 in) dbh. This level provides denning habitat for AMMA at the 50% tolerance level based on data from Wyoming.

To manage densities of snags at the 50% tolerance level based on inventory data provide for densities of about 38 snags/ha ≥ 25.4 cm dbh (15/acre ≥ 10 in)), of which 22 snags/ha (9/acre) are ≥ 50.0 cm (19.7 in) dbh, should be maintained on parts of the landscape (Figures MMC_L.inv-15 and MMC_L.inv-16). These snag densities are also similar to data for American marten (AMMA) from NE Oregon (Bull et al. 2005) for smaller snags but lower for the larger snags (Figures MMC_S/L.sp-5 and MMC_S/L.sp-7). The MMC_L vegetation condition provide snag densities above 60 snags/ha (24/acre) ≥ 25.4 cm (10 in) dbh of which 15 snags/ha (6/acre) are ≥ 50.0 cm (19.7 in) dbh on a significant proportion of the uharvested landscape (Figures MMC_L.inv-15 and MMC_L.inv-16). This level provides denning habitat for AMMA at the 50% tolerance level based on data from Wyoming.

30%
Small/Medium
To manage densities of snags at the 30% tolerance level based on data from unharvested inventory plots with measurable snags, provide densities of about 25 snags/ha ≥ 25.4 cm dbh (10/acre ≥10.0 in)), of which 6.6 snags/ha (2.7/acre) are ≥ 50.0 cm (19.7 in) dbh on the landscape (Figures MMC_S.inv-15 and MMC_S.inv-16). These levels are slightly lower than the 30% tolerance level for AMMA from NE Oregon, with densities of 29.4 snags/ha (11.8/acre) for snags ≥ 25 cm (10 in) dbh, and 9.2 snags/ha (3.7/acre) for snags ≥ 50 cm (20 in) dbh (Figures MMC_S/L.sp-5, MMC_S/L.sp-7). These areas of higher snag densities should be provided on part of the landscape to manage habitat for AMMA.
Large
To manage densities of snags at the 30% tolerance level based on inventory data provide for densities of about 27 snags/ha ≥ 25.4 cm dbh (11/acre ≥10 in)), of which 16 snags/ha (6.5/acre) are ≥ 50.0 cm (19.7 in) dbh, should be maintained on the landscape (Figures MMC_L.inv-15 and MMC_L.inv-16). These levels are fairly similar to the 30% tolerance level for AMMA from NE Oregon, with densities of 29.4 snags/ha (11.8/acre) for snags ≥ 25 cm (10 in) dbh, and 9.2 snags/ha (3.7/acre) for snags ≥ 50 cm (20 in) dbh (Figures MMC_S/L.sp-5, MMC_S/L.sp-7).

Down wood
80%
Small/Medium
To manage down wood cover at the 80% tolerance level based on data from unharvested inventory plots with measurable down wood, provide 8 percent cover of down wood ≥ 12.5 cm diameter (4.9 in) on parts of the landscape (Figure MMC_S.inv-10). Wildlife data indicate use of very high percent cover of down wood at the 80% tolerance level by SRBV and TTWO, ranging from 26-32 percent cover (Figure MMC_S.sp-10). These high levels can be left opportunistically, but are likely not sustainable over the long-term on most of the landscape (Figure MMC_S.inv-16).
Large
To manage down wood cover at the 80% tolerance level based on inventory data provide 10 percent cover of down wood ≥12.5 cm diameter (4.9 in) should be maintained on parts of the landscape (Figure MMC_L.inv-10). Even higher levels of down wood are likely to benefit and attract some species such as SRBV and TTWO (Figure MMC_L.sp-10); these high levels can be left opportunistically, but are likely not sustainable over the long-term.

50%
Small/Medium
To manage down wood cover at the 50% tolerance level based on data from unharvested inventory plots with measurable down wood, provide 4 percent cover of down wood ≥ 12.5 cm diameter (4.9 in) should be maintained on parts of the landscape (Figure MMC_S.inv-10). Clumps of down wood at at least 10% cover should be maintained to provide habitat for small mammals, TTWO, and AMMA (Figure MMC_S.sp-10); 10% of the unharvested landscape in the MMC_S vegetation conditions support dead wood at or above these levels (Figure MMC_S.inv-16).
Large
To manage down wood cover at the 50% tolerance level based on inventory data provide 5 percent cover of down wood ≥12.5 cm diameter (4.9 in) should be maintained on parts of the landscape (Figure MMC_L.inv-10). Clumps of down wood of 10% to 18% cover will benefit species such as TTWO and SRBV (Figure MMC_L.sp-10). About 12% of the unharvested area in the MMC_L vegetation conditions has down wood cover above 10% (Figure MMC_L.inv-16).

30%
Small/Medium
To manage down wood cover at the 30% tolerance level based on data from unharvested inventory plots with measurable down wood, provide 2.5 percent cover of down wood ≥ 12.5 cm diameter (4.9 in) should be maintained on parts of the landscape (Figure MMC_S.inv-10). Clumps of up to 6% cover will benefit species such as TTWO (Goggans et al. 1988)(Figure MMC_S.sp-10); approximately 1/4 of the unharvested landscape in the MMC_S vegetation conditions support dead wood at or above these levels (Figure MMC_S.inv-16).
Large
To manage down wood cover at the 30% tolerance level based on inventory data provide 3.3 percent cover of down wood ≥12.5 cm diameter (4.9 in) should be maintained on parts of the landscape (Figure MMC_L.inv-10). Clumps of up to 6% cover will benefit species such as TTWO (Figure MMC_L.sp-10). Approximately 1/4 of the unharvested area has above 6% down wood cover (Figure MMC_L.inv-16).

Appendix D – Distribution of NRF at Various Scales

Table D-1. Distribution of NRF at Various Scales.

		PAG NWFP		NRF NWFP		PAG LSR		NRF LSR		PAG OWLS 1.2***		NRF OWLS 1.2***		Nest Stand
		pag_clip_NWFP	acres/231001	nrf_pag_NWFP	acres/27686	pag_clip_lsr	acres/49120	**nrf_pag_LSR**	acres/8488	pag_owls_lsr	acres/28645	owl_pag_intersect_nrf	acres/6951	LSR
PAG	Plant Asso	Acres	% PAG	NRF_Acres	% NRF	Acres	% PAG	NRF_Acres	% NRF	Acres	% PAG	NRF Acres	% NRF	
ALPD	CLC1	21	0.01%											
ALPD Total		**21**	**0.01%**											
LPD	CLG3-11	7125	3.08%	30.78	0.11%	254	0.52%	4.66	0.05%	358	1%	4.63	0.07%	
	CLG4-13	61	0.03%											
	CLM2-11	737	0.32%	4.57	0.02%	371	0.76%	4.57	0.05%	51	0%	4.57	0.07%	
	CLS2-11	12667	5.48%	36.13	0.13%	3724	7.58%	2.42	0.03%	2554	10%	2.45	0.04%	
	CLS213	128	0.06%			87	0.18%							
	CLS2-14	17	0.01%			17	0.03%							
	CLS3-11	17781	7.70%	182.66	0.66%	3015	6.14%	12.19	0.14%	576	2%	13.97	0.20%	
	CLS4-12	4146	1.79%	46.02	0.17%	354	0.72%	8.74	0.10%	713	3%	22.36	0.32%	
	CLS9-11	890	0.39%	25.89	0.09%	144	0.29%	0.19	0.00%	137	1%	0.19	0.00%	
LPD Total		**43552**	**18.85%**	**326.05**	**1.18%**	**7966**	**16.22%**	**32.77**	**0.39%**	**4389**	**16%**	**48.17**	**0.69%**	
LPW	CLG4-11	7	0.00%											
	CLG4-12	65	0.03%	3.13	0.01%									
	CLM1-11	94	0.04%											
	CLM1-12	24	0.01%	2.49	0.01%									
	CLM1-13	339	0.15%	0.26	0.00%									
	CLM3-11	1364	0.59%											
	CLM3-12	1284	0.56%	54.56	0.20%	26	0.05%							
	CLM3-13	8	0.00%	0.22	0.00%					0	0%		0.00%	
	CLM3-14	71	0.03%	0.06	0.00%									
	CLM9-XX	470	0.20%											
	CLMX-XX	589	0.25%											
	CLS2-12	4223	1.83%	9.35	0.03%	1112	2.26%	8.73	0.10%	242	1%	1.55	0.02%	
LPW Total		**8538**	**3.70%**	**70.07**	**0.25%**	**1138**	**2.32%**	**8.73**	**0.10%**	**242**	**1%**	**1.55**	**0.02%**	
MCD	CRS1-11	19929	8.63%	2954.81	10.67%	5835	11.88%	1201.5	14.16%	2128	8%	744.84	10.72%	1
	CWC2-11	1846	0.80%	620.19	2.24%	1590	3.24%	524.53	6.18%	589	2%	169.78	2.44%	1
	CWC2-13	90	0.04%	70.72	0.26%	89	0.18%	69.56	0.82%					
	CWH1-11	32564	14.10%	11822.61	42.70%	11665	23.75%	3634.51	42.82%	7348	27%	3063.82	44.08%	4
	CWS1-12	3980	1.72%	758.64	2.74%	2223	4.53%	292.02	3.44%	519	2%	129.77	1.87%	
	CWS1-14	4760	2.06%	1679.44	6.07%	1014	2.06%	349.84	4.12%	996	4%	397.92	5.72%	
	CWS1-15	16143	6.99%	1956.41	7.07%	7490	15.25%	936.28	11.03%	6240	23%	973.14	14.00%	2
	CWSX-XX	113	0.05%	45.05	0.16%	113	0.23%	45.05	0.53%	113	0%	45.05	0.65%	
MCD Total		**79425**	**34.38%**	**19907.87**	**71.91%**	**30019**	**61.11%**	**7053.29**	**83.10%**	**17933**	**67%**	**5524.32**	**79.48%**	
MCW	CDS6-14	79	0.03%	66.62	0.24%	42	0.09%	42.32	0.50%					
	CEM1-11	216	0.09%	2.93	0.01%	70	0.14%	0.37	0.00%					
	CEM2-21	6	0.00%			6	0.01%					38.92	0.56%	
	CEM2-22	1992	0.86%	344.75	1.25%	360	0.73%	56.16	0.66%					
	CEM3-11	91	0.04%	1.79	0.01%		0.00%							
	CEM3-12	266	0.12%	34.01	0.12%	196	0.40%	7.44	0.09%	151	1%			
	CWS9-11	515	0.22%	216.95	0.78%	22	0.04%	8.01	0.09%	129	0%	108.75	1.56%	
MCW Total		**3165**	**1.37%**	**667.05**	**2.41%**	**696**	**1.42%**	**114.3**	**1.35%**	**280**	**1%**	**147.67**	**2.12%**	
MHD	CAXX	103	0.04%											
	CM-RCK	150	0.06%											
	CMS1-11	69094	29.91%	5909.46	21.34%	7910	16.10%	1123.57	13.24%	3121	12%	1168.01	16.80%	2*
	CMXX-XX	72	0.03%	0.06	0.00%		0.00%							
MHD Total		**69419**	**30.05%**	**5909.52**	**21.34%**	**7910**	**16.10%**	**1123.57**	**13.24%**	**3121**	**12%**	**1168.01**	**16.80%**	
MSHB	SW11-13	388	0.17%	7.24	0.03%	115	0.23%							
	SW11-19	33	0.01%											
	SW22-12	14	0.01%	0.39	0.00%									
	SW41-11	6	0.00%	1.52	0.01%									
	SW41-12	139	0.06%	2.29	0.01%	32	0.07%	2.29	0.03%					
MSHB Total		**580**	**0.25%**	**11.44**	**0.04%**	147	0.30%	**2.29**	**0.03%**					
PPD	CPS2-11	110	0.05%	27.42	0.10%	67	0.14%	3.36	0.04%					
	CPS2-12	1369	0.59%	34.69	0.13%	142	0.29%	2.7	0.03%	91	0%	3.74	0.05%	
	CPS2-13	1336	0.58%	96.88	0.35%	49	0.10%							
	CPS2-14	576	0.25%			7	0.01%			1	0%			
	CPS2-17	22	0.01%	12.33	0.04%	21	0.04%	11.66	0.14%					
	CPS3-12	1124	0.49%	68.95	0.25%	368	0.75%	58.12	0.68%					
PPD Total		**4537**	**1.96%**	**240.27**	**0.87%**	**654**	**1.33%**	**75.84**	**0.89%**	**92**	**0%**	**3.74**	**0.05%**	
PPW	CPS3-11	3540	1.53%	280.98	1.01%	327	0.67%	70.07	0.83%	148	1%	47.26	0.68%	
	CPS3-14	32	0.01%			32	0.07%			2	0%			
PPW Total		**3572**	**1.55%**	**280.98**	**1.01%**	**359**	**0.73%**	**70.07**	**0.83%**	**150**	**1%**	47.26	**0.68%**	
CINDER Total		**49**	**0.02%**	**1.84**	**0.01%**	**2**	**0.00%**	**1.83**	**0.02%**					
LAVA Total		**1181**	**0.51%**	**8.34**	**0.03%**	**0**	**0.00%**							
RIP Total		**1238**	**0.54%**	**94.22**	**0.34%**					**7**	**0%**	**5.9**	**0.08%**	
ROCK Total		**2267**	**0.98%**	**27.31**	**0.10%**	**48**	**0.10%**	**0.74**	**0.01%**	**12**	**0%**			
MEADOW Total		**1371**	**0.59%**	**35.73**	**0.13%**	**18**	**0.04%**							
WATER Total		**12086**	**5.23%**	**104.89**	**0.38%**	**163**	**0.33%**	**4.19**	**0.05%**	**619**	**2%**	**4.06**	**0.06%**	

Appendix E – References and Acronyms

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Acronyms Used in Davis LSR Assessment

ATV:	All-terrain Vehicle
BA:	Basal Area
BECA:	Bald Eagle Consideration Area
BEMA:	Bald Eagle Management Area
C&H:	Cattle and Horse
CFR:	Code of Federal Regulations
CHU:	Critical Habitat Unit
CYMO:	*Cypripedium montanum*-Mountain Ladyslipper
DBH:	Diameter at Breast Height
DEM:	Digital Elevation Model
DNF:	Deschutes National Forest
EA:	Environmental Assessment
EIS:	Environmental Impact Study
FEIS:	Final Environmental Impact Study
FG:	Foreground
FONSI:	Finding of No Significant Impact
FS:	Forest Service
FVS-FFE	Forest Vegetation Simulator – Fire/Fuels Extension
GIS:	Geographical Information
GNN:	Gradient Nearest Neighbor
GTR:	General Technical Report
HYPE:	*Hypericum perforatum*- St. Johnswort
HRV:	Historic Range of Variability
IDT:	Interdisciplinary Team
IRT:	Issue Resolution Team
IWMP:	Integrated Weed Management Plan
LOS:	Late and Old Structure
LP:	Lodgepole
LPD:	Lodgepole Dry
LPH:	Lodgepole with Mountain Hemlock
LPW:	Lodgepole Pine Wet
LRMP:	Land and Resource Management Plan
LSOG:	Late Structure and Old Growth
LSR:	Late Successional Reserve
LSRA:	Late-Successional Reserve Assessment
LWM:	Large Woody Material
MA:	Management Area
MCD:	Mixed Conifer Dry
MCW:	Mixed Conifer Wet
MG:	Middleground
MH:	Mountain Hemlock
MHD:	Mountain Hemlock Dry
MIJE:	*Mimulus jepsonii*- Jepson's monkeyflower
MIS:	Management Indicator Species
MSA:	Management Strategy Area
MSN:	Most Similar Neighbor
NEPA:	National Environmental Policy Act
NF:	National Forest
NFMA:	National Forest Management Act
NRF:	Nesting, Roosting, and Foraging

NSO:	Northern Spotted Owl
NTMB:	Neotropical Migratory Bird
NWFP:	Northwest Forest plan
Odell WA:	Odell Pilot Watershed Analysis
OGMA:	Old Growth Management Area
PAC:	Provincial Advisory Committee
PAG:	Plant Association Group
PCT:	Pacific Crest Trail
PETS:	Potential Endangered, Threatened, or Sensitive (Species)
PMR:	Pacific Meridian Resources
PNW:	Pacific Northwest
PP:	Ponderosa Pine
PPD:	Ponderosa Pine Dry
PR:	Partial Retention
R:	Retention
R6:	Region 6
R6 IP EIS	Region 6 Invasive Plant Environmental Impact Study
RD:	Ranger District
REO:	Regional Ecosystem Office
ROD:	Record of Decision
ROS:	Rate of Spread
S&G:	Standards and Guidelines
S&M:	Survey and Manage Species
SDI:	Stand Density Index
SEI:	Sustainable Ecosystems Institute Inc
SPOTS:	Strategic Placement of Treatments
SPP:	Species
TPA:	Trees per acre
UMZ:	Upper Management Zone
USDA:	United States Department of Agriculture
USFS:	United States Forest Service
USFWS:	United States Fish and Wildlife Service
USGS:	United States Geological Survey
WA:	Watershed Analysis
WEAVE:	Watershed Evaluation and Analysis for Viable Ecosystems