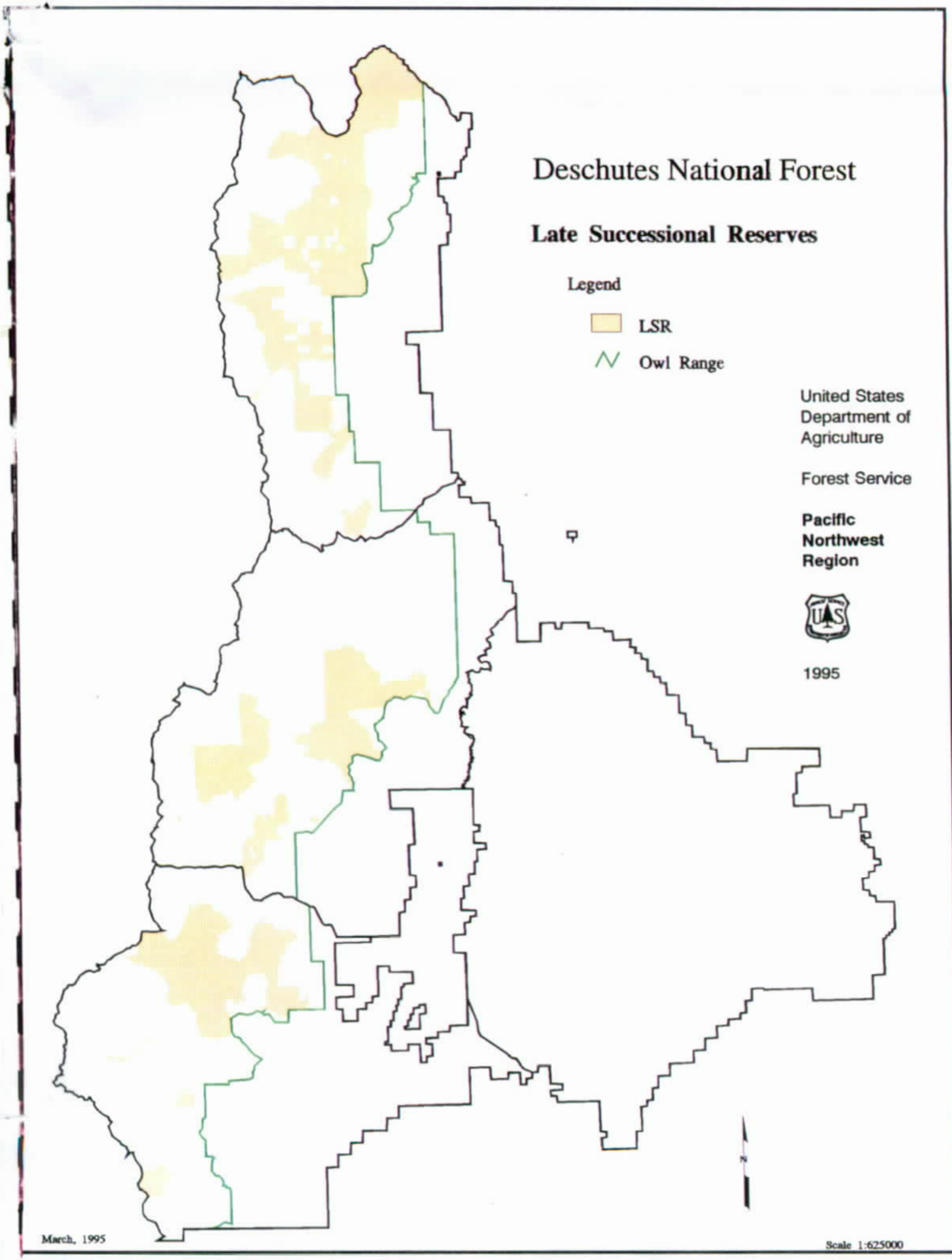
Deschutes National Forest
Late Successional Reserves
Legend
LSR
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TABLE OF CONTENTS

DESCHUTES NATIONAL FOREST

A

LATE SUCCESSIONAL RESERVE

OVERVIEW

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EXECUTIVE SUMMARY

The Deschutes National Forest Late Successional Reserve (LSR) Overview is designed to set the context for the site specific Deschutes Forest LSR Assessments, by providing general information on forest processes, pattern and structure, and forest function. It also provides information to: 1) discuss the importance of LSRs for maintaining ecosystem and species viability, 2) discusses the vegetative composition and structural instability of each LSR, 3) discusses whether or not each LSR needs to be sustained to provide habitat for all LSOG related species or whether each LSR provides unique habitats and can be managed for different species, 4) identifies the roles of Congressionally Reserved Areas (CRAs), Administratively Withdrawn Areas (AWAs) and Matrix in maintaining late successional and old growth habitats, and 5) evaluates whether or not Matrix lands are important for connectivity and dispersal habitat.

Eleven Late Successional Reserves were designated on the Deschutes National Forest within the Oregon Eastern Cascades physiographic province. These reserves vary in size from 200 acres to 75,800 acres, and are located on the eastern flank of the Cascade Range.

The Deschutes LSRs are part of a Regional network to maintain habitat for late successional and old growth related species including the northern spotted owl. East side habitat for the owl is on the periphery of suitability and their range. Providing habitat at the periphery of a species range may enhance maintenance of genetic variation. In otherwords, as genetic change occurs in some individual northern spotted owls (i.e. adapting to different structural habitat requirements) and is passed on to their decedents, genetic material contained in other individuals may be lost. Due to genetic variation that may occur in the northern spotted owl and other LSOG related species, maintenance and enhancement of east side late successional and old growth ecosystems may be critical for species viability.

Within each LSR, late successional and old growth stands have unique vegetation series types, soil productivity sites, climatic conditions and topographic features. Within Region 6, some of the Deschutes National Forest LSRs provide habitat for species which rely on late structured stands maintained by frequent, low intensity fire regimes. These "fire climax" late successional and old growth stands provide habitats and an array of late successional and old growth related species not usually associated with the "climatic climax" stands on the Deschutes Forest or Province. Because of this mix of "westside" and "eastside" vegetation types and conditions, management efforts should focus on maintaining the dynamic balance of all the vegetative series, to include both climatic climax and fire climax ecosystems. This will provide opportunities for ecosystem maintenance and restoration for existing and potential natural vegetation.

The Forest Overview describes the uniqueness of the Deschutes LSRs, regionally and locally, both vegetatively and by species diversity. Given the desired condition is to provide for fire climax and climatic climax ecosystems, not all LSOG related species can or will be managed for within each LSR. Management of the LSRs should focus on maintaining the dynamic balance of what is sustainable for a particular LSR. In doing so, we can enhance and maintain LSOG related species balance across the Forest.

The late successional stands within the LSRs, CRAs, AWAs and Matrix lands are critical essential habitat for LSOG related and dependent species life history and dispersal. The role of LSOG stands in CRAs, AWAs and Matrix lands is to provide additional refugia for LSOG species. Without these areas, LSRs alone would not maintain species viability.

The Late Successional Reserve Assessment process is not new. It should be viewed as the continuation or expansion of the Watershed Analysis process. The Deschutes has designed a LSR process to dovetail into our existing Watershed Evaluation & Analysis for Viable Ecosystems (WEAVE) by expanding the five (5) process Phases, the Biological Domain process and information in the WEAVE Appendix A (Data Summary and Analytical Tools). The Phases and Domain describe the methodology to help us meet the LSR objectives. Appendix I, of this document, provides the recommended elements that should be addressed in each LSR Assessment; an expanded description of what is contained in each element; and expands the 5 Phases, Biological Domain and Appendix A within the WEAVE process.

Site specific LSR team objectives are to describe and provide the following products: 1) criteria for determining appropriate treatments, 2) identification of specific areas to be treated under those criteria, 3) a proposed implementation schedule tiered to higher order plans, and 4) a proposed monitoring and evaluation guide to help evaluate if future activities are carried out as intended and achieve desired results. These products should form a strategy for protection (from fire, and insect and disease epidemics), management (enhancement) and prevention (long-term reduction of risk) for our late successional/old growth stands.

Information to provide these products will be derived from analysis on: 1) historic and current vegetative conditions, and a history and description of current land uses within the reserve, 2) current information on late successional and old growth (LSOG) related species and their locations within the reserve, and 3) a fire management plan. Much of this information is contained within the Watershed Analysis documents.

Listed below are four (4) challenges for the Deschutes Forest and the site specific LSR teams to keep in mind while preparing the LSR Assessment.

1) Our ability to protect and sustain current late successional and old growth structural characteristics, particularly in LSRs which contain east side vegetation series types.

2) Our ability to maintain fire, and insect and disease processes at levels that do not cause catastrophic loss of LSR LSOG habitat.

3) Our ability to maintain viable levels of LSOG related species in both "climatic climax" and "fire climax" ecosystems.

4) Our ability to enhance connectivity between LSRs on Forest and at the provincial scale.

The Deschutes Forest needs to provide connectivity (dispersal) habitat between LSRs for LSOG related and dependent species like the northern spotted owl. A common thread that links the Forests LSRs together is the lodgepole and ponderosa pine stands in the Matrix lands. The lodgepole pine stands may attain the Interagency Scientific Committees (ISC) standard of 11-40 but they will not sustain this condition for any period of time before some disturbance agent causes stand decline. The ponderosa pine stands could maintain this standard depending upon soil productivity. The Northwest Forest Plan (NFP) provides dispersal habitat that is appropriate for west side conditions not dry east side forests. Appendix II proposes a process to measure east side dispersal habitat.

For the past decade, the Metolius LSR, has had an epidemic outbreak of Western Spruce Budworm. Due to the prolonged period of drought and defoliation, many trees are dead. The management concern in this area is catastrophic fire. The Davis LSR is now incurring an outbreak of Mountain Pine Beetle in the lodgepole pine stands and fir engraver in the true fir stands. These stands serve as Nesting, Roosting and Foraging (NRF) and dispersal habitat for the northern spotted owl, as well as NRF habitat for several woodpecker species. The management concern is catastrophic fire. Both the Metolius and Davis LSRs have over stocked moist and dry mixed conifer stands that are high risk for additional insect, disease, and fire outbreaks.

For reasons discussed above, these two LSRs have been selected for the FY 95 assessment process. The LSR Assessment teams will provide the Forest with the assessments for review and forwarding to the Regional Ecosystem Office for final review.

INTRODUCTION

The Deschutes National Forest is required to prepare one or more Late Successional Reserve Assessments (LSRA) as outlined in the Regional Budget Advice, using the elements described on page C-11 of the Record of Decision (ROD) (USDA, 1994b) for the Northwest Forest Plan (NFP) (USDA, 1994a). The Deschutes Forest Leadership Team, with recommendations from the Deschutes Overview LSRA team, will provide the Regional Ecosystem Office (REO) with a Forest wide overview as well as two site specific LSR Assessments: the Metolius LSR (Map 1) and the Davis LSR (MAP 2).

The Deschutes LSRA team determined that there were several Forest landscape level concepts that should be addressed in the Forest wide overview. These concepts include: 1) a general description of each Late Successional Reserves (LSRs) vegetative series, and related floral and fauna species; 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 above concepts are to provide information to: 1) discuss the importance of LSRs for maintaining ecosystem and species viability, 2) discuss the vegetative composition and structural instability of each LSR, 3) discuss whether or not each LSR needs to be sustained to provide habitat for all LSOG related species or whether each LSR provides unique habitats and can be managed for different species, 4) identify the roles of Congressionally Reserved Areas (CRAs), Administratively Withdrawn Areas (AWAs) and Matrix lands in maintaining late successional and old growth habitats, and 5) evaluate whether or not Matrix lands are important for connectivity and dispersal habitat.

Attached to the Forest wide LSR overview is an analysis process that integrates LSR Assessments with Watershed Analysis, (APPENDIX I). The site specific LSR Assessments in combination with Watershed Analysis, will provide criteria to identify areas that would be recommended for treatment within each LSR.

LSR DESCRIPTIONS

LSRs are managed to protect and enhance conditions of late successional forest ecosystems, which serve as habitat for late successional and old growth (LSOG) related species including the northern spotted owl. These reserves are designed to maintain a functional, interacting, late successional and old growth forest ecosystem.

The purpose of the LSRs are to provide distribution, quantity and quality of late successional and old growth forest habitat sufficient to avoid foreclosure of future management options (USDA, 1994b). LSRs also provide habitat for populations of species that are associated with late successional and old growth forests and ensure that late successional and old growth species diversity and viability are conserved.

Late successional and old growth stands within CRAs are additional refugia for late successional and old growth related species. Management of CRAs follows direction written in the applicable legislation or plans. Direction from the standards and guidelines (S&Gs) in the ROD apply where they are more restrictive or provide greater benefits to late successional related species, unless S&Gs would be contrary to legislative or regulatory language or intent.

Late successional and old growth stands within AWAs also act as additional refugia for LSOG related species. Within AMAs the most restrictive S&Gs, in either the ROD or current forests plans, are designed to provide the greatest benefits to late successional and old growth related species and their habitats. While it is recognized that changes in AWAs may occur during future plan amendments, many assumptions in the NFP are based in part on the retention of AWAs in the long term. Plan amendments that propose to significantly reduce protection for late successional and old growth forest related species,

or reduce protection for aquatic ecosystems, are subject to review by the REO to determine if the objectives of the S&Gs would be significantly adversely affected (USDA, 1994b).

Late successional and old growth stands within CRAs and AWAs provide additional essential NRF habitat for LSOG related species life history. The landscape distribution of the CRAs and AWAs land allocations, in combination with LSRs, provide the LSOG forest network across the Provincial landscape for LSOG related species distribution, diversity and viability.

Critical Habitat Units (CHUs) for the northern spotted owl were designated by the US Fish and Wildlife Service (USDI, 1992). CHUs are not a land allocation within the NFP but need to be addressed when proposing activities within the CHU. The Service may review and revise its critical habitat designation for the northern spotted owl, based upon provisions within the ROD. In the interim, the combination of S&Gs for CRAs, AWAs, LSRs (LSRs under 10,000 acres), Riparian Reserves and Matrix, should allow critical habitat to perform the biological function for which it was designated. For the Deschutes Forest, all CHUs but for a small portion located on the Sisters Ranger District, immediately south of Sanitam Pass are contained within LSRs.

Eleven Late Successional Reserves were designated on the DNF within the Oregon Eastern Cascades physiographic province. Reserves vary in size from approximately 200 acre to 75,800 acres and are located on the eastern flank of the Cascade Range (MAP 3).

The following general discussion provides the LSR common name and Regional number, broad vegetative communities and a several late successional and old growth related species. This discussion is not an all inclusive list and does not provide densities or percentages but is to be used as general information to be validated and expanded with each site specific LSR Assessments.

The Regional number associated with each LSR is derived from the Final Draft US Fish and Wildlife Recovery Plan for the Northern Spotted Owl, December, 1992. Numbering for LSRs corresponds to the Designated Conservation Areas (DCAs). Numbering for the Deschutes NF LSRs stays between the allotted numbers for DCAs. Hence, Metolius LSR O-51 matches DCA OD-51. However, there are more LSRs than DCA numbers. So where a group of LSRs are geographically close, a third number is added. As an example, Round Mt. LSR O-551, is a small LSR next to the larger LSR, Browns Mt. O-55.

METOLIUS LSR, Regional # O-51: This LSR is located in the northern portion of the Deschutes NF and is bordered on the north by the Confederated Tribes of the Warm Spring reservation and the Jefferson Wilderness Area to the west. Vegetative communities are characterized by more contiguous moist mixed conifer communities, mountain hemlock and ponderosa pine stands with white fir understory. Areas surrounding the Metolius River are ponderosa pine stands with an understory of white fir and larch. Areas on Green Ridge are dry mixed conifer with white fir and Douglas fir understory. LSOG related species include Vaux's swift, northern spotted owl, American marten, northern bald eagle, pileated woodpecker, white-headed woodpecker, black-backed woodpecker, northern goshawk, tailed frog, cascade frog, bull trout and Allotropa virgata.

CACHE/TROUT LSR, Regional # O-52: This LSR is located immediately south of the Metolius LSR and lies east of the Mount Washington Wilderness Area. Vegetative communities are characterized by dry mixed conifer communities and ponderosa pine stands with white fir understory. LSOG related species include northern spotted owl, American marten, northern goshawk, white headed woodpecker, Vaux's swift, cascade and tailed frog.

THREE CREEKS LSR, Regional # O-53: This LSR is located south of Cache/Trout LSR and is bordered on the south by the Three Sisters Wilderness Area. It is small in size and it's vegetative communities are characterized by mountain hemlock and lodgepole pine. LSOG related species include black-backed woodpecker, American marten, northern goshawk and cascade frog.

SHERIDAN MT. LSR, Regional # O-54: This LSR is located several air miles east of the Cascade Range encompassing a volcanic butte south of Mount Bachelor. Vegetative communities include dry mixed conifer, mountain hemlock, ponderosa pine with white fir understory and lodgepole pine. LSOG related species include northern spotted owl, American marten, flamulated owl, northern goshawk, black-backed woodpecker and Allotropa virgata.

CULTUS MT. LSR, Regional # O-56: This LSR is located west and a little south of Sheridan Mt. LSR. It's western boundary is the Three Sisters Wilderness Area. Vegetative communities include dry mixed conifer, mountain hemlock, ponderosa pine with white fir understory and lodgepole pine. LSOG related species include northern spotted owl, great gray owl, northern bald eagle, black-backed woodpecker, spotted and cascade frog and Jepson's monkeyflower.

BROWNS MT. LSR, Regional # O-55: This LSR is located south and east of Cultus Mt. LSR. The LSR is surrounded by AWAs and Matirx lands. Vegetative communities are characterized by dry mixed conifer and ponderosa pine with white fir understory. LSOG related species include northern bald eagle and Allotropa virgata.

ROUND MT. LSR, Regional # O-551: This LSR is located several air miles east of Browns Mt. LSR and is the smallest LSR on the Deschutes NF. Vegetative communities are characterized by dry mixed conifer and ponderosa pine with white fir understory. LSOG related species that may occur include northern bald eagle and Allotropa virgata.

DAVIS LSR, Regional # O-57: This LSR is located approximately 10 air miles south of the Cultus Mt. LSR and several air miles south and west of Browns Mt. LSR. The intervening area is Matrix allocation. Vegetative communities are characterized by dry mixed conifer, ponderosa pine with white fir understory and lodgepole pine. LSOG related species include northern spotted owl, northern bald eagle, northern goshawk, American marten, black-backed woodpecker, tailed and cascade frog, Jepson's monkeyflower and Allotropa virgata.

CRESCENT LSR, Regional # O-571: This LSR is located south and west of the Davis Lake LSR. It is a narrow strip bordering the Diamond Peak Wilderness Area. Vegetative communities are characterized by dry mixed conifer. LSOG related species include the northern spotted owl and Allotropa virgata.

LOWER BIG MARSH LSR, Regional # O-572: This LSR is small is size and is located several miles south of the Crescent LSR. Vegetative community is lodgepole pine. LSOG related species include northern goshawk, black-backed woodpecker, and spotted frog.

UPPER BIG MARSH LSR, Regional # O-573: The LSR is the southern most LSR on the Forest. It is located several miles south of the Lower Big Marsh LSR. Vegetative communities are characterized by moist mixed conifer and mountain hemlock. LSOG related species include the northern spotted owl, cascade frog and Allotropa virgata.

The above discussion does not show the late successional and old growth related species density within each LSR. For example, half of the northern spotted owls on the DNF reside in the Metolius LSR (Sisters Ranger District). The balance of owls on the Forest reside in the southern LSRs (Bend and Crescent Ranger Districts) where the Interagency Scientific Committee (ISC) determined the area to be a special area of concern (Thomas et al, 1990). Each site specific LSRA will provide specific densities and trends for the LSOG related species.

The general discussion of the 11 LSRs describes similar and different vegetation series types among the LSRs. Keeping in mind the desired condition to provide for fire climax and climatic climax ecosystems and the landscape mosaic of current vegetation patterns, not all LSOG related species can or will be managed for within each LSR. Because of the mix of vegetation series types, soil productivity and climatic conditions, management efforts should focus on maintaining the dynamic balance of what is

sustainable for a particular LSR. In doing so, we can enhance and maintain LSOG related species balance across the Forest.

Climatic conditions on the eastern flank of the Cascade Range are much drier than conditions west of the crest. These drier climatic conditions in combination with the exclusion of fire and past timber harvest activities have created over stocked and stressed stands that are and have been susceptible to large scale insect and disease epidemics, and catastrophic fires (USDA, 1993a). Significant moisture gradients occur within the Deschutes NF. In general more moist conditions are in the northern and western locations and drier conditions are in the eastern and southern locations. The above general LSR discussion shows a general trend of moist mixed conifer series in the north grading to dry mixed conifer, ponderosa and lodgepole pine series in the south. The same is true when moving west to east. MAP 4 displays the existing vegetative pattern across the Forest.

The southern Deschutes Forest is characterized by unique topographic features. Volcanically formed buttes dot the landscape. The north aspects of these buttes provide a moist environment for mixed conifer stands. LSOG dependent species like the northern spotted owl have keyed into these moist north environments for portions of their life history. Additionally, these buttes provide critical dispersal habitat for connectivity of LSOG stands.

FOREST PROCESSES

Ecological processes essential in late successional and old growth ecosystems include: tree growth and maturation, death and decay of large trees, low to moderate disturbances (blowdown, fire, insect and disease) creating canopy openings, tree establishment in canopy gaps or under overstory, and canopy gap closure through understory growth or lateral canopy growth (USDA, 1994a). These processes result in forests moving through different stages of successional development towards old growth conditions.

Human induced alterations to forest processes include timber harvest and related activities, other vegetative manipulations, recreation activities, fires, fire suppression and collection of special forest products. The combination of fire suppression and past harvest activities has produced overstocked stands of younger, smaller diameter trees mixed with a few remaining large, old trees. Combined with continued drought conditions the stands within many late successional and old growth forests are at a threshold of instability. Criteria used to determine unstable conditions include high stand densities, increased root disease pockets and insect epidemics. It is the role of each site specific LSR Assessment team to define how many acres in each LSR are unstable, describe stand risk and identify the possible disturbance agents (fire, disease, insects or all).

The roles of insects and diseases as disturbance agents in the forest are very closely tied to vegetation patterns. Factors such as tree growth and vigor as influenced by site conditions, vegetative species composition, size structure and density of forest stands are all very important in determining which insect and disease agents are likely to be operating in the forested environments, their abundance, and how profound their effect is likely to be on that vegetation. By their actions, insects and diseases sometimes alter the very vegetative patterns that provided them with suitable habitat, and set the stage for new processes to occur.

A recent history of insect and disease infestations would imply that certain vegetative patterns were present on the landscape when these disturbance agents were at work. For example, the extremely high levels of western spruce budworm activity in the Metolius LSR during the late 1980's reflected a high proportion of white fir in stands which previously contained a mixture of vegetative species. Similarly, high incidence of Armillaria root disease in many mixed conifer stands suggests extreme stand densities combined with a cutting history that has produced many large stumps to be inoculated by the fungus.

Some vegetative series within the DNF have experienced minimal departures from the natural balance, while others have been altered quite dramatically and are outside the natural range of variation with respect to their current vegetative patterns. For example, forested vegetation at the higher elevations that occurs within the mountain hemlock series has probably been altered minimally by human activity. In contrast, the dry mixed conifer series has experienced the most extreme degree of change due to a combination of harvest practices and exclusion of natural fire. This series is now dominated by white fir, a very unstable species on these dry sites. The dry mixed conifer series, together with some portions of moist mixed conifer and ponderosa pine series are the most likely to experience dramatic changes due to insect and disease disturbance agents.

Fire has been an important disturbance process over intervals of 3-300 years on the DNF. Records from early explorers and dates of frequent fires measured on many older scarred trees suggest that fires burned at frequent intervals. Fire affects ecosystem function and structure, altering the physical environment.

A fire regime is a generalized way of integrating various fire characteristics. Organization may be according to characteristics of the disturbance, dominant or potential (climax) vegetation on the site, or fire severity, the magnitude of effects on dominate vegetation. Fire regime is defined at historical levels by the potential climax vegetation.

Fire regime for the vegetative series types on the DNF follow (Agee, 1993):

> The ponderosa pine series has a fire interval ranging from 7-38 years. The stable patch dynamics of ponderosa pine forest were largely a result of frequent, low intensity fires.
>
> The lodgepole pine series has a fire regime classed as moderate severity. A typical disturbance scenario includes selective removal of about a third of the stands every 60 years, either by insects, fire, or the interaction between them.
>
> Grand fir/white fir forests are transitional between the drier, lower elevation forests and higher elevation subalpine forest types. Fire return intervals range from 9-50 years. This series shows the most frequent fire activity, although the wetter sites have longer fire return intervals.
>
> The Mountain hemlock/subalpine fir series occupies the coolest sites. Fire intervals tend to be longer and may exceed 100 years. Fire intensities tend to be higher. Fire pattern appears to be stand-replacing fires of variable size.

Because of natural and human induced alterations to forest processes, areas on the forest vary with degrees of instability. The Metolius LSR, for the past decade, has had an epidemic outbreak of Western Spruce Budworm. Due to the prolonged period of defoliation, many trees are dead. The concern is catastrophic fire. The Davis LSR is now incurring an outbreak of Mountain Pine Beetle. It is affecting most late successional lodgepole pine stands. These stands serve as dispersal habitat for the northern spotted owl, as well as NRF habitat for several woodpecker species. Both LSRs have over stocked dry mixed conifer stands that are very high risk areas for insect, disease, and fire.

The key to keeping these insect and disease disturbance agents operating at natural or below epidemic levels involves managing the vegetation patterns across the landscape. The degree to which a forest is healthy can be measured by the over abundance or absence of the various combinations of size, structure and species composition that can occur within a particular vegetation series. The desired vegetation condition (from a forest health perspective) would be one where all possible combinations of size, structure and species composition are represented in a balanced distribution across the landscape. This type of vegetative assemblage conveys a resilience to the forest and limits the scale at which disturbance agents operate.

Given the altered forest landscape and current management direction (USDA, 1994b) we may not be able to return to historic levels of disturbance in the next 50 years. Therefore, current and future risks need to be evaluated as to when, where and why so that we may be able to manage forest conditions and human activities to minimize the "catastrophic risks" and move towards historic forest conditions.

FOREST PATTERN AND STRUCTURE

Components that produce "climatic" late successional and old growth structural stands include: live old growth trees, standing dead trees, logs on the ground and in the stream, multicanopy layers, understory trees, canopy gaps and small patches in the understory. Components that make up "fire-induced" late successional and old growth structural stands include all the above except multicanopy layers. These structures contribute to ecological processes that occur in late successional forests. These structures are also directly manipulated by management activities.

Late successional moist mixed conifer stands on the northern portion of the Forest (Metolius LSR) are characterized by a high canopy cover layer with multi-stories, understory trees, high accumulations of standing dead and down trees and canopy gaps. The ponderosa pine community around the Metolius River is of higher site productivity than other pine sites on the southern portion of the Forest. These stands are characterized by an understory of white fir and larch, moderate to high canopy cover and moderate to high standing dead and down trees. The southern LSRs are a blend of dry mixed conifer, ponderosa and lodgepole pine. These areas are characterized by moderate to high canopy cover, high accumulations of standing dead and down trees and an understory of ponderosa and/or lodgepole pine. At higher elevations (Cultus Lake and Upper Big Marsh LSRs), the conifer mix includes mountain hemlock and sub-alpine fir. These higher elevation areas are characterized by understory trees, and high accumulations of standing dead and down logs.

Habitat for late successional and old growth related species is fragmented across the Forest because of past harvest and related activities, insect and disease epidemics, natural variability in soil site productivity and wildfire. Existing late successional and old growth habitats remain primarily within the LSRs, CRAs and AWAs. Very limited amounts remain within the Matrix allocation, emphasizing that these LSOG stands are critical for connectivity between the LSRs. Within the Matirx allocation, apply the standard and guideline in the ROD, C-44, retention of late successional and old growth fragments in watersheds where little remains (USDA, 1994b). The S&G will be applied in fifth field watersheds in which federal lands are currently comprised of 15 percent of less LSOG forest.

MAP 5 displays late successional and old growth habitats across the Forest. These stands are broadly based PAGs of mixed conifer, ponderosa and lodgepole pine. The fragmented vegetative pattern indicates a potential forest wide concern of LSOG connectivity. The concept of connectivity is an issue for dispersal of late successional and old growth related species.

FOREST FUNCTION

General Old Growth Ecosystem Function

Late successional ecosystems perform many ecological functions. For example, they provide microclimate buffering during seasonal extremes, food production for late successional related species, carbon storage, nutrient and hydrologic cycling, source of arthropod predators and organisms beneficial to other ecosystems or successional stages, high retention of nutrients, low soil erosion potential and moisture/precipitation interception. These functions tend to be less developed or not found at all in younger forests (USDA, 1994a., Thomas et al., 1993, and USDA, 1993b).

Species Habitat Function

Functioning late successional and old growth stands provide nesting, roosting and foraging (NRF) habitat for late successional and old growth related species including the northern spotted owl. For example, NRF habitat for the northern spotted owl on the DNF are stands of mixed conifer, ponderosa pine with white fir understory and mountain hemlock with sub-alpine fir with 75 percent of canopy cover, 22 large diameter trees per acre (25" or greater DBH), 280 trees per acre of second canopy layer, 12 hard snags (> 15" DBH) per acre, 15 down logs (> 15" DBH) per acre (Austin, 1994). Habitat characteristics were developed from vegetative survey plots on six reproductive northern spotted owl pair sites on the Deschutes. The Wenatchee PNW conducted the habitat inventories and provided the data to the forest. Using that data, the Forest used aerial photo interpretation and limited ground truthing to plot the mixed conifer NRF layer in GIS (MAP 7). This layer overlaid with all known northern spotted owl pairs and territorial singles confirmed that all owl locations were within the mixed conifer NRF habitat. The majority of NRF habitat lies within the LSRs, CRAs and AWAs land allocations.

The Metolius, Sheridan Mt., Cultus Mt., Davis, Crescent Lake and Upper Big Marsh LSRs all contain NRF habitat for the northern spotted owl. The general discussion for each LSR also identifies other late successional and old growth related species that occupy these LSRs. Each species listed requires different structural attributes for it's NRF habitat. NRF habitat requirements for these species will need to be identified and balanced with other species requirements within each LSR.

Three Creeks LSR provides NRF habitat for LSOG species including the American marten, black-backed woodpecker, northern goshawk and cascade frog. It may never provide NRF habitat for the northern spotted owl but may provide dispersal habitat for the owl.

Browns Mt. LSR provides NRF habitat for the northern bald eagle and potential NRF habitat for the northern goshawk. It also provides dispersal habitat for the northern spotted owl and may be a critical dispersal link between the Cultus Mt. and Davis Lake LSRs.

Round Mt. LSR may provide NRF habitat for the northern goshawk. The LSR is very small and conforms to the Deschutes Land and Resource Management Plan (LRMP) old growth Management Area (MA) size guidelines (USDA, 1990). It may provide dispersal habitat for the northern spotted owl.

Lower Big Marsh LSR provides NRF habitat for the blacked-backed woodpecker, northern goshawk, spotted and cascade frogs. It may provide dispersal habitat for the northern spotted owl.

The Metolius, Sheridan Mt., Cultus Mt., Browns Mt., Davis and Lower Big Marsh LSRs contain large areas of the ponderosa pine and lodgepole pine series. These series provide NRF habitat for many of the species identified in the general LSR discussion.

The late successional and old growth habitats for the ponderosa and lodgepole pine series are being mapped using the 1988 Pacific Meridian Resources (PMR) data (MAP 6). Validation of the mapping effort is being verified by ground truthing and overlaying related species location records. Data from Map 7 (mixed conifer NRF for the northern spotted owl) & Map 6 (ponderosa and lodgepole pine NRF habitat), combined are Map 5 (late successional and old growth NRF habitat across the forest).

Forest Scale Connectivity

Map 5 illustrates functioning late successional and old growth habitats across the Forest. In order for species to move between these LSOG stands there needs to be forested habitat that provides connectivity for successful dispersal of LSOG related species. Connectivity is just one essential component of a functioning late successional ecosystem.

Connectivity is a measure of the extent to which intervening habitat truly connects blocks of suitable habitat to allow individuals, usually juveniles, of the species in question to disperse between them. Provision of habitat features that enhance dispersal between blocks is essential (Thomas et al., 1990).

Connectivity for the northern spotted owl was to be measured using the 50-11-40 rule as identified in the Interagency Scientific Committee report. It was applied to all lands outside the Habitat Conservation Areas (HCAs) (Thomas et al., 1990).

The NFP addresses connectivity by providing dispersal habitat using riparian reserves, Wild and Scenic River corridors, the 15 percent retention areas in Matrix lands, AWAs, and the 100 acre owl activity centers (USDA, 1994b). This concept may be valid for west side conditions, not for dry east side forests on the Deschutes were riparian areas are lacking or widely dispersed, where Wild and Scenic River corridors are very limited, where LSOG stands are limited in AWAs and all but two owl activity centers are accounted for within LSRs.

Appendix II provides the Deschutes Forest Science Team recommendation for providing dispersal habitat for the northern spotted owl and a background paper that will help the Deschutes define dispersal habitat for different vegetation groups.

Additional dispersal habitat requirements should be provided by the Matrix land allocation. This allocation is the primary connector for all the Forests LSRs. Matrix provides the north/south movement link of LSOG related species. The CRAs provide the east/west connectivity between the Deschutes, Umpqua and Willamette NFs, and some LSRs within the Forest.

Of particular concern are the Matrix land allocation surrounded by the Metolius LSR (the Jack Canyon area), Matrix lands between the Cache/Trout and Three Creeks LSR, Matrix between the Sherdian Mt. and Cultus Mt. LSRs (the area between Crane Prairie and Lava Lakes), Matrix between the Cultus Mt. and Davis Lake LSRs (the area west of Wickiup Reservoir), and Matrix between the Davis Lake and Big Marsh LSRs (the area south and southeast of Crescent Lake).

A common thread that links these LSRs together is the lodgepole and ponderosa pine stands in the Matrix allocation. The lodgepole pine stands may attain the ISC standard of 11-40 but they will not sustain this condition for any period of time before some disturbance agent causes stand decline. The ponderosa pine stands could maintain this standard depending upon soil productivity.

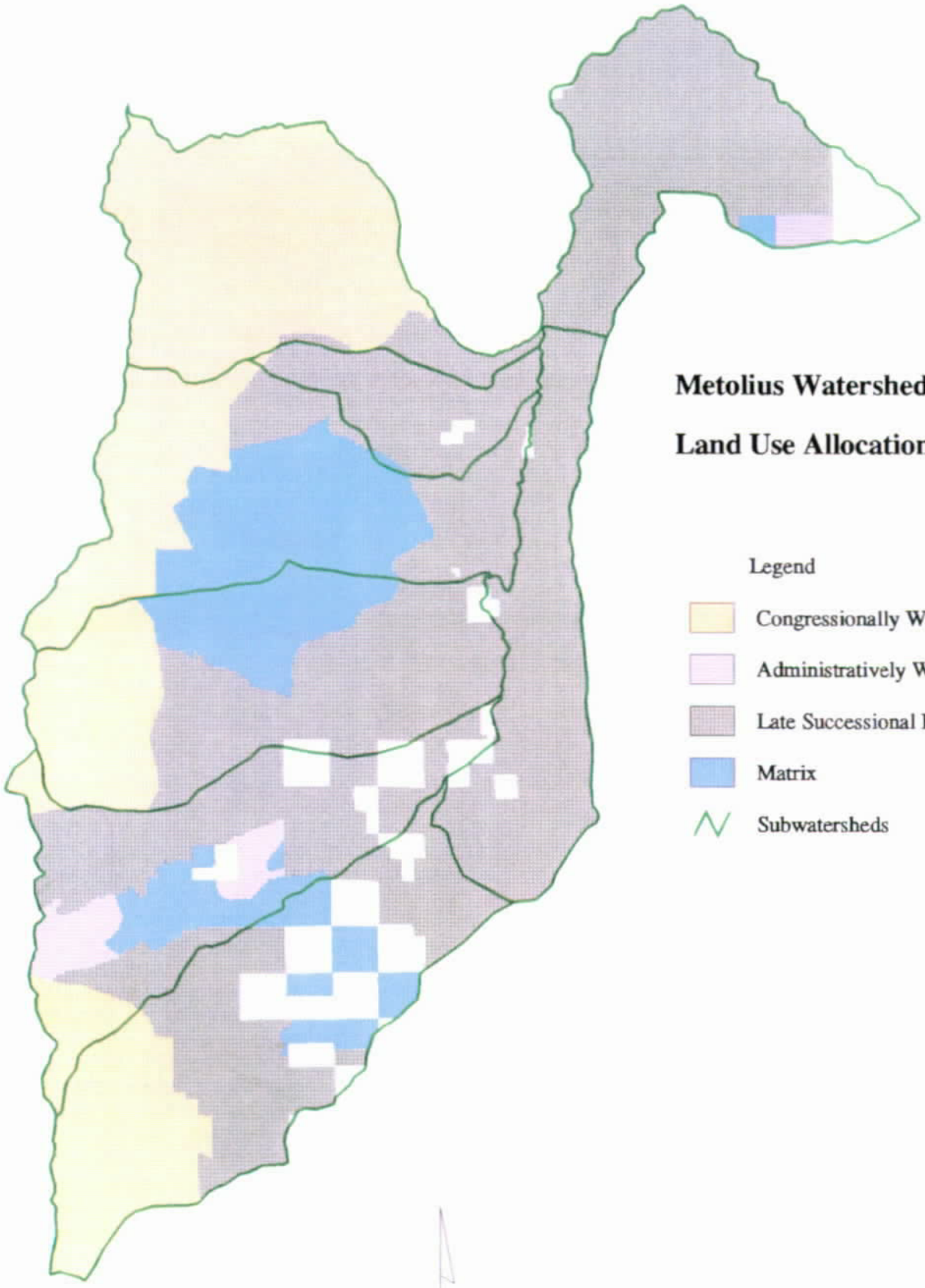
Due to past management activities, and insect and disease agents, many of the Matrix lands described above are in need of restoration. Restoration goals should include forest health and dispersal habitat objectives. Residual stands that provide dispersal habitat and are not at risk to short term "catastrophic" loss, should be maintained and enhanced.

Province Scale Connectivity

Landscape flow patterns for habitat connectivity and dispersal are important for the Deschutes, Willamette, Umpqua, Winema NF and the Confederated Tribes of the Warm Springs. Using the northern spotted owl as an indicator for habitat connectivity and dispersal, a couple flow patterns are identified: east/west movements between the Deschutes, Willamette and Umpqua NF, and north/south movements between the Deschutes and Winema NF, and the Confederated Tribes of the Warm Springs. One flow pattern between the Deschutes and Willamette NF, goes from LSR to matrix land allocation. Flow of LSOG related species may be restricted unless careful coordination of vegetation management treatments are designed to retain dispersal habitat between the Forest and Tribal lands. Connectivity of late successional and old growth habitats at the provincial scale is vital for species viability. These patterns indicate the need to maintain connectivity within the forest and adjacent lands.

CONCLUSIONS

The Executive Summary provides our interpretation/conclusions for the Deschutes National Forest Late Successional Reserve Overview. Please see pages 3 - 5.



Metolius Watershed Analysis

Land Use Allocations

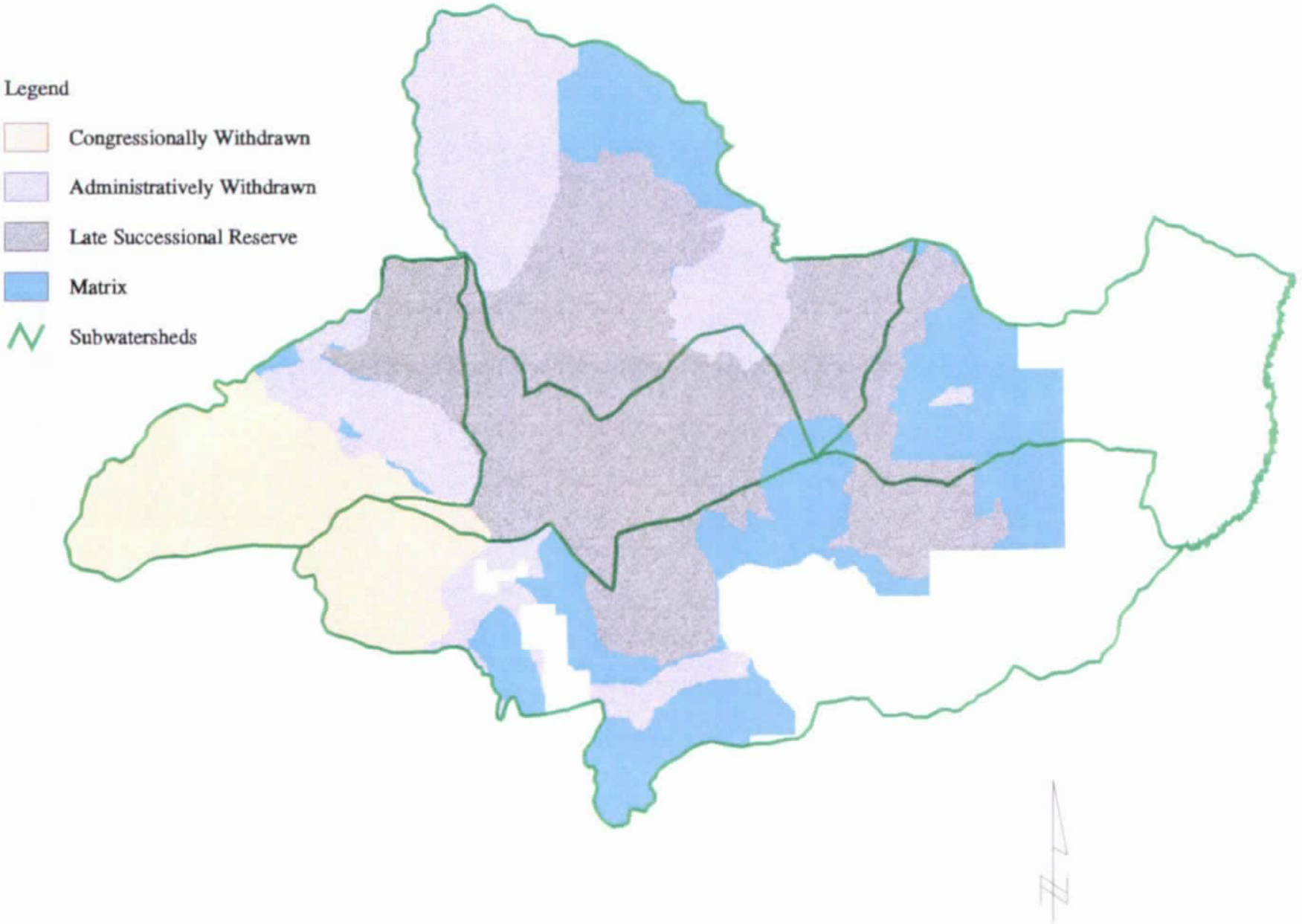
Legend

- Congressionally Withdrawn
- Administratively Withdrawn
- Late Successional Reserve
- Matrix
- Subwatersheds

August, 1995

Scale 1:200000

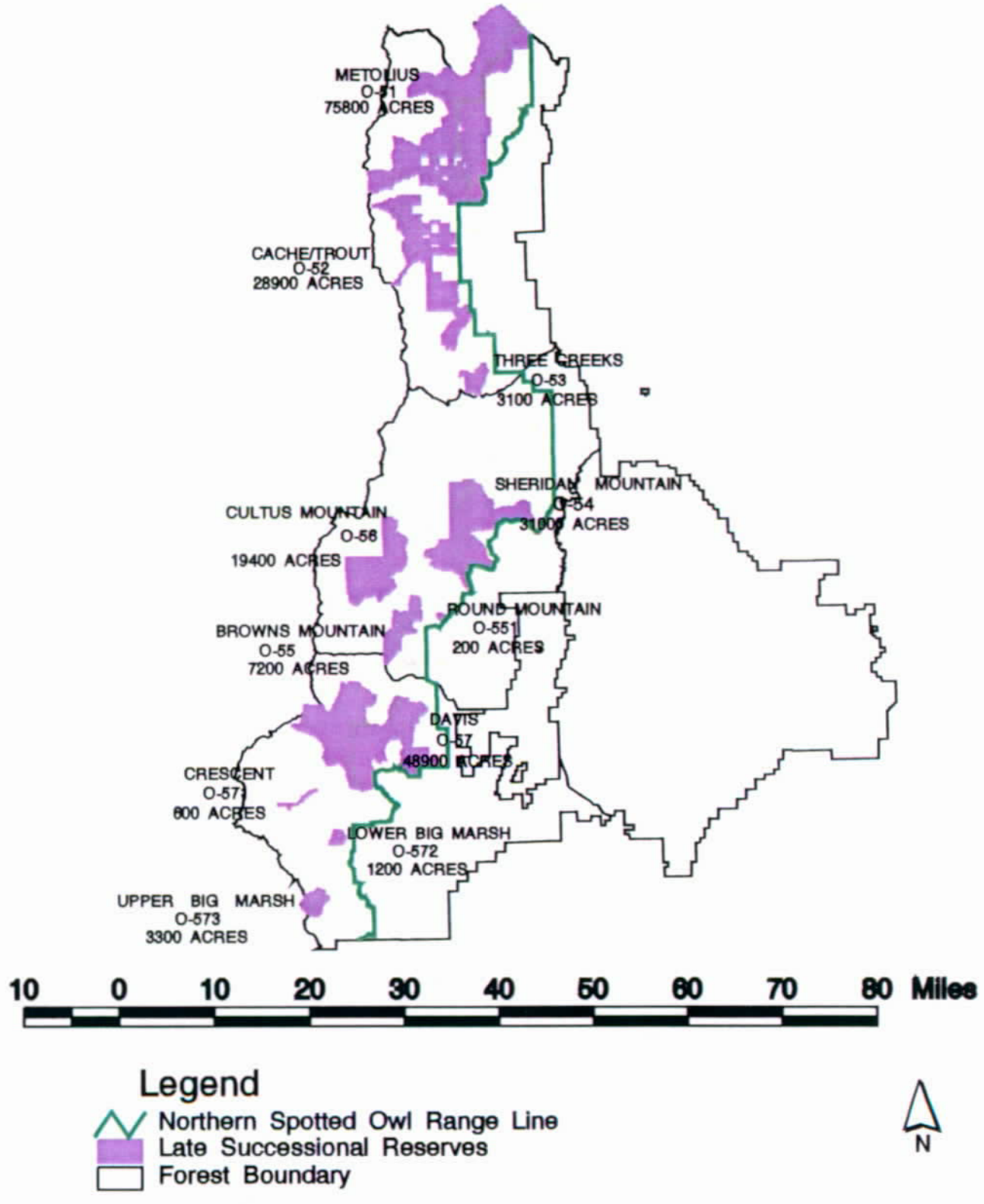
Davis LSR

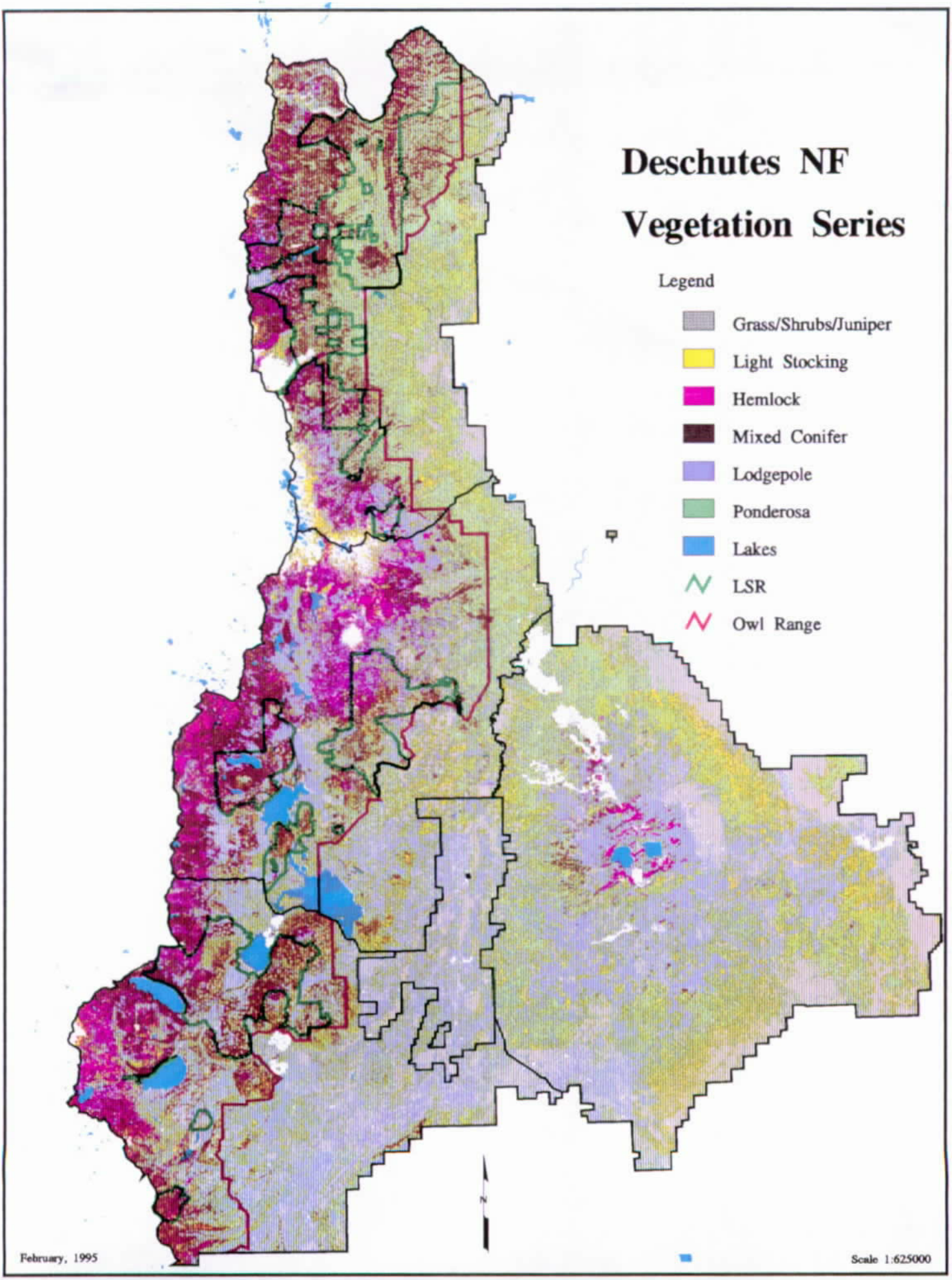


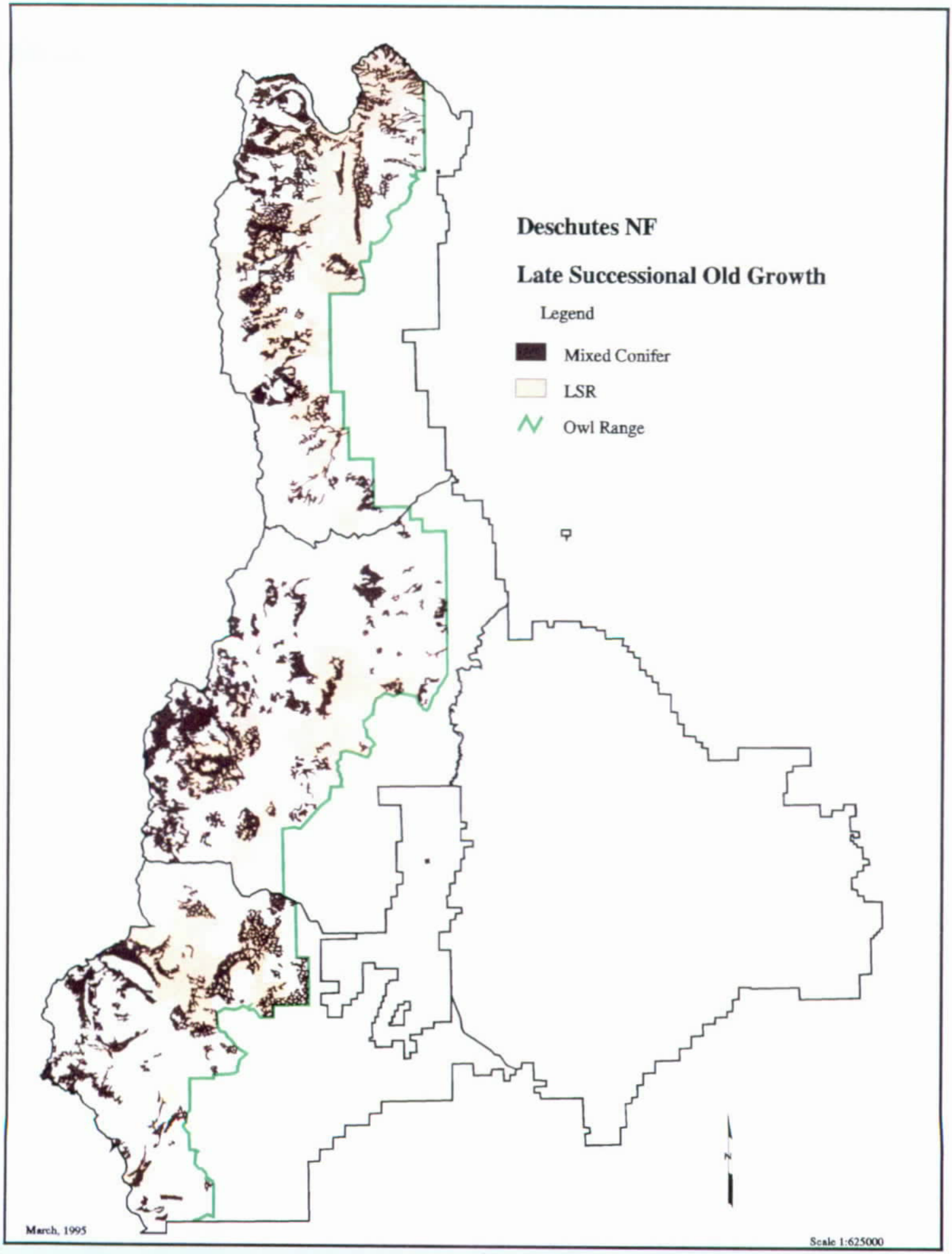
August, 1995

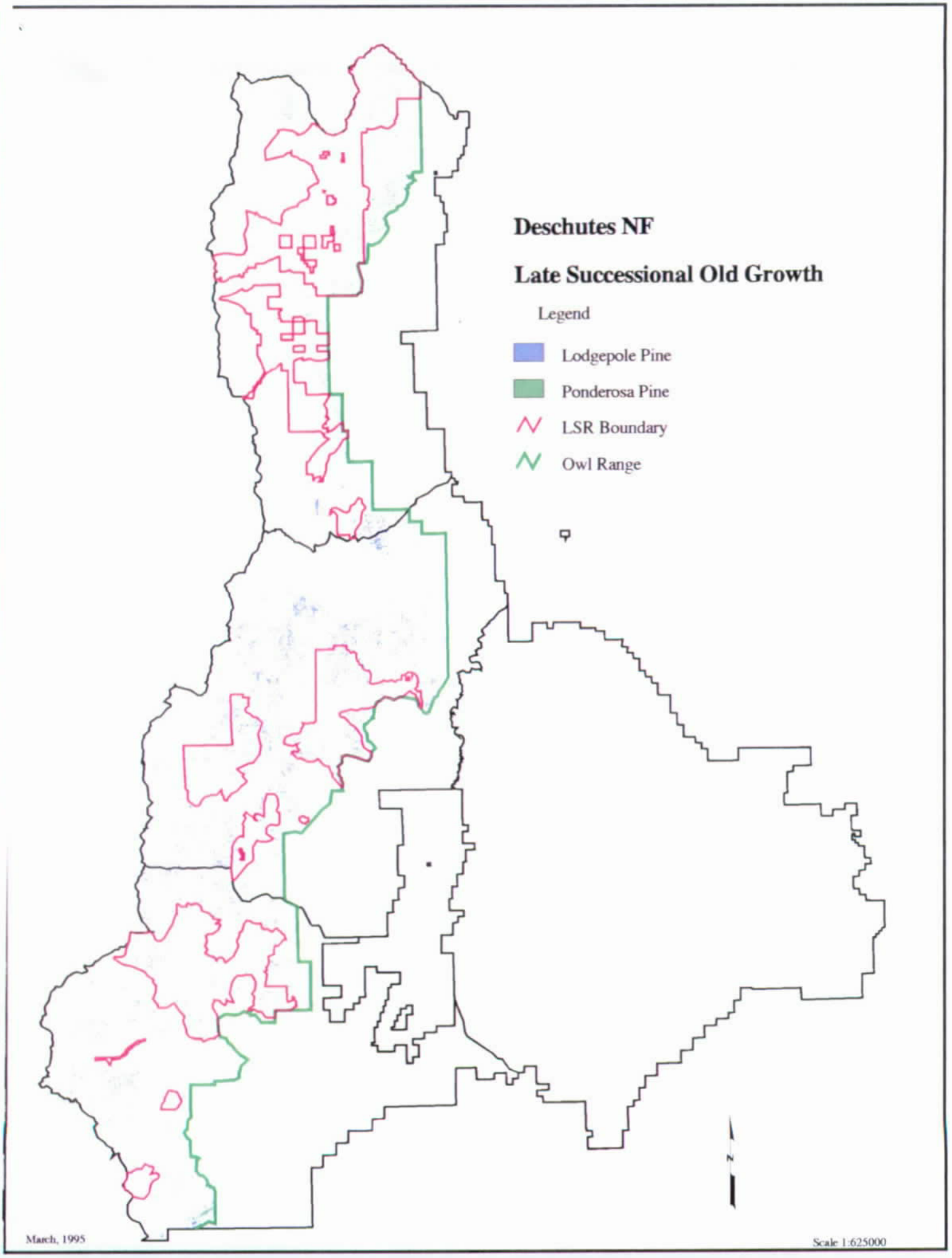
Scale 1:200000

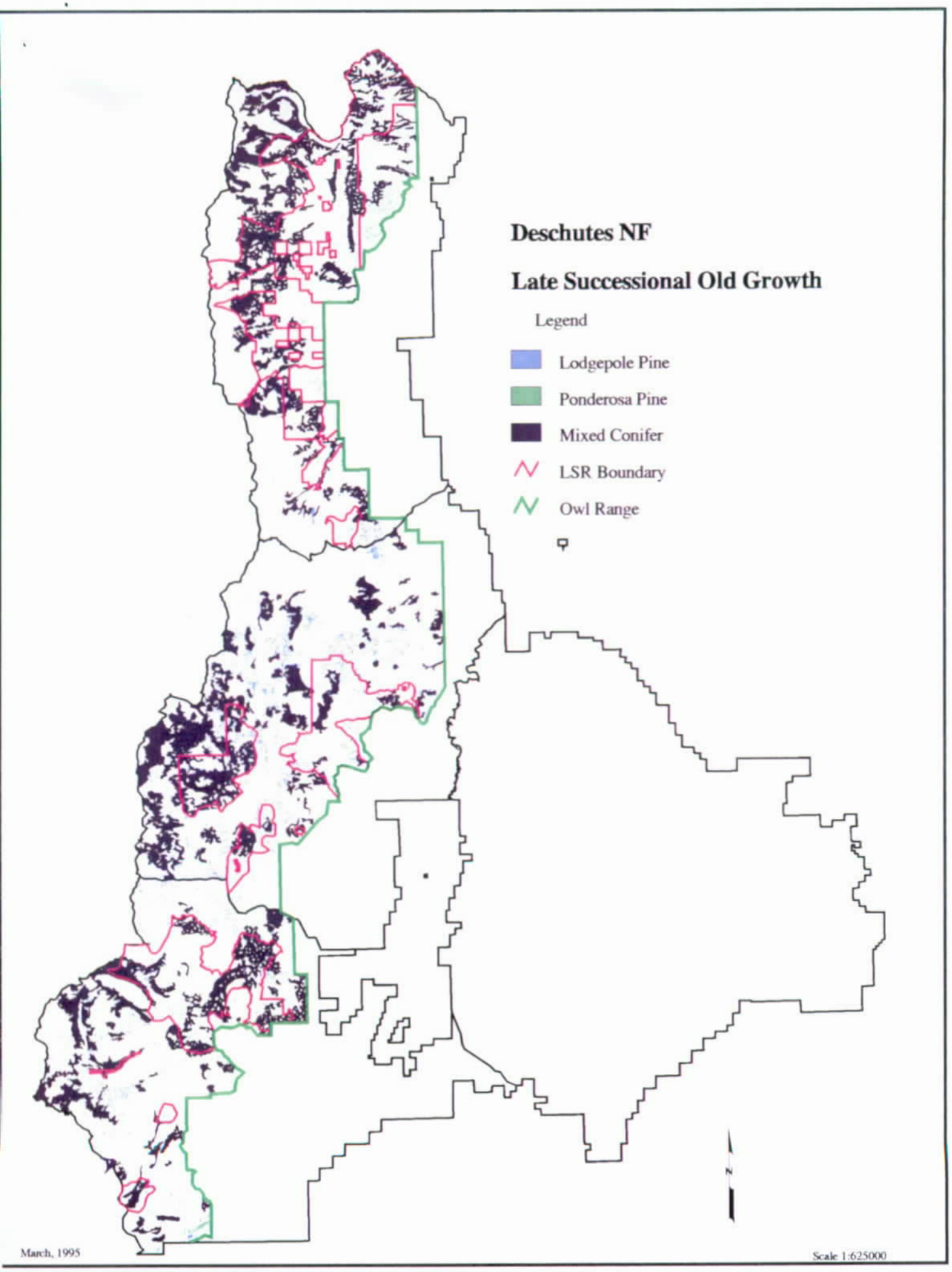
Deschutes National Forest
Late Successional Reserves




Deschutes NF
Vegetation Series
Legend
Grass/Shrubs/Juniper
Light Stocking
Hemlock
Mixed Conifer
Lodgepole
Ponderosa
Lakes
LSR
Owl Range
N
February, 1995
Scale 1:625000


Deschutes NF
Late Successional Old Growth
Legend
Mixed Conifer
LSR
Owl Range
March, 1995
Scale 1:625000


Deschutes NF
Late Successional Old Growth
Legend
Lodgepole Pine
Ponderosa Pine
LSR Boundary
Owl Range
N
March, 1995
Scale 1:625000


Deschutes NF
Late Successional Old Growth
Legend
Lodgepole Pine
Ponderosa Pine
Mixed Conifer
LSR Boundary
Owl Range
N
March, 1995
Scale 1:625000

APPENDIX I

BRIDGING

LATE SUCCESSIONAL RESERVE ASSESSMENTS

AND

WATERSHED EVALUATION AND ANALYSIS FOR VIABLE ECOSYSTEMS

FOR THE

DESCHUTES NATIONAL FOREST

The intent of this process paper is to describe elements which must be addressed in each Late Successional Reserve Assessment (LSRA), and highlight the Phases, Domains and Appendices within the Watershed Evaluation and Analysis for Viable Ecosystems (WEAVE) guide, that can be expanded to incorporate additional data collection, Geographic Information System (GIS) layers, analysis and synthesis for completing the site-specific Late Successional Reserve Assessments (LSRAs).

ELEMENTS

The Forest Wide Overview team met on January 17, 19 and 20, 1995, and recommended reducing the eight elements from the Record of Decision for the President's Forest Plan (C-11) to five by combining several of the elements. Recommended elements and a description of what is contained within each element are as follows. Note that identified items under each element are not all necessary for each LSRA. The LSRA team may include other items or delete items as appropriate.

Element 1: A description of historic and current vegetative conditions, and a history and description of current land uses within the reserve.

1. History of vegetation should address:
    a. Past vegetative distribution and abundance, patch size juxtaposition, including the range of variability in species and structure.
    b. Historic processes that sculpted the landscape.
    c. ID trends or changes in processes that sculpted the landscape.
    d. Quantify down woody material, standing hard snags, and number of live old growth trees.

2. Inventory of current vegetation should address:
    a. Current composition of tree species.
    b. Plant association groups (PAGs).
    c. ID existing tree species within each PAG.
    d. Quantify down woody material, standing hard snags, and number of live old growth trees.
    e. Canopy cover.
    f. Spatial patterns of vegetation, and patch/matrix.
    g. Description of natural and manmade processes occurring.

* Low to moderate intensity disturbances.
* Fire regimes.
* Insect and disease epidemics.
* Past harvest activities.

h. ID areas that do not have the potential (based on soils, geology, etc.) to be late successional stands.
i. ID stands that have the greatest potential to become late successional stands.
j. ID potential high risk areas for catastrophic loss of existing late successional stands.
k. ID potential high risk hazards of fuel loading in LSOG stands.

3. History and description of current land uses and disturbance processes.
   a. Timber harvest.
   b. Recreation.
   c. Fuelwood gathering.
   d. Roads.
   e. Special forest product collection.

Element 2: A list of late successional and old growth related species known to exist within the LSR and information on their locations.

1. Identify late successional and old growth related species known to exist and their locations.

2. Identify species expected to occur based on existing seral and structural composition, and current knowledge.

3. Identify species expected to occur based on potential vegetative characteristics.

4. Discuss some basic information about species habitat conditions and stability. In otherwords, how are they doing?

Element 3: A fire management plan.

1. Identify and rate (if appropriate) hazard areas, with "hazard" being related to the fuel component such as the degree of fuel loading and down woody material, and the threat to existing late successional and old growth stands. May need to look outside LSR to determine threat.

2. Identify areas with existing late successional and old growth stands that are at risk, "risk" being related to the probability of ignition.

3. Identify strategies that address these risks and the associated consequences to late successional and old growth ecosystems by suggesting actions that will help maintain or restore ecosystem processes and function. Suggestions may include: prescribed burns, suppression strategies or guidelines to support revisions to existing plans.

4. Review fire management suppression and prescribed fire guidelines.
   a. Assessment of current NFMAS and how well they meet the LSR needs.
   b. Allowable acre loss appropriate for each LSR.

Element 4: Developing criteria for appropriate treatments, identification of specific areas to be treated under those criteria and a proposed implementation schedule tiered to higher order plans.

1. This element suggests the "master planning" part of the landscape analysis process (See Analysis Process below). It takes all information gathered, analyzed and synthesized, and designs implementation cells (Diaz/Apostle). These cells of various sizes will outline areas that may serve a specific role in the late successional and old growth ecosystems, such as patch, matrix or corridor. For appropriate units the following could be addressed:

a. Stand manipulation toward desired successional stage.
b. Provide connectivity and or reduce fragmentation.
c. Salvage operations.
d. Prescribed burns.
e. Soil restoration.
f. Road closures or obliteration's.
g. Areas for re-vegetation with specific species.

2. Describe the rational how the above activities meet the intent of the Northwest Forest Plan Record Of Decision (ROD) for LSRs objectives.

3. Describe the thought process that suggests criteria for appropriate treatment needs and include an effects analysis of implementing these criteria on the short term and long term basis.

Element 5: Proposed monitoring and evaluation components to help evaluate if future activities are carried out as intended and achieve desired results.

1. Monitoring....implementation, effectiveness and validation

2. Identify areas of needed research, ex. a structural analysis of northern spotted owl nest sites for what east side owls need.

ANALYSIS PROCESS

The following discussion is intended to provide LSRA teams with the ability to either incorporate Watershed Analysis (WA) and LSRA into one analysis or to use as a stand alone assessment for LSRs.

PHASES (Refer to WEAVE Document)

Phase A: Orientation, Context-Setting and Organization

Watershed Analysis purpose and products will be expanded (what is needed in addition to WA process) to incorporate the LSRs that are within and immediately adjacent to the watershed analysis boundary. The focus will be on managing and protecting late successional and old growth conditions within LSRs. These reserves are designed to maintain a functional, interacting, late successional and old growth forest ecosystem. The LSR objectives should be included in key questions and serve to help focus the analysis. The maintenance of LSRs must be integrated into the restoration and long term goals of the watershed landscape.

Phase B: Data Gathering and Analysis

Purpose and products of this phase will be expanded to include the items needed from Elements 1&2 above. More emphasis will be placed on the biological component and less on the social and physical domains.

1. Describe standing dead and down component using:
    a. Forest decline layer.
    b. Insect and disease input.
    c. Fuel loading information.
    d. Site specific analysis and surveys.

2. Numbers of large old growth trees.
    a. Trees per acre both current and historic.
    b. GIS layer showing late successional and old growth areas by vegetative series.
    c. Forest vegetation communities flow chart. SEE BIOLOGICAL DOMAIN BELOW.

3. Provide a layer showing potential insect and disease epidemic loss, using high, medium and low risk.

4. Assess the risk for stand replacement fires.
    a. Fire intensity derived from fuel loading, slope, aspect and multi-storied or canopy cover.

5. A fire management plan. Products include:
    a. Fire risk map based on fire occurrence, indicating High, Medium and Low risk.
    b. Proposed prescriptions and guidelines.
    c. A suppression proposal.

6. Survey and Manage species expected to occur within each vegetative series.
    a. ID unique habitats and build GIS layer.
    b. ID other species habitat and build GIS layer, ex goshawk.

7. Late successional and old growth related species list and location layer.
    a. Deschutes National Forest Wildlife Habitat Relationships database.
    b. Sensitive plant, lichen, fungi layer.
    c. ID critical/essential habitat for late successional and old growth species.
    d. ID "red flag" areas for treatment; thinking about size, linking key areas and rotating stands.

Phase C: Information Sharing and Education

Same as WEAVE

Phase D: Synthesis and Integration

Phase D incorporates the "master planning" part of above element #4. It takes all information gathered, analyzed and synthesized, and designs implementation cells.

1. Will vary in scope as outlined in Phase B.

2. Overlay/discuss the suppression proposal, fire management plan proposal and fire risk map with critical/essential habitat vegetation blocks, nest layers, unique habitats, etc., to estimate areas at risk of catastrophic loss.

3. Overlay Insect and Disease risk layer with critical/essential habitat vegetative blocks, etc., to estimate areas where vegetation management would be most effective and areas at risk for catastrophic loss.

4. Overlap social uses and needs where appropriate. Determine how to meet those uses and needs or determine feasibility.

5. Discuss climatic climax vs. fire climax and how mixed conifer stands have expanded with fire suppression.

6. Use data/tools in WEAVE.

7. ID "best" late successional and old growth characteristics

Phase E: Landscape Goal and Opportunities

This phase describes the management criteria for each implementation cells:

1. Criteria for vegetation management and timing.
2. Vegetation management prescriptions.
3. Fire management plan.
4. Implementation schedule, with proposed monitoring, evaluation and research.
5. Validate Forest overview and propose changes where necessary.

DOMAINS

Biological Domain

The Forest Overview team discussed a flow chart for Forested Community Types that could be added to the Biological Domain as a separate module. It focused on potential and non potential nesting, roosting and foraging habitat for late successional and old growth related species including the northern spotted owl. The flow chart includes:

A. Potential NRF habitat for the northern spotted owl.

Guide for range of conditions
* Plant Association Groups
* Pacific Meridian Resources - size structure, canopy cover
* Known existing habitat
* Empirical data - low end of range
* East side specific Nesting, Roosting and Foraging habitat needs

1. Habitat that can be restored
   * early seral
   * mid seral
   * some social

Using the Nesting, Roosting and Foraging (NRF) LAYER

2. Existing NRF habitat that can't be maintained
    * fire climax
    * disturbance risks

3. Existing NRF habitat that can be maintained
    * existing NRF layer
    * describe habitat from best to worst

a. Nest site locations
b. Compare similar sites
    * Pacific Northwest Research Lab reproductive nest site data
    * reproductive nesting pair site - US Fish & Wildlife Service take analysis

B. NO potential NRF habitat for owls but habitat for other LS species.

1. No potential habitat for any late successional species, period.

2. Potential habitat for other late successional species.
    a. Existing habitat can be maintained
        * existing NRF layer
        * describe habitat from best to worst
    b. Nest site locations
    c. Compare similar sites

3. Existing habitat can not be maintained
    * social - human uses

4. Habitat can be restored.

APPENDICES

WEAVE Appendix A -- Data Summary and Analytical Tools

The Forest Overview team used this appendix as a starting point to identify layers needed for the LSRA. The team went through the High, Medium and Low priority GIS layer list and after discussion decided that all but a few were applicable for the LSRA. A few additional high priority layers were identified. They include:

1. Dead and Down woody debris
2. Cartographic Feature file
3. Land Allocation layer (DNF Land and Resource Management Plan and Northwest Forest Plan)
4. Wilderness Boundary, Historic Vegetation
5. Land Type Association (Form Class)
6. Survey and Manage Species
7. Fire Risk Layer (combination of risk, hazard and occurrence)

Form the "Other Data" list, the team felt 5 items were necessary for the LSRA. They include:

1. Riparian Areas
2. Plant Association Groups
3. Forest Decline layer
4. Aerial photos
5. DNF Wildlife Habitat Relations Database
6. Threatened, Endangered and Sensitive plant layer

APPENDIX II

United States Department of Agriculture | Forest Service | Deschutes National Forest | 1645 Highway 20 East Bend, OR 97701

File Code: 2670

Date: November 27, 1995

Subject: Northern Spotted Owl Dispersal Habitat

To: District Rangers, NR Staff & Wildlife Biologists

The Science Team has been requested to provide Forest consistency on the issue of dispersal habitat for the northern spotted owl. A brief discussion on the history and evolution of owl dispersal habitat is first needed.

BACKGROUND INFORMATION

The Interagency Scientific Committee (Thomas, et al. 1990) first proposed defining dispersal habitat using the 50-11-40 rule. The rule is defined as, 50% of the forest matrix be in stands with an average d.b.h. of 11 inches and a 40% canopy cover. This rule was to be applied outside the Habitat Conservation Areas (HCAs). The Deschutes and other Forests, recognized that this condition was not biologically sustainable for one or more of our plant association groups. The issue was raised to the Regional Office, however no solutions were reached. An on Forest analysis by Gerdes and Beyer, identified plant associations that could not meet or sustain the 11-40 standard for any length of time.

The U.S. Forest Service preferred alternative for the Final Environmental Impact Statement on Management for the Northern Spotted Owl in the National Forests (USDA, 1992), applied the 50-11-40 rule to lands suited for timber production outside the HCAs. Again, east side Forests recognized that the rule did not fit some east side plant association groups.

The Final Draft Recovery Plan for the Northern Spotted Owl (USDI, 1992), applied the 50-11-40 rule to lands suitable for timber production outside the Designated Conservation Areas (DCAs) within each quarter township. The Deschutes and other Forests again raised the issue that the 50-11-40 standard could not be sustained within the ponderosa and lodgepole pine and some sites within the dry mixed conifer plant association groups. The Deschutes was given the lead to provide a solution for dispersal habitat on east side Forests.

That dispersal habitat proposal suggests using east side vegetative series types (plant association groups), defining dispersal habitat requirements for the northern spotted owl within each type, and providing 50 percent of contiguous 6,000 to 10,000 acre blocks within each vegetative series as dispersal habitat. In January 1993, the proposal for east side spotted owl dispersal habitat was provided to the Regional Office. No response to the proposal was ever received.

The report from the Forest Ecosystem Management Assessment Team: An Ecological, Economic, and Social Assessment (Thomas, 1993), provided 9 options to the White House on the management of the Pacific Northwest Ecosystems. Options 1-6 used the 50-11-40 rule, while options 7-10 provide green trees, snags, and logs at various levels. Additionally, option 9 retained 15% of the volume of a cutting unit in clumps or individual trees.

The Record of Decision for Amendments to Forest Service and Bureau of land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA, 1994), adopted option 9 with some changes in management of dispersal habitat. Management for dispersal habitats in Matrix lands include: habitat in riparian reserves, Administratively Withdrawn Areas (AWAs), northern spotted owl 100 acre core areas, wild and scenic river corridors, 15% retention areas within cutting units, and 15% late successional forest habitat in fifth field watersheds.

In December 1994, the Regional Forester signed an interagency cooperative guide with the US Fish and Wildlife Service to assist with the consultation process on projects proposed in fiscal years 1994 and 1995. Dispersal habitat is an element within the guidance package, and in combination with the draft answers to questions on the guidance package (January, 1995), suggest that two methods be used to determine what qualifies as dispersal habitat. The two methods are 1) the 50-11-40 rule, and 2) using local forest conditions and local biological knowledge of what is likely to be dispersal habitat.

In April 1995, during the Level I US Fish and Wildlife Service consultation meeting, the east side dispersal habitat issue was discussed. It was recognized that for "unmanaged" lodgepole and ponderosa pine, and some dry mixed conifer stands, the 11-40 standard either could not be met or could not be sustained for more than a decade. However, in "managed" lodgepole and ponderosa pine, and some mixed conifer stands, the 11-40 standard can be attained and sustained for several decades, depending upon management objectives.

In some dry and all moist mixed conifer "unmanaged and managed" stands, the 11-40 standard can be met and sustained for many decades, depending upon management objectives.

FOREST POSITION

The US Fish and Wildlife Service, after reviewing several of our habitat sites, are comfortable with and will support us using local forest conditions and local biological knowledge of what is likely to be dispersal habitat. Using the two concepts identified in the Section 7 Consultation Guidance package and the responses to questions about the package; two solutions for evaluating dispersal habitat are identified for the Deschutes Forest. **1) For those plant associations with the site capability to meet and sustain the 11-40 standard, we will do so** (reference: Volland, Plant associations of the central Oregon pumice zone 1985) **and 2) For those plant association** (reference: Volland, plant associations of the central Oregon pumice zone, 1985) **that can not meet or sustain the 11-40 standard, we will use local forest conditions and local biological knowledge of what is likely to be dispersal habitat.**

Thus, for plant associations that meet and can sustain the 11-40 standard, measurement and documentation of the 11-40 standard will continue using existing Deschutes methodology, (reference: 50-11-40 analysis process, Crescent Ranger District files, December 1992).

In areas that cannot meet or sustain the 11-40 standard, our local biological knowledge on site specific requirements for dispersal of the northern spotted owl will be described. These descriptions can be derived from the following sources of applicable information: Peer reviewed literature; practical field

experience; and radio telemetry data pertinent to east side Cascade ecosystems. Site specific requirements include the physical elements that provide overhead cover from avian predators, stand conditions that provide lateral limbs for roosting, structure that provides habitat for prey species for dispersing owls, and the amount of this type habitat needed for successful dispersal. These elements may be measured directly or indirectly using the following suggested variables: 1) percent canopy cover, 2) average stand dbh, 3) number of hard and soft snags, 4) amount of large down woody material, and 5) amount of area meeting dispersal habitat conditions. Other variables may be selected if more appropriate but they must be documented.

Care should be taken when developing these site specific descriptions that recommended tree densities and species composition reflect a viable range of conditions that are tied to the site capability of the plant association.

District Rangers will forward draft site specific dispersal habitat descriptions, together with the rationale for the descriptions, to the Deschutes Science Team for peer review and consistency. Peer review will be completed no later than two weeks after the Science Team has received the proposed description. Final recommendations from the Science Team will be forwarded back to the District Rangers.

Sally Collins
Forest Supervisor, Deschutes NF

!Author, Mike Gerdes, Forest Wildlife Biologist 12/13/95!
!I concur, Helen Maffei, Science Team Leader 12/13/95!
!I concur, Bill Queen, Restoration Team Leader 12/13/95!
!I concur, David Summer, Chair Executive Team 1/23/96

NORTHERN SPOTTED OWL DISPERSAL HABITAT CONCEPT

USING EVEN-AGED PONDEROSA PINE PLANT COMMUNITY GROUP AS A PROTOTYPE

JANUARY 7, 1993

Abstract

On August 8, 1991, an interdisciplinary team was established to provide a quantifiable dispersal habitat concept for the northern spotted owl on the Eastside Cascades. The team developed a procedure to identify desired future conditions for plant community groups within the northern spotted owl range. In October, 1992, the Regional Technical Review Team (RTRT) R-6 suggested strengthening the concept prior to forwarding to the Oversite Team. The suggestions were to: 1) include a copy of Pat Cochran's (1988) unpublished paper; 2) document criteria used for evaluating dispersal habitat; and 3) clarify the Standard & Guideline for dispersal habitat. The suggestions are incorporated.

The procedure developed by Rainville, et. al, includes identification of major vegetative series and definition of dispersal habitat conditions for each series. Habitat definition was based on biologists' professional judgment. Ability of stands to provide and sustain dispersal habitat was based on their ability to provide desired vegetative conditions without exceeding thresholds of catastrophic loss. Thresholds of catastrophic loss in this example were based upon risk of insect epidemic and vary with vegetative site potential.

Even-aged ponderosa pine stands were selected to serve as an example of this procedure. The analysis of this plant association group resulted in the following conclusions.

> Dispersal habitat exists in stands with an average diameter of 6 inches and larger and canopy cover of at least 25 percent. Enhancement measures are recommended for stands at the edge of habitat suitability (between 6-8 inches in diameter and between 25-35 percent canopy cover).
>
> Ability of ponderosa pine stands to provide dispersal habitat on a sustained basis varies with vegetative site potential.
>
> Ponderosa pine occurring in stands with site indexes less than 90 (Barrett, 1978) are not capable of providing dispersal habitat on a sustained basis.

Implementation of the outlined procedures would allow Forests to evaluate their ability to provide sustainable habitat over large contiguous areas. Evaluation areas could be drawn by Forests in consideration of corridors between Habitat Conservation Areas (HCA's), sub-basin boundaries, and management areas of potential conflict. Long term management scenarios could then be developed based on habitat capabilities of stands within each evaluation area. Stands capable of providing dispersal habitat could be managed to achieve habitat objectives such as sustaining suitable conditions over 50 percent of these stands without exceeding thresholds of catastrophic loss. Stands unable to provide sustainable habitat could be removed from dispersal calculations. These stands would be managed with extended rotations based upon specially prepared guidelines.

Team Members

Bob Rainville, Team Leader, Range, Wildlife, Watershed Staff Officer, Deschutes National Forest
Scott Beyer, Vegetative Inventory Coordinator, Deschutes and Ochoco National Forests
Leslie Sekavec, Silviculturist, Winema National Forest
Charlie Phillips, Wildlife Biologist, Wenatchee National Forest
Monte Bickford, Silviculturist Wenatchee National Forest
Mike Gerdes, Wildlife Biologist, Deschutes National Forest
Jim Gray, Silviculturist, Deschutes National Forest
John Nesbitt, Fuels Management Specialist, Pacific Northwest Region
Roger Sandquist, Entomologist, Pacific Northwest Region

The following individuals provided assistance to the Team:

Pat Cochran, Soil Scientist, Pacific Northwest Forest and Range Experiment Station
Andy Eglitis, Entomologist, Pacific Northwest Region, Area IV.
Randy Floyd, Wildlife Biologist, Winema National Forest
Bill Hopkins, Ecologist, Pacific Northwest Region, Area IV.
Helen Maffei, Pathologist, Pacific Northwest Region, Area IV.

Objectives

At a Regional meeting on August 8, 1991, eastside Forests discussed difficulties they were having in managing stands within the range of the northern spotted owl according to 50-11-40 guidelines. Existing guidelines are based upon westside Douglas fir plant communities. When applied to eastside plant communities, 50-11-40 requirements cannot be accomplished or are achievable for only a brief period in the maturation of stands. The result has been that management of stands within eastside dispersal habitat is severely restricted or eliminated.

Elimination of management of eastside stands presents barriers to achievement and maintenance of dispersal habitat for northern spotted owls. In the absence of management, natural cycles of insect epidemics, catastrophic fire, and loss of desired spotted owl dispersal habitat conditions will proceed. Because of the relatively short fire cycles, high existing fuel levels, and mature condition of many eastside stands, a high potential for catastrophic habitat loss exists in some parts of the owls range. Under 50-11-40 guidelines, the risk of catastrophic loss will increase and spread over a larger area of the range. Alternatives to 50-11-40 which would provide sustainable dispersal habitat would be preferable to guide management of eastside stands for spotted owl dispersal needs.

As a result of this meeting, a team (members listed above) was established to accomplish the following objective:

> To identify desired future conditions for eastside plant communities within the northern spotted owl's range which:
>
> > -provide quantifiable dispersal habitat management objectives and a means to assess management's ability to accomplish them,
> >
> > -offer flexibility to deal with site-specific conditions,
> >
> > -best maintain spotted owl dispersal habitat through time, and

-minimize the potential for catastrophic habitat loss as a result of insects, disease, fire, or timber harvest.

The team adopted the following objectives for northern spotted owl range based on the Report of the Interagency Scientific Committee (Thomas, et al. 1990):

Spotted Owl: To provide sustainable habitat for spotted owl dispersal from and connectivity between Habitat Conservation Areas that includes foraging opportunities, overhead cover, and protection from predation.

Vegetation: To achieve a sustained, even flow of stand replacement over time while maximizing canopy cover and minimizing the potential for catastrophic habitat loss.

Proposed Process For Defining Desired Future Conditions With Prototype Methods and Results

The team developed a procedure to identify desired future conditions for plant communities within the northern spotted owl range. The approach was tested using even-aged ponderosa pine. The methods and results for ponderosa pine are listed under each step of the procedure. Similar analysis would be needed for
each plant community group identified in Step 1.

STEP 1. Identify plant communities within eastside spotted owl range and group similar communities.

The team identified the following plant community groups.

Winema and Deschutes National Forests:
- ponderosa pine, even-aged
- ponderosa pine, uneven-aged
- mixed conifer, even-aged
- mixed conifer, uneven-aged
- lodgepole pine

Wenatchee National Forest:
- hemlock/silver fir
- grand fir
- ponderosa pine
- lodgepole pine
- Douglas fir

The Okanogan, Mt. Hood, Klamath and Gifford Pinchot National Forests have not yet been involved and may add to this list. The even-aged ponderosa pine group was selected as a prototype to evaluate the merits of the proposed procedure.

Research in northern spotted owl neighborhoods on the Wenatchee NF, indicate that mixed conifer stands will meet the 50-11-40 rule. District wildlife biologist from the Deschutes NF concur with the research findings based upon the analysis of quarter townships. Although mixed conifer stands will meet the dispersal habitat rule, evaluation of site indices will determine the sustainability of that stand.

Discussions between Charlie Phillips, Monte Bickford, Dick Schellhaas and myself suggest that the plant communities for Eastside Cascades be narrowed to three: mixed conifer, ponderosa pine and lodgepole pine.

mixed conifer, even-aged
mixed conifer, uneven-aged
ponderosa pine, even-aged
ponderosa pine, uneven-aged
lodgepole pine

STEP 2. Display the relationship between tree density, average tree diameter, and percent canopy cover for each plant community group. Identify the maximum stocking level for a range of site indexes that can achieved before insect epidemics become likely.

Canopy cover can be related to average stand diameters and stocking levels for each plant community group. Figure 1 shows this relationship for ponderosa pine stands. Canopy cover was based on average ponderosa pine crown widths as measured by a sample of Managed Stand Survey (MSS) plots from the Deschutes NF. The sample of MSS plots were from existing stands and do not include plantations where crown widths would be expected to be larger due to more open conditions. Canopy cover is expressed as a percentage of an acre shaded by trees if the sun were directly overhead. The percentage assumes no overlap of canopies. Crown width averages determined from MSS were compared with crown widths derived from using the COVER extension of the Stand Prognosis Model (Stage, 1973). Crown widths by DBH class were similar between the two sources. Several ponderosa pine stands were visited to verify projected amounts of canopy cover. Projected canopy cover provided a reasonable approximation of the conditions.

Recommended upper limits of stand density were derived from an unpublished paper by Pat Cochran (1988) entitled, "Maximum Stocking For Ponderosa Pine To Control Mountain Pine Beetle." These stocking levels represent thresholds to beetle attack based on tree vigor. Vigor is defined as a function of site productivity (site index), tree size (DBH), and density (Trees per Acre). Figure 2 displays the relationship between number of insect attacks and stand vigor. Based on this relationship, a vigor of 100 g/m2/yr. was considered the lowest acceptable vigor. Lower vigor levels were considered very vulnerable to insect epidemics. Upper stocking levels for each site index were defined based upon this level of vigor. Site indexes were based on Barrett, 1978. Upper stocking levels were applied to ponderosa pine plant associations based on site index values. These plant associations are further described in Plant Associations of the Central Oregon Pumice Zone (Volland, 1985).

Although the upper stocking limits address only mountain pine beetles and, in some limited instances, western pine beetles, this stocking level is believed to be roughly appropriate to minimize ponderosa pine mortality from most other insects (Eglitis, personal conversation). Upper stocking limits may provide overly optimistic estimations of future stocking when stands are infected with dwarf mistletoe (Maffei, personal conversation).

STEP 3. Define conditions for spotted owl dispersal habitat based on stand canopy cover and average diameter.

Wildlife biologists evaluated eleven stands to define dispersal habitat conditions based on canopy cover, average stand diameter, and stocking level. The wildlife biologists' criteria for judging stand's suitable for northern spotted owl dispersal habitat were: 1) percentage of overhead cover from avian predation; 2) distance of canopy from ground; 3) amount and size of lateral limbs for perching; 4) amount, distribution and size of dead and down material as habitat for the owls prey base; and 5) islands of dense (greater than 40% canopy closure) thickets used as a refuge. The biologists basis for the evaluation criteria were experience and professional judgment. Stands that were judged to be on the edge of the suitable range were noted. Table 1 lists the results of their assessments.

Table 1. Field Observations of Spotted Owl Dispersal Habitat in Even-aged Ponderosa Pine Stands Described Based Upon Stand Basal Area (BA), Canopy Cover, Average Diameter (DBH), and Density (trees per acre, TPA).

BA	% Canopy Cover		DBH	TPA	Evaluation
120	40	10	220	Habitat	
140	50	10	260	Habitat	
150	60	8	430	Habitat	
160	30-35	4-24	250	Habitat	
180	60	16	130	Habitat	
70	25	11	108	Habitat but at edge	
140	30-35	16	100	Habitat but at edge	
140	25-30	28	30	Habitat but at edge	
30	15-20	6	140	Not Habitat	
90	20	26	25	Not Habitat	
130	100	4	1500	Not Habitat	

Based on these observations, spotted owl dispersal habitat in even-aged ponderosa pine was defined as stands with average diameters greater than eight inches DBH and with canopy cover 35 percent or greater. Discussions between Charlie Phillips, Dick Schellhaas and myself suggested that the 8" DBH and 35% canopy cover be the minimum requirements for this prototype. Figure 3 describes the range of suitable habitat conditions. The biologists considered stands with canopy cover between 25 and 35 percent to be at the edge of suitability because spotted owls would be more vulnerable to predation. Similarly, stands with average diameters between six and eight inches were also felt to be on the edge of suitability because they lacked the large (greater than nine inches in diameter) standing and down dead material needed to support owl foraging. Although stands at the edge would provide dispersal habitat if enhancement measures are employed, stands with canopy cover 35 percent or greater and diameters of eight inches DBH and larger are most desirable. Research on spotted owl use of stands at the edge of suitability is recommended.

The following enhancement measures were identified and are recommended to improve dispersal habitat for stands that are at the edge of suitability.

To enhance foraging:

- provide large woody debris, rotten logs and slash piles to encourage squirrel, chipmunk, and other rodent populations,

- provide nest boxes for flying squirrels where there is a shortage of large soft snag habitat, and/or

- provide snags ten inches DBH and larger at the 40 to 60 percent biologic potential level.

To enhance escapement and thermal cover:

- provide dense thickets of trees interspersed throughout the stand,

- include some component of Douglas-fir and true firs in the stand structure, and /or

- allow for some dwarf mistletoe-infected clumps.

The biologists also noted that stands with average diameters ranging from 10 to 20 inches provided the best dispersal habitat when comparing stands with similar basal areas. Stands with larger average diameters provide less effective canopy cover. Because of the increased openness and height of their canopy, they provide a lower level of protection from predation and poorer thermal insulation than stands with average diameters of ten to twenty inches DBH. The existence of reduced habitat conditions of stands with canopy cover approaching 25 percent and with average stand diameters larger than 24 inches are noted in Figure 3 by a dotted line.

Step 4. Determine spotted owl dispersal habitat management capability for each plant community group by identifying the upper limit of stand stocking and determining the range of spotted owl dispersal habitat within this limit.

Catastrophic events such as insect and disease epidemics, fire, and accelerated harvest must be avoided to achieve our objective. Upper stocking levels for sites must not be exceeded. By determining the range of desired stand conditions within upper stocking level limitations, the ability of management to achieve spotted owl dispersal habitat can be assessed for each site index.

Figure 4 displays the relationship between spotted owl dispersal habitat and upper stocking level limitations for even-aged ponderosa pine stands with three different site indexes. Site indexes (Barrett, 1978) for ponderosa pine on the Deschutes NF range from 58 to 135 with an average of 108. Figures 5 through 9 display the management "window" associated with even-aged ponderosa pine stands with site indexes ranging from greater than 110 to 70. The preferred window exists between the upper stocking level for the site and the 35 percent canopy cover line. The total window extends to the 25% canopy cover line.

The figures demonstrate that achievement of sustainable spotted owl dispersal habitat is heavily influenced by site potential. Stands with site indexes greater than 90 can be managed to provide habitat, but stands with lower indexes cannot sustain suitable conditions.

IMPLEMENTATION RECOMMENDATIONS

Information obtained through the described procedure may be implemented in management of spotted owl range through a variety of guidelines. The team recommends the following approach to achieve dispersal habitat objectives.

1. Evaluate management's ability to provide dispersal habitat on contiguous 6,000 to 10,000 acre areas within the range. Larger areas are not recommended because analysis could overlook dispersal problems. Small areas could limit management flexibility without benefit to dispersal habitat quality. The evaluation areas would be drawn by Forests in consideration of corridors between HCA's, sub-basins boundaries, and management areas of potential conflict. Once drawn, the blocks would be established permanently for the purpose of evaluation.

2. Prepare a long term management scenario which would provide sustainable dispersal habitat for each 6,000 to 10,000 acre area based on plant community site potential. The assessment would evaluate management's ability to provide sustainable spotted owl habitat based on existing stand conditions. Descriptions of dispersal habitat and stocking level limitations developed for each plant community group would provide the basis of this assessment.

3. Establish as an objective that 50 percent of each analysis segment provide dispersal habitat over time. Exclude Habitat Conservation Areas and unsuitable areas from the calculations in determining percentages. Also exclude areas where dispersal habitat could not be provided or sustained. Special management guidelines and extended rotations would be used for lands which may support timber harvest but cannot sustain spotted owl dispersal habitat. For even-aged ponderosa pine, site indexes less than 90 would be excluded from the calculations. These stands would be managed with extended rotations and special guidelines developed by the Forests.

   a. If at least 50 percent of the remaining area provides dispersal habitat, and 50 percent can be maintained over time, other areas could be managed to best meet other resource objectives. Stands at the edge of suitability should only be used when more desirable stand conditions cannot be achieved.

   b. If less than 50 percent of the remaining area provides dispersal habitat, silvicultural treatments would be implemented to establish suitable habitat as quickly as possible.

   c. Major conflicts with Forest Plan management objectives would be noted and presented for consideration by the Spotted Owl Technical Committee. Treatment of old growth stands to enhance spotted owl dispersal habitat is an example of a conflict that would be discussed with the Committee.

   d. Report acres and percent of the total area that would provide dispersal habitat each decade. Indicate the acres and percent of the area for which enhancement measures listed in Step 3 would be needed.

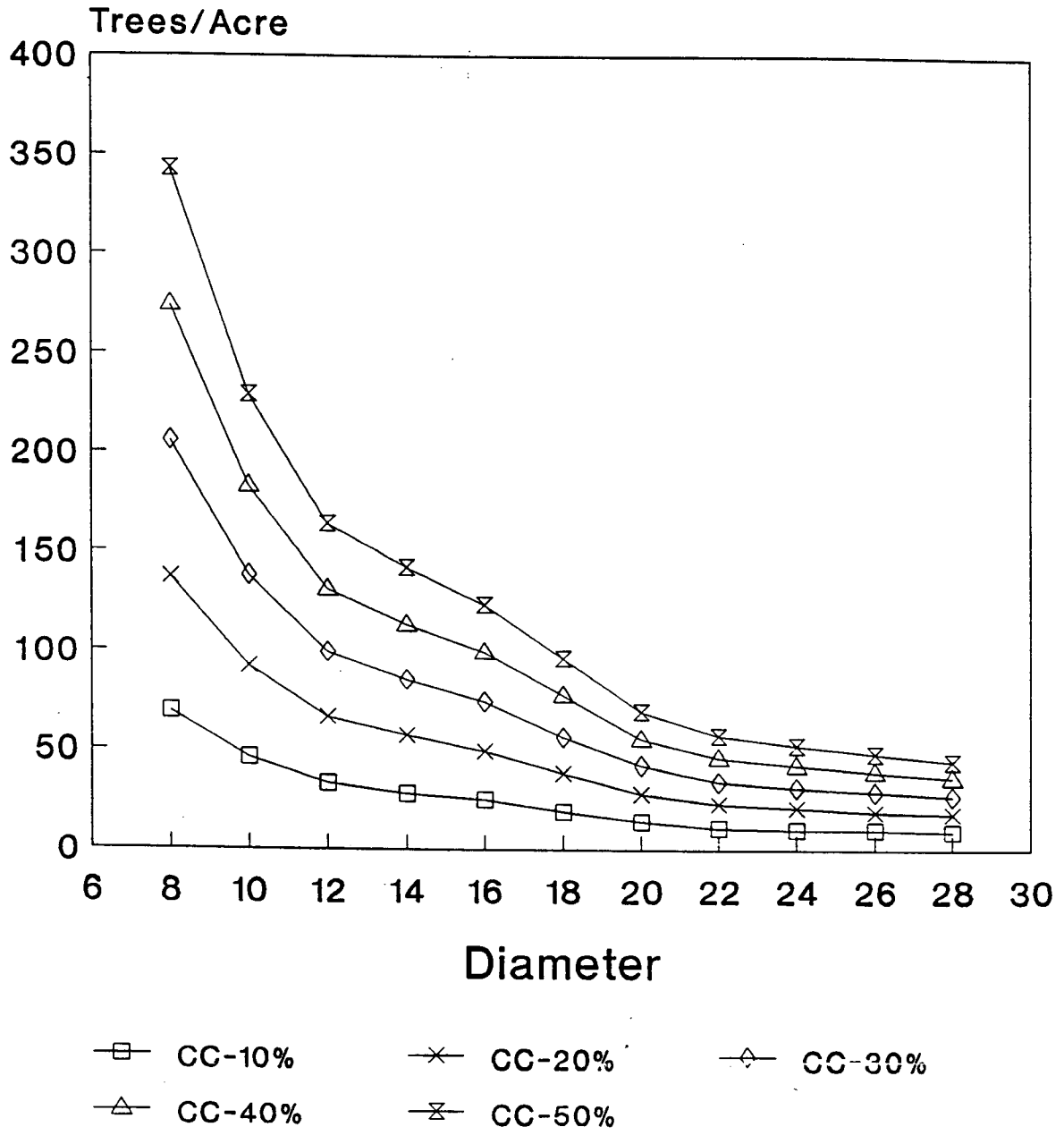
4. Implement enhancement measures for stands providing suitable habitat that are at the edge of desired conditions. Research would be desirable to evaluate spotted owl use of these stands.

5. Use the National Fire Management System's Fuels Management Process to establish desired levels of standing and down dead woody material in relation to fuel loading concerns.

6. Evaluate after 6 to 12 months of implementation. New data and unforeseen problems should be anticipated as the process is implemented . The procedure should remain dynamic by including a established period for review.

Figure 1

Canopy Cover for Even-aged Ponderosa
Based on Avg. Crown by Diameter Class

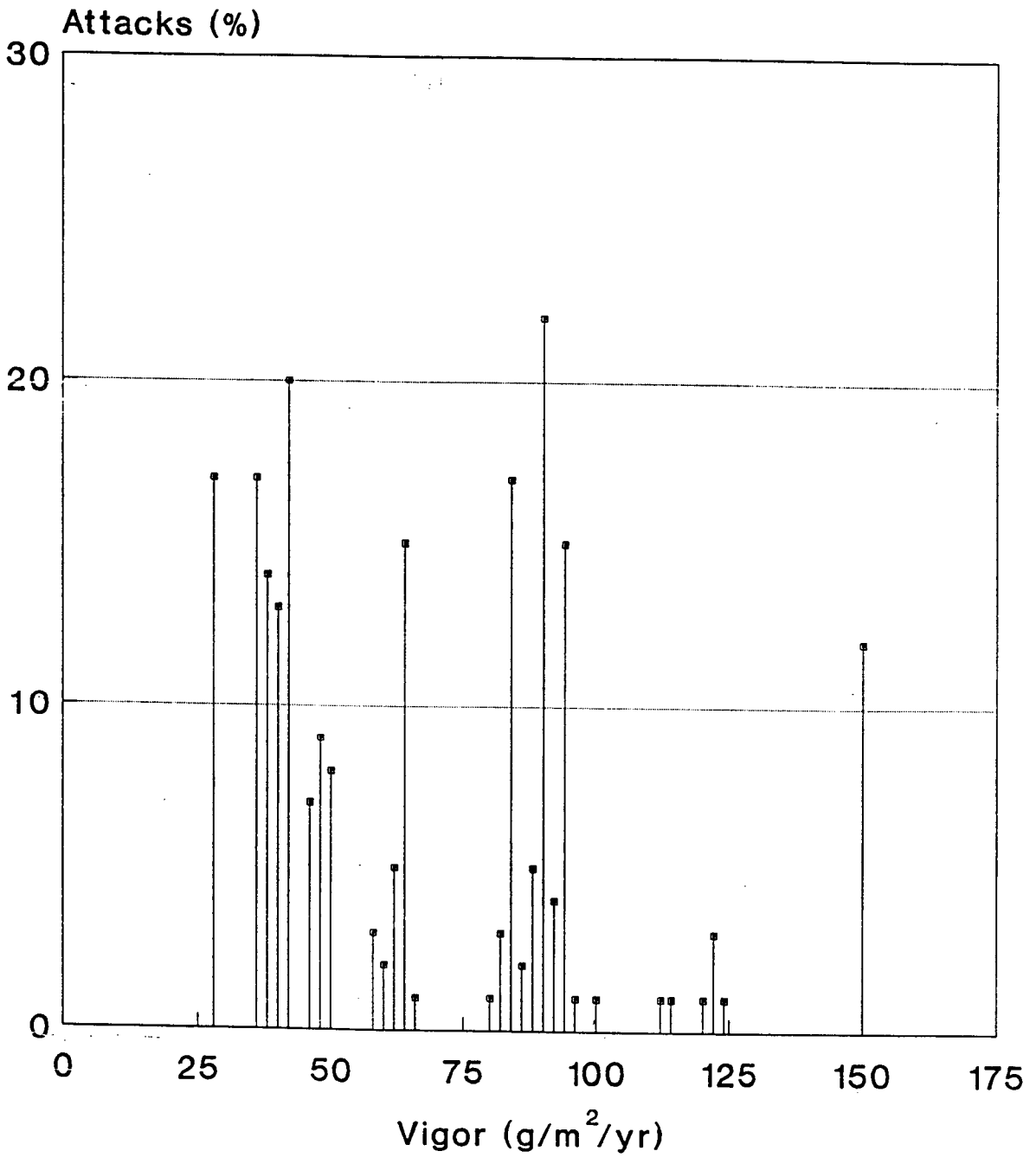


Source - Deschutes Managed Stand Survey

Figure 2

Beetle Attacks by Tree Vigor

Central Oregon Ponderosa Pine

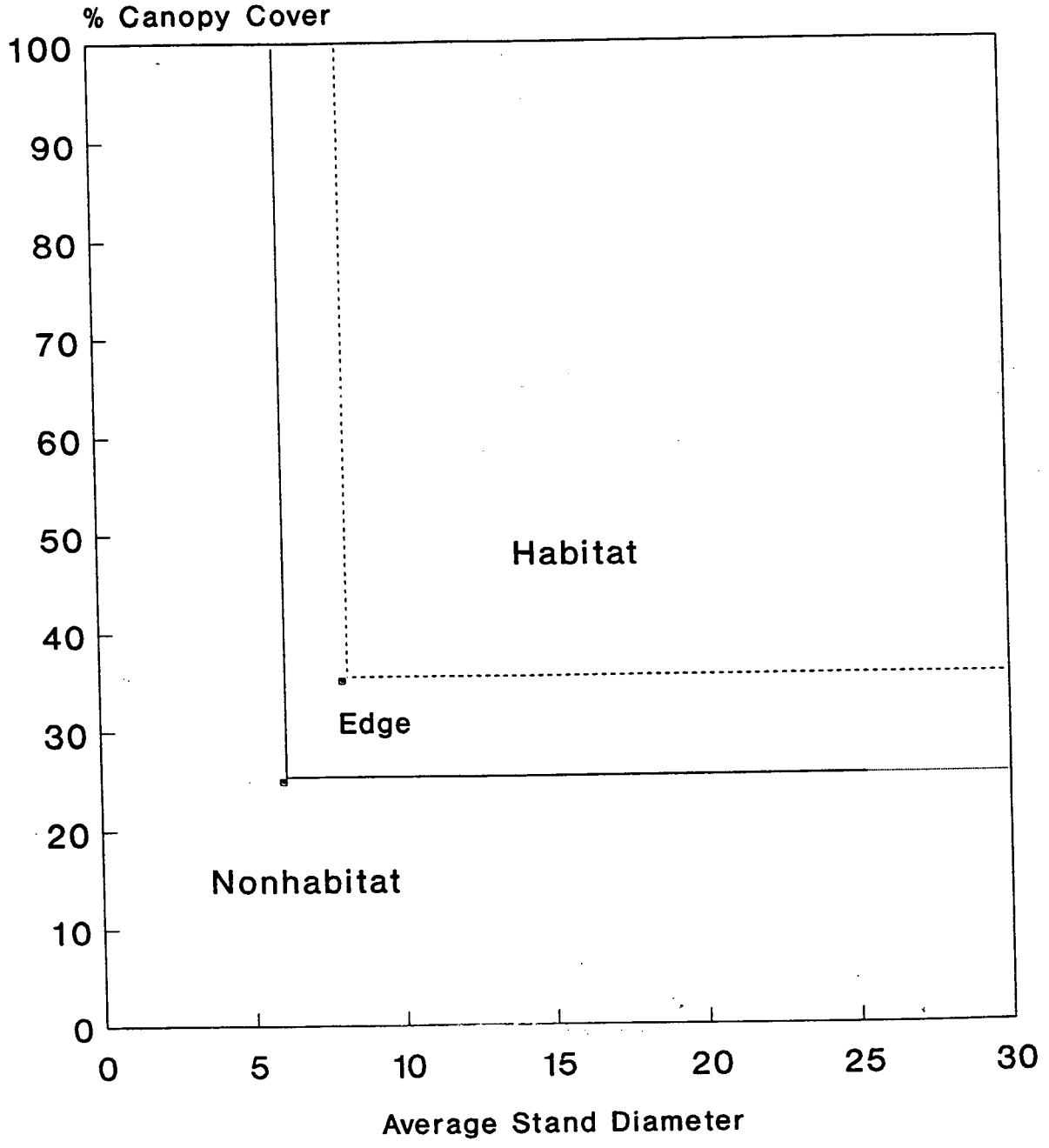


Source - Larsson et al, 1983

Figure 3

Owl Dispersal Habitat

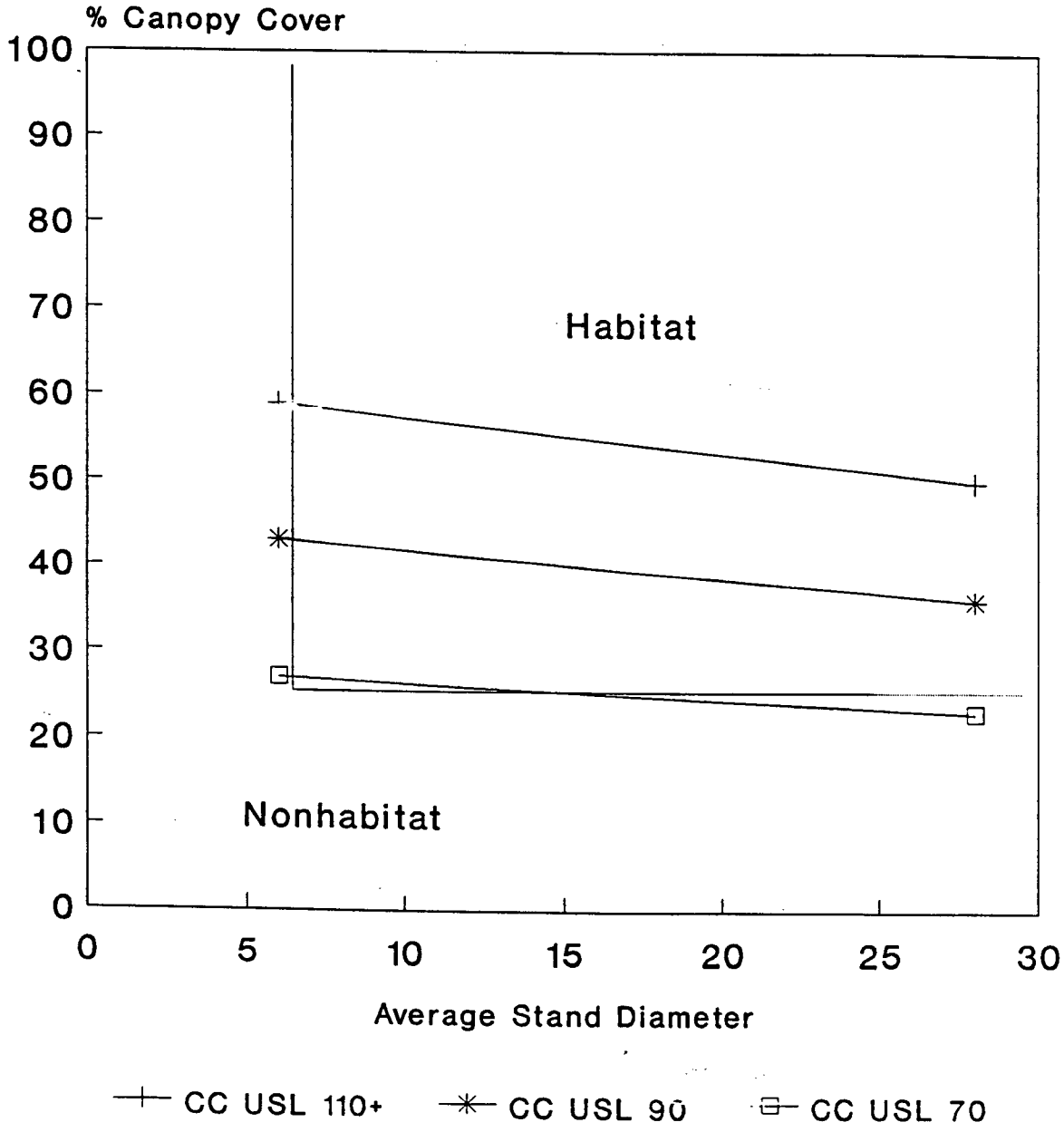
Eastside Even-aged Ponderosa Pine



Source - Eastside Wildlife Biologists

Figure 4

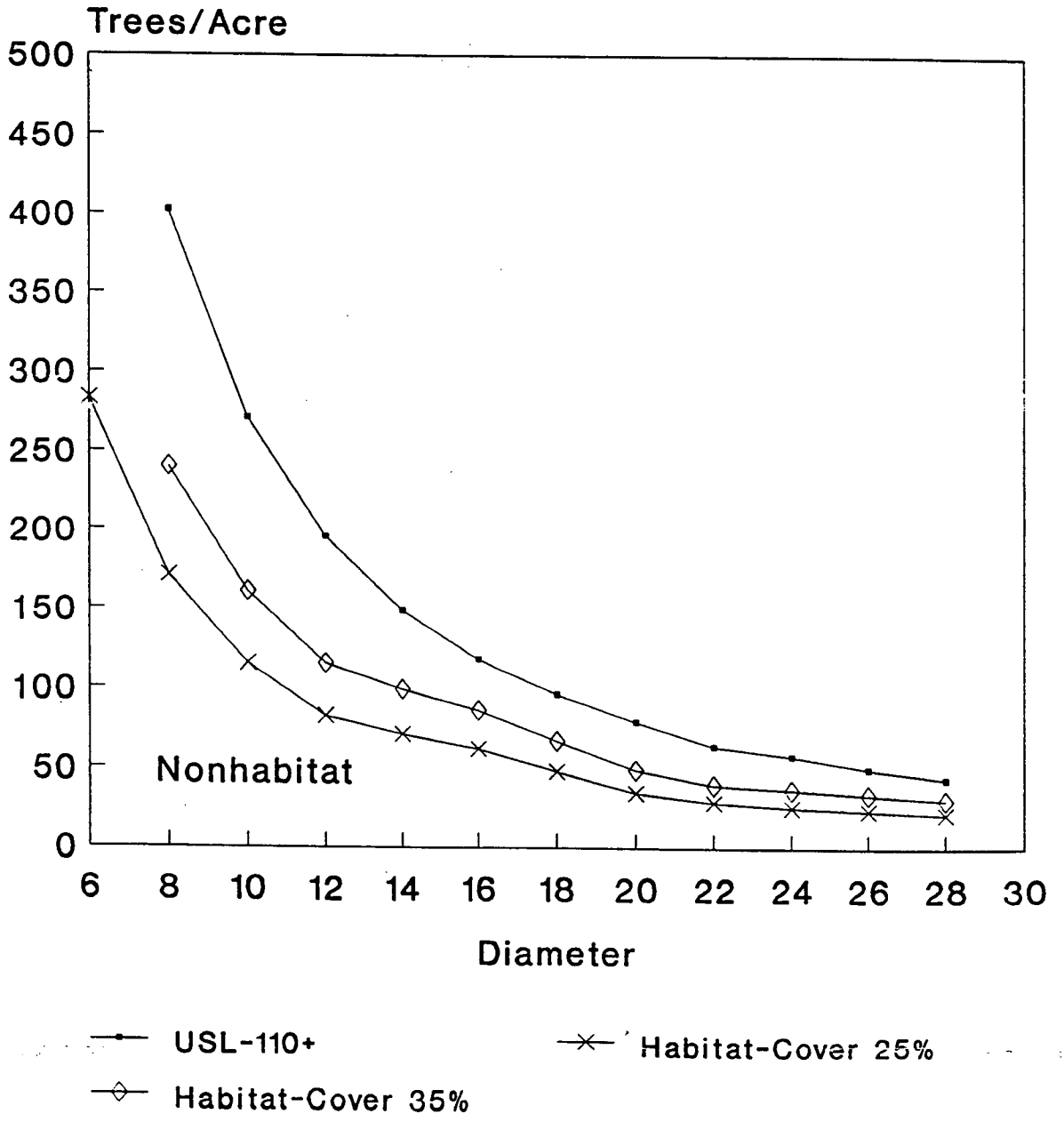
Canopy Cover at Upper Stocking Levels Compared with PP Owl Dispersal Habitat



Source - Eastside Wildlife Biologists
and PP Upper Stocking Limits by Site

Figure 5

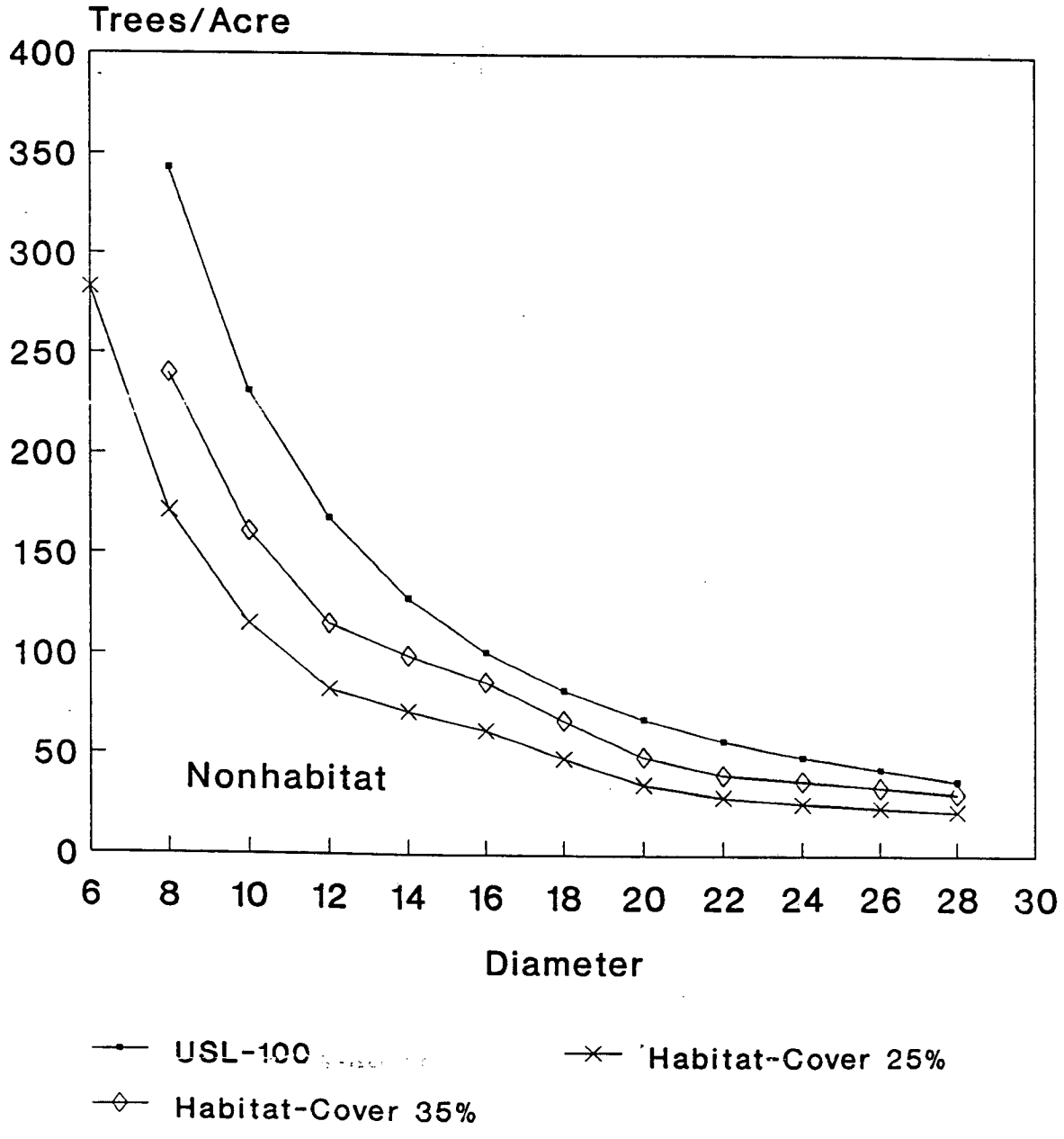
Dispersal Habitat Capability for PP on a Site Index 110+ (Barrett)



Source - Cochran's Upper Stocking Limit

Figure 6

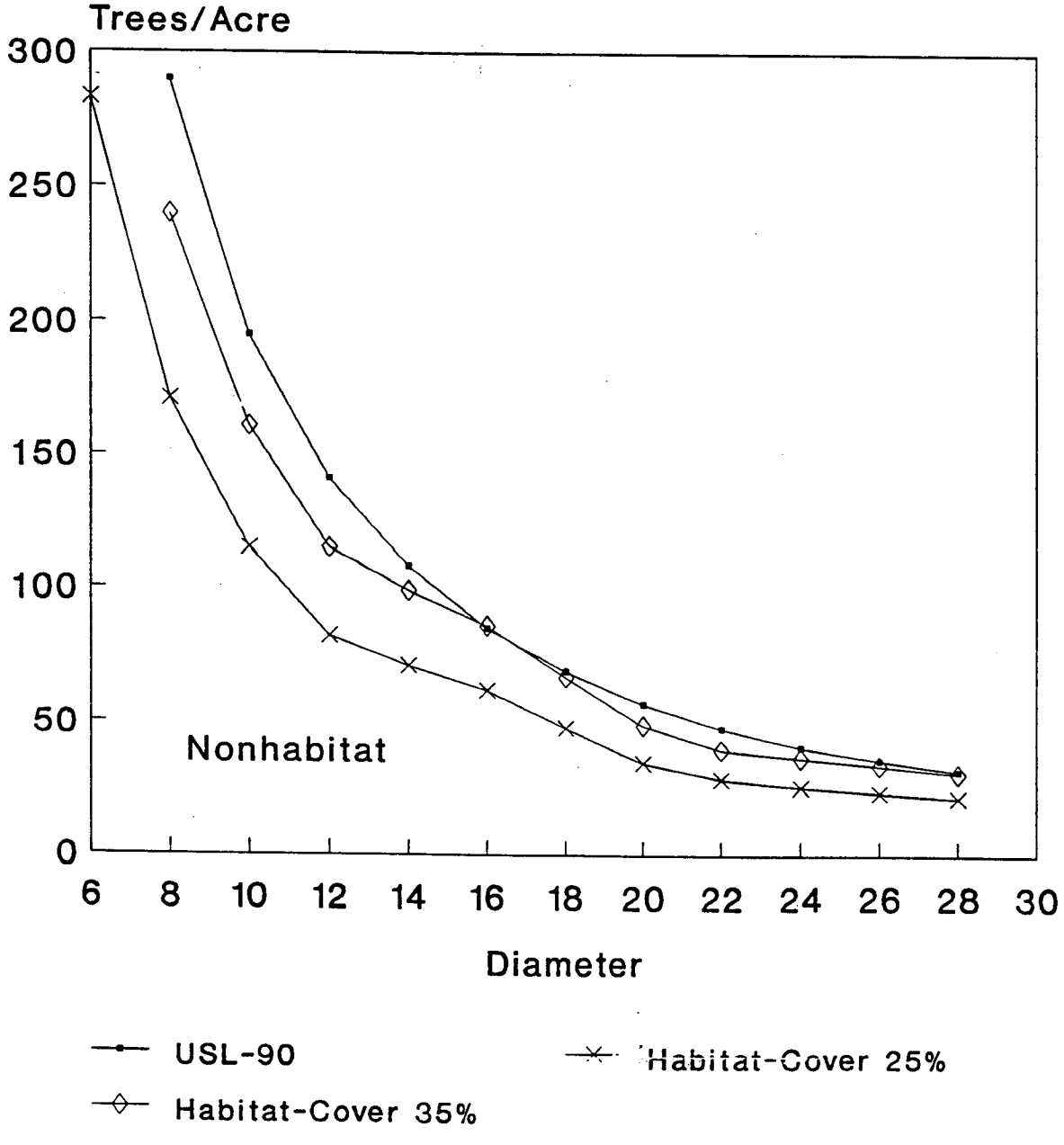
Dispersal Habitat Capability for PP on a Site Index 100 (Barrett)



Source - Cochran's Upper Stocking Limit

Figure 7

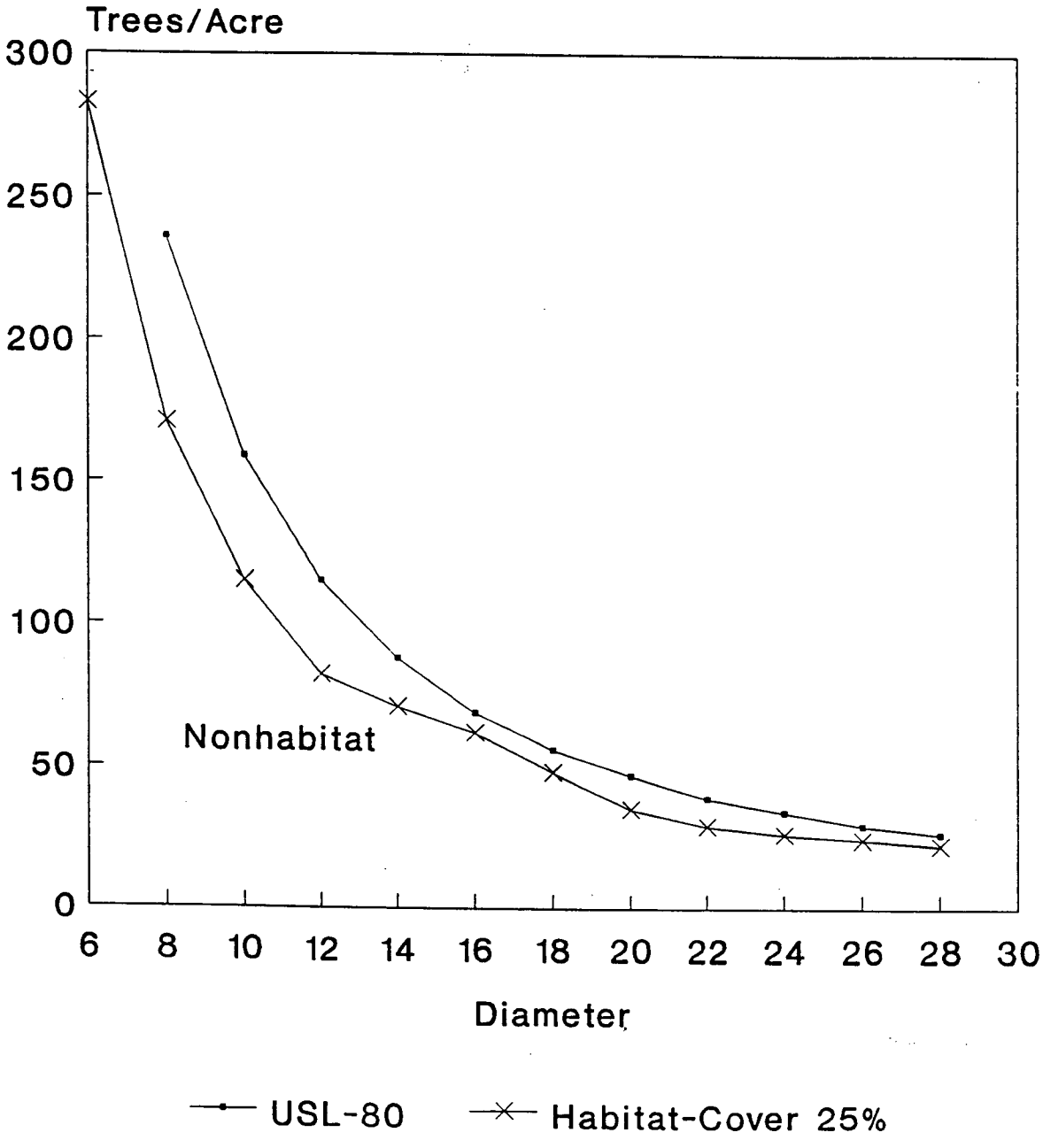
Dispersal Habitat Capability for PP on a Site Index 90 (Barrett)



Source - Cochran's Upper Stocking Limit

Figure 8

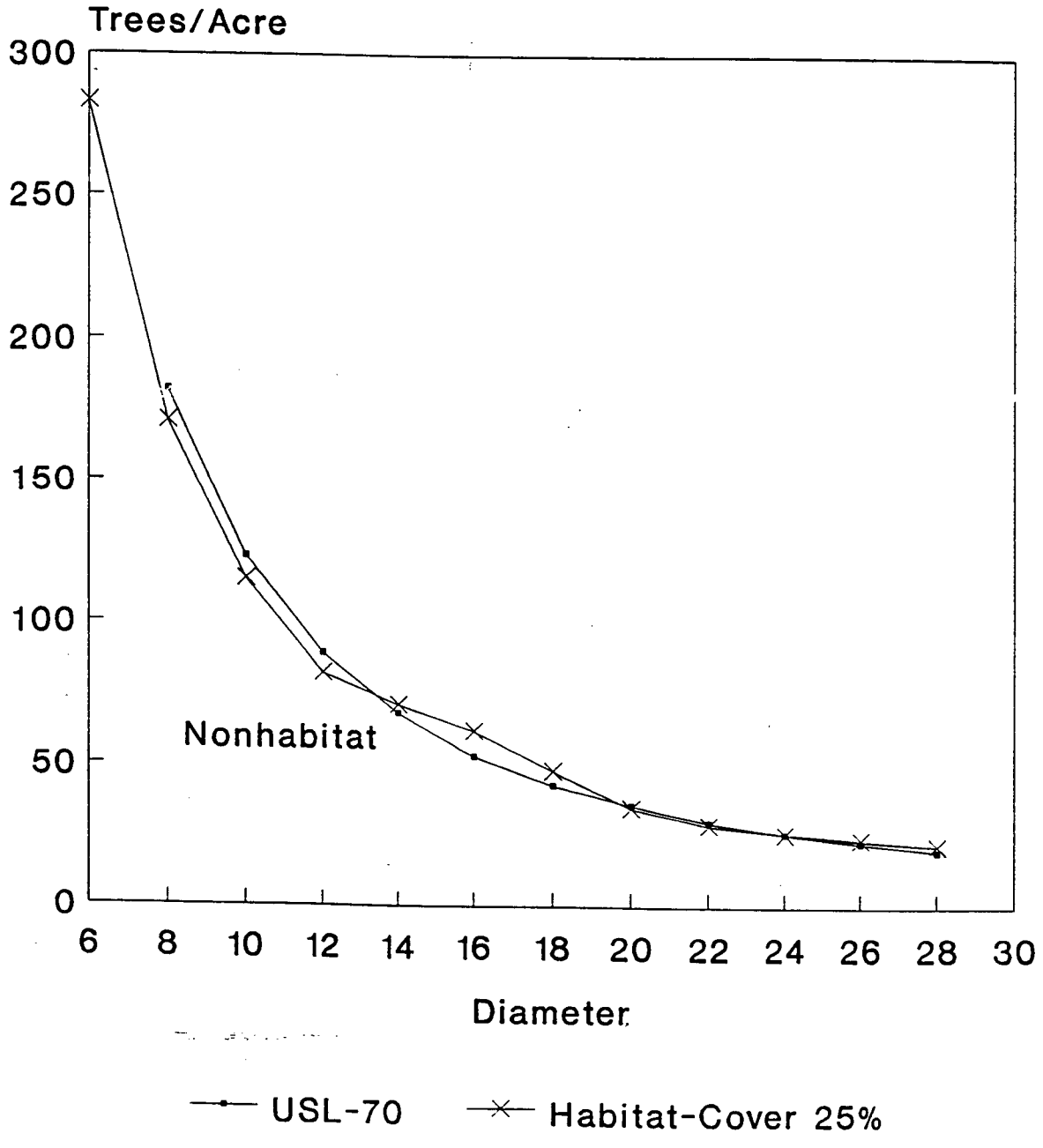
Dispersal Habitat Capability for PP on a Site Index 80 (Barrett)



Source - Cochran's Upper Stocking Limit

Figure 9

Dispersal Habitat Capability for PP on a Site Index 70 (Barrett)



Source - Cochran's Upper Stocking Limit

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ACRONYMS

AWA:	Administratively Withdrawn Area
BA:	Basal Area
CHU:	Critical Habitat Unit
CRA:	Congressionally Reserved Area
DBH:	Diameter at Breast Height
DCA:	Designated Conservation Areas
DNF:	Deschutes National Forest
DNFWHR:	Deschutes National Forest Wildlife Habitat Relationships
FSEIS:	Final Supplemental Environmental Impact Statement
GIS:	Geographical Information System
HCA:	Habitat Conservation Areas
ISC:	Interagency Scientific Committee
LRMP:	Land & Resource Management Plan
LSOG:	Late Successional Old Growth
LSR:	Late Successional Reserve
MA:	Management Area
MSS:	Managed Stand Survey
NFMAS:	National Fire Management Analysis System
NFP:	Northwest Forest Plan
NRF:	Nesting, Roosting & Foraging
PAG:	Plant Association Group
PMR:	Pacific Meridian Resources
REO:	Regional Ecosystem Office
ROD:	Record Of Decision

RTRT:	Regional Technical Review Team
S&G:	Standard & Guideline
TES:	Threatened, Endangered & Sensitive
TPA:	Trees Per Acre
USDA:	United States Department of Agriculture
WA:	Watershed Analysis
WEAVE:	Watershed Evaluation and Analysis For Viable Ecosystems