Chapter 1

Introduction and Highlights

Chapter 1
Table of Contents

Map 1-1 Late-Successional Reserves Map 1-ii

Introduction 1-1

1-1 Management Objectives 1-2

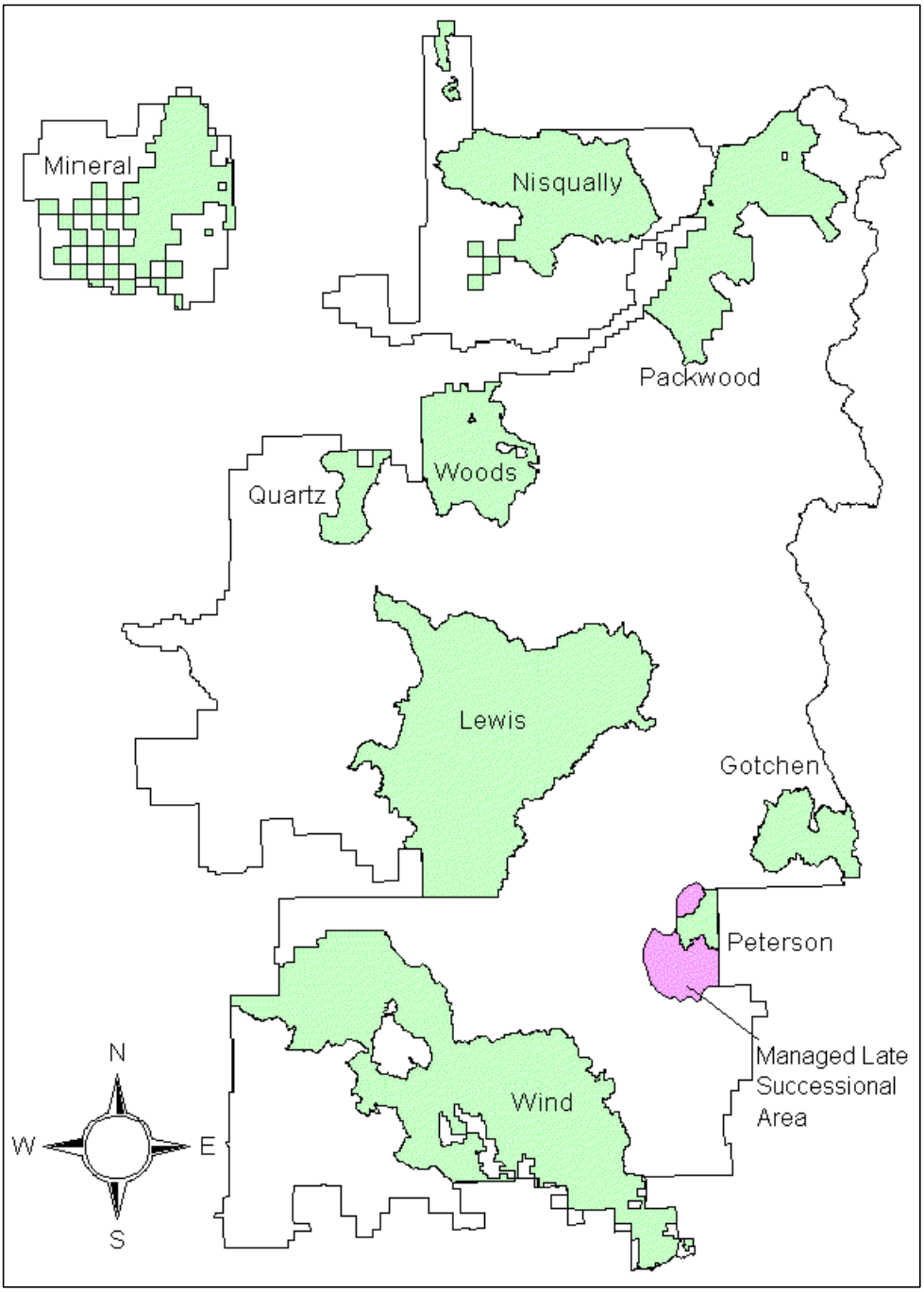
1-2 Approach to the Assessment 1-2

1-3 Highlights of the Assessment 1-3

Literature Cited 1-4

1-4 REO Exemption Letter 1-5

Map 1-1 Late-Successional Reserves Map



Chapter 1
Introduction

In 1994 the Northwest Forest Plan (NWFP) designated a network of Late-Successional Reserves (LSR) with the object of protecting and enhancing conditions of late-successional and old-growth forest ecosystems. As part of its strategy for protecting these ecosystems, the NWFP directs us to prepare an assessment of conditions and the functions of each LSR. This Assessment was prepared by an interdisciplinary team comprised of Forest Service resource specialists and managers. A biologist from the U.S. Fish and Wildlife Service also participated on the team. A list of prepares is included at the end of the document.

Its purpose is to describe the ecological framework within which projects will be designed to ensure they will meet LSR standards and guidelines and further LSR objectives. Decisions on where, when and how projects will be implemented are made through project level environmental analysis, not in this Assessment.

The Regional Ecosystem Office (REO) exemption letter is reproduced beginning on page 1-5. This letter describes the types of projects which are subject to review by the REO prior to implementation.

The emphasis of this document is on terrestrial habitats in the LSRs. Aquatic habitats are analyzed in watershed analyses. To obtain the total picture of the ecosystem and its functions, the watershed analyses should be examined concurrently with this Assessment.

For the purposes of this Assessment, there are nine Late-Successional Reserves including one Managed Late-Successional Area on the Gifford Pinchot National Forest. The LSRs comprise about 450 thousand acres, which is nearly one third of the Forest. See Map 1-1. They range in size from about 9 thousand to 125 thousand acres.

Seven of the LSRs are on the west side of the Cascade Range. The Peterson and Gotchen LSRs in the drier east side present a different set of management concerns and opportunities. The Managed Late-Successional Area in the Peterson LSR has the same objectives as the Late-Successional Reserves but was identified by the FEMAT scientists as an area in a drier province where regular and frequent fire is a natural part of the ecosystem. In Managed Late-Successional Areas, a wider range of silvicultural treatments may be appropriate to help prevent stand destruction by fire or insects and disease.

Through site-specific analyses of the LSRs, the Gotchen LSR was found to be the driest of the nine LSRs and better fit the FEMAT description for the Managed Late-Successional Area than the Peterson area.

All Late-Successional Reserves and the Managed Late-Successional Area are addressed in this province-wide assessment. Unless otherwise noted, we use the acronym LSR to apply generically to the Late-Successional Reserves and the Managed Late-Successional Area.

1-1 Management Objectives

The objective of the Late-Successional Reserve system is 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. The reserves are designed to maintain a functional, interacting, late-successional and old-growth forest ecosystem. They were designed to provide distribution, quantity and quality of old-growth forest habitat sufficient to avoid foreclosure of future management options. (ROD p. B-5). They provide habitat for viable, well-distributed populations of species including spotted owl and marbled murrelets. They will help ensure that the full range of late-successional biodiversity will be conserved. (FEMAT p. IV-31)

1-2 Approach to the Assessment

The assessment begins with broad-scale discussions of the Southwest Washington Province in Chapter 2 and becomes more site specific as the emphasis shifts to stand level treatments in Chapter 5. Each chapter takes a hierarchical approach by presenting information from up to four scales: Province, Forest, plant zone, and LSR.

Chapter 2 provides context for the assessment by describing the relationship of the vegetation and management objectives of the Gifford Pinchot National Forest to the other lands and ownerships in the Southwest Washington Province. This chapter contains province-scale discussions of landscape patterns and connectivity.

Beyond Chapter 2, we follow the model common to environmental analyses:

Chapter 3 - Desired Conditions
Chapter 4 - Existing Conditions
Chapter 5 - Treatments
Chapter 6 - Fire Management Plan
Chapter 7 - Monitoring

Chapter 3 describes desired LSR conditions and functions. This chapter interprets the broad goals and objectives outlined in the NWFP in terms of the late-successional structure, function, wildlife habitat relationships and human uses for the Gifford Pinchot LSRs.

Chapter 4 assesses the existing condition and functions parallel to the descriptions of desired conditions in Chapter 3. Also discussed in Chapter 4 are plant and animal species in the LSRs with special status and unique habitats.

The focus of Chapter 5 is on any disparity between desired and existing conditions and how through management we can bring the existing condition closer to desired. Criteria are developed to describe conditions, which would trigger management activities.

Chapter 6 is the plan for managing fire within the LSRs. Fire behavior is described for each fire group. Fire groups are analogous to the plant zone scales applied in Chapters 3 and 4. Fire hazards are assessed and guidelines are provided for appropriate fire suppression response. The fire plan describes historical fire occurrence and cause in each LSR over the past 25 years.

The final chapter summarizes monitoring questions raised throughout the document. These questions provide the foundation for developing monitoring programs which will assist in ensuring projects are implemented as intended and achieve the desired results.

We intend that this be a dynamic document. With Regional Ecosystem Office (REO) concurrence, we will update or amend it as conditions change and new information becomes available.

1-3 Highlights of the Assessment

1. The Forest provides most of the late-successional habitat in the SW Washington Province. This relationship is not expected to change in the future because of the predominantly private ownership in the province. See page 2-1.
2. Site of the only known nesting sites of marbled murrelets on the Forest, the Mineral LSR is recognized as an important island of late-successional vegetation at the province scale. See page 3-17.
3. The LSRs contain over half the Forest's deer and elk winter range. There will be a reduction in the quality of deer and elk habitat as LSR vegetation matures. Forage enhancement is recommended where it does not retard development of late-successional habitat and is consistent with LSR objectives. See pages 4-25 and 5-10.
4. Where they provide necessary habitat for species which are federally listed or sensitive, meadows may be maintained through fire or mechanical methods. See page 5-47.
5. Within the LSRs there are many opportunities to accelerate development of late-successional characteristics through:
   - Young Stand Thinning - see page 5-1
   - Commercial Thinning of stands less than 80 years old - see page 5-6
   - Older Stand Structural Enhancements - see page 5-11
6. All LSRs are low fire risks in general but have localized areas of moderate risk. See page 6-11.
7. There is a concern in the Gotchen LSR, that if left unchecked, the combination of the relatively dry environment, abundance of fire intolerant tree species and endemic levels of insect and disease will pose significant risk of catastrophic stand replacing fire in the future. Vegetation management and risk reduction treatments are proposed in the Gotchen LSR to reduce the risk of large scale stand replacing fires. See pages 3-15, 4-41, and 5-14.

8. The Managed Late-Successional Area was combined with the adjacent Peterson LSR for assessment. The assessment team found the Gotchen LSR to be a drier environment with a greater fire risk than the Managed Late-Successional Area (MLSA). The Gotchen LSR conditions more closely resemble NWFP description of an MLSA. See pages 4-41 and 4-82.
9. Revised guidelines for snags and down wood are developed for application in LSRs. See pages 5-22 and 5-26.
10. NWFP salvage guidelines are refined to acknowledge the functions of insects and disease and to incorporate refinements to the snag and down wood standards developed in this Assessment. See page 5-43.

Literature Cited

[FEMAT]Forest Ecosystem Management Assessment Team. 1993. Forest ecosystem management: an ecological, economic, and social assessment. Portland, OR: US Department of Agriculture; US Department of the Interior [and others].

[NWFP] Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl. 1994. Portland OR: US Department of Agriculture; US Department of the Interior [and others].

1-4 REO Exemption Letter

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MORANDUM

DATE: November 18, 1997

TO: Robert W. Williams, Regional Forester, Region 6, Forest Service

FROM: Donald R. Knowles, Executive Director

SUBJECT: Regional Ecosystem Office Review of the Gifford Pinchot National Forest Forestwide Late-Successional Reserve Assessment

Summary

The Regional Ecosystem Office (REO) and the interagency Late-Successional Reserve (LSR) Work Group have reviewed the Gifford Pinchot National Forest Forestwide Late-Successional Reserve Assessment (LSRA). The REO finds that the LSRA, with the assumptions and modifications explained below, provides sufficient framework and context for future projects and activities within the LSR. Future silvicultural activities described in the LSRA (as discussed below) that conform to the LSRA criteria and objectives and are consistent with the Standards and Guidelines (S&Gs) in the Northwest Forest Plan (NFP) are exempt from further project-level REO review. In addition, future salvage activities less than 1,000 acres in size that are described in the document and that conform to the LSRA criteria and objectives and are consistent with the S&Gs in the NFP are exempt from further project-level REO review.

Basis for the Review

Under the S&Gs for the NFP, a management assessment should be prepared for each large LSR (or group of smaller LSRs) before habitat manipulation activities are designed and implemented. As stated in the S&Gs, these assessments are subject to the REO review. The REO review focuses on the following:

1. The review considers whether the assessment contains sufficient information and analysis to provide a framework and context for making future decisions on projects and activities. The eight specific subject areas that an assessment should generally include are found in the NFP (S&Gs, page C-1 1). The REO may find that the assessment contains sufficient information or may identify topics or areas for which additional information, detail, or clarity is needed. The findings of the review are provided to the agency or agencies submitting the assessment.

2. The review considers potential treatment criteria and treatment areas addressed in the LSRA. When treatment criteria are clearly described and their relationship to achieving desired late-successional conditions are also clear-- subsequent projects and activities within the LSR(s) may be exempted from the REO review, provided they are consistent with the LSRA criteria and S&Gs. The REO authority for developing criteria to exempt these actions is found in the S&Gs (pages C-12, C-13, and C-18).

Scope of the Assessment and Description of the Assessment Area

The REO reviewed the LSRA for conformity with the eight subject areas identified in the S&Gs (page C-11), Several initial questions regarding proposed silvicultural, salvage, and risk-reduction treatments were resolved by meetings and conference calls between the work group and staff of the Gifford Pinchot National Forest. The LSRA was revised to reflect the results of those meetings and conversations and the revised portions of the LSRA were resubmitted by the Forest. The REO finds that the revised LSRA, with the assumptions and modifications discussed below, provides a sufficient framework and context for making future decisions on projects and activities within the LSR.

The LSRA addresses approximately 450,000 acres within eight LSRs and one Managed Late-Successional Area (MLSA) across the entire Forest. Individual reserves range in size from 9,000 to 125,000 acres. All of the LSRs in the Southwest Washington Province occur in this Forest. Plant zones across all LSRs include: silver fir (48% of total LSR acres), western hemlock (41 %), grand fir (6%), mountain hemlock (5%), and subalpine fir (>1%). Approximately 25% of the LSRs is in stands >200 years old.

The assessment addresses LSR management at several scales, beginning with a provincial scale, then stepping down to the stand level for proposed treatments. The assessment describes habitat conditions for several wildlife guilds in an attempt to address connectivity within and between LSRs, across the forest. The assessment details desired future conditions at several different levels, including a forest-wide scale, by individual LSRs, and for each plant zone. Detailed information on existing condition is presented for each individual LSR.

Assumptions and Clarifications

Members of the work group visited with the assessment team as the LSRA was being developed. The work group visit looked at potential treatment areas. Upon receipt of the assessment for review, work group members held meetings and phone conversations with LSRA team members to clarify portions of the assessment. The Forest submitted an addendum revising portions of the LSRA in response to these meetings and discussions. Additional assumptions and clarifications not found in this addendum or the originally submitted LSRA are noted below.

- The LSRA, as originally submitted, proposed silvicultural treatments for the enhancement of late-successional characteristics in stands between 80 and 100 years. However, REO has not made any finding on whether such projects that meet the criteria described in this assessment would meet the purposes of LSRs and the intent of the NFP. Any projects proposing to do non-risk-related silvicultural treatments in stands over 80 years old would, therefore, require review by REO prior to implementation.
- Several places in the document discuss projects that may provide enhancement opportunities for elk forage. Any enhancement of elk forage will only be incidental to the project's primary purpose, which is to enhance late-successional conditions.
- In Section ***5-2 Commercial Thinning***, under the heading "Treatments Description," reference is made to the portion of the REO memo (Criteria to Exempt Specific Silvicultural Activities in Late-Successional Reserves and Managed Late-Successional Areas dated July 9,

1996) that describes criteria for leaving small openings and heavily thinned patches to increase diversity (viz., Treatment Standard #4). This standard was amended by REO memo (dated September 30, 1996) to modify the size and extent of the patches. REO assumes that this amendment will be incorporated into the treatment criteria for commercial thinnings within this LSR.

- In Chapter ***5-2 Commercial Thinning***, RE0 assumes that all snags and down wood existing prior to treatment will be retained. Any snags that pose a hazard to safe operations may be felled but will be left on site.
- In Chapter ***5-4*** Treatments to Reduce Fire Risk and Maintain Late-Successional Forest in Gotchen LSR, under "Treatments Description," the Group 6 treatment for fully stocked stands that contain large, old-growth early seral tree species will be applied throughout the Gotchen LSR. Also in this section, activities under the Group 7 treatment within fully stocked stands that contain few or no large, early seral tree species, REO assumes that any existing large early-seral trees will be retained.
- In Chapter ***5-6 Down Wood Management***, **Figure 5-1** (Down Wood Decision Tree) is modified as follows: the decision box that reads "Emphasize CWD at >low level" is changed to "Emphasize CWD at >low level." We assume that the CWD levels to be retained in these circumstances will, to the degree possible, equal or exceed those levels identified as "moderate."
- In Chapter ***5-11 Salvage and Risk Reduction***, three treatment situations are described under the section "Refinements to NWFP Salvage Guidelines, Guideline 2." In treatment group 3, which describes possible treatments in laminated root rot and dwarf mistletoe infection centers, REO assumes that conversion of green trees to snags would only occur if reforestation by host or susceptible species is necessary to meet LSR objectives. The following, or similar, edit is suggested to help clarify the intent to this treatment:

  > In the last sentence under the group 3 treatment description, replace "Where reforestation options are limited," with "Where reforestation of non-host or non-susceptible species will not meet attainment of desired future late-successional conditions, …"

Conclusions

Based on the discussion presented in the final LSRA, the REO finds that it provides sufficient framework and context for future projects and activities within the LSR. Silvicultural activities, risk reduction activities, and salvage activities less than 1,000 acres described in the LSRA which are consistent with the S&Gs and the treatment criteria identified in the assessment, as discussed above, are exempted from future project-level REO review. Because of the issues surrounding the management of CWD at the levels proposed in this document, the LSR work group is interested in seeing if a project with these levels meets the work group's expectations. Please inform me when such a project is completed so that the work group may arrange a site visit. I would also appreciate a copy of the revised final LSRA.

cc:
REO, RIEC
Lisa Freedman
Gifford Pinchot NF

1041/ly

Chapter 4

Existing Conditions

Chapter 4

Table of Contents

Existing Conditions....4-1
4-1 Forest Scale Existing Condition....4-1
Vegetation....4-1
Wildlife Habitat....4-12
Connectivity....4-29
Disturbance Regimes....4-35
Human Uses....4-37
Grazing....4-39
Plantation Management....4-39
Roads....4-39

4-2 LSR Scale Existing Condition....4-41
Gotchen LSR....4-41
Lewis LSR....4-50
Mineral LSR....4-58
Nisqually LSR....4-66
Packwood LSR....4-74
Peterson LSR/MLSA....4-82
Quartz LSR....4-90
Wind LSR....4-97
Woods LSR....4-107

Literature Cited....4-121

List of Maps

Map 4-1 LSR Associations with Critical Habitat Units 4-22

Map 4-2 Biological Deer and Elk Winter Range 4-26

Map 4-3 Habitat Conditions - Guild TLMLT 4-31
Map 4-4 Habitat Conditions - Guild TMMLT 4-32
Map 4-5 Habitat Conditions - Guild TSPLT 4-33
Map 4-6 Habitat Conditions - Guild TSGSL 4-34

Map 4-7 Gifford Pinchot National Forest Grazing Allotments 4-40

Map 4-8 Gotchen LSR Ecoclass 4-45
Map 4-9 Gotchen LSR Age Class 4-46
Map 4-10 Gotchen LSR Stand Structure 4-47
Map 4-11 Gotchen LSR Dominant Tree Species 4-48
Map 4-12 Gotchen LSR Special Sites 4-49

Map 4-13 Lewis LSR Ecoclass 4-53
Map 4-14 Lewis LSR Age Class 4-54
Map 4-15 Lewis LSR Stand Structure 4-55
Map 4-16 Lewis LSR Dominant Tree Species 4-56
Map 4-17 Lewis LSR Special Sites 4-57

Map 4-18 Mineral LSR Ecoclass 4-61
Map 4-19 Mineral LSR Age Class 4-62
Map 4-20 Mineral LSR Stand Structure 4-63
Map 4-21 Mineral LSR Dominant Tree Species 4-64
Map 4-22 Mineral LSR Special Sites 4-65

Map 4-23 Nisqually LSR Ecoclass 4-69
Map 4-24 Nisqually LSR Age Class 4-70
Map 4-25 Nisqually LSR Stand Structure 4-71
Map 4-26 Nisqually LSR Dominant Tree Species 4-72
Map 4-27 Nisqually LSR Special Sites 4-73

Map 4-28 Packwood LSR Ecoclass 4-77
Map 4-29 Packwood LSR Age Class 4-78
Map 4-30 Packwood LSR Stand Structure 4-79
Map 4-31 Packwood LSR Dominant Tree Species 4-80
Map 4-32 Packwood LSR Special Sites 4-81

Map 4-33 Peterson LSR/MLSA Ecoclass 4-85
Map 4-34 Peterson LSR Age Class 4-86
Map 4-35 Peterson LSR Stand Structure 4-87
Map 4-36 Peterson LSR Dominant Tree Species 4-88
Map 4-37 Peterson LSR Special Sites 4-89

Map 4-38 Quartz LSR Ecoclass 4-92
Map 4-39 Quartz LSR Age Class 4-93
Map 4-40 Quartz LSR Stand Structure 4-94
Map 4-41 Quartz LSR Dominant Tree Species 4-95
Map 4-42 Quartz LSR Special Sites 4-96

Map 4-43 Wind LSR Ecoclass 4-102
Map 4-44 Wind LSR Age Class 4-103
Map 4-45 Wind LSR Stand Structure 4-104
Map 4-46 Wind LSR Dominant Tree Species 4-105
Map 4-47 Wind LSR Special Sites 4-106

Map 4-48 Woods LSR Ecoclass 4-110
Map 4-49 Woods LSR Age Class 4-111
Map 4-50 Woods LSR Stand Structure 4-112
Map 4-51 Woods LSR Dominant Tree Species 4-113
Map 4-52 Woods LSR Special Sites 4-114

Map 4-53 LSR Road Network 4-115

List of Tables

Table 4-1 Age Distribution Summary - All LSRs 4-1
Table 4-2 Survey and Manage Vascular Plants 4-3
Table 4-3 Vascular plants associated with late-successional and old-growth forest. 4-4
Table 4-4 Lichens associated with late-successional and old-growth forest. 4-8
Table 4-5 Bryophytes associated with late-successional and old-growth forest..... 4-9
Table 4-6 Fungi associated with late-successional and old-growth forest..... 4-10
Table 4-7 Wildlife Species Using Late-Successional Habitat by LSR..... 4-13
Table 4-8 Mollusks Assessed in the Northwest Forest Plan..... 4-17
Table 4-9 Introduced Species by LSR 4-18
Table 4-10 Suitable Owl Habitat by Land Class 4-21
Table 4-11 Acreage of Northern Spotted Owl Critical Hab.Units/Associated LSRs ... 4-23
Table 4-12 Habitat Attributes 4-27
Table 4-13 LSR and Grazing 4-39
Table 4-14 Current and Projected Levels of Transitory Range in LSRs. 4-39
Table 4-15 Down Wood - Gotchen LSR..... 4-42
Table 4-16 Snags - Gotchen LSR..... 4-42
Table 4-17 Down Wood Lewis LSR..... 4-51
Table 4-18 Snags Per Acre Lewis LSR..... 4-51
Table 4-19 Down Wood Mineral LSR..... 4-59
Table 4-20 Snags Per Acre Mineral LSR..... 4-59
Table 4-21 Down Wood -Nisqually LSR..... 4-68
Table 4-22 Snags - Nisqually LSR..... 4-68
Table 4-23 Down Wood - Packwood LSR 4-75
Table 4-24 Snags - Packwood LSR 4-75
Table 4-25 Down Wood - Peterson LSR 4-83
Table 4-26 Snags - Peterson LSR 4-83
Table 4-27 Down Wood - Quartz LSR 4-91
Table 4-28 Snags - Quartz LSR 4-91
Table 4-29 Down Wood - Wind LSR 4-98
Table 4-30 Snags - Wind LSR 4-98
Table 4-31 Down Wood - Woods LSR..... 4-108
Table 4-32 Snags - Woods LSR..... 4-108
Table 4-33 Plant Zone by LSR..... 4-116
Table 4-34 Ecotypes by LSR 4-116
Table 4-35 Deer and Elk Winter Range..... 4-117
Table 4-36 Age Classes by LSR 4-117
Table 4-37 Structural Stage Distribution 4-118
Table 4-38 Dominant Tree Species 4-119
Table 4-39 Road Densities by LSR..... 4-120

Chapter 4
Existing Conditions

This chapter describes existing conditions at two scales, Forest-wide and individual Late-Successional Reserve (LSR). Existing Conditions for Late-Successional Reserves emphasize vegetative conditions and wildlife habitat. Existing conditions for ecological processes, human uses, and facilities are also described at the appropriate scale. Some components are described at both Forest and LSR scales. Vegetative conditions, for example, are described in aggregate at the Forest scale and in more detail for each LSR.

4-1 Forest Scale Existing Condition

Vegetation

Forest-wide, the dominant tree species comprising stands of the LSRs are Douglas-fir (63 percent), silver fir (12 percent), western hemlock (10 percent) and Noble fir (5 percent) (see LSR Ecoclass Map 4-8, Map 4-13, Map 4-18, … Map 4-48, and Table 4-38. Hardwoods are the dominant tree in less than 1 percent of the acres within the LSRs. Only about a quarter of the area in LSRs contains stands beyond 200 years old, the minimum age standard in the R6 Old-Growth Definition. Another quarter of the area is in plantations less than 40 years old (See LSR Age Class Map 4-9, Map 4-14, Map 4-19, Map 4-24, … Map 4-49, and Table 4-36, page 4-117). Forestwide, about 20 thousand acres or 5 percent of the area in LSRs is comprised of sites such as rock outcropping and wet meadows which are incapable of supporting late-successional vegetation.

The following table shows the total acres for all stands less than 80 years old for all LSR's on the Gifford Pinchot National Forest.

Table 4-1 Age Distribution Summary - All LSRs

Age Class (Years)	Total Acres (Thinning)		
	Young Stand	Commercial	Total
<10	25,915		25,915
10-20	31,979		31,979
21-40		55,175	55,175
41-80		35,116	35,116
TOTAL	57,894	90,291	148,185

Potentially all acres in the LSRs between the ages of 10 and 80 are suitable for some form of stand density management, because they are the result of past management practices which planned for such treatments. All of these stands are growing rapidly, and are subject to being severely overstocked for many decades which can result in greatly delaying the development of desired conditions and increasing the risk of stand-replacement disturbances. Many of these stands are already in overstocked conditions.

Most of the 57,894 acres of young stands are in an overstocked condition and are ready for stocking control (thinning) treatment within the next five years. Those which are less than ten years old

now will come on line over the next ten years. Table 5-1, page 5-4, summarizes an estimate of net acres per year (net of stands which may not need thinning for various reasons) that could be thinned each year for the next five years. All of acres will subsequently become eligible for commercial thinning when they near the age of 35-45.

Most of the 90,291 acres of commercial thinning in Table 4-1 plus most of the above young stand thinning acres will develop the need for commercial thinning over the next few decades.

These stands represent the best opportunity to accelerate the development of the LSRs toward the desired landscape condition.

The LSRs contain about 55 thousand acres stands in the 80 to 100 year-age class. Many of these areas were established after the large burns around the turn of the century. These stands are often lacking in snags and down wood as a result of reburns. Because of high stocking levels, they lack the structural characteristics of late-successional habitat.

The main change in vegetation conditions from pre-settlement times to the present is a reduction in late-successional forest due to forest fires and timber harvest. This change was associated with a large increase in the amount of mid-successional forest in the small tree and single-story large tree category. The trend in the reduction of late-successional forest continued until the implementation of the Northwest Forest Plan. Within the past decade, managers have attempted to implement new practices to maintain and increase forest diversity. Examples are reserve areas within harvest units, levels of tree retention, and retention of large woody debris.

Plants and Fungi

Late-successional and old-growth forests on the Gifford Pinchot National Forest are inhabited by a diverse array of vascular plants, bryophytes, lichens, and fungi. Our knowledge of population trends, distribution, and habitat associations and requirements for most species of bryophytes, lichens, and fungi on the Gifford Pinchot National Forest is limited. Botanical species were not used by FEMAT as indicators for late-successional and old-growth habitat due to insufficient data on late-successional and old-growth conditions. In the future, using plant indicators may add a dimension that is more closely tied to soil condition and mycorrhizal habitats.

The viability analyses conducted by the Forest Ecosystem Management Assessment Team led to the identification of species of concern under the Northwest Forest Plan (Survey and Manage Species). For Strategy 1 species, known sites have been identified and existing information compiled on their ecological requirements. Because of the direction in the NWFP to manage for these Survey and Manage Species, they will be specifically addressed in this document. In addition, plants listed on the Regional Forester's Sensitive Species List which occur in LSRs are also discussed within the context of addressing possible conflicts between LSR objectives and viability requirements for these species.

Vascular Plants Associated with Late-successional and Old-growth Forests

A total of 124 vascular plant species met the Forest Ecosystem Management Analysis Team criteria for being closely associated with late-successional and old-growth forest within the range of the northern spotted owl. Of these, 76 (61 percent) have been documented on the Gifford Pinchot National Forest (Table 4-3). Six species of vascular plants which have been documented on the Forest were identified as Survey and Manage Species (Table 4-2). An additional five species are suspected to occur, based on available habitat.

Table 4-2 Survey and Manage Vascular Plants

Status	Species	Common Name
D	*Allotropa virgata*	sugar stick
D	*Arceuthobium tsugense*	dwarf mistletoe
D	*Botrychium minganense*	mingan moonwort
D	*Botrychium montanum*	mountain moonwort
S	*Coptis asplenifolia*	spleenwort-leaved goldthread
S	*Coptis trifolia*	threeleaf goldthread
D	*Corydalis aquae-gelidae*	cold-water corydalis
D	*Cypripedium fasciculatum*	clustered lady's slipper
S	*Cypripedium montanum*	mountain lady's slipper
S	*Galium kamtschaticum*	boreal bedstraw
S	*Platanthera orbiculata*	round-leaved orchid

(D) Documented
(S) Suspected to occur on the Gifford Pinchot National Forest.

Other late-successional and old-growth species of concern include those which are on the periphery of their range, are local endemics, or have special status (e.g., Regional Forester's Sensitive List, Washington Natural Heritage Program List, federal candidates). Information on selected species is provided below.

Table 4-3 Vascular plants considered closely associated with late-successional and old-growth forest. Documented on the Gifford Pinchot National Forest.

Species	Family	Common Name	Species	Family	Common Name
Abies lasiocarpa	*PINACEAE*	*subalpine fir*	*Listera convallarioides*	*ORCHIDACEAE*	*broad-lipped twayblade*
Achlys triphylla	*BERBERIDACEAE*	*vanilla leaf*	*Listera cordata*	*ORCHIDACEAE*	*northern listera*
Adenocaulon bicolor	*ASTERACEAE*	*pathfinder*	*Luzula hitchcockii*	*JUNCACEAE*	*smooth woodrush*
Adiantum pedatum	*POLYPODIACEAE*	*western maidenhair fern*	*Lycopodium selago*	*LYCOPODIACEAE*	*fir clubmoss*
Allotropa virgata	*ERICACEAE*	*sugarstick*	*Lysichiton americanum*	*ARACEAE*	*skunk cabbage*
Anemone deltoidea	*RANUNCULACEAE*	*threeleaf anemone*	*Melica subulata*	*POACEAE*	*Alaska oniongrass*
Arnica latifolia	*ASTERACEAE*	*broadleaf arnica*	*Menziesia ferruginea*	*ERICACEAE*	*fool's huckleberry*
Asarum caudatum	*ARISTOLOCHIACEAE*	*wild ginger*	*Mitella breweri*	*SAXIFRAGACEAE*	*Brewer's miterwort*
Botrychium minganense	*OPHIOGLOSSACEAE*	*Mingan moonwort*	*Mitella caulescens*	*SAXIFRAGACEAE*	*star-shaped mitella*
Botrychium virginanum	*OPHIOGLOSSACEAE*	*Virginia grapefern*	*Mitella pentandra*	*SAXIFRAGACEAE*	*five-stamen miterwort*
Calypso bulbosa	*ORCHIDACEAE*	*deer-head orchid*	*Mitella trifida*	*SAXIFRAGACEAE*	*three-tooth mitrewort*
Chamaecyparis nootkatensis	*CUPRESSACEAE*	*Alaska yellow-cedar*	*Monotropa uniflora*	*ERICACEAE*	*Indian pipe*
Chimaphila menziesii	*ERICACEAE*	*little pipsissewa*	*Oxalis oregana*	*OXALIDACEAE*	*Oregon oxalis*
Chimaphila umbellata	*ERICACEAE*	*prince's pine*	*Oxalis trilliifolia*	*OXALIDACEAE*	*great oxalis*
Cimicifuga elata	*RANUNCULACEAE*	*tall bugbane*	*Pleuricospora fimbriolata*	*ERICACEAE*	*fringed pinesap*
Cimicifuga laciniata	*RANUNCULACEAE*	*cut-leaved bugbane*	*Pterospora andromedea*	*ERICACEAE*	*pine drops*
Clintonia uniflora	*LILIACEAE*	*queencup beadlily*	*Pyrola asarifolia*	*ERICACEAE*	*large pyrola*
Coptis laciniata	*RANUNCULACEAE*	*cut-leaved goldthread*	*Pyrola chlorantha*	*ERICACEAE*	*green pyrola*
Corallorhiza maculata	*ORCHIDACEAE*	*spotted coralroot*	*Pyrola picta*	*ERICACEAE*	*white vein pyrola*
Corallorhiza mertensiana	*ORCHIDACEAE*	*Merten's coralroot*	*Pyrola uniflora*	*ERICACEAE*	*woodnymph*
Corallorhiza striata	*ORCHIDACEAE*	*striped coralroot*	*Rubus lasiococcus*	*ROSACEAE*	*dwarf bramble*
Disporum hookeri	*LILIACEAE*	*fairy bells*	*Rubus pedatus*	*ROSACEAE*	*trailing blackberry*
Disporum smithii	*LILIACEAE*	*Smith's fairy lantern*	*Smilacina racemosa*	*LILIACEAE*	*feather solomonplume*
Dryopteris austriaca	*POLYPODIACEAE*	*mountain woodfern*	*Smilacina stellata*	*LILIACEAE*	*starry solomonplume*
Eburophyton austiniae	*ORCHIDACEAE*	*phantom orchid*	*Steptopus roseus*	*LILIACEAE*	*purple twisted stalk*
Galium oreganum	*RUBIACEAE*	*Oregon bedstraw*	*Synthyris schizantha*	*SCROPHULARIACEAE*	*fringed synthyris*
Gaultheria humifusa	*ERICACEAE*	*alpine wintergreen*	*Tellima grandiflora*	*SAXIFRAGACEAE*	*fringecup*
Gaultheria ovatifolia	*ERICACEAE*	*slender wintergreen*	*Thuja plicata*	*CUPRESSACEAE*	*western redcedar*
Goodyera oblongifolia	*ORCHIDACEAE*	*rattlesnake plantain*	*Tiarella trifoliata*	*SAXIFRAGACEAE*	*coolwort foamflower*
Gymnocarpum dryopteris	*POLYPODIACEAE*	*oak-fern*	*Tiarella unifoliata*	*SAXIFRAGACEAE*	*coolwort foamflower*
Habenaria saccata	*ORCHIDACEAE*	*slender bog-orchid*	*Trillium ovatum*	*LILIACEAE*	*western trillium*
Habenaria unalascensis	*ORCHIDACEAE*	*short-spurred rein orchid*	*Vaccinium alaskense*	*ERICACEAE*	*Alaska huckleberry*
Hemitomes congestum	*ERICACEAE*	*gnome plant*	*Vaccinium membranaceum*	*ERICACEAE*	*big huckleberry*
Hieracium scouleri	*ASTERACEAE*	*Scouler's hawkweed*	*Vaccinium ovalifolium*	*ERICACEAE*	*oval-leaf huckleberry*
Hypopitys monotropa	*ERICACEAE*	*common pinesap*	*Vaccinium parvifolium*	*ERICACEAE*	*red huckleberry*
Isopyrum hallii	*RANUNCULALACEAE*	*Hall's rue-anemone*	*Vancouveria hexandra*	*BERBERIDACEAE*	*white vancouveria*
Lathyrus polyphyllus	*FABACEAE*	*leafy peavine*	*Viola glabella*	*VIOLACEAE*	*pioneer violet*
Listera caurina	*ORCHIDACEAE*	*western twayblade*	*Viola orbiculata*	*VIOLACEAE*	*darkwoods violet*

Detailed information on these plants is provided in Conservation Strategies and Management Guidelines.

Allotropa virgata - Survey and Manage Strategy 1 and 2: The LSR network may provide an important contribution to the viability of this species on the Forest. Small old-growth fragments are considered important for this species; seed dispersal corridors may be important for this and other late-successional and old-growth associated species which have complex mycorrhizal relationships and small, ephemeral seeds (e.g., *Cypripedium fasciculatum*).

Botrychium minganense - Survey and Manage Strategy 1 and 2: A total of 3 populations of Mingan moonwort have been documented from the Forest; one population occurs within the Woods LSR. A related species, Mountain moonwort (*B. montanum*) is suspected to occur in deep shade under old-growth western red-cedar. Mingan moonwort occurs in more diverse habitats.

Cimicifuga elata - Regional Forester's Sensitive Species: Only two populations of tall bugbane have been documented from the Gifford Pinchot National Forest and a total of 30 from Washington, with populations sizes often less than 25 individuals. This species may require gaps and small openings in canopy for reproduction. Specific prescriptions to maintain viable populations within LSRs should be developed and incorporated into a conservation strategy.

Corydalis aquae-gelidae - Federal Candidate, Regional Forester's Sensitive Species, Survey and Manage Strategy 1 and 2: A total of 45 populations of cold-water corydalis have been documented from the Forest, with 32 (71 percent) occurring within the Wind LSR. This species inhabits riparian areas and may be adversely affected by sedimentation and increased water temperature.

Cypripedium fasciculatum - Two populations of clustered lady's slipper have been documented from the Forest. Because of the extremely slow growth rate, complex symbiotic relationships with other organisms, and possible fire requirements, management for this species may require specific treatment, including prescribed burning.

Pleuricospora fimbriolata - Regional Forester's Sensitive Species in Washington: A total of 233 populations of fringed pinesap have been documented from the Forest, with 183 (79 percent) occurring within LSRs. This species is on the edge of its range in Washington. The LSRs provide a high level of assurance that this species will remain viable on the Gifford Pinchot National Forest. Small old-growth fragments are also important habitats for this species. Seed dispersal corridors may be important for this and other late-successional and old-growth associated species which have complex mycorrhizal relationships. It may require seed dissemination by fungivores such as the red-backed vole and northern flying squirrel.

Streptopus streptopoides - Although no occurrences have been documented for the Forest, kruhsea is listed by the Regional Forester as sensitive in Oregon. The LSRs would provide suitable habitat for this species, which is found in old-growth forests in microsites with thick organic layers including decomposing coarse woody debris.

Synthyris schizantha - Fringed synthyris is known only from a few mountain peaks in the north Coast Range in Oregon, and from the Olympic and Cascade Mountains of Washington. It is known from the Little Rockies area within the Mineral LSR.

Lichens Associated with Late-successional and Old-growth Forests

Of the 157 species of lichens considered closely associated with late-successional and old-growth forest within the range of the northern spotted owl, 77 have been documented on the Gifford Pinchot National Forest and an additional 31 species are strongly suspected to occur here. Seven of these species are considered Survey and Manage Species Strategy 1 (Table 4-4). Those which have been documented within one or more LSR include: *Dendriscocaulon intricatulum, Hydrothyria venosa, Leptogium rivale, Lobaria hallii, Nephroma occultum, Pseudocyhellaria rainierensis,* and *Tholorna dissimilis.*

Bryophytes Associated with Late-successional and Old-growth Forests

Of the 106 species of bryophytes considered closely associated with late-successional and old-growth forest within the range of the northern spotted owl, 48 have been documented on the Gifford Pinchot National Forest and an additional 41 species are suspected to occur here. Fourteen of these species are considered Survey and Manage Species (Table 4-6). *Rhizomnium nudum* is the only Strategy 1 bryophyte which has been documented within an LSR, to date.

In addition, populations of *Buxbaumia viridis,* and *Ulota megalospora*, which are Protection Buffer species have been documented within LSRs.

Fungi Associated with Late-successional and Old-growth Forests

Of the 527 species of fungi considered closely associated with late-successional and old-growth forest within the range of the northern spotted owl, at least 128 have been documented on the Gifford Pinchot National Forest and at least an additional 166 species are suspected to occur here. The fungal flora has been poorly documented on the forest, with very few areas intensively inventoried (e.g., T.T. Munger Research Natural Area and the DEMO study areas). Nine Survey and Manage Species Strategy 1 fungi have been documented from within one or more LSRs (Table 4-6). These include *Aleuria rhenana, Bondarzewia montana, Cortinarius olympianus, Gymnopilus punctifolius, Helvella elastica, Leucogasster microsporus, Otidea smithii, Polyozellus multiplex,* and *Tylopilus pseudoscaber*.

Species and Habitats within LSR Not Associated with the Late-Successional Habitat

In addition to species considered by FEMAT to be closely associated with late-successional and old-growth forest, there are species of concern which occur within other habitats that may be affected by forest management. On the Gifford Pinchot National Forest, the Regional Forester's sensitive species include those that require openings, such as *Sisyrinchium sarmentosum, Calochortus longebarbartus* var. *longebarbatus, Botrychium pinnatum, Montia diffusa, Penstemon barrettiae, Polemonium carneum,* and *Veratrum insolitum*. Some of these species may be negatively affected by closing of the forest canopy, fire suppression, or encroachment by woody vegetation.

Non-Native Plant Species within the LSRs

Introduced plants may adversely affect the LSRs by competing with native plants and reducing their populations and in turn, those insects and other animals dependent upon them. The major exotic species which have been documented within LSRs include spotted knapweed (*Centaurea maculosa*), diffuse knapweed (*Centaurea diffusa*), black knapweed (*Centaurea nigra*) yellow hawkweed (*Hieracium pratense*), and scotch broom (*Cytissus scoparius*). All are designated as Class B noxious weeds. Most noxious weeds are early- to mid-seral species, which decline in abundance in later successional stages.

Table 4-4 Lichens considered closely associated with late-successional and old-growth forest. Documented (D) or suspected (S) on the Gifford Pinchot National Forest.

Species	Status	Habitat	Species	Status	Habitat	Species	Status	Habitat
Ahtiana sphaerosporella	D	arboreal (leafy)	*Hypygymnia duplicata*	S	rare arboreal (leafy)	*Peltigera neopolydactyla*	D	soil
Alectoria lata	D	arboreal (forage)	*Icmadophila ericetorum*	D	decaying wood	*Peltigera pacifica*	D	nitrogen-fixing
Alectoria sarmentosa	D	arboreal (forage)	*Leptogium burnetiae var. hirsutum*	S	riparian	*Peltigera venosa*	D	soil
Alectoria vancouverensis	D	arboreal (forage)	*Leptogium cyanescens*	S	riparian	*Pertusaria amara*	S	tree boles
Baeomyces rufus	D	soil	*Leptogium gelatinosum*	S	rock	*Pilophorus acicularis*	D	rock
Bryoria capillaris	D	arboreal (forage)	*Leptogium rivale*	D	aquatic	*Pilophorus clavatus*	D	rock
Bryoria friabilis	D	arboreal (forage)	*Leptogium saturninum*	D	riparian	*Pilophorus nigricaulis*	D	rare rock
Bryoria glabra	D	arboreal (forage)	*Leptogium teretiusculum*	D	riparian	*Platismatia herrei*	D	arboreal (leafy)
Bryoria pikei	D	arboreal (forage)	*Lobaria hallii*	D	rare nitrogen-fixing	*Platismatia lacunosa*	D	riparian
Bryoria pseudofuscescens	D	arboreal (forage)	*Lobaria linita*	D	rare nitrogen-fixing	*Platismatia norvegica*	D	arboreal (leafy)
Bryoria subcana	D	rare oceanic influenced	*Lobaria oregana*	D	nitrogen-fixing	*Platismatia stenophylla*	D	arboreal (leafy)
Calicium abietinum	D	pin	*Lobaria pulmonaria*	D	nitrogen-fixing	*Protoparmelia ochrococca*	D	tree boles
Calicium adaequatum	D	pin	*Lobaria scrobiculata*	D	nitrogen-fixing	*Pseudocyphellaria anomala*	D	nitrogen-fixing
Calicium adspersum	S	pin	*Loxospora sp. nov. "corallifera"*	D	oceanic	*Pseudocyphellaria anthraspis*	D	nitrogen-fixing
Calicium glaucellum	D	pin	*Melanelia subelegantula*	D	arboreal (leafy)	*Pseudocyphellaria crocata*	D	nitrogen-fixing
Calicium viride	D	pin	*Mycoblastus sanguinarius*	D	tree boles	*Pseudocyphellaria rainierensis*	D	rare nitrogen-fixing
Cavernularia hultenii	D	arboreal (leafy)	*Mycocalicium subtile*	S	pin	*Ramalina thrausta*	D	riparian
Cavernularia lophyrea	S	arboreal (leafy)	*Nephroma bellum*	D	nitrogen-fixing	*Sphaerophorus globosus*	D	arboreal (leafy)
Cetraria californica	S	oceanic	*Nephroma helveticum*	D	nitrogen-fixing	*Stenocybe major*	S	pin
Cetraria subalpina	D	arboreal (leafy)	*Nephroma laevigatum*	D	nitrogen-fixing	*Sticta beauvoisii*	S	nitrogen-fixing
Cetrelia cetrarioides	D	riparian	*Nephroma occultum*	D	rare nitrogen-fixing	*Sticta fuliginosa*	D	nitrogen-fixing
Chaenotheca brunneola	D	pin	*Nephroma parile*	D	nitrogen-fixing	*Sticta limbata*	D	nitrogen-fixing
Chaenotheca ferruginea	S	pin	*Nephroma resupinatum*	D	nitrogen-fixing	*Tholurna dissimilis*	D	rare arboreal (leafy)
Cladonia bacillaris	S	decaying wood	*Niebla cephalota*	U	rare oceanic influenced	*Tuckermannopsis pallidula*	D	arboreal (leafy)
Cladonia bellidiflora	D	decaying wood	*Parmotrema chinense*	S	arboreal (leafy)	*Usnea filipendula*	D	arboreal (forage)
Cladonia cenotea	S	decaying wood	*Peltigera collina*	D	nitrogen-fixing	*Usnea longissima*	D	riparian
Cladonia macilenta	S	decaying wood	*Peltigera horizontalis*	S	soil	*Xylographa abietina*	S	decaying wood
Cladonia norvegica	D		*Peltigera leucophlebia*	S	soil	*Xylographa vitiligo*	S	decaying wood
Cladonia umbricola	D	decaying wood	*Ochrolechia androgyna*	D	tree boles			
Collema nigrescens	D	riparian	*Ochrolechia oregonensis*	D	tree boles			
Cyphelium inquinans	S	pin	*Pannaria leucostictoides*	D	nitrogen-fixing			
Dendriscocaulon intricatulum	D	rare nitrogen-fixing	*Pannaria mediterranea*	S	nitrogen-fixing			
Dermatocarpon luridum	S	aquatic	*Pannaria pezizoides*	S	soil			
Epilichen scabrosus	S	soil	*Pannaria rubiginosa*	D	rare nitrogen-fixing			
Erioderma sorediatum	S	rare oceanic influenced	*Pannaria saubinetii*	D	nitrogen-fixing			
Hypocenomyce friesii	S	tree boles	*Parmelia kerguelensis=P. pseudosulcata*	S	arboreal (leafy)			
Hypogymnia oceanica	D	rare oceanic influenced	*Parmelia squarrosa*	D	arboreal (leafy)			
Hypogymnia rugosa	D	arboreal (leafy)	*Parmeliopsis hyperopta*	D	tree boles			
Hypogymnia metaphysodes	D	arboreal (leafy)	*Parmotrema arnoldii*	S	arboreal (leafy)			
Hypogymnia vittata	S		*Peltigera neckeri*	S	nitrogen-fixing			

Table 4-5 Bryophytes considered closely associated with late-successional and old-growth forest. Documented (D) or suspected (S) on the Gifford Pinchot National Forest.

Species	Status	Habitat	Species	Status	Habitat
Antitrichia curtipendula	D	canopy interior	*Lophozia incisa*	D	decaying wood-abundant
Apometzgeria pubescens	S	flood plain	*Lophozia longiflora*	S	decaying wood-less common
Bazzania ambigua	S	decaying wood-less common	*Lophozia ventricosa*	S	decaying wood-abundant
Bazzania denudata	S	decaying wood-less common	*Marsupella emarginata var. aquatica*	S	rare
Bazzania tricrenata	S	decaying wood-less common	*Metzgeria conjugata*	S	flood plain
Blepharostoma trichophyllum	D	decaying wood-abundant	*Pellia epiphylla*	S	flood plain
Brachythecium hylotapetum	D	shaded duff/humic soil	*Pellia neesiana*	D	flood plain
Brotherella roelli	S		*Plagiochila asplenioides complex*	D	wet shaded humic soil
Bryum gemmascens	S	shaded rock outcrop w/ thin soil	*Plagiomnium insigne*	D	flood plain
Buxbaumia piperi	D	decaying wood-less common	*Plagiothecium piliferum*	D	shaded rock outcrop w/ thin soil
Buxbaumia viridis	D	decaying wood-less common	*Plagiothecium undulatum*	D	decaying wood-abundant
Calypogeia fissa	D	wet shaded humic soil	*Porotrichum bigelovii*	D	flood plain
Calypogeia muelleriana	D	wet shaded humic soil	*Pseudoleskea baileyi*	S	tree boles/understory
Calypogeia neesiana	S	decaying wood-abundant	*Pseudoleskea stenophylla*	D	tree boles/understory
Calypogeia suecica	S	decaying wood-less common	*Pseudotaxiphyllum elegans*	D	shaded mineral soil
Cephalozia bicuspidata sp. lammersiana	S	decaying wood-abundant	*Pterigynandrum filiforme*	S	tree boles/understory
Cephalozia connivens	S	decaying wood-abundant	*Ptilidium californicum*	D	tree boles/understory
Cephalozia lunulifolia	S	decaying wood-abundant	*Racomitrium aciculare*	D	splash zone
Chiloscyphus polyanthos	S	aquatic (submerged)	*Racomitrium aquaticum*	S	
Conocephalum conicum	D	flood plain	*Racomitrium obesum*	S	flood plain
Dichodontium pellucidum	D	splash zone	*Racomitrium pacificum*	D	rare
Dicranella palustris	S	flood plain	*Radula bolanderi*	D	tree boles/understory
Dicranum fuscescens	D	tree boles/decaying wood	*Rhizomnium glabrescens*	D	decaying wood-abundant
Diplophyllum albicans	S		*Rhizomnium nudum*	D	flood plain
Diplophyllum plicatum	S		*Rhytidiadelphus subpinnatus*	S	flood plain
Ditrichum schimperi	S	shaded mineral soil	*Rhytidiopsis robusta*	D	shaded duff/humic soil
Douinia ovata	D	canopy interior	*Riccardia latifrons*	D	decaying wood-abundant
Encalypta brevicolla var. crumiana	S		*Riccardia palmata*	S	decaying wood-less common
Fissidens ventricosus	D	aquatic (submerged)	*Roellia roellii*	D	shaded duff/humic soil
Fontinalis howellii	D		*Scapania bolanderi*	D	tree boles/decaying wood
Geocalyx graveolens	S	decaying wood-less common	*Scapania umbrosa*	D	decaying wood-less common
Herbertus aduncus	S		*Scapania undulata*	D	aquatic (submerged)
Herzogiella seligeri	S	decaying wood-less common	*Schistidium agassizii*	S	flood plain
Heterocladium dimorphum	D	shaded rock outcrop w/ thin soil	*Schistidium rivulare*	D	splash zone
Heterocladium macounii	D	shaded rock outcrop w/ thin soil	*Schistostega pennata*	S	rare
Heterocladium procurrens	D	shaded rock outcrop w/ thin soil	*Scouleria aquatica*	D	splash zone
Hookeria lucens	S	flood plain	*Scouleria marginata*	S	
Hypnum circinale	D	tree boles/decaying wood	*Tetraphis geniculata*	D	
Isoterygiopsis pulchella	S	wet shaded humic soil	*Tetraphis pellucida*	D	decaying wood-abundant
Jungermannia atrovirens	S	splash zone	*Thamnobryum neckeroides*	D	
Lepidozia reptans	D	decaying wood-abundant	*Timmia austriaca*	D	shaded rock outcrop w/ thin soil
Lophocolea bidentata	S	decaying wood-abundant	*Tritomaria exsectiformis*	S	rare
Lophocolea cuspidata	S	decaying wood-abundant	*Tritomaria quinquedentata*	S	
Lophocolea heterophylla	D	decaying wood-abundant	*Ulota megalospora*	D	canopy exterior
			Ulota obtusiuscula	D	canopy exterior

Table 4-6 Fungi considered closely associated with late-successional and old-growth forest. Documented (D) or suspected (S) on the Gifford Pinchot National Forest.

Species	Status	Species	Status	Species	Status	Species	Status
Albatrellus avellaneus	S	*Clitocybe clavipes*	S	*Cortinarius rainierensis*	S	*Gyromitra esculenta*	D
Albatrellus ellisii	D	*Clitopilus prunulus*	D	*Cortinarius renidens*	S	*Gyromitra infula*	D
Albatrellus flettii	D	*Collybia acervata*	D	*Cortinarius salor*	S	*Gyromitra melaleucoides*	S
Aleuria rhenana	D	*Collybia bakerensis*	S	*Cortinarius traganus*	D	*Gyromitra montana*	D
Amanita constricta	S	*Collybia butryracea*	S	*Cortinarius vanduzerensis*	D	*Hebeloma crustuliniforme*	D
Amanita farinosa	D	*Collybia maculata var. maculata*	S	*Cortinarius variipes*	S	*Helvella compressa*	D
Amanita franchetii	D	*Collybia maculata var. occidentalis*	S	*Cortinarius vibratilis*	S	*Helvella crassitunicata*	D
Amanita gemmata	S	*Collybia maculata var. scorzonerea*	S	*Cortinarius violaceus*	D	*Helvella elastica*	S
Amanita inaurata	S	*Collybia racemosa*	S	*Cortinarius wiebeae*	S	*Helvella maculata*	D
Amanita muscaria var. formosa	D	*Coltrichia perennis*	D	*Cortinarius zinziberatus*	S	*Hemimycena delectabilis=Mycena delectabilis*	S
Amanita pachycolea	D	*Cordyceps capitata*	D	*Cortinarius scutulatus*	S	*Hericum abietis*	D
Amanita pantherina	S	*Cordyceps ophioglossoides*	S	*Cudonia circinans*	D	*Hydnum repandum*	D
Amanita porphyria	D	*Cortinarius acutus*	D	*Cudonia monticola*	D	*Hydnum umbilicatum*	S
Amanita smithiana	D	*Cortinarius allutus*	D	*Dermocybe idahoensis*	S	*Hygrocybe conica=Hygrophorus conicus*	D
Amphinema byssoides	S	*Cortinarius anomalus*	D	*Dermocybe phoenicea var. occidentalis*	S	*Hygrocybe laeta*	S
Asterophora lycoperdoides	D	*Cortinarius badiovinaceus*	S	*Dermocybe sanguinea*	S	*Hygrophoropsis aurantiaca*	D
Asterophora parasitica	S	*Cortinarius callisteus*	S	*Dermocybe semisanguinea*	D	*Hygrophorus bakerensis*	D
Baeospora myriadophylla	S	*Cortinarius calochrous*	D	*Dichostereum granulosum*	S	*Hygrophorus camarophyllus*	D
Boletus chrysenteron	S	*Cortinarius camphoratus*	S	*Elaphomyces granulatus*	S	*Hygrophorus chrysodon*	S
Boletus coniferarum	S	*Cortinarius caninus*	S	*Endogone oregonensis*	S	*Hygrophorus eburneus*	D
Boletus edulis	D	*Cortinarius collinitus var. collinitus*	D	*Endoptychum despressum*	S	*Hygrophorus erubescens*	S
Boletus mirabilis	D	*Cortinarius cyanites*	S	*Fayodia gracilipes (rainierensis)*	S	*Hygrophorus inocybiformis*	D
Boletus piperatus	D	*Cortinarius delibutus*	S	*Galerina atkinsoniana*	S	*Hygrophorus vernalis*	S
Boletus smithii	S	*Cortinarius evernius*	D	*Galerina heterocystis*	S	*Hypholoma capnoides= Naematoloma capnoides*	D
Boletus subtomentosus	D	*Cortinarius gentilis*	S	*Galerina mammillata*	S	*Hypholoma dispersum*	S
Boletus truncatus	S	*Cortinarius glaucopus*	D	*Galerina sphagnicola*	S	*Hypomyces lactifluorum*	D
Boletus zelleri	S	*Cortinarius griseoviolaceus*	S	*Galerina vittaeformis*	S	*Hypomyces luteovirens*	D
Bondarzewia mesenterica	D	*Cortinarius herpeticus*	S	*Ganoderma oregonense*	D	*Inocybe calamistrata*	S
Cantharellus cibarius	D	*Cortinarius infractus*	S	*Ganoderma tsugae*	D	*Inocybe hirsuts var. maxima*	S
Cantharellus formosus	D	*Cortinarius junghuhnii*	S	*Gastroboletus subalpinus*	D	*Inocybe lanuginosa*	D
Cantharellus subalbidus	D	*Cortinarius laniger*	S	*Gastroboletus turbinatus*	D	*Inocybe sororia*	D
Cantharellus tubaeformis	D	*Cortinarius limonius*	S	*Gelatinodiscus flavidus*	D	*Ischnoderma resinosum*	D
Catathelasma ventricosa	D	*Cortinarius magnivelatus*	S	*Geopora cooperi f. cooperi*	S	*Kuhneromyces ligicola*	S
Chroogomphus tomentosus	D	*Cortinarius miniatopus*	S	*Gomphus bonarii*	D	*Kuhneromyces mutabilis*	S
Chrysomphalina aurantiaca	S	*Cortinarius mutabilis*	D	*Gomphus clavatus*	D	*Laccaria amethysteo-occidentalis*	D
Clavaria americana	S	*Cortinarius obtusus*	S	*Gomphus floccosus*	D	*Laccaria bicolor*	D
Clavariadelphus spp.	D	*Cortinarius olympianus*	D	*Gomphus kauffmanii*	D	*Laccaria laccata*	D
Clavulina cinerea	D	*Cortinarius paleaceus*	S	*Gymnopilus hybridus*	S	*Lactarius alnicola*	S
Clavulina cristata	D	*Cortinarius paragaudis*	D	*Gymnopilus puntifolius*	S	*Lactarius deliciosus var. deliciosus*	D
Clavulina ornatipes	S	*Cortinarius pinetorum sensu Kaufman*	S	*Gymnopilus spectabilis*	S	*Lactarius deliciosus var. olivaceosordidus*	S
Clitocybe avellaneialba	D	*Cortinarius pseudoarquatus*	D	*Gyromitra californica*	D	*Lactarius fallax var. concolor*	S

Table 4-6 Fungi considered closely associated with late-successional and old-growth forest. Documented (D) or suspected (S) on the Gifford Pinchot National Forest.

(Continued)

Species	Status	Species	Status	Species	Status
Lactarius fallax var. fallax	S	*Nolanea cetrata*	S	*Rozites caperata*	D
Lactarius kauffmanii	D	*Nolanea cuneata*	S	*Russula aeruginea*	S
Lactarius olivaceoumbrinus	S	*Nolanea staurospora*	S	*Russula albonigra*	D
Lactarius olympianus	S	*Nolanea stricta*	S	*Russula bicolor*	S
Lactarius pallescens	D	*Oligoporus guttulatus*	S	*Russula brevipes var. acrior*	S
Lactarius pseudomucidus	D	*Ostenia obducta*	S	*Russula crassotunicata*	D
Lactarius scrobiculatus	D	*Otidea leporina*	S	*Russula decolorans*	S
Lactarius subviscidus	S	*Otidea onotica*	S	*Russula nigricans*	D
Laetiporus sulphureus	D	*Otidea smithii*	S	*Russula occidentalis*	S
Limacella glioderma	S	*Oxyporus nobilissimus*	D	*Russula olivascens*	S
Lycoperdon nigrescens=L. foetidum	D	*Paxillus atrotomentosus*	S	*Russula pelargonia*	S
Lycoperdon pyriforme	S	*Paxillus panuoides*	S	*Russula rosacea*	S
Macowanites chlorinosmus	S	*Phaeocollybia fallax*	S	*Russula variata*	S
Macowanites mollis	S	*Phaeocollybia kauffmanii*	S	*Russula xeramphelina*	D
Marascmiellus pluvius	S	*Phaeocollybia olivacea*	S	*Sarcodon fuscoindicum*	D
Marasmiellus papillatus	S	*Phaeocollybia pseudofestiva*	S	*Sarcodon imbricatus*	D
Marasmius pallidocephalus	S	*Phellodon atratum*	D	*Sarcosoma mexicana*	D
Marasmius salalis	S	*Phlogiotis helvelloides*	D	*Sarcospaera eximia*	D
Melanotus textilis	S	*Pholiota albivelata*	S	*Sparassis crispa*	D
Mycena amabilissima	S	*Pholiota astragalina*	D	*Spathularia flavida*	D
Mycena amicta	S	*Pholiota decorata*	S	*Stagnicola perplexa*	S
Mycena aurantiidisca	S	*Pholiota flammans*	S	*Stropharia hornemannii*	S
Mycena aurantiomarginata	S	*Pholiota flavida*	S	*Suillus punctatipes*	D
Mycena capillaripes	D	*Pholiota lubrica*	S	*Thaxterogaster pingue*	D
Mycena elegantula	S	*Pholiota scamba*	S	*Tomentella spp.*	S
Mycena epipterygia	D	*Phylloporus rhodoxanthus*	D	*Trechispora farnacea*	S
Mycena galericulata	S	*Phytoconis ericetorum*	S	*Trechispora mollusca*	S
Mycena galopus	S	*Pithya vulgaris*	S	*Tricholoma flavovirens*	D
Mycena hudsoniana	S	*Plectania melastoma*	D	*Tricholoma focale=Armillaria zelleri*	S
Mycena leptocephala	D	*Pleurocybella porrigens*	S	*Tricholoma imbricatum*	S
Mycena lilacifolia	S	*Polyozellus multiplex*	D	*Tricholoma inamoenum*	S
Mycena longiseta	S	*Polyporoletus sublividus*	S	*Tricholoma magnivelare*	D
Mycena maculata	S	*Polyporus melanopus*	S	*Tricholoma pessundatum*	S
Mycena monticola	S	*Pycnoporellus alboluteus*	S	*Tricholoma portentosum*	D
Mycena overholtsii	D	*Ramaria spp.*	D	*Tricholoma saponaceum*	D
Mycena rosella	D	*Ramaria araiospora*	D	*Tricholoma sejunctum*	S
Mycena sanguinolenta	S	*Ramaria stuntzii*	D	*Tricholoma vaccinum*	D
Mycena strobilinoides	D	*Resupinatus applicatus*	S	*Tricholoma virgatum*	D
Mycena tenax	S	*Rhizopogon evadens var. subalpinus*	D	*Tricholomopsis decora*	D
Mycena viscosa	S	*Rhodocybe nitida=Entoloma nitidum*	S	*Tricholomopsis flavissima*	S
Mythicomyces corneipes	S	*Rhodocybe speciosa*	S	*Tricholomopsis fulvescens*	S
Neournula pouchetii	S	*Rhodocybe trachyospora var. purpureoviolaceum*	S	*Tylopilus pseudoscaber*	D
Nivatogastrium nubigenum	D	*Rickenella setipes*	D	*Xeromphalina cauticinalis*	D
				Xeromphalina cornui	S

Wildlife Habitat

Late-Successional Dependent Species

Current condition of wildlife habitat in LSRs is different than desired conditions. There is currently less late-successional habitat in LSRs and Riparian Reserves than is expected to occur in the future and that habitat is fragmented to varying degrees. Fragmentation causes reduction in the amount and quality of habitat and isolation of habitat patches.

In general, LSRs were designated in areas where the most late-successional habitat still exists. Thus, the LSRs currently support a host of species that utilize late-successional habitat (Table 4-7) which include species such as the spotted owl that appear to be dependent on older forest and other species that use older forests as well as other habitats (see Vegetation Structure dependent column, Table 4-7).

The "dependent" species are keying in on a combination of habitat components provided by late-successional forests, including: large trees, snags and defective trees, down wood, moderated temperature and moisture regimes, snow interception, forest floor duff and litter, and multilayered canopies. Many of the habitat "generalists" utilize snags and down logs and will also use younger forests if those components are present. This group includes cavity nesting birds, terrestrial amphibians, and small mammals (see CWD column, Table 4-7). A number of the song bird "generalists" are attracted to shrubs in canopy gaps and the understory of multilayered late-successional forests. This habitat component also exists in open habitats but is usually absent from young forests.

Another group of species, referred to as "contrast" species (Vegetation Structure column, Table 4-7) use late-successional habitat for nesting, hiding, or resting but forage in adjacent open habitats. Due to fragmentation, primarily from past timber harvest, habitat for these species is more abundant currently than it has been in the past. This group includes elk and large raptors such as red-tail hawks, great horned owls, and great gray owls. Several species of bats roost in large snags in late-successional forests but forage in open habitats. Snags in late-successional forest provide moderated temperatures which are important to roosting bats.

Table 4-7 Wildlife Species Using Late-Successional Habitat by LSR

Common Name	Scientific Name	Vegetation Structure	CWD	Status	LSR								
					Wind	Lewis	Quartz	Woods	Nisqually	Packwood	Mineral	Gotchen	Peterson
AMPHIBIANS													
Northwestern salamander	*Ambystoma gracile*	General	L		S	D	S	D	S	S	S	S	S
Cope's giant salamander	*Dicamptodon copei*	Riparian		FSS, J2	D	D	S	S	S	S	S		
Pacific giant salamander	*Dicamptodon tenebrosus*	Riparian	L		D	D	D	S	D	S	S	S	S
Cascade torrent salamander	*Rhyacotriton cascadae*	Riparian		J2	S	S	S	S	S	S	S		
Ensatina	*Ensatina eschscholtzii*	General	L		S	S	D	S	S	S	S	S	S
Larch mountain salamander	*Plethodon larselli*	Late		S&M, FSS	D	D	P	P	P	D	P		
Van dyke's salamander	*Plethodon vandykei*	Riparian	L	S&M	S	S	S	S	S	S	D		
Western red-backed salamander	*Plethodon vehiculum*	General	L		S	S	D	S	S	S	S	S	S
Rough-skinned newt	*Taricha granulosa*	General			S	D	S	D	S	S	S	S	S
Pacific treefrog	*Pseudacris regilla*	General	L		D	D	S	D	S	S	S	S	S
Tailed frog	*Ascaphus truei*	Riparian	L	J2	D	D	D	D	D	D	S	S	S
Red-legged frog	*Rana aurora*	General			S	S	S	D	D	D	S		
Cascades frog	*Rana cascadae*	General			D	D	S	D	D	S	D	S	S
BIRDS													
Great blue heron	*Ardea herodias*	General			D	D	S	D	S	D	S	D	S
Wood duck	*Aix sponsa*	Riparian	SL		D	S	S	D	S	S	S	S	S
Harlequin duck	*Histrionicus histrionicus*	Riparian			D	D	S	D	D	D	S	S	S
Barrow's goldeneye	*Bucephala islandica*	Riparian	SL		S	S	S	D	S	S	S	S	S
Bufflehead	*Bucephala albeola*	General	S		S	S	D	D	S	S	S		
Hooded merganser	*Lophodytes cucullatus*	Riparian	S		S	S	S	D	S	S	S	S	S
Common merganser	*Mergus merganser*	Riparian	S	J2	D	S	S	S	S	S	S	S	S
Turkey vulture	*Cathartes aura*	Contrast	L		S	S	S	D	S	D	S	S	S
Osprey	*Pandion haliaetus*	General	S		S	S	S	S	S	S	S	S	S
Bald eagle	*Haliaeetus leucocephalus*	General	S	T&E	D	D	D	D	D	D	D	D	S
Sharp-shinned hawk	*Accipiter striatus*	General			D	D	S	D	S	S	D	D	S
Cooper's hawk	*Accipiter cooperii*	General			D	D	S	S	S	D	S	S	S
Northern goshawk	*Accipiter gentilis*	Late			D	D	S	D	D	D	D	D	D
Red-tailed hawk	*Buteo jamaicensis*	Contrast			D	D	S	D	S	D	D	D	S
Golden eagle	*Aquila chrysaetos*	Contrast			D	D	S	S	D	D	D	S	S
Peregrine falcon	*Falco peregrinus*	General		T&E	D	D		D	P	P			
Blue grouse	*Dendragapus obscurus*	General	L		S	S	S	D	S	S	D	D	S
Ruffed grouse	*Bonasa umbellus*	General	L		D	S	S	D	S	S	S	S	S
Wild turkey	*Meleagris gallopavo*	General	L		D	S	S	S	S	S	S	D	S
Marbled murrelet	*Brachyramphus marmoratus*	Late		T&E					P		D		
Band-tailed pigeon	*Columba fasciata*	General			S	S	S	S	D	S	D	S	S
Flammulated owl	*Otus flammeolus*	Contrast	S	PB								S	S
Great horned owl	*Bubo virginianus*	Contrast			D	D	S	D	D	D	D	D	D
Northern pygmy-owl	*Glaucidium gnoma*	General	S		D	D	S	D	D	D	D	D	D
Northern spotted owl	*Strix occidentalis caurina*	Late		T&E	D	D	D	D	D	D	D	D	D

Table 4-7 Wildlife Species Using Late-Successional Habitat by LSR (con't)

Common Name	Scientific Name	Vegetation Structure	CWD	Status	LSR								
					Wind	Lewis	Quartz	Woods	Nisqually	Packwood	Mineral	Gotchen	Peterson
Barred owl	*Strix varia*	Late	S		D	D	S	D	D	D	D	S	D
Great gray owl	*Strix nebulosa*	Contrast	S	S&M	S						D	D	S
Long-eared owl	*Asio otus*	General			S	S	S	S	S	S	S		
Northern saw-whet owl	*Aegolius acadicus*	General	S		S	S	S	D	D	S	S	S	S
Black swift	*Cypseloides niger*	General							P	P			
Vaux's swift	*Chaetura vauxi*	General	S		S	D	S	S	S	S	S	S	S
Rufous hummingbird	*Selasphorus rufus*	General			D	S	S	S	S	S	S	S	S
Belted kingfisher	*Ceryle alcyon*	Riparian	S		S	D	S	S	S	S	S	S	S
Lewis' woodpecker	*Melanerpes lewis*	Contrast	SL		S							S	S
Red-naped sapsucker	*Sphyrapicus nuchalis*	General	S		S	S		S	S	S		S	S
Red-breasted sapsucker	*Sphyrapicus ruber*	General	S		D	S	S	D	S	S	S	S	S
Williamson's sapsucker	*Shpyrapicus thyroideus*	Late/Mid	S		S	S		S	S	S		D	S
Hairy woodpecker	*Picoides villosus*	General	SL		S	S	S	D	S	S	S	S	S
White-headed woodpecker	*Picoides albolarvatus*	General	S	PB	S							S	S
Three-toed woodpecker	*Picoides tridactylus*	Late	SL		S	D	P	P	P	D	P	S	S
Black-backed woodpecker	*Picoides arcticus*	Late	S	J2	D	D	P	P	P	S	P	D	S
Northern flicker	*Colaptes auratus*	General	SL		D	S	S	S	S	S	S	S	S
Pileated woodpecker	*Dryocopus pileatus*	Late	SL		D	D	S	D	D	D	D	D	D
Olive-sided flycatcher	*Contopus borealis*	Contrast			S	S	S	S	S	S	S	S	S
Hammond's flycatcher	*Empidonax hammondii*	General			S	S	S	S	S	S	S	S	S
Pacific slope flycatcher	*Empidonax difficilis*	Late			S	S	S	S	S	S	S	S	S
Purple martin	*Progne subis*	General	S		P		P	P	P	P	P		
Pygmy nuthatch	*Sitta pygmaea*	General	S	PB	S	S		P	P	S	P	S	S
Brown creeper	*Certhia americana*	Late/Mid	S		S	S	S	S	S	S	S	S	S
Winter wren	*Troglodytes troglodytes*	General	L		S	S	S	S	S	S	S	S	S
American dipper	*Cinclus mexicanus*	Riparian			S	S	S	S	S	S	D	S	S
Golden-crowned kinglet	*Regulus satrapa*	General			S	S	S	S	S	S	S	S	S
Ruby-crowned kinglet	*Regulus calendula*	General			S	S	S	S	S	S	S	S	S
Townsend's solitaire	*Myadestes townsendi*	General	L		S	S	S	S	S	S	S	S	S
Swainson's thrush	*Catharus ustulatus*	General			S	S	S	S	S	S	S	S	S
Hermit thrush	*Catharus guttatus*	General			S	S	S	S	S	S	S	S	S
Varied thrush	*Ixoreus naevius*	General			S	S	S	S	S	S	S	S	S
Solitary vireo	*Vireo solitarius*	General			D	S	S	S	S	S	S	S	S
Warbling vireo	*Vireo gilvus*	General			S	S	S	S	S	S	S	S	S
Yellow-rumped warbler	*Dendroica coronata*	General			S	S	S	D	S	S	S	S	S
Black-throated gray warbler	*Dendroica nigrescens*	General			S	S	S	S	S	S	S	S	D
Townsend's warbler	*Dendroica townsendi*	Late/Mid			S	S	S	S	S	S	S	D	S
Hermit warbler	*Dendroica occidentalis*	Late/Mid			S	S	S	S	S	S	S	S	S
Wilson's warbler	*Wilsonia pusilla*	General			S	S	S	S	S	S	S	S	S
Western tanager	*Piranga ludoviciana*	General			D	S	S	S	S	S	S	D	S
Dark-eyed junco	*Junco hyemalis*	General			S	S	S	S	S	S	S	S	S
Pine grosbeak	*Pinicola enucleator*	General			S	S	S	S	S	S	S	S	S

Table 4-7 Wildlife Species Using Late-Successional Habitat by LSR (con't)

Common Name	Scientific Name	Vegetation Structure	CWD	Status	LSR								
					Wind	Lewis	Quartz	Woods	Nisqually	Packwood	Mineral	Gotchen	Peterson
Cassin's finch	*Carpodacus cassinii*	Contrast			S	S	S	S	S	S	S	S	S
Red crossbill	*Loxia curvirostra*	General			S	S	S	S	S	S	S	S	S
White-winged crossbill	*Loxia leucoptera*	Late			P	P	P	P	P	P	P	P	P
Pine siskin	*Carduelis pinus*	General			S	S	S	S	S	S	S	S	S
Evening grosbeak	*Coccothraustes vespertinus*	General			S	S	S	S	S	S	S	S	S
MAMMALS													
Masked shrew	*Sorex cinereus*	General			S	S	S	S	S	S	S		
Dusky shrew	*Sorex monticolus*	General	L		S	S	S	S	S	S	S	S	S
Water shrew	*Sorex palustris*	Riparian	L		S	S	S	S	S	S	S		
Pacific water shrew	*Sorex bendirii*	Riparian	L		S	S	S	S	S	S	S		
Trowbridge's shrew	*Sorex trowbridgii*	Late	L		D	S	S	S	S	S	S	S	S
Shrew-mole	*Neurotrichus gibbsii*	Late	L		S	S	S	S	S	S	S		
Coast mole	*Scapanus orarius*	General			S	S	S	S	S	S	S	S	S
Little brown myotis	*Myotis lucifugus*	Contrast	S		D	S	S	S	S	S	D	S	S
Yuma myotis	*Myotis yumanensis*	General	S		S	S	S	S	S	S	S	S	S
Keen's myotis	*Myotis keenii*	Contrast	S	J2			P	P	P	P	P		
Long-eared myotis	*Myotis evotis*	General	S	S&M	S	S	S	S	S	S	S	S	S
Fringed myotis	*Myotis thysanodes*	Contrast		S&M	D	S	S	S	S	S	S		
Long-legged myotis	*Myotis volans*	General	S	S&M	S	S	S	S	S	S	S	S	S
California myotis	*Myotis californicus*	Contrast	S		D	S	S	S	S	S	S	S	S
Western small-footed bat	*Myotis ciliolabrum*	General			S	S	S	S	S	S	S	S	S
Silver-haired bat	*Lasionycteris noctivagans*	Contrast	S	S&M	D	S	S	S	S	S	S	S	S
Big brown bat	*Eptesicus fuscus*	Contrast	S		S	S	S	S	S	S	S	S	S
Hoary bat	*Lasiurus cinereus*	General		J2	D	S	S	S	S	S	S	S	S
Townsend's big-eared bat	*Plecotus townsendii*	Contrast		FSS	D	D					D	S	S
Townsend's chipmunk	*Tamias townsendii*	General	L		S	S	S	S	S	S	S	S	S
Cascade golden-mantled ground squirrel	*Spermophilus saturatus*	General	L		S	S	S	S	S	S	S	S	S
Douglas' squirrel	*Tamiasciurus douglasii*	General	SL		S	S	S	S	S	S	S	S	S
Northern flying squirrel	*Glaucomys sabrinus*	Late	S		S	S	S	S	S	S	S	S	S
Forest (long-tailed) deer mouse	*Peromyscus oreas*	General	L		D	S	S	S	S	S	S	S	S
Deer mouse	*Peromyscus maniculatus*	General	L		D	S	S	S	S	S	S	S	S
Bushy-tailed woodrat	*Neotoma cinerea*	Late/Mid			S	S	S	S	S	S	S	D	S
Southern red-backed vole	*Clethrionomys gapperi*	Late/Mid	L		D	S	S	S	S	S	S	S	S

Table 4-7 Wildlife Species Using Late-Successional Habitat by LSR (con't)

Common Name	Scientific Name	Vegetation Structure	CWD	Status	LSR								
					Wind	Lewis	Quartz	Woods	Nisqually	Packwood	Mineral	Gotchen	Peterson
Porcupine	*Erethizon dorsatum*	General	L		S	S	S	S	S	S	S	S	S
Gray wolf	*Canis lupus*	General		T&E	D	P	P	P	D	D	P	P	P
Black bear	*Ursus americanus*	General	L		D	D	D	D	D	D	D	D	D
Grizzly bear	*Ursus arctos*	General		T&E	E	E	E	E	E	E	E	E	E
Raccoon	*Procyon lotor*	General	S		S	S	S	S	S	S	S	S	S
Marten	*Martes americana*	Late	SL	J2	S	D	D	S	D	D	S	D	D
Fisher	*Martes pennanti*	Late	SL	J2	S	S	S	S	S	S	S	S	S
Ermine	*Mustela erminea*	General	L		S	S	S	S	S	S	S	S	S
Mink	*Mustela vison*	General	L		D	S	S	S	S	D	D	S	S
Wolverine	*Gulo gulo*	General		FSS	S	D	P	P	D	S	P	S	S
River otter	*Lutra canadensis*	Riparian			D	D	S	D	D	D	S	S	S
Mountain lion	*Felis concolor*	General			D	D	S	D	D	D	D	D	S
Lynx	*Felis lynx*	General	L	S&M	D	P	P	P	P	P	P	P	P
Elk	*Cervus elaphus*	Contrast			D	D	D	D	D	D	D	D	D
Black-tailed & mule deer	*Odocoileus hemionus*	General			D	D	D	D	D	D	D	D	D
Mountain goat	*Oreamnos americanus*	General			D	D	S	D	D	D		S	D

KEY:
CWD - Indicates species for which Coarse Woody Debris is an important habitat component: S - Snags; L - Logs; SL - Snags and Logs
Status: T&E - Federally Threatened or Endangered;
FSS - Forest Service Sensitive Species;
S&M - Survey and Manage Guidelines apply;
PB - Protection Buffer Standards and Guidelines apply;
J2 - Received additional analysis in Appendix J2 due to viability concerns.
Occurrence by LSR: D - Documented -WILDOBS, STRIX, DEMO Database
S - Suspected (occurrence likely though not documented)
P - Potential (habitat available but occurrence uncertain)
E - Extirpated

Table 4-8 Mollusks Assessed in the Northwest Forest Plan

Common Name	Scientific Name	Habitat	Status	LSR								
				Wind	Lewis	Quartz	Wood	Nisqually	Packwood	Mineral	Gotchen	Peterson
Land Snails												
Puget oregonian	*Cryptomastix devia*	Riparian	S&M	S(D)	S	S	S	S	S	S		
Columbia oregonian	*Cryptomastix hendersonii*	Talus/seeps	S&M	S								
Dalles sideband	*Monadenia fidelis minor*	Talus/seeps	S&M	S								
Dalles hesperian	*Vespericola depressa*	Talus/seeps	J2	P								
Slugs												
Evening field slug	*Deroceras hesperium*	Rip/OG	S&M	H	H	H	H	H	H	H		
Malone jumping-slug	*Hemphillia malonei*	OG	S&M	P								
Warty jumping-slug	*Hemphillia glandulosa*	OG/Rip	S&M	S	S	S	S	S	S	S		
Panther jumping-slug	*Hemphillia pantherina*	OG/Rip	S&M					S (D)				
Blue-grey tail-dropper	*Prophysaon coeruleum*	OG/Rip	S&M	H	H	H	H	H	H	H		
Palipose tail-dropper	*Prophysaon dubium*	Rip/Rock	S&M	H	H	S	S(D)	S	S(D)	H		
Freshwater Snails												
Columbia duskysnail	*Lyogyrus n. sp. 1*	Riparian	S&M	S(D)								
Shortface lanx	*Fisherola nuttalli nuttalli*	Riparian	J2	P								
Columbia pebble snail	*Fluminocola columbiana*	Riparian	J2	P								
Dalles juga	*Juga(J.) hemphilli dallesensis*	Riparian	J2	S								
Barren juga	*Juga (J.) hemphilli hemphilli*	Riparian	J2	P								
Brown juga	*Juga (J.) n. sp. 1*	Riparian	J2	S								
Tall juga	*Juga (J.) n. sp. 3*	Riparian	J2	H								
None	*Juga (O.) n. sp. 1*	Riparian	J2	S								
Rotund physa	*Physella (P.) columbiana*	Riparian	J2	H								
Nerite rams-horn	*Vorticifex neritoides*	Riparian	J2	S								
Freshwater clams												
California floater	*Anodonta californiensis*	Riparian	J2	H								

Status: S&M - Survey and Manage Standards and Guidelines apply to this species.
J2 - Species of concern - received additional analysis in Appendix J2 due to viability concerns.
Occurrence by LSR: D - Documented; (D) - Documented nearby; S - Suspected; P - Potential; H - Historic range
Sources: FEIS Appendix J2, Frest and Johannes (1993).

Table 4-9 Introduced Species by LSR

Common Name	Scientific Name	LSR								
		Wind	Lewis	Quartz	Woods	Nisqually	Packwood	Mineral	Gotchen	Peterson
Bullfrog	*Rana catesbeiana*	P								
Wild turkey	*Meleagris gallopavo*	D	D						D	S
California quail	*Callipepla californica*	P		P	P	P	P	P	P	P
Rock dove	*Columbia livia*	P		P	P	P	P	P	P	P
European starling	*Sturnus vulgaris*	D	P	S	D	S	S	S	S	S
House sparrow	*Passer domesticus*	D	P	S	D	S	S	S	S	S
Virginia opossum	*Didelphis virginiana*	S			D	S	S	S	P	P
House mouse	*Mus musculus*	S			S	S	S	S	P	P
Norway rat	*Rattus norvegicus*	P			P	P	P	P	P	P

Occurrence by LSR: D - Documented
S - Suspected (not documented but likely)
P - Potential (occurs adjacent to LSR, not documented within LSR)

Riparian Associated Species

Several species of amphibians are closely associated with riparian areas within late-successional forests. These species include: Cope's giant salamander, Pacific giant salamander, Cascade torrent salamander, Van Dykes salamander, and the tailed frog. These species require cold, clear water and cool, moist microclimates at the stream's edge. A few ducks are cavity nesters which require large snags in the vicinity of water. These species include: wood duck, Barrow's goldeneye, bufflehead, hooded merganser, and common merganser.

Survey and Manage Wildlife Species

The NWFP identified a host of species to be managed with the Survey and Manage standards and guidelines. The "Status" fields in Table 4-7, pages 4-13 through 4-16 and Table 4-8, page 4-17, indicates those wildlife and mollusk species, respectively, which occur or are expected to occur on the Gifford Pinchot that are considered Survey and Manage species. None of the known sites for mollusks are within LSRs though a few have been documented adjacent to LSRs. Most of the Survey and Manage wildlife species have been documented in LSRs.

Threatened, Endangered, Extirpated, and Sensitive Wildlife Species

The following federally threatened or endangered species have been documented to occur within LSRs (see Table 4-7): bald eagle, peregrine falcon, marbled murrelet, northern spotted owl, and gray wolf. These species will use late-successional habitat, and thus management of LSRs for late-successional habitat should have beneficial or no impact on these species. The exception may be the gray wolf, because prey populations of large herbivores are expected to decline in LSRs.

The spotted frog is a federal candidate species. The frog inhabits ponds and wetlands. Habitat for this species is not expected to be affected by management of LSRs.

Grizzly bears are the only species known to be extirpated from the Forest. The species has been sighted within 10 miles northwest of the Nisqually LSR on private property. Grizzly bears and gray wolf are sensitive to road density.

Forest Service sensitive species that use late-successional forests are identified in Table 4-7. All should benefit by management for late-successional habitat in LSRs. Additional sensitive species include: ferruginous hawk, western pond turtle, common loon, and sandhill crane. Ferruginous hawks occasionally may occur in open habitats on the east side of the Forest. The other species use wetlands, lakes, and ponds. Habitat for these additional species is not expected to be impacted by management of LSRs.

Critical Northern Spotted Owl Habitat

Critical habitat is established as part of recovery plan efforts for endangered species. It is designed to maintain and protect habitat components essential for recovery of an endangered species. Eight critical habitat units totaling 596,159 acres were established for the spotted owl on the Gifford Pinchot National Forest in 1992.

Establishment of LSRs under the NWFP purposefully encompassed critical habitat units. Since the objective of spotted owl critical habitat was to maintain and protect old-growth and late-successional forest, the purposes of the LSRs and critical habitat are similar. Across the Forest, the LSRs cover 371,623 acres or 62 percent of the critical habitat units. Not all of the LSRs are contained within the critical habitat units. Thus, some portions of LSRs are not designated as critical habitat. Only one critical habitat unit does not contain a LSR; unit WA-39 in the Upper Kalama River watershed.

Map 4-1 and Table 4-11 display area for each critical habitat unit and the area of overlap with a LSR.

Marbled Murrelet critical habitat was established in 1996, after implementation of the NWFP. In this case, certain LSRs were designated as critical habitat on federal lands. On the Gifford Pinchot National Forest the Mineral and Nisqually LSRs are designated as Marbled Murrelet critical habitat.

Table 4-10 displays suitable owl habitat in each LSR, on timber suitable and non-timber suitable lands and the Forest total.

Table 4-10 Suitable Owl Habitat by Land Class

Land Class	Nesting	Foraging	Dispersal	Non-Habitat	Unknown
Gotchen LSR	5,997	5,983	1,423	1,765	4
Lewis LSR	37,644	27,908	17,599	37,315	173
Mineral LSR	12,323	7,401	2,177	15,164	525
Nisqually LSR	13,469	56	15,214	22,616	2
Packwood LSR	18,825		7,213	19,066	4
Peterson LSR	7,166	714	1,033	6,593	8
Quartz LSR	5,665	1,289	430	1,474	1
Wind LSR	32,155	28,404	24,152	40,162	127
Woods LSR	15,128	3,714	4,622	4,768	11
LSR Totals	**148,373**	**75,469**	**73,863**	**148,923**	**855**
Other Non-Timber Suitable Lands	**137,622**	**58,892**	**101,029**	**349,795**	**1,900**
Total Non-Timber Suitable	**285,995**	**134,361**	**174,891**	**498,718**	**2,755**
Timber Suitable Lands:					
Matrix	54,880	26,281	31,344	104,530	284
Cispus AMA	18,813	9,530	9,994	16,313	18
Total Timber Suitable	**73,693**	**35,812**	**41,338**	**120,843**	**302**
Grand Total	**359,688**	**170,173**	**216,229**	**619,561**	**3,057**

Map 4-1 LSR Associations with Critical Habitat Units

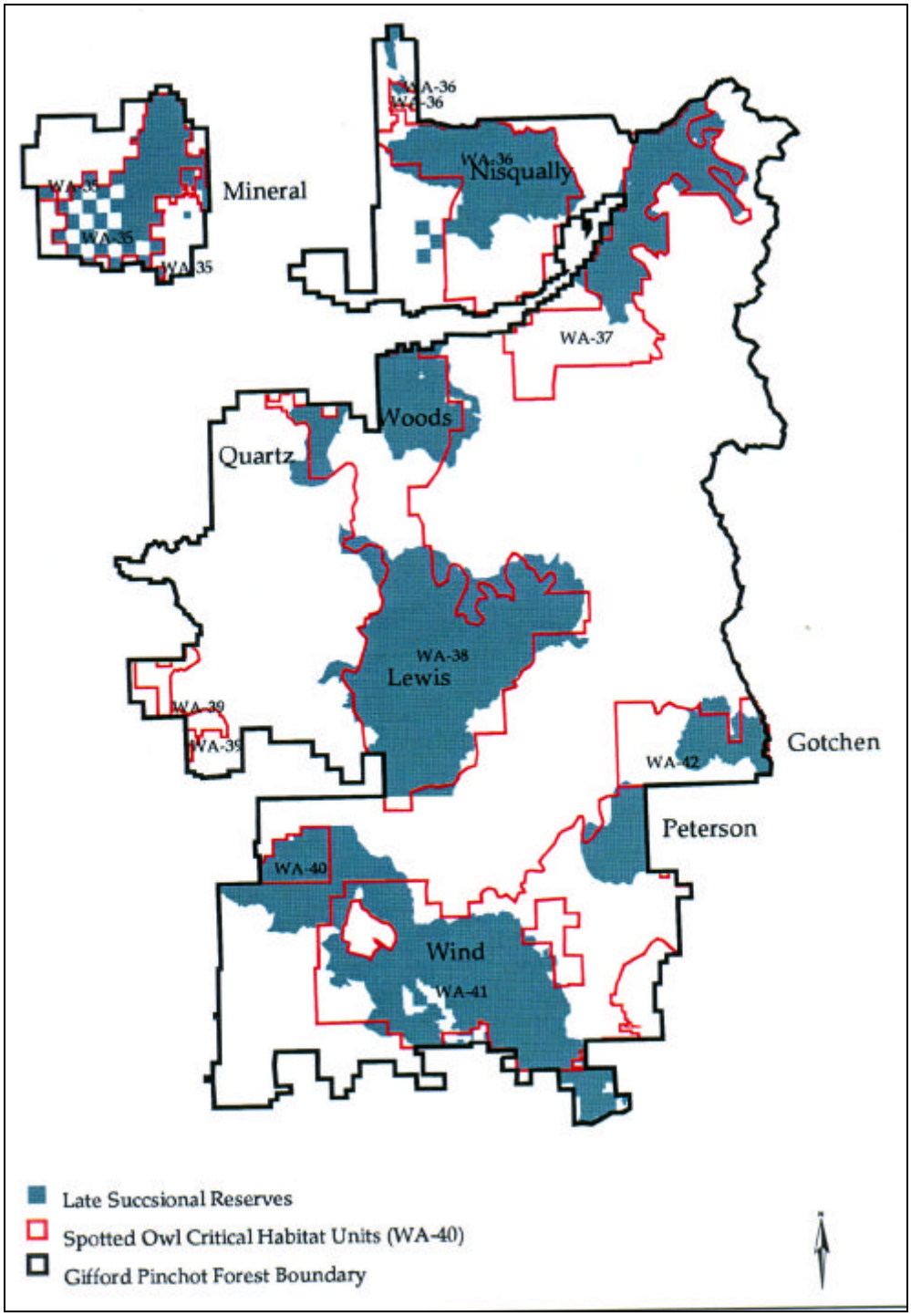


Table 4-11 Acreage of Northern Spotted Owl Critical Habitat Units and Associated LSRs.

Critical Habitat	Total Area	LSR									
		Gotchen	Lewis	Mineral	Nisqually	Packwood	Peterson	Quartz	Wind	Woods	Total w/in LSRs
WA-35	50,726	0	0	37,592	0	0	0	0	0	0	37,592
WA-36	75,605	0	0	0	44,357	0	0	0	0	0	44,357
WA-37	68,470	0	0	0	0	38,077	0	0	0	0	38,077
WA-38	169,831	0	102,845	0	0	0	0	6,636	0	22,978	132,460
WA-39	9,711	0	0	0	0	0	0	0	0	0	0
WA40	12,032	0	0	0	0	0	0	0	9,998	0	9,998
WA-41	173,901	0	0	0	0	0	11,927	0	84,798	0	96,725
WA-42	35,884	12,414	0	0	0	0	0	0	0	0	12,414
Total	596,160	12,414	102,845	37,592	44,357	38,077	11,927	6,636	94,796	22,978	371,623

Introduced Species

Several introduced species are likely to occur in LSRs (see Table 4-9). House sparrows and starlings compete with native cavity nesting wildlife for nest sites. The house sparrow is most likely to occur near areas of human habitation along the Cowlitz River and south end of Wind LSR. Starlings will venture further into the LSRs. Both species are generalists but primarily use open habitats that currently are widespread in LSRs. Rock dove, Virginia opossum, house mouse, and Norway rat are all associated with human habitation and their distribution in LSRs is probably limited. The Virginia opossum and Norway rat will eat the eggs of ground nesting birds. Bullfrogs occur in low elevation wetlands. There are no documented occurrences of bullfrogs in any of the LSRs. These voracious predators can decimate populations of native frogs and turtles. Wild turkey and California quail were introduced for sport hunting. Wild turkeys occur in forested habitats in LSRs. Quail occur at lower elevations at the fringes of Wind LSR. Effects of these two game birds on native species is unknown.

Open Wildlife Habitats

Forested stands of age 0 to about 40 years old provide open habitat and make up approximately 25 percent of the LSR network. (See Table 4-35, page 4-117.) The presence of this open habitat is largely the result of regeneration timber harvest. These habitats are characterized by few large live trees, standing snags, or down woody debris remaining within the unit boundaries. To this lack of remnant forest structures in harvested units is attributed the loss of species diversity as the stand ages (Hansen et al. 1991).

Bruce et al. (1985) determined that 60 percent of the 460 described vertebrate wildlife species found in western Oregon and Washington utilize open habitats for feeding purposes. However, only 39 percent of the same vertebrate wildlife species utilized open habitat for breeding purposes. Reproductive use of early seral habitat is probably due to a lack of vegetative structure necessary for nest construction or cover (i.e., snags, down wood, etc.) required by certain species.

Naturally occurring open habitat within the LSRs consist of dry and wet meadows and shrublands. These areas are limited, currently comprising less than 1 percent of the LSRs (see Table 4-34). Natural openings are typically the result of geomorphic factors. They persist over time changing only with gradual modifications of soils or microclimate (Logan et al. 1985). The inherent edges that are produced by different plant communities provide nesting and foraging areas (Logan et al. 1985). Black-tailed deer and elk are noted as frequent users of natural openings (Witmer et al. 1985). As many as 130 species use these natural openings and their inherent edges for breeding while as many as 183 species use them for foraging (Brown 1985).

Mid-Seral Wildlife Habitats

Forested stands between 41 and 100 years old provide closed mid-seral habitat and represent approximately 20 percent (90,718 acres) of the LSRs. (See Table 4-36.) Some of the younger stands of mid-seral habitat are the result of past timber harvest, but most of the stands are the result of large scale fire disturbances that occurred around the turn of the century. The size and amount of trees, snags, and down wood from the original stand present in these mid-seral stands depends on fire and management history occurrence. Intensive removal of burned trees to reduce subsequent fire hazard left stands devoid of snag or down wood habitat. Where trees were left, they now provide snag and downwood in soft decay classes. Hard snags and sound down wood of large diameter may be deficient in most stands. Species use of closed mid-seral stands appears related to the presence of remnant forest structures. No native species are known to depend on closed-canopy forest which lack remnant forest structures (Hansen et al. 1991).

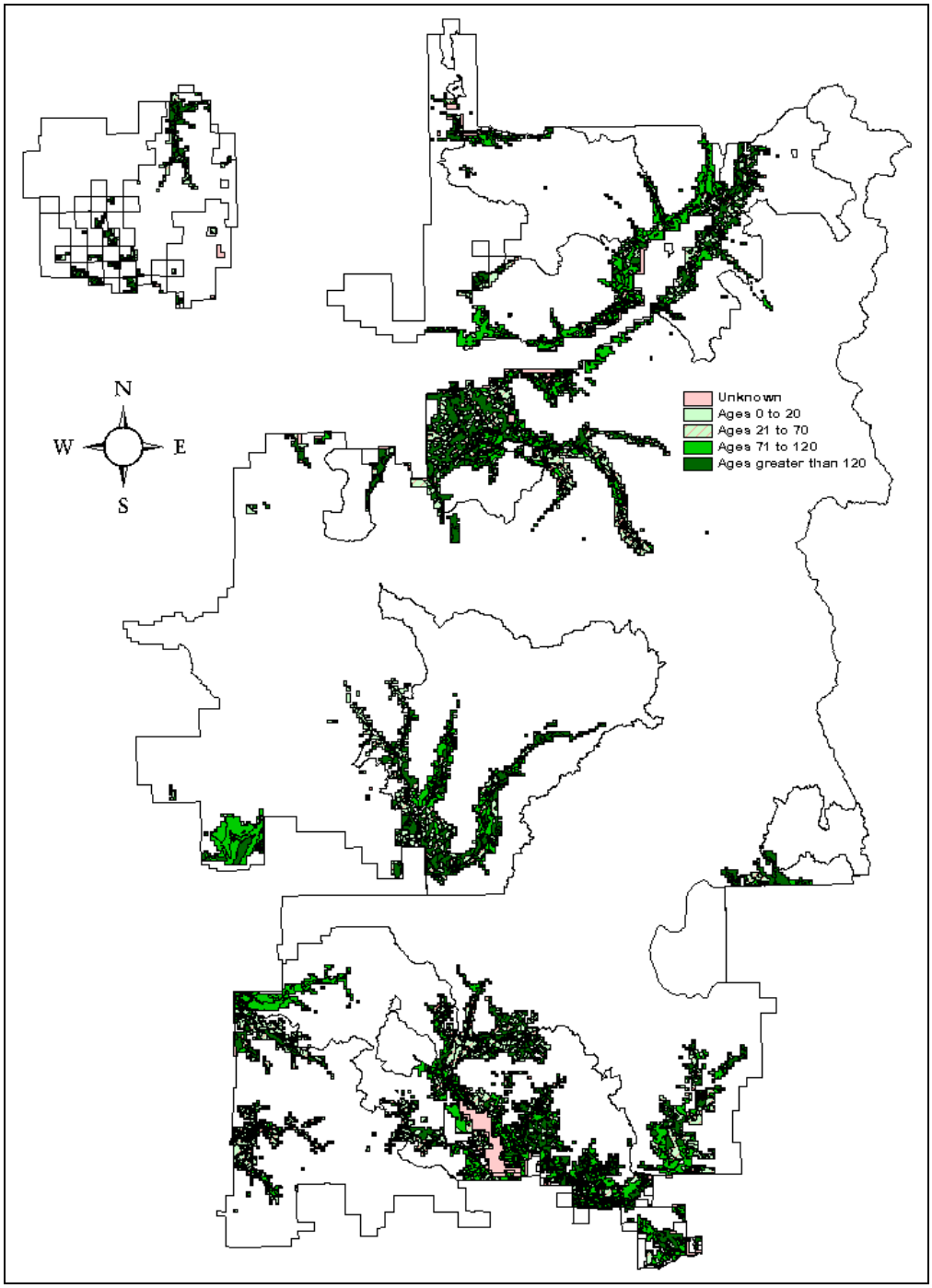
Deer and Elk Winter Range

Two species of high public interest that frequently utilize open habitats are black-tailed deer and elk. Forested stands 0 to 40 years old provide an increased forage base beneficial to deer and elk populations. Stands with large trees (greater than 21 inches) provide optimal cover and have been identified as a critical component of biological winter range (BWR). Optimal cover stands provide forage under a forest canopy that has snow interception capabilities. This capability maintains some forage accessibility when heavy snows bury forage in openings (Witmer et al. 1985). Open habitats are still an important component of BWR because they provide high quantities of forage when snowfall is not excessive.

The LSRs contain 56 percent of the classified BWR found on the forest (see Map 4-2 and Table 4-35).

Table 4-35 overstates usable winter range because it includes areas with non-forested and unknown ecoclass. Currently, 42 percent of BWR in the LSRs are in stands greater than 120 years old. Open habitats only comprise 9 percent of the winter range in LSRs.

Map 4-2 Biological Deer and Elk Winter Range



Wildlife Habitat Relationship Analysis

The program HABSCAPES (Mellen et al. 1995) was used to assess the amount and distribution of habitat for late-successional (large tree) associated species across the Gifford Pinchot National Forest. Wildlife species expected to occur on the Forest were grouped into life-history guilds. Species were first placed into three groups: special and unique habitat obligates, riparian habitat obligates, and terrestrial habitat users. The riparian habitat and terrestrial habitat groups were further divided into guilds.

The terrestrial habitat group was divided into guilds based on combinations of home range size; patch configuration use; and use of open, small tree (less than 21 inches DBH), or large tree (greater than 21 inches DBH) structural habitats.

Table 4-12 Habitat Attributes

Attribute	
Home Range Size (Acres)	**Patch Configuration**
Small <60 Medium 61-1,000 Large >1,000	Patch Mosaic Contrast Generalist

Home range categories include: small (less than 60 acres), medium (60-1,000 acres) and large (greater than 1,000 acres). Patch configuration categories include: patch (uses one homogeneous patch), mosaic (can use aggregate patches in close proximity), contrast (uses two different seral stages in close proximity), and generalist (uses a variety of structural stages).

There are four terrestrial species guilds that use large tree habitat, or a combination of large and small tree habitat as primary habitat for breeding and foraging. These are the species that will be most benefited by the establishment of late-successional reserves. The following is a list of the species found on the Gifford Pinchot National Forest in each of the four guilds.

Guild TLMLT

(Terrestrial, Large home range, Mosaic, Large Tree dependent):

--Northern goshawk
--Pileated woodpecker
--Marten
--Fisher
--Northern spotted owl
--Barred owl
--Marbled murrelet

The marbled murrelet is atypical of this group as it only requires a single late-successional patch within its home range for nesting.

Guild TMMLT

(Terrestrial, Medium home range, Mosaic, Large Tree dependent)

--Black-backed woodpecker
--Three-toed woodpecker

Guild TSPLT

(Terrestrial, Small home range, Patch, Large Tree dependent):

--Pacific slope flycatcher
--Northern Flying squirrel
--White winged crossbill
--Shrew-mole
--Trowbridge's shrew

Guild TSGSL

(Terrestrial, Small home range, Generalist, Small and Large Tree dependent):

--Brown creeper
--Southern red-backed vole
--Hermit warbler
--Townsend's warbler
--Williamson's sapsucker

Maps of suitable habitat for these guilds have been created using HABSCAPES. See Map 4-3 Habitat Conditions - Guild TLMLT through Map 4-6 for a description of habitat conditions for each of these guilds. On these maps, the most important habitat is found in the areas shown as large patch habitat, followed by aggregated patch and dispersed patch. The size of the patch alone, however, is not the only measure of quality. The amount of fragmentation of these patches by natural or created openings is an important consideration.

As would be expected, habitat for species with large home ranges (TLMLT) is most limiting across the Forest, because these species require the most acres of relatively contiguous habitat. Wind, Lewis, Gotchen, Peterson and Quarts LSRs provide the highest amounts of contiguous large-patch habitat for this guild. Mineral, Nisqually, Woods LSRs and the lower elevations of Packwood LSR provide little contiguous habitat for the guild.

Habitat for the TMMLT guild is similar to that of the TLMLT guild. However, due to smaller area requirements of these species, more areas provide contiguous habitat for the guild.

Habitat for the TSPLT guild is fairly widespread throughout the LSRs. However, because most of the species in the guild have low mobility, habitat quality is affected by fragmentation (see connectivity discussion, below).

Since species in guild TSGSL utilize both small and large tree structure stages, and have small home ranges, habitat for this guild is least limiting across the forest. Large amounts of habitat for the TSGSL occur in all LSRs though habitat fragmentation occurs in many areas as a result of recent timber harvest. Also, the southern red-backed vole requires down wood and the Williamson's sapsucker requires snags. These components are missing in much of the small tree habitat. Mineral LSR is the only LSR with large blocks of unsuitable habitat.

All of the LSRs contain large amounts of closed small tree habitat. This structural stage has a high canopy closure that provides cover, but generally lacks structural diversity including multiple canopy layers, large snags and logs. Late-successional habitat is expected to develop in these stands in the next 50 years or so, significantly increasing the size of suitable habitat patches in the LSRs.

The TSGSL (Map 4-6, page 4-34) gives an indication of the expected extent of late-successional habitat in the next 50 years or longer. Thinning these stands and creating snags and down logs would accelerate the development of late-successional forest attributes, while increasing structural diversity in the short-term.

Connectivity

LSRs were designed to be large, contiguous blocks of late-successional habitat that could sustain populations or sub-populations of species associated with late-successional habitat (FEMAT p. IV-187). All the LSRs are below the desired condition for amounts of late-successional habitat. The current fragmented conditions in LSRs results in isolation of individuals or small groups of less mobile species. Both may interfere with an LSRs ability to provide for self-sustaining populations.

Wind, Lewis, Nisqually, and Mineral LSRs have relatively large expanses of younger habitat in the middle of the LSRs. Most of this habitat is in the small-tree structural stage and should develop into late-successional habitat in the next 50 years or longer. Silvicultural treatment that accelerates the development of late-successional habitat would be beneficial in these areas. Some of these are 80-100 years of age and would benefit from thinning. Many of the less mobile species are small mammals, terrestrial amphibians and terrestrial mollusks which use down wood. Increasing the level of down wood in these areas should result in increased habitat connectivity for these species.

Each LSR is designed to function as part of a network connected by habitat in the Matrix that allows for dispersal of animals between LSRs (ROD p. B-1, 4; FEMAT p. IV-187). Riparian Reserves were designed to be an integral part of the connectivity between LSRs (ROD p. B-13; FEMAT p. IV-187). Currently, Riparian Reserves are highly fragmented and thus are not providing the connectivity function for which they were designed. On average, (across the range of the spotted owl) the percent of Riparian Reserves (outside LSRs) currently in late-successional habitat is 29 percent (see FSEIS pages 3&4-26, 39, and 41). On the Gifford Pinchot, the percent of Riparian Reserves between LSRs currently in late-successional habitat (large-tree structural stage) ranges from 18 to 46 percent. Mid-seral (small conifer) habitat comprises between 27 to 40 percent of Riparian Reserves between LSRs. Thus, the connectivity function of Riparian Reserves should improve in the next 40 years as the mid-seral stands develop late-seral characteristics. Riparian reserves will recover in the next 40 years. The small conifer habitat type may provide dispersal habitat for some late-successional species. The general lack of down wood, snags, and remnant trees in these stands limits their functionality as dispersal habitat. While there is late-successional habitat between LSRs, current condition of LSRs makes connectivity in the Matrix even more important.

The HABSCAPES maps (see Map 4-3 through Map 4-6) indicate where habitat providing connectivity currently exists. TLMLT and TMMLT species guilds are mobile and thus travel fairly large distances between LSRs. Scattered habitat can provide stepping stones between LSRs for these species. TSGSL species utilize small tree habitat which is currently fairly well connected across the forest, with a couple of exceptions. Connectivity may be bigger problem for TSPLT species and other poor dispersers. These species are unlikely to move very far across non-habitat. Individuals are unlikely to move the full distance between LSRs so individuals must survive in the Matrix to provide connectivity between LSRs.

Connectivity between the LSRs in the north part of the Forest is weak. The Riparian Reserves between Lewis, Quartz, and Woods LSRs, and between Woods and Packwood, contain only 18 percent late-successional habitat. Late-successional habitat (large-tree structural stage) occurs in the Matrix at low levels; 9 percent of unsuitable lands outside Riparian Reserves and 17 percent of suitable lands are in the late-successional habitat.

The connectivity between the Lewis, Wind, Peterson, and Gotchen LSRs in the southern half of the Forest is better than connectivity in the north part of the Forest. Riparian Reserves between Gotchen and Peterson are 30 percent late-successional habitat. The percent of Riparian Reserves in late-successional habitat between Gotchen, Peterson, and Lewis LSRs ranges from 28 to 46 percent (depending on watershed). Between Gotchen, Peterson, and Wind LSRs, the Riparian Reserves ranges from 30 to 46 percent late-successional habitat.

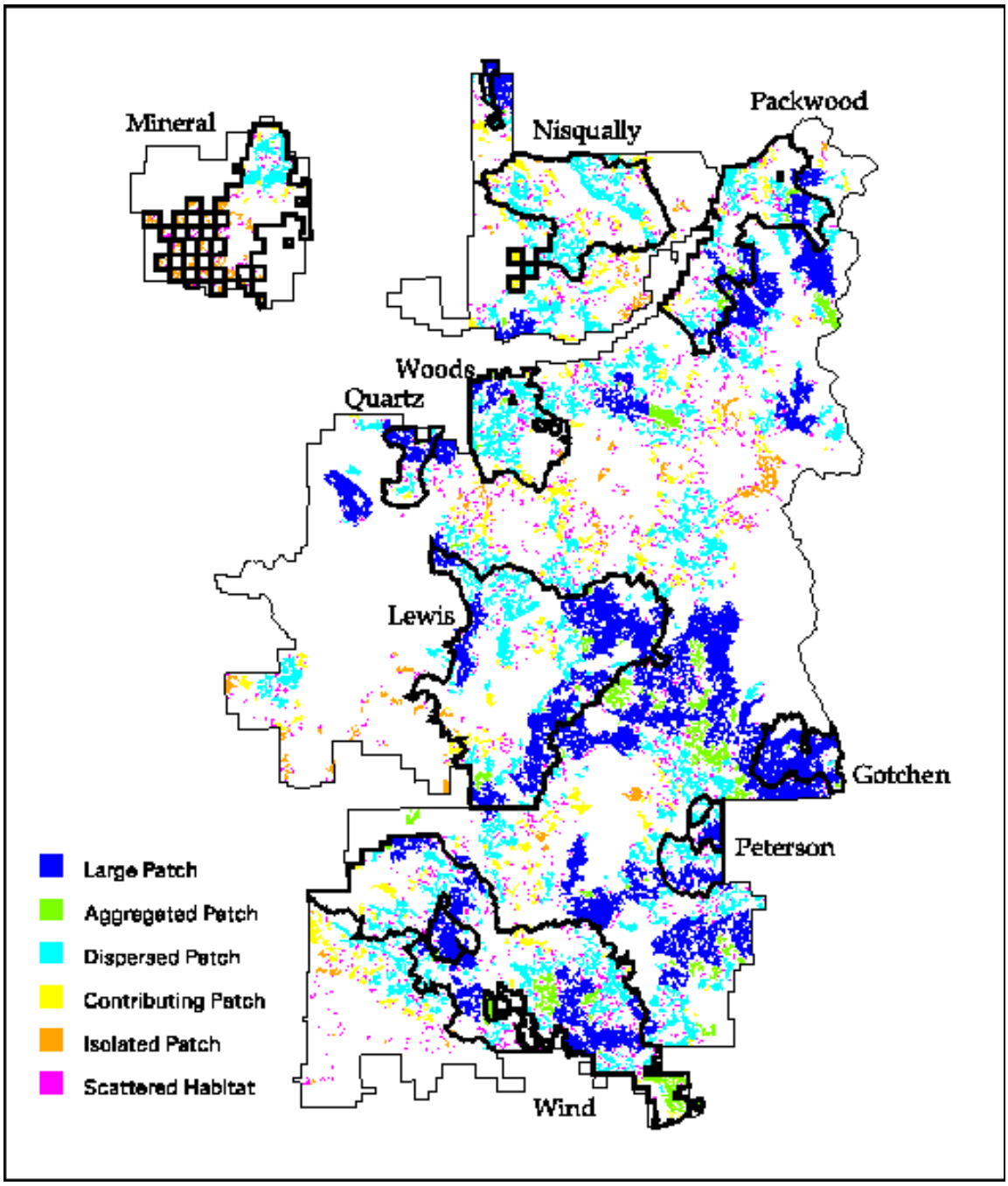
Connectivity between Wind and Lewis LSRs is weaker. Riparian Reserves between Wind and Lewis LSRs average between 20 to 22 percent late-successional habitat, which is below the regional average. Matrix lands between these two LSRs is also about 20 percent late-successional habitat.

There are essentially no linkages between the Mineral LSR and any of the others. The Nisqually LSR appears to be isolated from other LSRs, as well, especially for less mobile species such as amphibians and small mammals. The private, developed land along the Cowlitz River is a barrier to movement. An east-west linkage between the Nisqually and Packwood LSRs through the Tatoosh Wilderness is unlikely to be used by less mobile species because of the barrier formed by the Tatoosh Range.

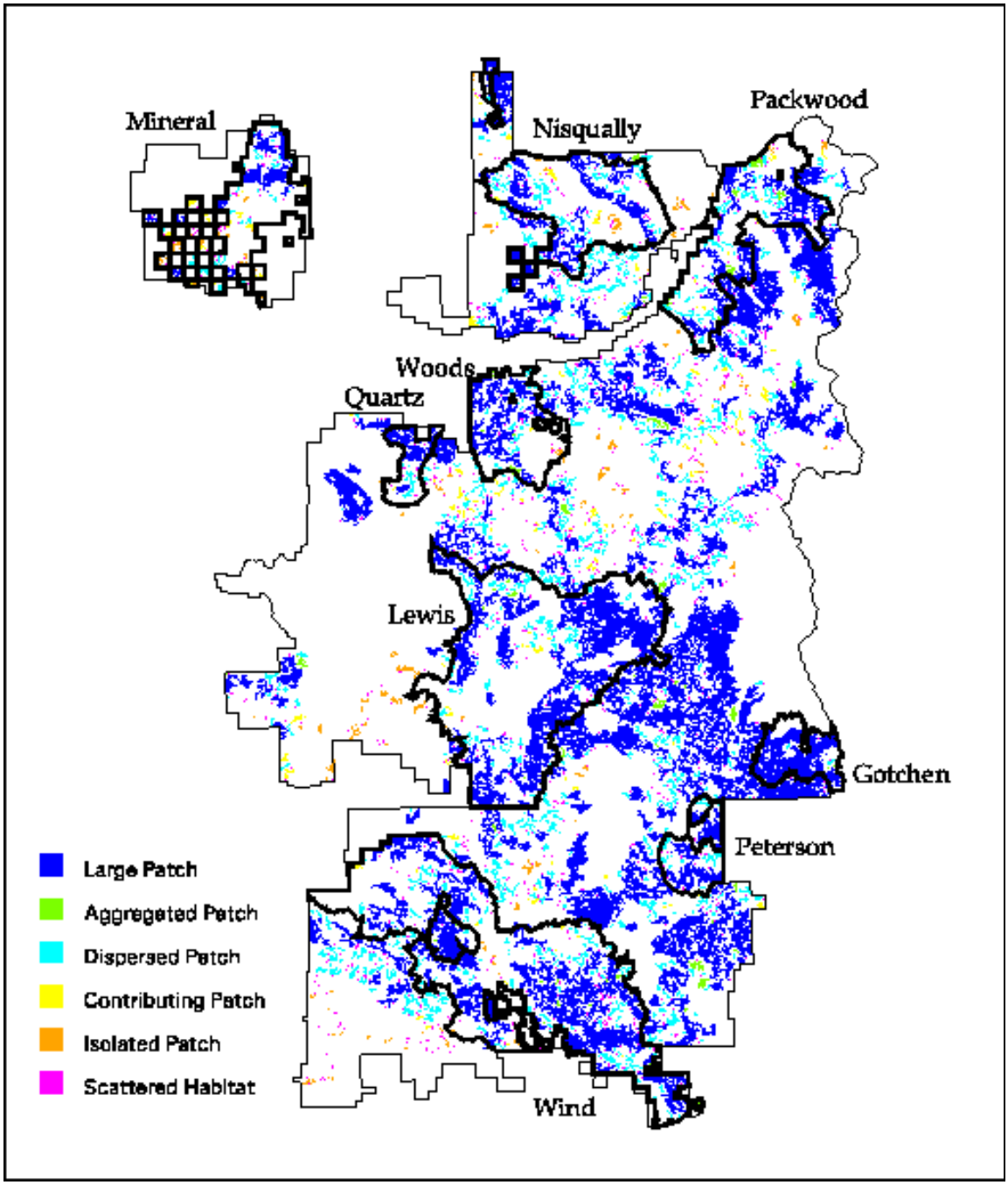
Roads can cause fragmentation of habitat for some species, resulting in isolated populations. This concern is highest for species with very low mobility such as amphibians, mollusks, and arthropods which rely on microhabitats. Mortality of dispersing individuals may be high on wide, well-traveled roads due to dehydration, increased predation or "roadkill." (Fahrig et al. 1995).

Major roads bisect LSRs and create barriers to movement between LSRs. Wind, Peterson, Lewis, Gotchen, Packwood, and Nisqually LSRs are all bisected by major forest roads. State highways present barriers between Nisqually and the other LSRs and Mt. Rainier National Park.

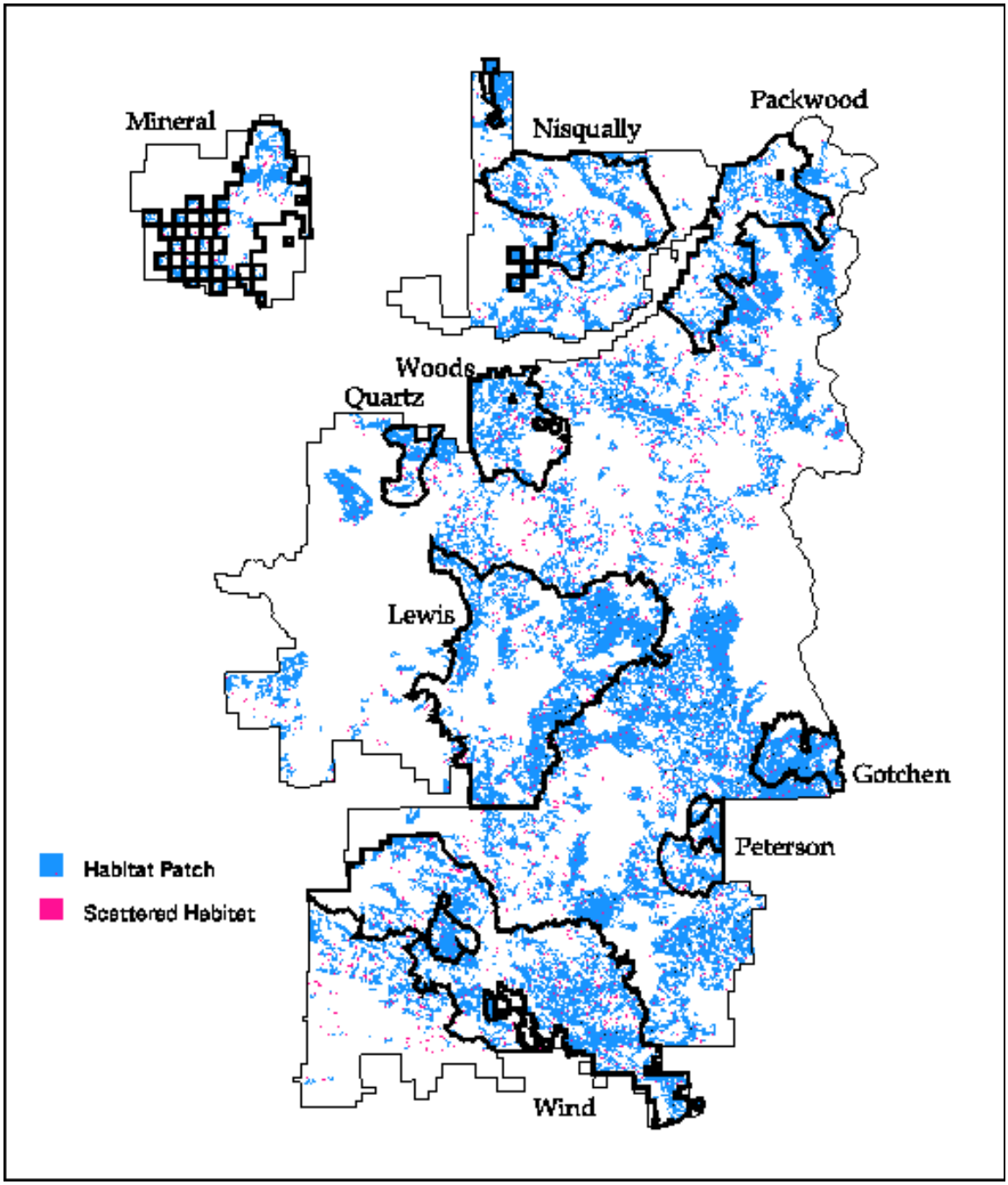
Map 4-3 **Habitat Conditions - Guild TLMLT**



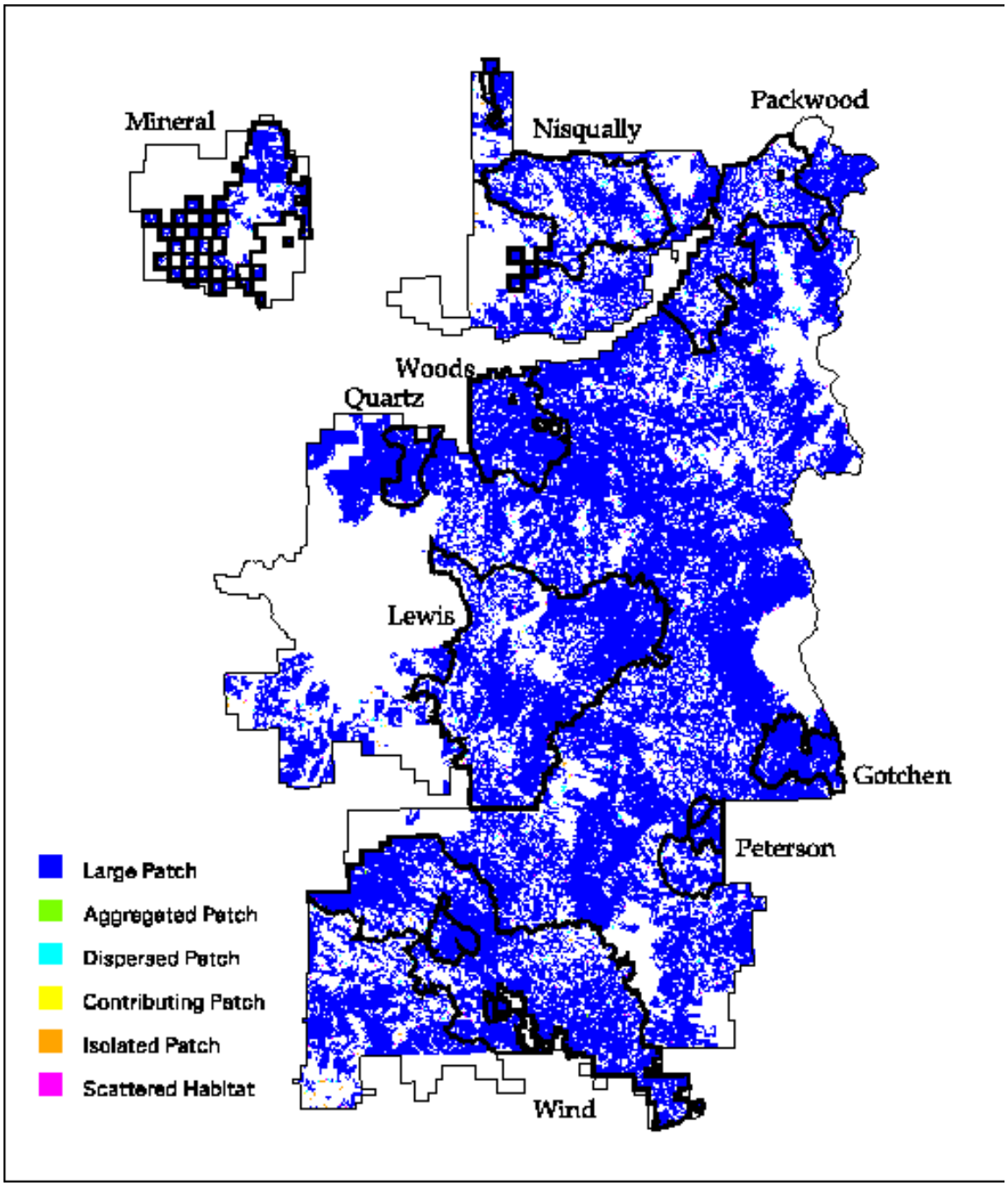
Map 4-4 **Habitat Conditions - Guild TMMLT**



Map 4-5 Habitat Conditions - Guild TSPLT



Map 4-6 Habitat Conditions - Guild TSGSL



Disturbance Regimes

LSRs on the Gifford Pinchot National Forest are subject to a wide range of biological and physical disturbance agents. Disease, insects, animals, and people are the biotic agents. Fires, floods, landslides, ice and snow, and wind are some of the common physical agents. With the eruptions of Mount St. Helens, we have witnessed one of the less common yet very dramatic physical agents.

Disturbance agents may act alone, but more often they act in concert with other agents. A lightning killed tree may brood bark beetles that attack neighboring trees the following spring. Grand fir defoliated by spruce budworm may succumb to Armillaria root disease. While the intensity of any one fire depends on many factors, the potential for destructive stand replacing fires can be enhanced by the build-up of dead and downed trees killed by insects and disease. On a stand level, disturbance regimes can either reset or advance succession depending on how many and which trees are killed. The following discussion focuses on insects, disease, wind, and eruptions. Fire is covered in Chapter 6.

Insects and Disease

In the west Cascade LSRs, insects and diseases typically cause the death of individual trees and groups of trees, and often work together on stressed trees.

Each conifer species has its own associated and indigenous root and stem fungi, mistletoes, rusts, and foliage and phloem eating insects. There are also introduced pathogens such as the white pine blister rust that has had a pronounced effect on native five-needle pines.

Important among the insects and disease west of the Cascade crest are Douglas-fir bark beetles and laminated root rot. Both are widespread and cause numerous gaps in mature forests dominated by Douglas-fir. Most mortality pockets from this insect and disease rarely exceed ten acres.

Other insects and disease have the potential to cross this threshold only when there are pure stands of host species. Overall, insects and diseases on the west side typically create fine scale disturbances that advance stand-level succession. They create small gaps in the overstory that characterize the transition and shifting-gap stages of old-growth forest development. They are also responsible for the development of essential structures (snags and downed logs) used by many late-successional wildlife.

The drier environments east of the Cascades place trees under greater moisture stress, while at the same time favoring some insects and diseases. Within the grand fir zone, the selective removal of large ponderosa pine and the exclusion of fire has led to greater tree densities, primarily grand fir and Douglas-fir, which further accentuates the problem. Consequently, insects and disease have a greater potential to degrade entire stands. Important pathogens include: laminated, Armillaria, and annosus root rots; mountain, fir engraver, and Douglas-fir beetles; and western spruce budworm of late.

Western spruce budworm (Choristoneura occidentalis Freeman) consume the foliage of a wide range of conifers, but there are four principal host species on the Gifford Pinchot; they include grand-fir, Douglas-fir, subalpine fir, and Engelmann spruce. Budworm occurs within the grand fir and subalpine fir/lodgepole pine zone. Stands

on the drier end of the grand fir type appear to be more vulnerable to severe damage by budworm, as are stands with high densities and high proportions of the principal host species.

Wind

Wind causes mortality at both small and large scales. Most mortality from wind is widely scattered throughout mature forests, toppling trees already structurally weakened often by root disease. Large acres of continuous windfall typically occur along created forest edges (cutting unit boundaries) where high water tables limit rooting depths, and/or the topography accentuates wind speeds. It seems most catastrophic blowdown events have occurred on the westside, as though the storm winds lessen after crossing the Cascade Crest.

Volcanic Eruptions

The presence of Mount St. Helens within this province introduces a unique disturbance agent. While major events occur at longer intervals than stand replacing fire, volcanic eruptions are the epitome of catastrophic disturbance. Ash fall from even minor eruptions can cause mortality. Following the 1980 eruption of Mount St. Helens, true firs beyond the blast zone were killed by the settling of volcanic tephra on the upper side of needles. Ash and pumice deposition from eruptions, several hundreds to several thousands of years ago resulted in widespread mortally. Late-successional and old-growth forest in the Lewis, Woods, and Quartz LSRs were affected.

Fire

Historically wildfires have been a major agent of natural change in the forest landscape. Fire has been an integral part of the forest ecosystem, affecting wildlife habitat, vegetation dynamics, soil properties and watershed hydrology. It appears that large, infrequent, high-intensity, stand replacement fires occurred throughout the area prior to European settlement in the mid 1800s. Historically, the Yakama, Klickitat, and Cowlitz Tribes set fire to logs for drying berries, and lingering fires sometimes spread. Fires may have also been set intentionally to maintain berryfields or keep hunting areas open. Non-Native American settlement around the area began in the 1850s, and many fires were set to clear land.

Fires are infrequent (50 to 400 year intervals) but can be catastrophic in their effects. Highly productive and long-lived tree species associated with Douglas-fir stands accumulate great quantities of intermediate to large class fuels. Fine fuels, the most readily ignitable, are present in a relatively small amount. Fine fuels reach their maximum dryness in July and August, while the larger fuels do not usually dry out until September. Most of the fires in any given year occur in July and August, but the majority of these are less than 10 acres in size. Most of the larger fires, and virtually all of the catastrophic fires, occur during September, or from late August to early October. Fire behavior, fuels conditions, fire risks and historic fire occurrences are discussed in Chapter 6, Fire Management Plan.

Human Uses

The following human uses are common within LSRs across the Forest. See individual LSR descriptions below for unique activities.

- **Administrative Sites:** Wind River Ranger Station, Wind River Nursery, seed orchards
- **Facilities and Recreation:** There are numerous facilities and trails currently in use within LSRs. They fall into the following categories:

  --Campgrounds
  --Interpretive Sites
  --Motorized and Non-motorized Trails
  --Trailheads and Sno*parks

- Hunting and fishing administered by Washington State
- Rock quarries
- **Utility Sites:** power lines, telecommunications installations, weather stations, etc.

Special Forest Products

Special Forest Products (SFP) encompass most vegetative materials removed from the forest with the exception of saw logs.

The four use categories of Special Forest Products allowed to be collected within the Late Successional Reserve include:

1. **Tribal Use:** Special forest products have been gathered by native peoples for thousands of years for important food, craft, medicinal, and cultural uses. Their right to gather these products is established by treaty with the federal government. Nothing in NWFP and Gifford Pinchot Forest Plan direction is intended to conflict with or restrict Treaty rights of the tribes. The Yakama, Nisqually, Puyallup, Squaxin Island and Steilacoom Indian Tribes have treaty rights on the Gifford Pinchot National Forest.

   Traditional non-commercial are gathered by American Indians affiliated with a recognized tribe for cultural, spiritual, and medicinal use. Known materials collected include huckleberry (*Vaccinium* spp.), bitter root (*Lewisia rediviva*), Cedar bark and *root (Thuja plicata*), Pacific Yew wood (*Taxus brevifolia*), poles from other evergreen trees and several ferns and grasses.

2. **Incidental Use:** On-site product consump-tion/use, usually associated with recreation activities. Items include edible berries, nuts and mushrooms, firewood, poles, and post. (Tribal and incidental uses are not regulated by a permit process. Personal and Commercial use are regulated).

3. **Personal Use:** Collection of materials for personal use/consumption, not to be sold. At this time, “free use” permits are issued for edible berries (huckleberries) and edible mushrooms. Mushroom gathering is limited to three gallons a day per person for ten days per calendar year. Other materials collected for personal use include Christmas trees, evergreen boughs and cones. Firewood is available at times along road right-of-ways or other designated sites. Brush harvest, cuttings, young trees and plants may also be removed along existing road right-of ways.

4. **Commercial Use:** Collection of materials for the primary purpose of sale, resale or use in a manufacturing process resulting in a finished product that will be sold. Commercial permits are sold for the collection of floral products that are harvested in a manner that does not kill or destroy the plant. Products collected at present include huckleberry (*Vaccinium* spp.), salal (*Gaultheria shallon*), western sword fern (*Polystichum munitum*), beargrass (*Xerophyllum tenax*), Oregon grape (*Berberis nervosa*), scotch-broom (*Cytisus scoparius*) and many species of evergreen boughs. Commercial permits are issued for edible berries (primarily huckleberries) and edible mushrooms. Major species of mushrooms collected include chanterelles (*Cantharellus* spp.), boletes (*Boletus* spp.), matsutake (*Tricholoma* spp.), and morels (*Morchella* spp.).

Commercial harvest by non-Native Americans of mosses, lichens and other plant species of concern (medicinal plants) that are killed during collection is not allowed within the LSR.

Special Forest Products Identified by Produced Type: (Floral Greens - cuttings or portions of plants materials that do not kill the plant.)

- Beargrass (*Xerophyllum tenax*)
- Christmas Ornamentals - these are Christmas trees, boughs and pine cones taken from most coniferous species.
- Dwarf Oregon Grape (*Berberis nervosa)*
- Huckleberry (V*accinium* sp.)
- Salal (*Gaultheria shallon*)
- Scotchbroom (*Cytisus scoparius*)
- Western swordfern (*Polystichum munitum)*

Wild mushrooms - there are many species of edible and non-edible mushrooms collected on the Forest. Know harvested species include:

- Bear tooth (*Hiericium abietis*)
- Boletus (*Boletus* sp.)
- Chanterelle (*Cantharellus* sp.)
- Chicken-of-the-Woods (*Laetiporus sulphureus*)
- Coral fungus (*Ramaria* sp.)
- Indian Paint Fungus (*Echinodontium tinctorium*)
- Lobster Mushroom (*Hypomyces lactifluorum*)
- Matsutake (*Tricholoma magnivelare*)
- Morels (*Morchella* sp. and *Verpa* sp.)
- Tooth fungus (*Dentinum repandum*)

Other products harvested include:

- Edible fruits, seeds, nuts and berries.
- Medicinal plants and roots.
- Fuelwood products from road prisms or other designated sites.
- Transplants of shrubs, trees and forbs from road right-of-ways.

Grazing

There are three allotments on the Forest: Twin Buttes Sheep and Goat Allotment, Mt. Adams Horse and Cattle Allotment, and the Ice Caves Cattle and Horse Allotment. These allotments overlap 100 percent of the Gotchen and Peterson LSRs and 8 percent of the Lewis LSR (see and Table 4-13). Current use of the allotments is a total of 1150 head of sheep and 716 head of cattle over a four-month period (June to September).

This area has a long history of sheep and cattle grazing. Records from 1890 indicate 100,000 head of sheep and 1,500 head of cattle grazed on the Gifford Pinchot National Forest. Most of this occurred in the Mt. Adams area, and would have included lands now within the Gotchen and Peterson LSRs. By 1968, 1000 head of sheep and 300 head of cattle were reported to have used the Forest.

Table 4-13 LSR and Grazing

LSR	Allotment	Allot-ment Ac in LSR	% LSR in Allot-ment	Allotment Head
Gotchen	Mt. Adams	15,154	100	516 Cattle
Peterson	Ice Caves	13,657	88	200 Cattle
Peterson	Twin Buttes	1,854	12	1150 Sheep
Lewis	Twin Buttes	9,263	8	1150 Sheep

Table 4-14 Current and Projected Levels of Transitory Range in LSRs.

LSR	Current Transitory Range	Projected Transitory Range (2005)
Gotchen	1056 (7%)	1069 (7%)
Peterson	2371 (15%)	684 (4%)
Lewis	1741 (19%)	469 (5%)

--Current range is plantations < 30 years old.
--Projected based on plantations < 20 years old except < 30 for Gotchen.

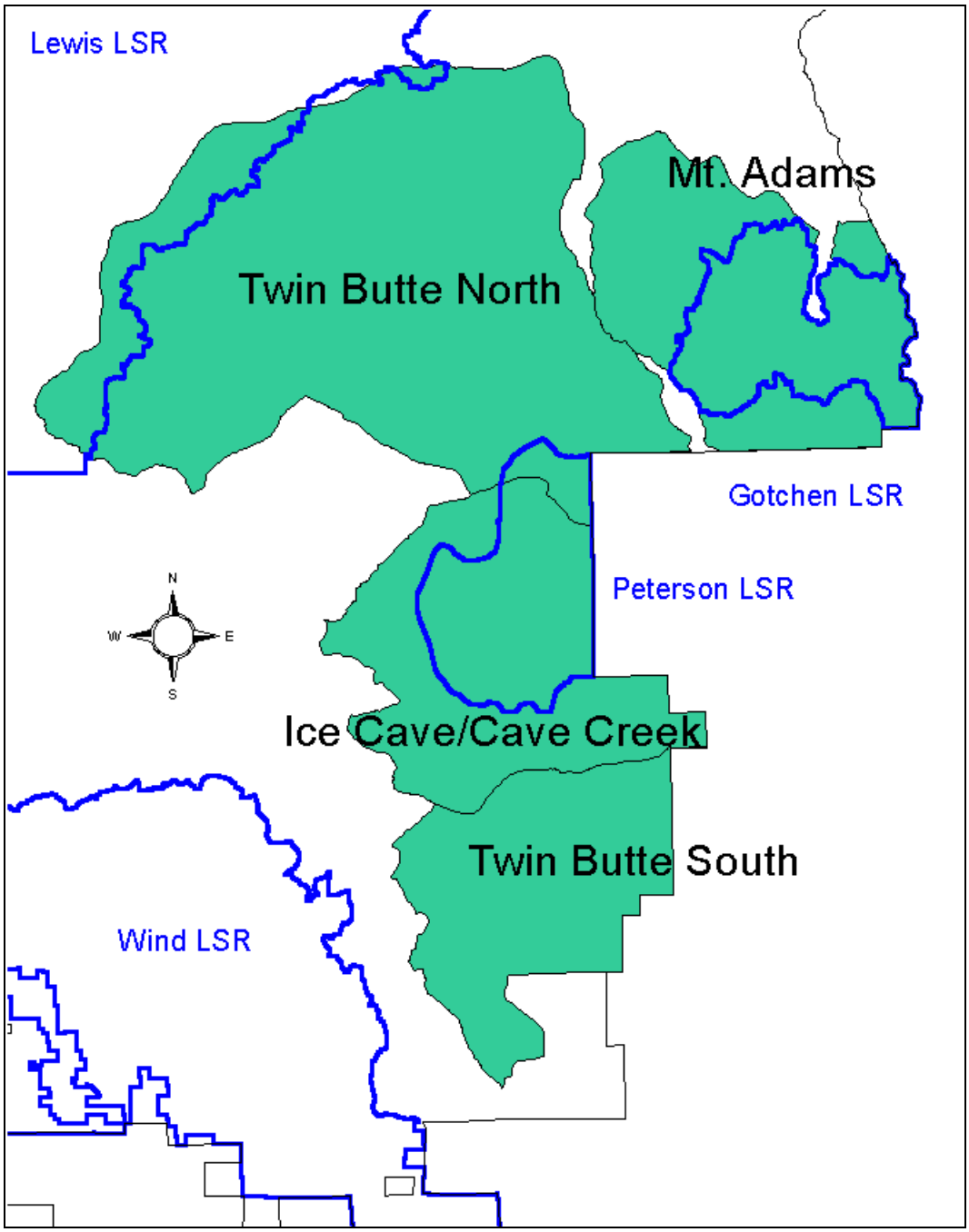
Plantation Management

Site preparation, reforestation, animal damage control, and sapling thinning are ongoing activities for recently harvested lands within the LSR.

Roads

Road densities within LSRs are listed in Table 4-39, page 4-120. Primary arterial roads that provide access to popular recreation sites have higher scenic standards along the road and its viewshed. Road maintenance is recurrent along the main arterials and as needed on secondary roads. Road closure, decommissioning, or obliteration has occurred on selected secondary roads in keeping with the Forest Access and Travel Management Plan.

Map 4-7 Gifford Pinchot National Forest Grazing Allotments



4-2 LSR Scale Existing Condition

The following is a description of existing conditions specific to individual LSRs. Aspects of the existing condition which are not described at the Forest-wide scale are emphasized here. To obtain a complete picture of the existing condition for an LSR, both sections must be reviewed. LSR descriptions follow in alphabetical order.

Gotchen LSR Riparian Conditions

Existing conditions and functions for riparian resources are described in the *Upper White Salmon Watershed Analysis* (1995) and not repeated here.

Unique Species and Habitats

The Gotchen LSR contains a high percentage of large patch habitat (see Map 4-3, page 4-31) which extends well beyond the LSR boundary on the south and west sides. The available habitat is relatively unfragmented. The LSR contains no isolated or scattered habitat patches, indicating that all of the suitable habitat is useable by the species in the TLMLT guild.

The structural stage map (Map 4-10, page 4-47) indicates that the central portion of this LSR is dominated by stands of small tree habitat. While these stands would not contain the same habitat qualities of large tree habitat, they serve to reduce the effects of fragmentation of the large tree habitat (edge effects).

Unique botanical areas include Smith Butte (proposed RNA) and Gotchen Creek Meadows. Quaking aspen, which is limited on the Forest, is present in these meadows and surrounding forests.

Pine broomrape, a sensitive parasitic species, also occurs in this eastside environment. Fringed pinesap, a sensitive species present throughout the Forest, also occurs in this LSR.

Ponderosa pine habitat for protection buffer species, flamulated owl, pygmy nuthatch and white-headed woodpecker, occurs in this LSR.

Goshawk nests, a heron rookery, and northern spotted owl nests are the known wildlife special sites.

The Gotchen LSR contributes to 12,414 acres or 35 percent of Critical Habitat Unit WA-42. (See Map 4-1, page 4-22.)

There are 6 northern spotted owl nest sites within this LSR and 6,700 acres of nesting, roosting, and foraging habitat.

Vegetation Conditions

The Gotchen **LSR is** almost entirely described by the grand fir plant zone. Late-successional stands in the Gotchen LSR are composed primarily of grand fir, Douglas-fir, and ponderosa pine, with a few western white pine, western larch, and lodgepole pine present. Old-growth, where present, is usually ponderosa pine or Douglas-fir, with a few western larch. Grand fir and Douglas-fir make up a second stand canopy layer that has been established since fire exclusion. The number of trees in this second canopy layer exceeds the number of old-growth trees. In many stands, older ponderosa pine and Douglas-fir have been removed, leaving primarily younger (80-100 years old) Douglas-fir and grand fir.

Stands are much more dense, for the most part, than in the past. Historically, many stands were composed of older ponderosa pine and Douglas-fir, with less grand fir understory than is now present. Today, many stands today exceed 200 trees per acre in smaller grand fir and Douglas-fir stems. Patch clearcuts, created in the past 20 years or so, are primarily composed of planted ponderosa pine, Douglas-fir, and minor amounts of western larch and other species.

Stands are likely at or near the upper end of their range of variation, in terms of stand density. In the past decade or more, increased tree mortality from agents such as fir engraver, Armillaria root disease and, more recently, spruce budworm are partly the result of changing stand composition toward tree species susceptible to these agents, and increased stand density.

Snags and Down Wood

Data from the Forest's Continuous Vegetation Survey shows the following averages for snags and down logs in stands over 80 years old. The sample size for this data was small and observations contained a great deal of variability.

Table 4-15 Down Wood - Gotchen LSR

Large end Diameter	Pieces per acre	Cumulative Length per Acre	Percent Ground Cover
9 inches	213	3,392 feet	6

Table 4-16 Snags - Gotchen LSR

Average DBH	Snags per Acre
14 inches	41

Disturbance History

Fire

Fire behavior, risk and occurrence is described in Chapter 6, Fire Management Plan.

Because this LSR borders on wilderness areas it may be at a greater risk from wildfire because we are limited in our ability to aggressively suppress wildfire in wilderness areas.

Insects and Disease

The Gotchen LSR is in the midst of spruce budworm outbreak. Noticeable defoliation began in 1994. The affected area now includes most all of the Gotchen LSR along with Yakama Indian Nation, Washington State Department of Natural Resources, and private lands to the east in the Glenwood area. Spruce budworm outbreaks occur periodically lasting for approximately 10 years. However, there are no historical records (since 1947) of budworm outbreaks on the Gifford Pinchot National Forest (Dolph 1980), nor has it been detected in the regional cooperative annual aerial detection surveys 1980-1993. The severity of the current outbreak is light, defoliation and some top kill. Being on the western edge of the outbreak area, a slightly higher moisture regime may temper the ultimate impact of this outbreak on the Gotchen LSR. However, there are many stands that are very susceptible. Their structure and density carries a high hazard potential to spruce budworm. To the extent standing dead and down fuels increase, the hazard potential for catastrophic fire also increases.

Historic Uses

In the 1940s, timber management began in this area. At that time, early seral tree species were still quite dominant. In 1942, stand volumes in the White Salmon working circle (which included the Gotchen LSR) were still over 50 percent ponderosa pine, and over 80 percent either ponderosa pine or Douglas-fir. Early railroad logging in the Gotchen LSR area emphasized selective removal of ponderosa pine, accelerating the changes in species composition brought on by fire exclusion. Timber management into the 1980's emphasized maximizing wood fiber yield. Silvicultural prescriptions proposed thinning of stands, along with removal of ponderosa pine and Douglas-fir overstory, to favor growth of grand fir understories. Clearcutting increased in the 1980s, partly as a result of mortality or loss of vigor in maturing grand fir stands. Clearcuts were regenerated primarily with ponderosa pine and Douglas-fir.

Current Human Uses

Facilities

Morrison Creek Campground, Morrison Creek Horse Camp, Whicky Shelter, Gotchen Guard Station, Cow Camp and Smith Butte Sno*Park are developed recreation sites located within the Gotchen LSR.Trails

Popular trails are Pinway (#71), Snipe (#11) Cold Springs (#72), Gotchen (#40), and Morrison (#39). Winter use (skiing and snowmobiling) originates from Smith Butte and Pineside Sno*Parks and is primarily along existing roads.

Roads

Forest Road 80 provides access to the popular Mt. Adams South Climb trailhead and three campgrounds. Road 82 provides access to Bird Creek Meadows on the Yakama Indian Reservation, and the Smith Butte Sno*Park. Scenery along both roads is maintained at higher standards (retention VQO). Road density at 2.5 miles per square mile is in the mid-range of road densities within LSRs on the Forest. (See Table 4-39, page 4-120 and Map 4-53, page 4-115.)

Winter Recreation

The Gotchen LSR is a popular destination for snowmobilers and cross-country skiiers. Portland/Vancouver area skiiers favor the Smith Butte area for its dryer eastside snow conditions.

Special Forest Products

Gotchen LSR is one of the few areas on the Forest where morel mushrooms are harvested each spring. Matsutake are also collected in the fall months. Huckleberries are generally of high quality in this area. Demands for other special forest products is minimal as compared to other LSRs but a few permits have been issued in past years for personal use firewood, poles, post, and transplants.

Special Uses

The only special use permit in effect in the Gotchen LSR is for occupying a government-owned residence.

Grazing

The entire LSR is overlapped by the Mt. Adams Cattle and Horse Grazing Allotment. The LSR comprises 46 percent of land base in this allotment. Approximately 516 head use this allotment from June to September. A developed water system including eight troughs dispense water for permittee cattle. Cow Camp, an administrative site used primarily by the permittee, is also located within the LSR. With this allotment, the Forest Service participates in the King Mountain Coordinated Resource Management Plan, the local grazing cooperative which includes the Mt. Adams Cattle Association members, Yakama Indian Nation, Champion International, Washington State DNR and DFW, and the U.S. Natural Resources Conservation Service. This area covers 73,822 acres, with about half being on National Forest land.

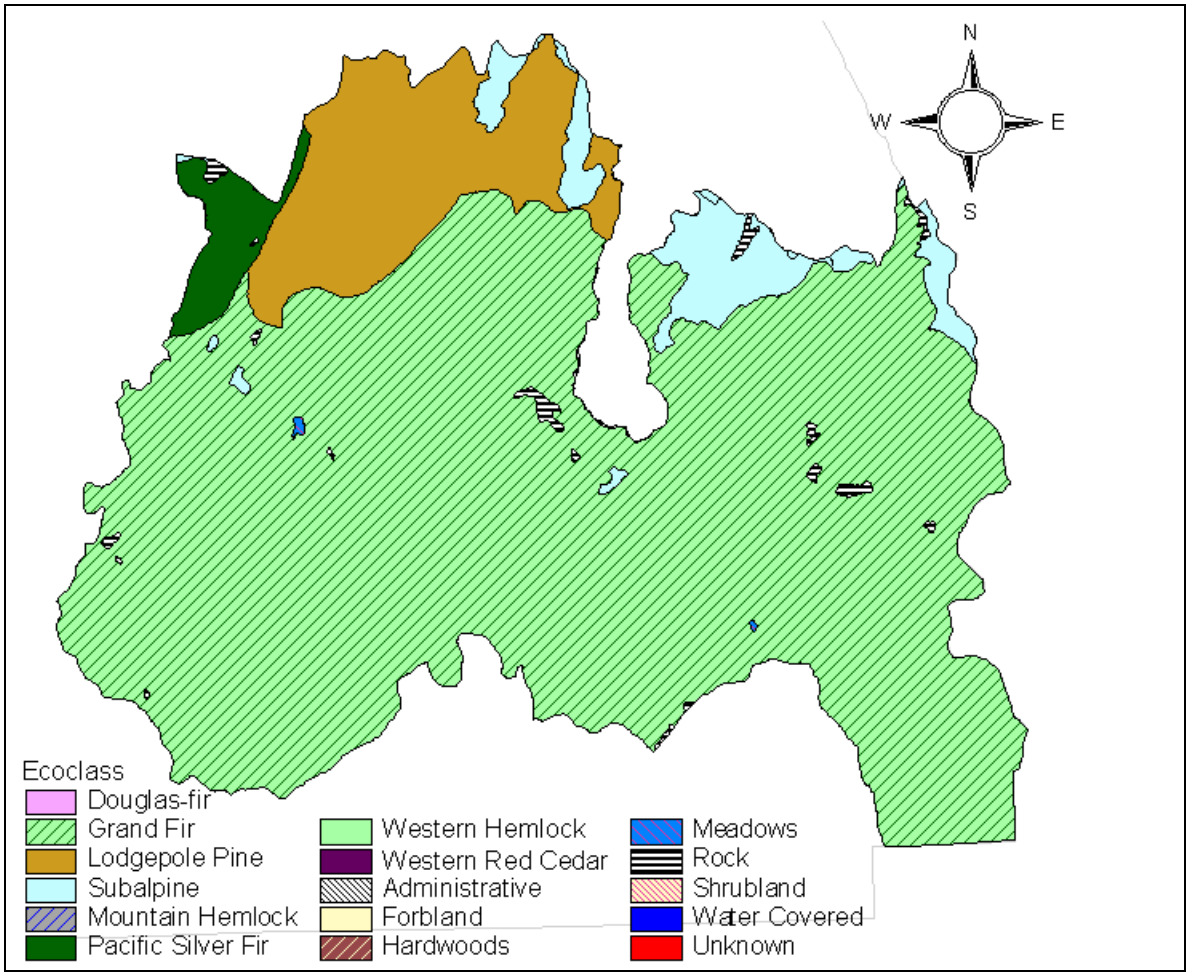
Social Significance

The entire LSR was ceded to the U.S. under the 1855 Yakama Indian Treaty. Per this treaty, the Yakama Indians retained the rights to traditional uses.

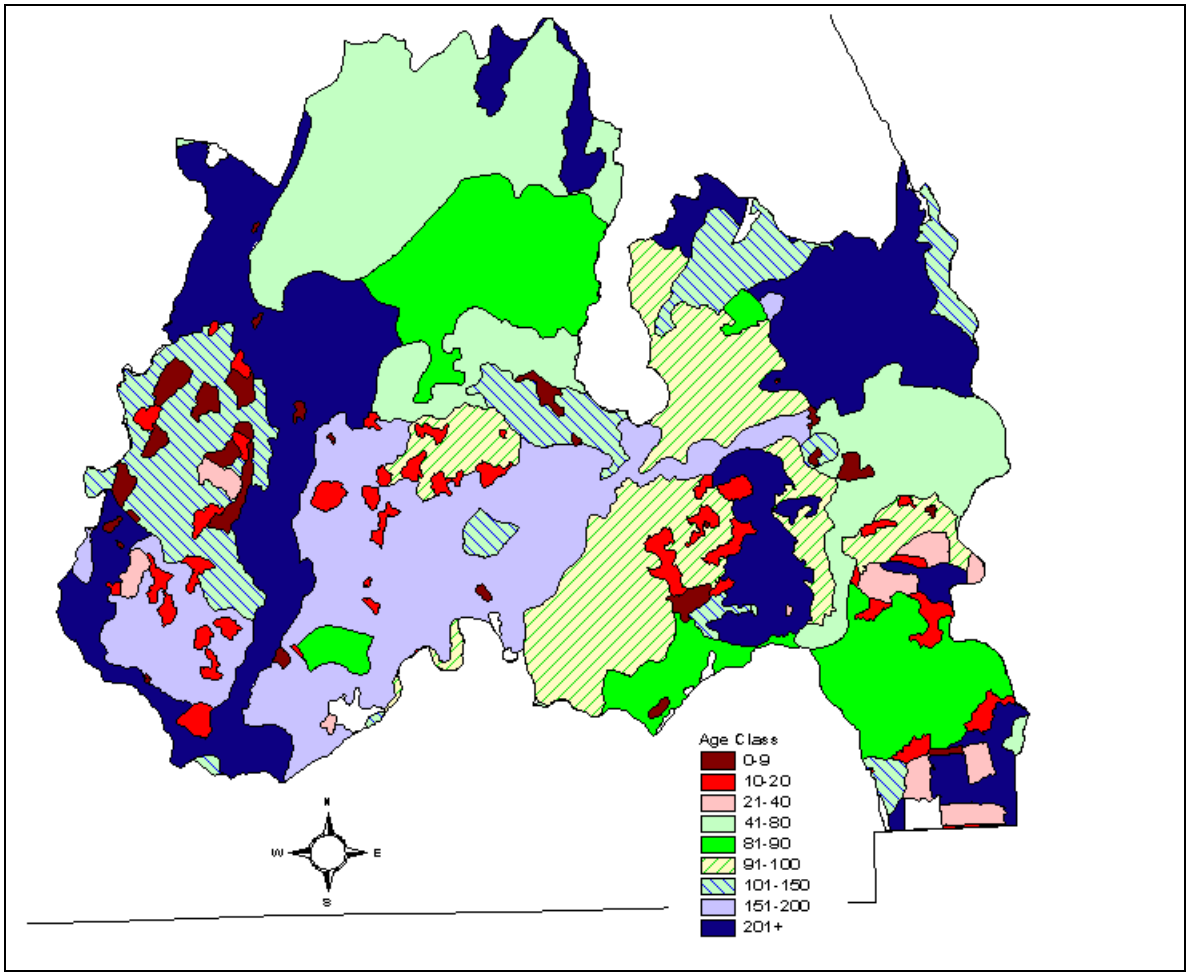
The north half of the LSR lies within the 6600 acre Gotchen Creek RARE II roadless area. Gotchen Creek Guard Station and Wicky Creek Shelter are managed as Special Interest/Historic Sites.

A portion of the White Salmon River, which is the southwest boundary of the Gotchen LSR has been recommended as a Wild and Scenic River with a “Scenic” designation. Forest Plan direction provides for protection of the values which contributed to this recommendation until eligibility studies and Congressional designations are completed.

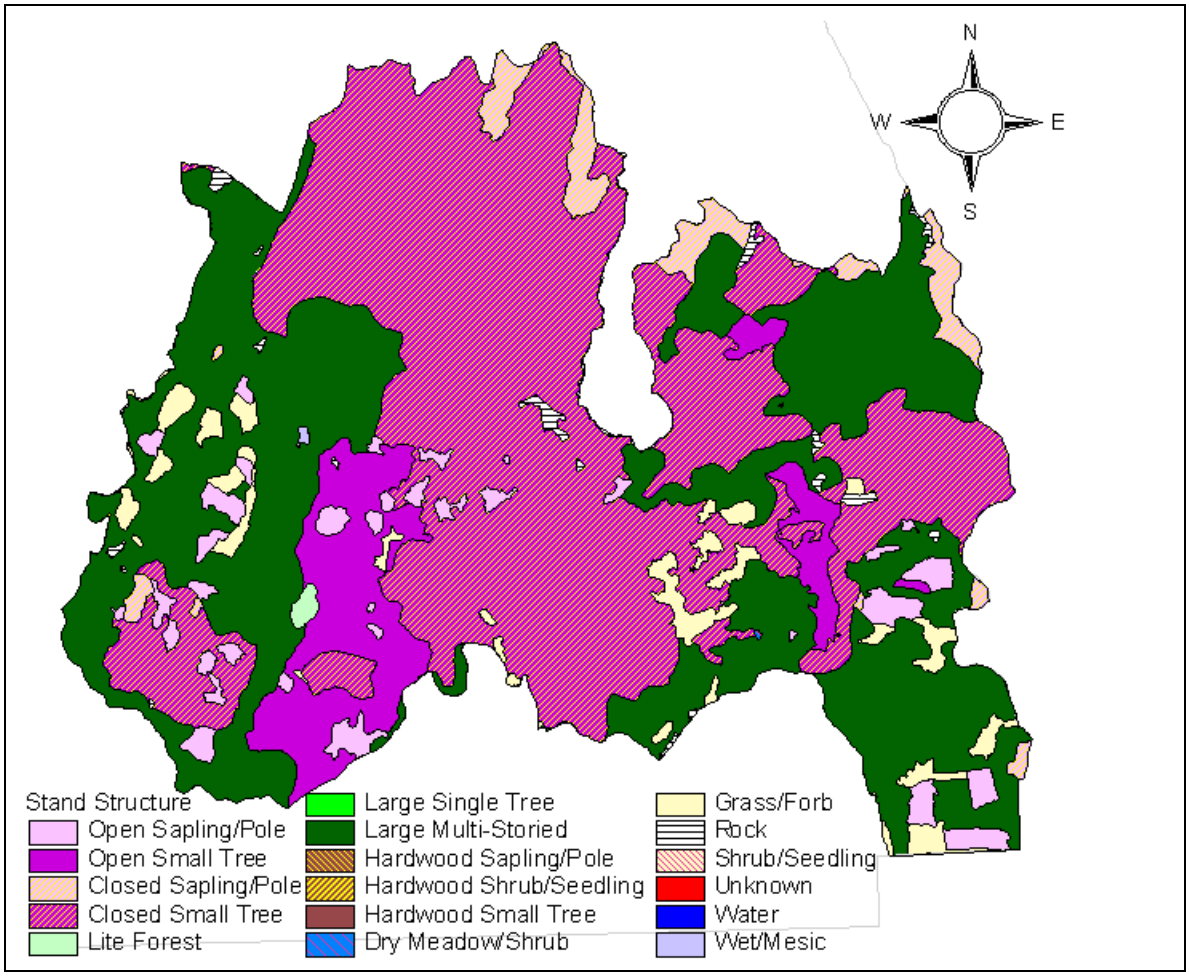
Map 4-8 Gotchen LSR Ecoclass



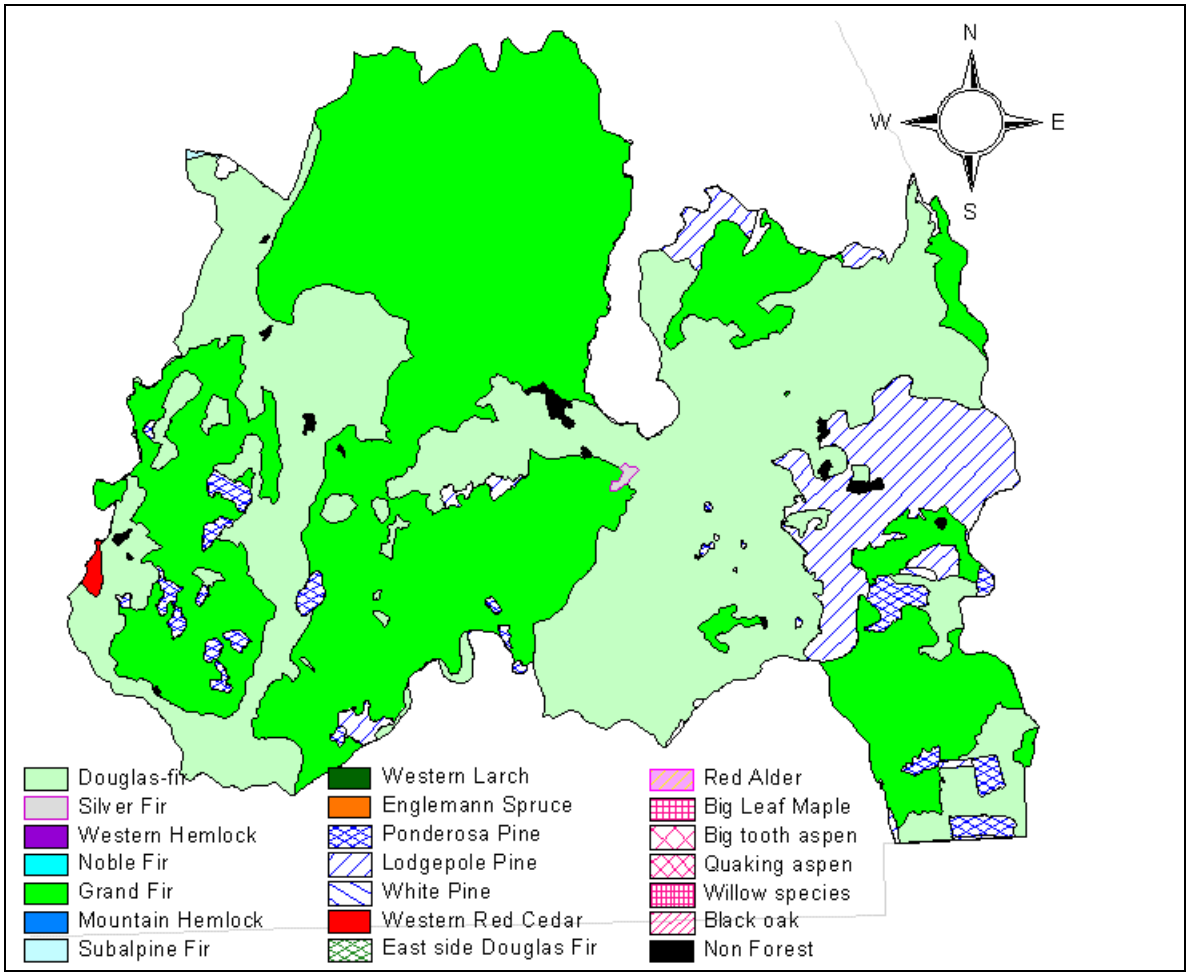
Map 4-9 Gotchen LSR Age Class



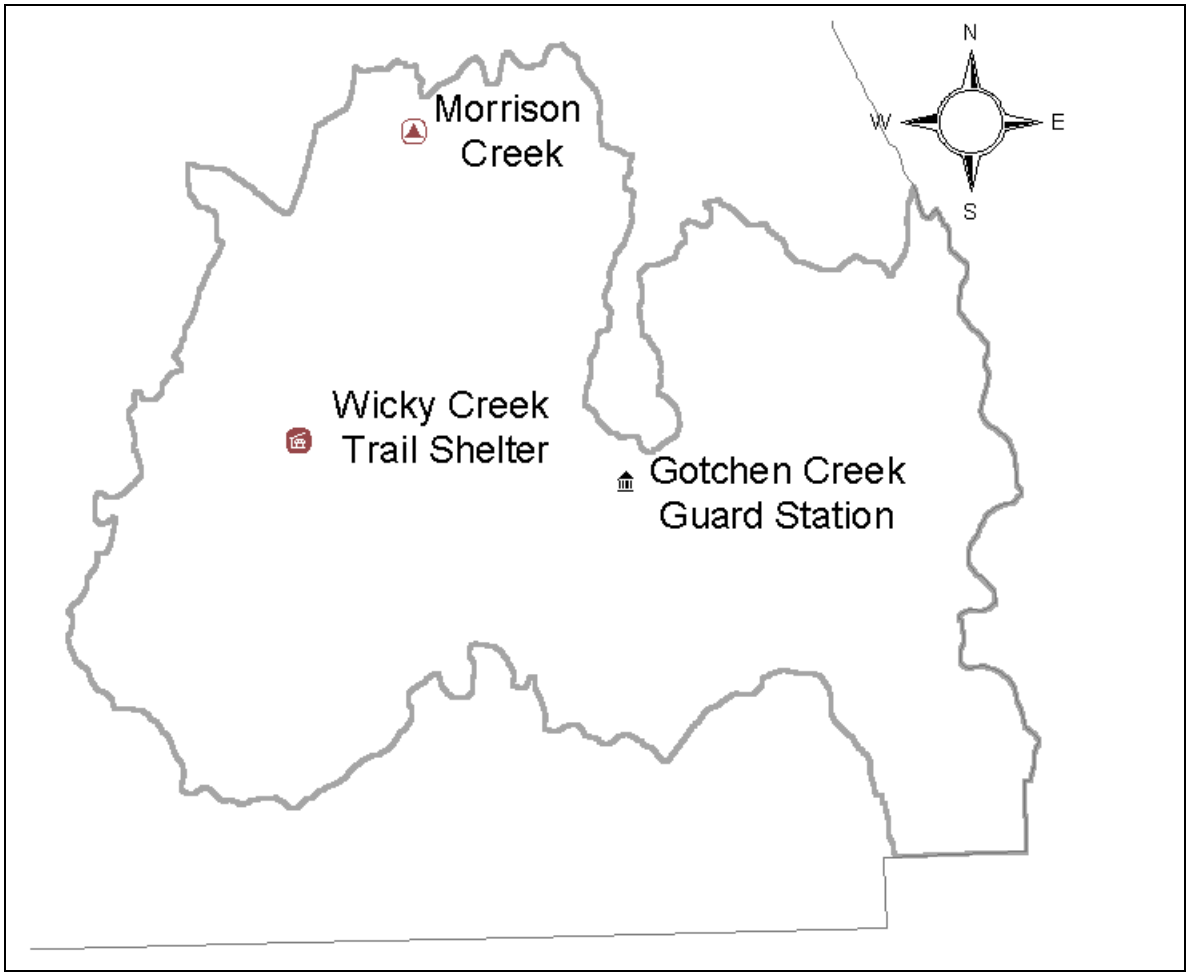
Map 4-10 Gotchen LSR Stand Structure



Map 4-11 Gotchen LSR Dominant Tree Species



Map 4-12 Gotchen LSR Special Sites



Lewis LSR

Riparian Conditions

Existing conditions for riparian resources and functions are described in the *Upper North Fork Lewis River, Middle North Fork Lewis River, and Muddy River Watershed Analyses* are not repeated here.

Unique Species and Habitats

The Lewis LSR has a relatively large expanse of younger habitat in the middle of the LSR. Most of this habitat is in the small-tree structural stage and should develop into late-successional habitat in the next 50 years or longer. Silvicultural treatment that accelerates the development of late-successional habitat would be beneficial in these areas. Some of these are 80-100 years of age and would benefit from thinning. Many of the less mobile species are small mammals, terrestrial amphibians and terrestrial mollusks which use down wood. Increasing the level of down wood in these areas should result in increased habitat connectivity for these species.

The Lewis LSR contains large tree, large patch habitat that extends for most of its length along the east side. (See Map 4-5, page 4-33). There is additional large patch habitat on the west side. However, the central portion is dominated by non-habitat, and dispersed and scattered habitat patches. While this LSR contains a large amount of large patch habitat, east-west movement across the LSR for species in the TLMLT guild is somewhat restricted (See Map 4-3, page 4-31).

The Lewis LSR contains about 21 thousand acres of biological deer and elk winter range.

The only verified population of bull trout, listed as a Regional Forester's sensitive species, inhabit the North Fork Lewis River within the LSR. It is a population which migrates to and from Swift Reservoir, east of the LSR.

The Lewis LSR contains the largest population of Larch Mountain salamander on the Forest.

A hibernacular cave for Townsends big-eared bat is located within the LSR.

The Lewis LSR shares Critical Habitat Unit WA-38 with the Quartz and Woods LSRs. However, the Lewis LSR covers 102,845 acres or 61 percent of the unit. All three LSRs cover approximately 79 percent of Critical Habitat Unit WA-38. See Map 4-1, page 4-22. There are 45 northern spotted owl nest sites within this LSR and 37,000 acres of nesting, roosting, and foraging habitat.

Vegetation Condition

Coniferous forest covers 120,600 acres of the Lewis LSR. The Pacific silver-fir, a mid level zone between 3,000 to 4,300 feet, makes up the largest portion of forest within the LSR - 86,400 acres. The western hemlock zone covers 25,200 acres.

Stands within the LSR range in age from less than 10 years to well over 200 years. Nearly 70 percent (84,420 acres) of the LSRs forest stands are older than 80 years and serve in some capacity as late-successional/old-growth habitat. However, these mature forest stands were fragmented by roads and clear-cut harvesting methods. This resulted in large patches of late-successional forest existing mostly on the west-side and east-side of the LSR, while the central portion is dominated by young forest and scattered late-successional forest patches.

Historically, fire played an important role in shaping the stand structure and distribution. These fires burned large swaths sometimes impacting hundred of thousands of acres. In some areas only small pockets of late-successional forest remains intact on ridgetops and in wet areas. The regeneration harvesting and related activities that has occurred over past the 40 years have altered stand structure, composition, and distribution across the landscape by creating numerous openings containing little if any structural diversity.

Snags and Down Wood

Data from the Forest's Continuous Vegetation Survey shows the following averages for snags and down logs in stands over 80 years old. The sample size for this data was small and observations contained a great deal of variability.

Table 4-17 Down Wood Lewis LSR

Large end Diameter	Pieces per acre	Cumulative Length per Acre	Percent Ground Cover
14 inches	264	3,767 feet	6

Table 4-18 Snags Per Acre Lewis LSR

Average DBH	Snags per Acre
14 inches	27

Disturbance History

Fire is the primary disturbance agent in the Lewis LSR. Since 1930 very little of the LSR area has burned due to wildfire. Fire behavior, risk and occurrence is further described in Chapter 6, Fire Management Plan.

Human Uses

Trails

There are 33 trails, totaling 94 miles within the Lewis LSR. Each trail is assigned a management level with associated standards and guidelines for management (1990 GPNF Forest Plan). Development of the Mount St. Helens National Volcanic Monument and improvement to National Forest Service Roads 25, 51, and 90 has resulted in an increase in use of these trails.

Developed Sites

Facilities and developed recreation sites in the Lewis LSR are shown on Map 4-17, page 4-57.

Roads

Primary access through the LSR is via National Forest Roads 25, 51 and 90. There are 2.2 miles per square mile of road within the Lewis LSR. This road density is somewhat high for species such as the gray wolf and grizzly bear which are highly sensitive to human disturbance. Road access from the town of Cougar is primarily by Road 90 which is an east to west link across the forest. Washington Department of Transportation is constructing and relocating the Curly Creek Road 51.

Special Forest Products

Lewis River LSR is a high use mushroom gathering area. Post, poles, and firewood are also collected from the road right-of-ways and other designated sites. Beargrass and huckleberries are harvested in the summer months in the higher elevation areas. Christmas trees, boughs, and cones are also harvested.

Special Uses

There is one telecommunications site and two data telemetry installations operated under special use permit in the Lewis LSR. There are four lode mining claims located in the Lewis LSR.

Grazing

Sheep were introduced to the this area during the 1890s in the search for suitable summer range. Historically, 100,000 ewes plus lambs ranged over the area.

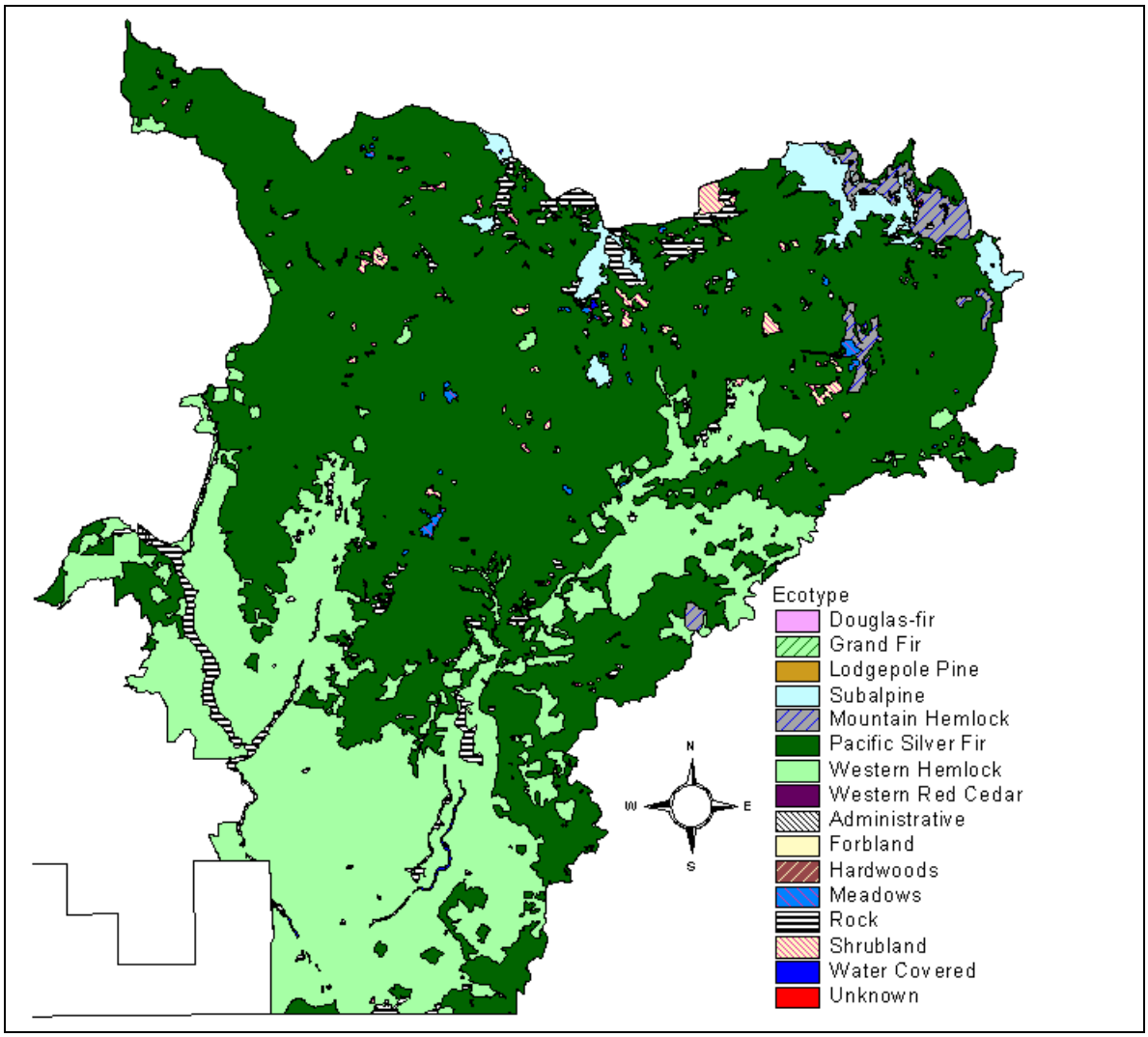
A portion of Lewis LSR is part of the Twin Buttes Sheep and Goat Allotment. The Allotment Management Plan was revised in 1991 to bring management into compliance with the Gifford Pinchot National Forest Land and Resource Management Plan. The allotment plan permits utilization only within present grazing capacity. The present capacity is estimated at 10,437 animal unit months. Today, use is at 14 percent of capacity.

Social Significance

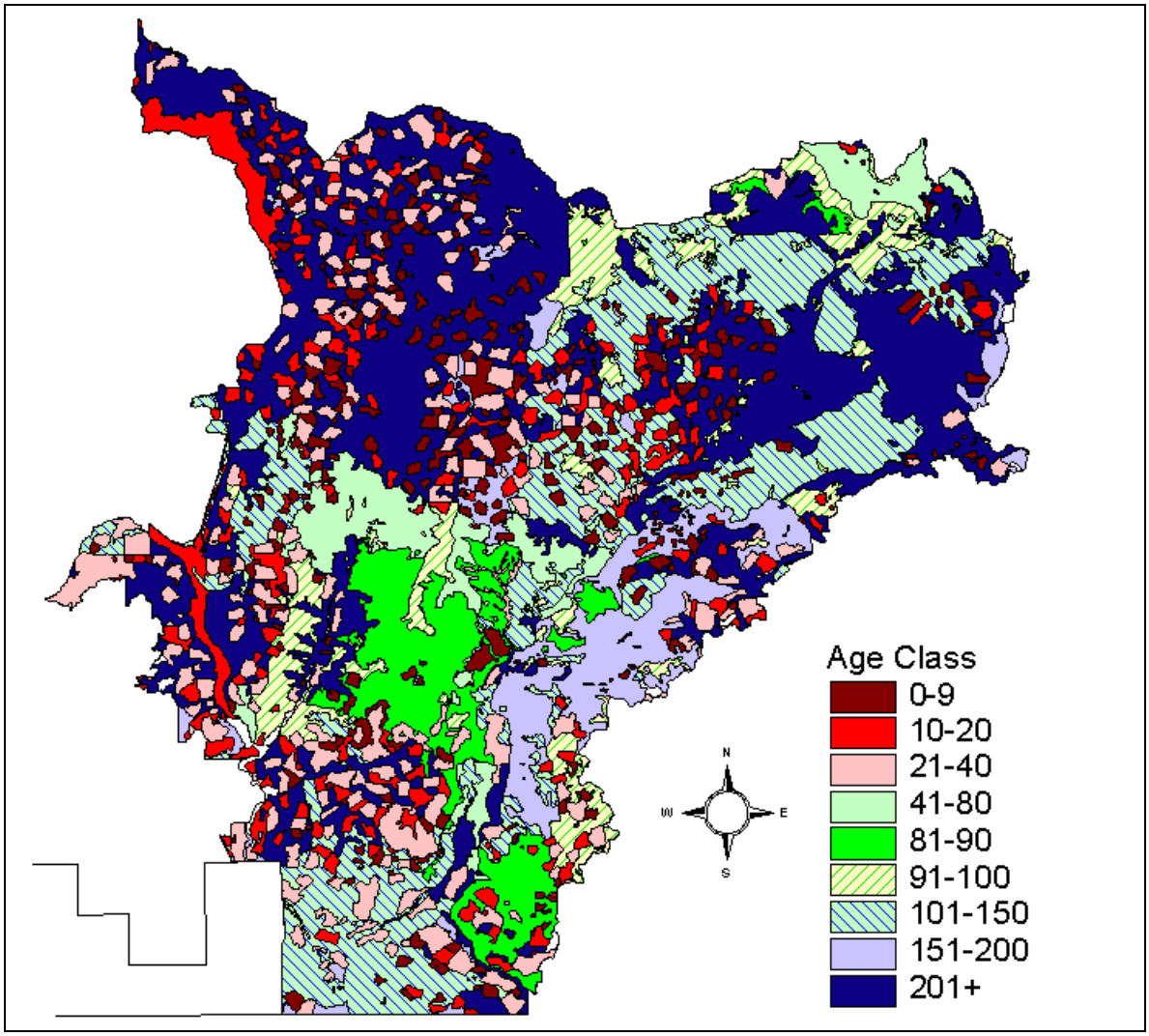
The Lewis LSR contains the Spencer Ridge and southern portions of the Dark Divide RARE II roadless areas.

Two segments of Clear Creek, two segments of Quartz Creek and one segment of the East Fork Lewis River in this LSR are “Further Study Rivers” to be evaluated for suitability for Wild and Scenic designation in a future study. Forest Plan direction provides for protection of values contributing to their potential for classification until the studies are complete. The Forest Plan recommended the portion of the Lewis River which flows through the Lewis LSR for designation by Congress as a Scenic River.

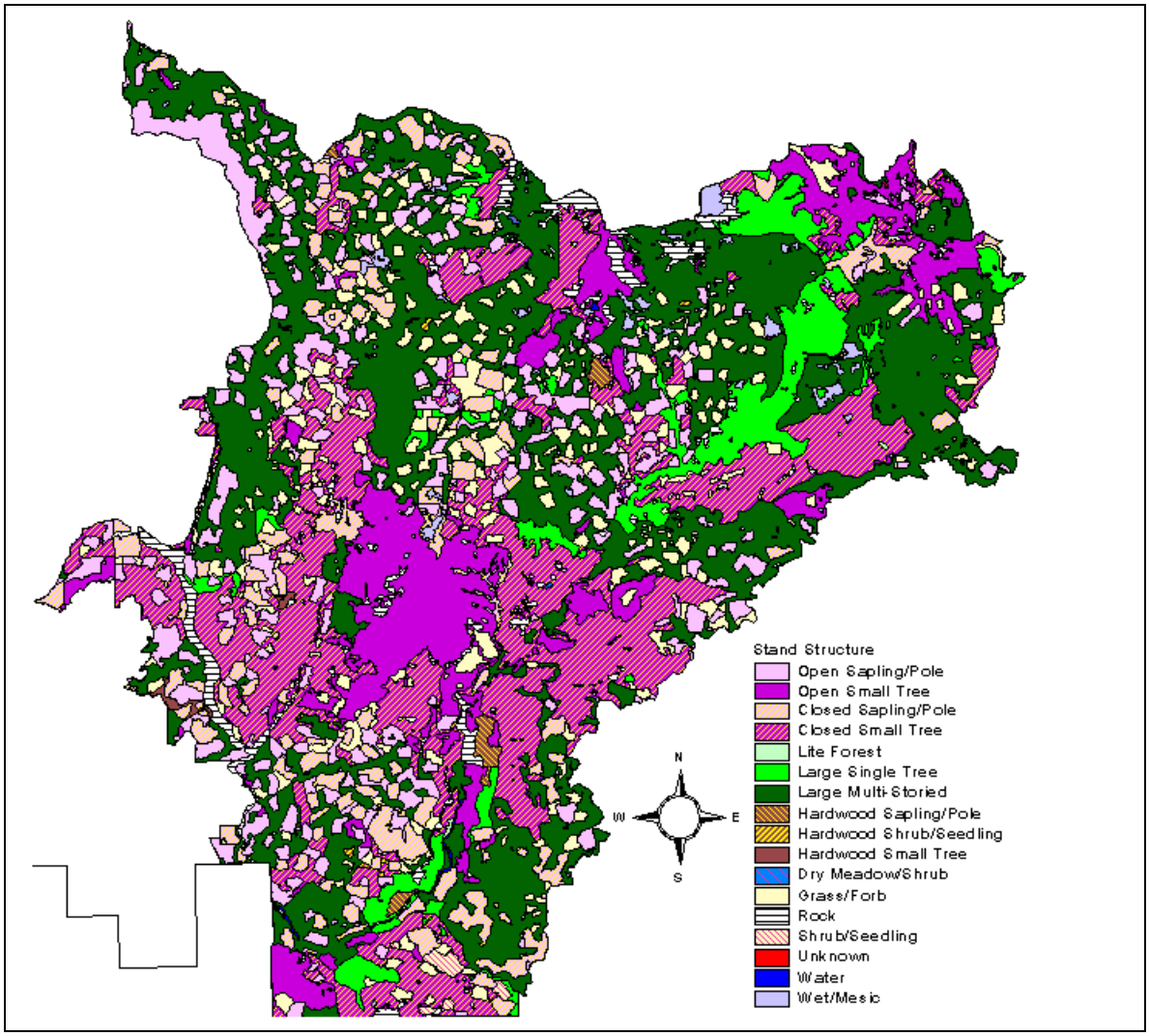
Map 4-13 Lewis LSR Ecoclass



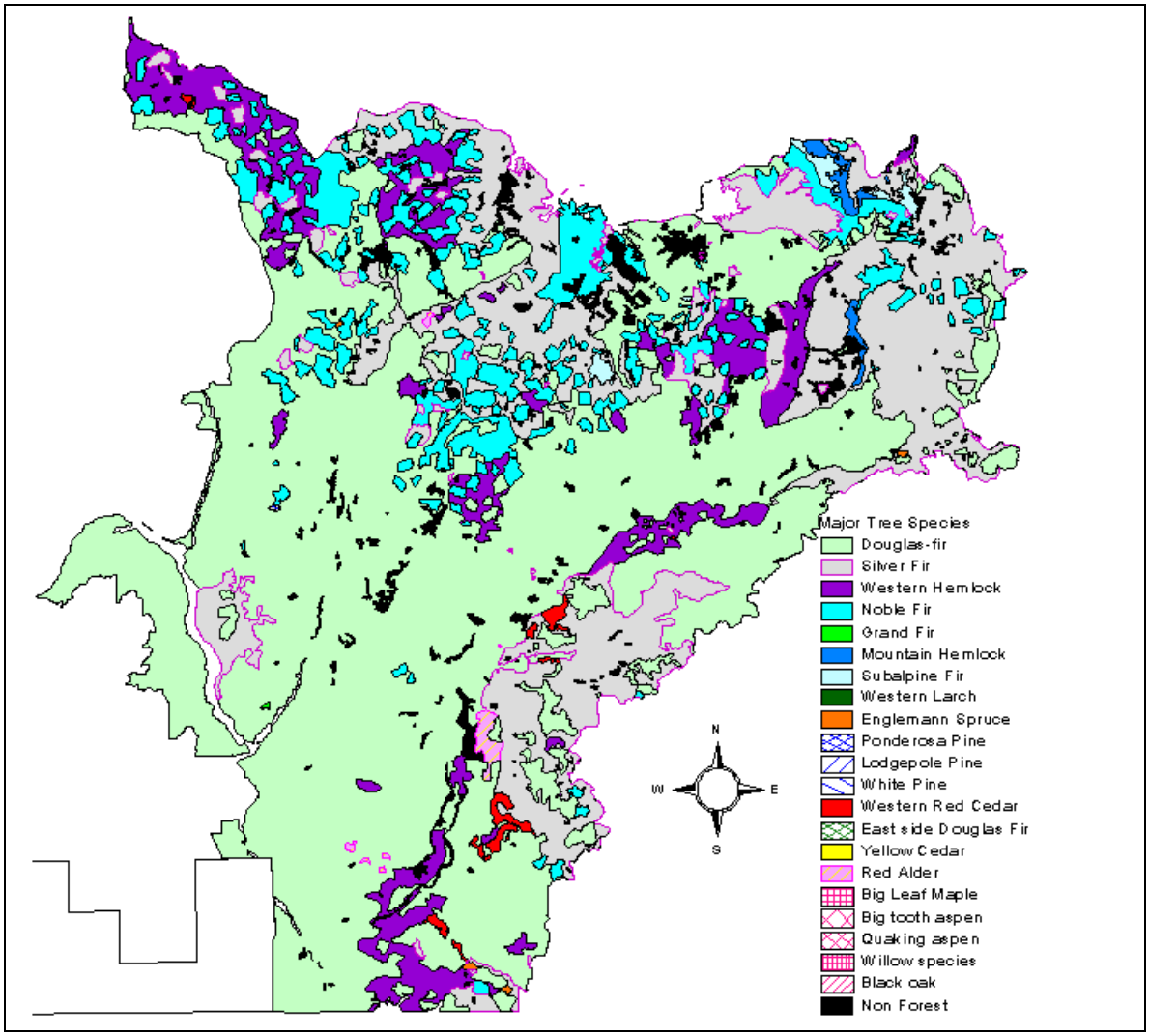
Map 4-14 Lewis LSR Age Class



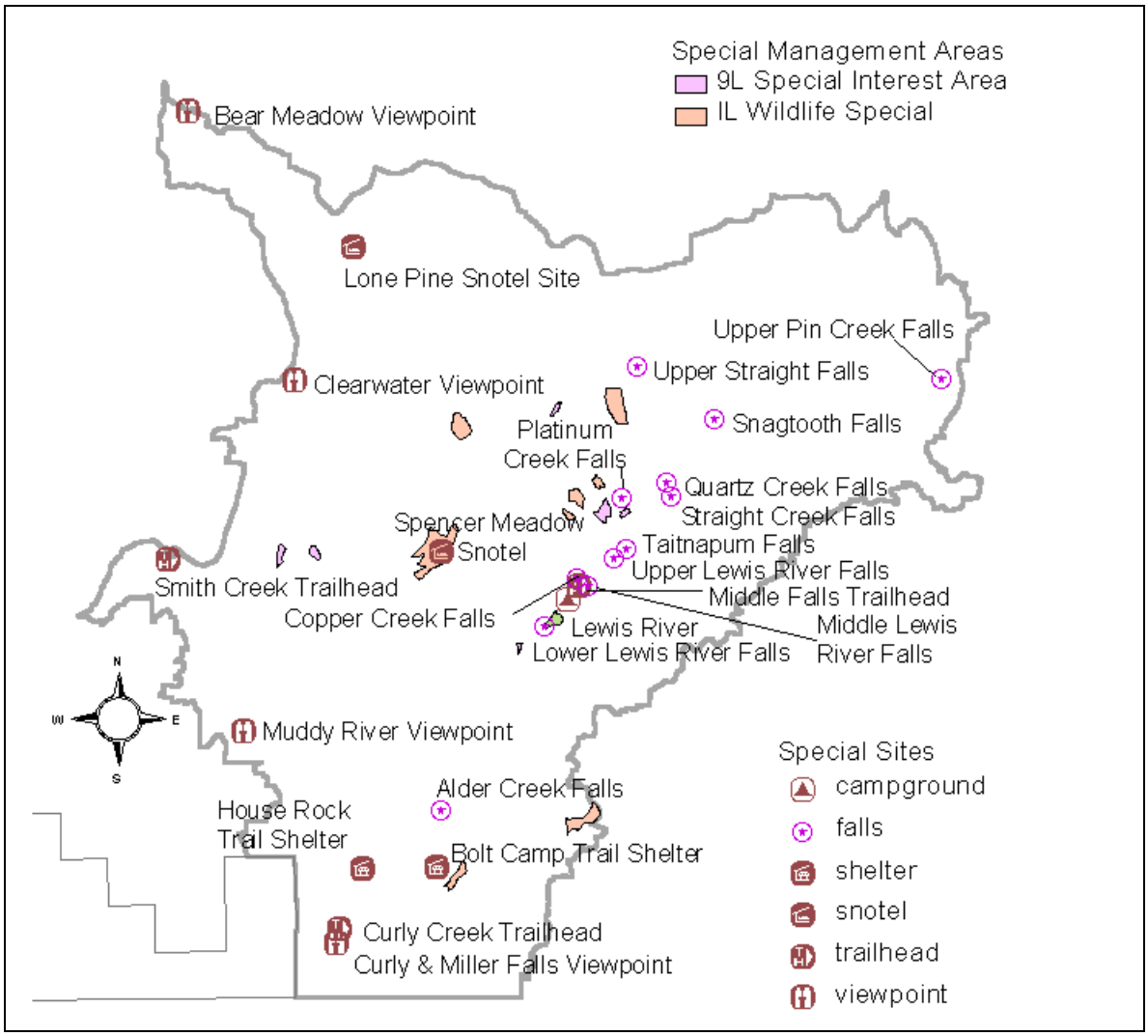
Map 4-15 Lewis LSR Stand Structure



Map 4-16 Lewis LSR Dominant Tree Species



Map 4-17 Lewis LSR Special Sites



Mineral LSR

Riparian Conditions

Existing conditions for riparian resources and functions will be described in the Nisqually (FY-97) and Tilton River/Quartz Creek (FY-98) watershed analyses and are not developed here.

Unique Species and Habitats

The Mineral LSR has a relatively large expanse of younger habitat in the middle of the LSR. Most of this habitat is in the small-tree structural stage and should develop into late-successional habitat in the next 50 years or longer. Silvicultural treatment that accelerates the development of late-successional habitat would be beneficial in these areas. Some of these are 80-100 years of age and would benefit from thinning. Many of the less mobile species are small mammals, terrestrial amphibians and terrestrial mollusks which use down wood. Increasing the level of down wood in these areas should result in increased habitat connectivity for these species.

The Mineral LSR contains no large tree, large patch habitat, and very minor amounts of aggregated patch. The only block of late-successional and old-growth forest is around Newaukum Lake and above Scatter Creek in the northern portion of the Block. (See Map 4-3, page 4-31). While large tree habitat exists, the land ownership pattern has resulted in fragmented conditions. As a result, movement by species in the TLMLT guild within the LSR is restricted. The alternate ownership pattern in the western portion of this LSR limits the opportunity to provide large patch habitat.

The Rockies, a botanical special interest area that has unusual flora endemic to the area and has been proposed as a Research Natural Area, is located in this LSR.

This is the only area where marbled murrelets are known to nest on the Forest.

The entire Mineral LSR is designated as a critical habitat unit for the spotted owl and marbled murrelet.

There are 25 northern spotted owl nest sites within this LSR and 12,600 acres of nesting, roosting, and foraging habitat.

Little Nisqually, Tilton, Deschutes, and Wallanding Creeks provide foraging and roosting habitat for wintering bald eagles.

It is one of two places on the Randle Ranger District that a Townsend's big-eared bat is known to roost.

Vegetation Conditions

Forty-seven percent of this LSR (17,774 acres) is in age classes up to 80 years old, most of which are young plantations which originated from past clearcutting 20-40 years ago, and are stocked at levels (300-400 trees per acre) considered to be appropriate for rapid growth through age 40 to 50.

At least 13 percent of the LSR (5,160 acres) is in the 10-20 year age range. Most of these plantations have not had any stocking control treatment (thinnings), and are stocked at levels ranging from 500 to 1500 trees per acre. Heights of these trees range from 10 feet in the youngest stands to 30 feet in the older stands. Some stands may have very uniform stocking of only the trees which were planted, while others may have a great variety of species and sizes of trees due to natural seeding which followed the planting.

Most of these early seral stands are dominated by Douglas-fir. Higher

elevations were planted to mixes of Douglas-fir and noble fir. Minor amounts of Pacific silver fir, western hemlock, white pine, western redcedar, and Engelmann spruce have been planted in this LSR.

The remainder of the LSR is occupied by mature stands (100+ years old) of Douglas-fir, western hemlock, noble fir, Pacific silver fir, and minor amounts of associated conifers and hardwoods. Douglas-fir is the dominant tree, and these stands have rich understories of other shade-tolerant tree species, shrubs and herbs. The higher elevations have a smaller representation of Douglas-fir, and many more true fir species with smaller tree sizes.

In the oldest stands (200+ years), many of the desired old-growth characteristics are present in varying degrees - standing snags, large woody material on the floor, very large diameter trees, multiple layers of tree canopies, and gaps.

Disturbance History

Large portions of this LSR were burned about 150 years ago in a pattern that suggests that about half of this area was burned over. Most of that has since been harvested.

This LSR is fragmented by private land ownership boundaries. There are about 13 sections of private timber company land within the boundary of this LSR. All of these sections are in young-aged stands (less than 20 years old).

Snags and Down Wood

Data from the Forest's Continuous Vegetation Survey shows the following averages for snags and down logs in stands over 80 years old. The sample size for this data was small and observations contained a great deal of variability.

Table 4-19 Down Wood Mineral LSR

Large end Diameter	Pieces per acre	Cumulative Length per Acre	Percent Ground Cover
10 inches	280	4,820 feet	9

Table 4-20 Snags Per Acre Mineral LSR

Average DBH	Snags per Acre
13 inches	72

Human Uses

Facilities

There are no developed campgrounds or other Forest Service facilities in this LSR. Dispersed campsites are numerous.

Trails

There are no system trails in the Mineral LSR. There are some abandoned trails.

Special Forest Products

Permits for special forest products have been limited in this area due to its remoteness and alternate landownership pattern. Firewood, post, and poles are removed from road right-of-ways and other designated sites.

Special Uses

Because of the alternate ownership pattern in the Mineral LSR there are numerous road easements granted to adjacent landowners. There are also easements for two powerlines, a telephone line and a water transmission line. There are two placer mining claims in the Mineral LSR.

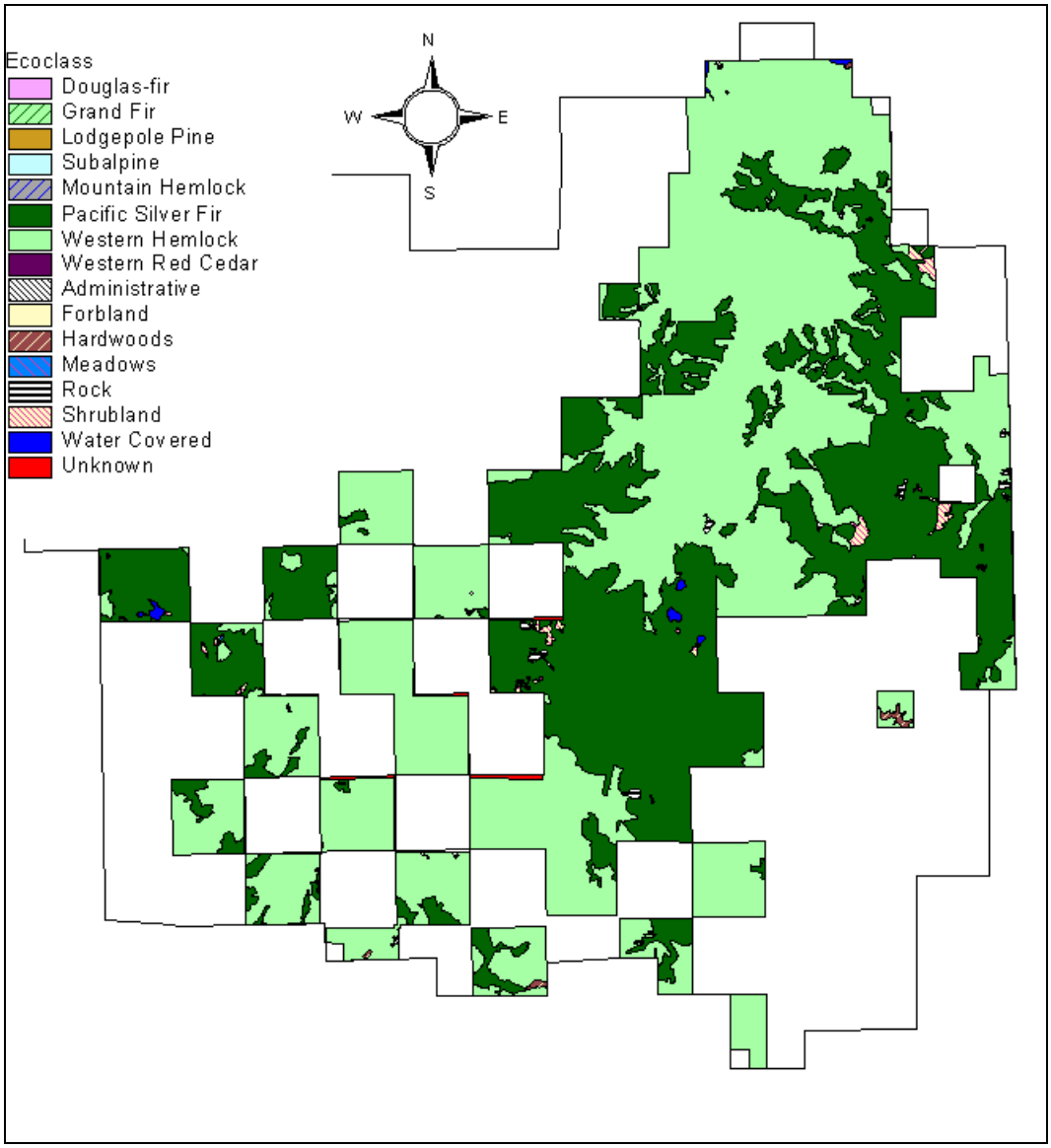
Roads

The open road density in this LSR is the highest on the Forest at 3.6 miles per square mile. The high road density is attributed to the alternate ownership pattern, and dissected terrain.

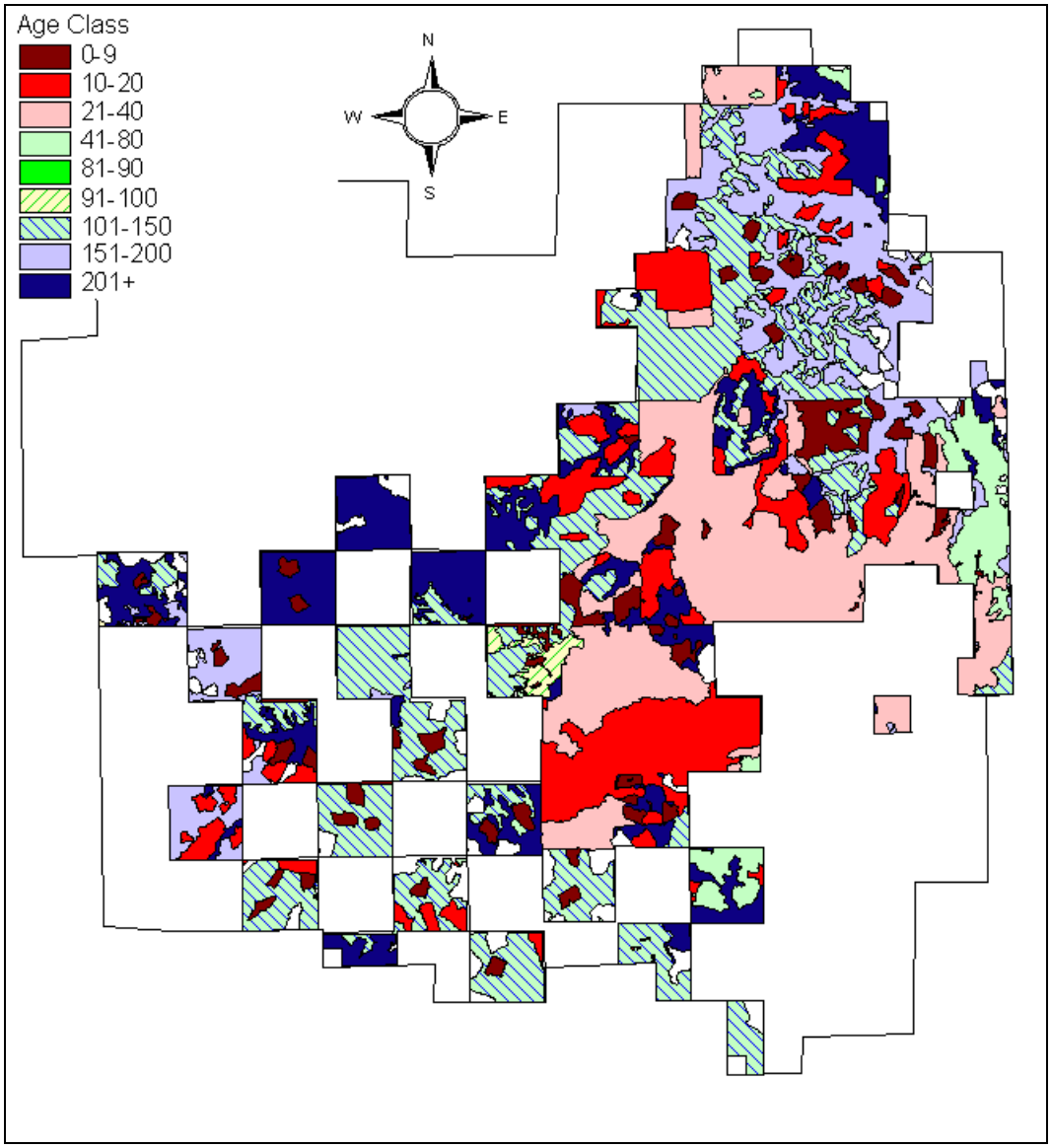
Historic Uses

Much of the cut-over portion of this LSR was acquired from private owners after it had been harvested. The mineral rights were retained by the original owner.

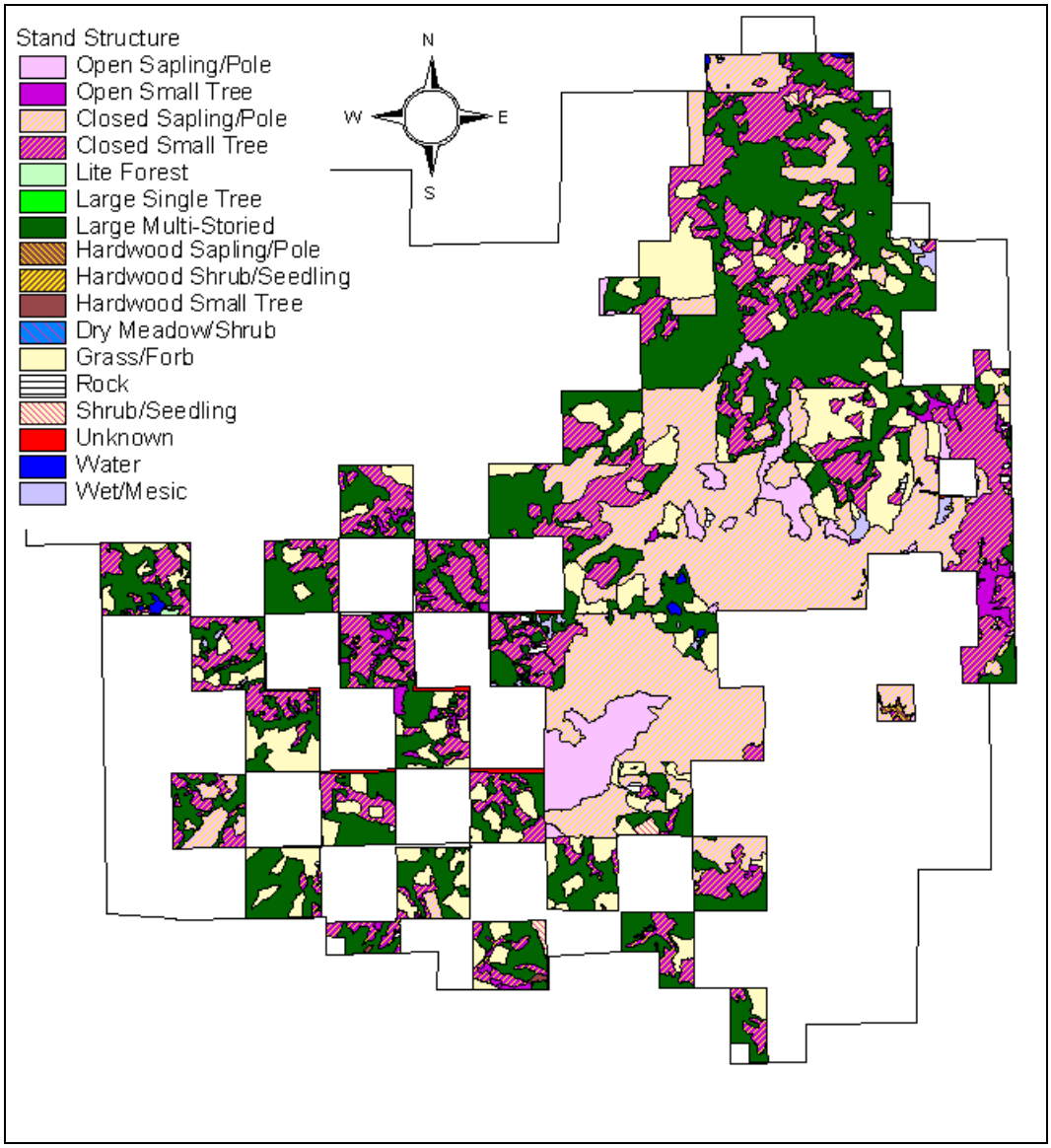
Map 4-18 Mineral LSR Ecoclass



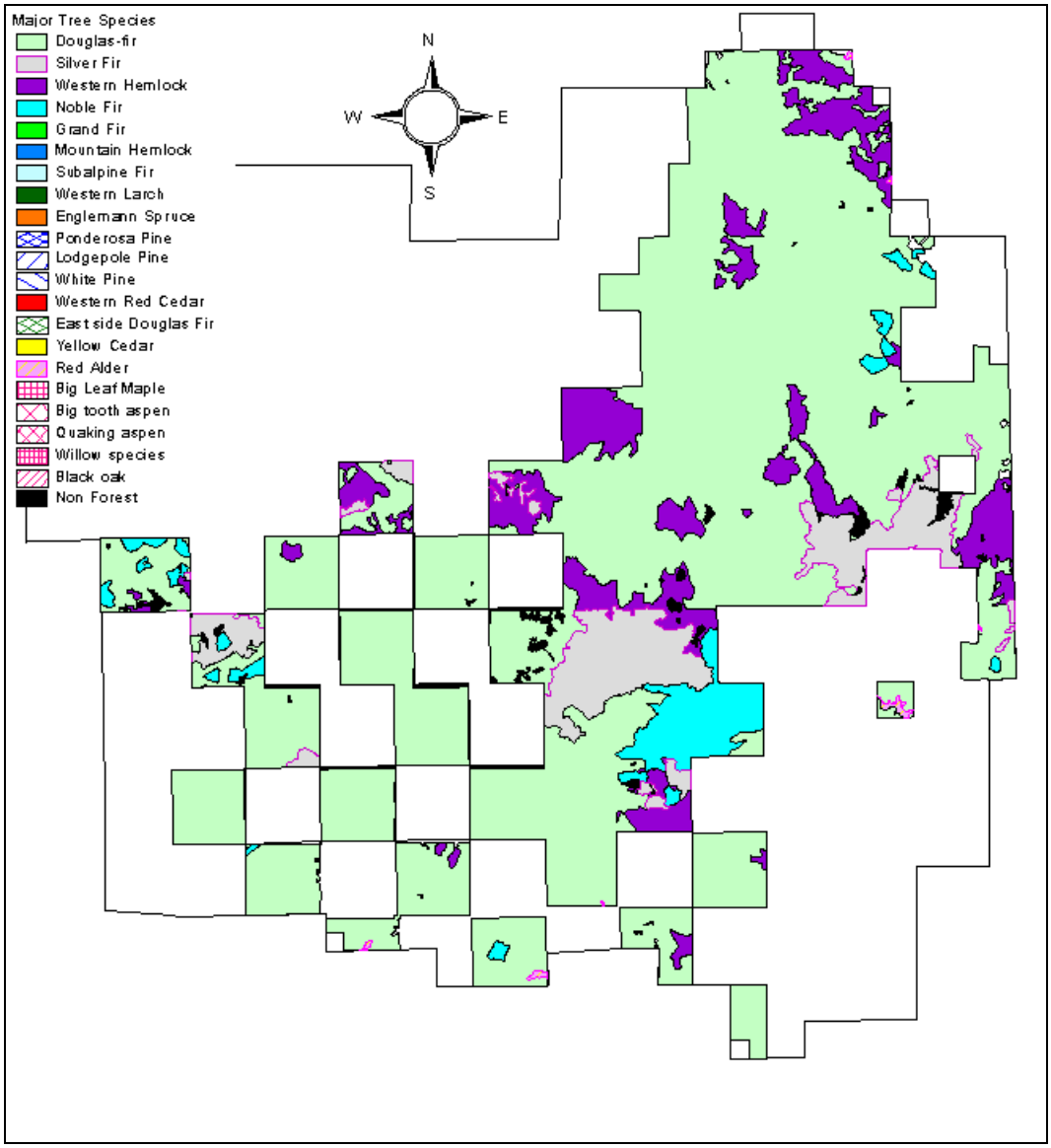
Map 4-19 Mineral LSR Age Class



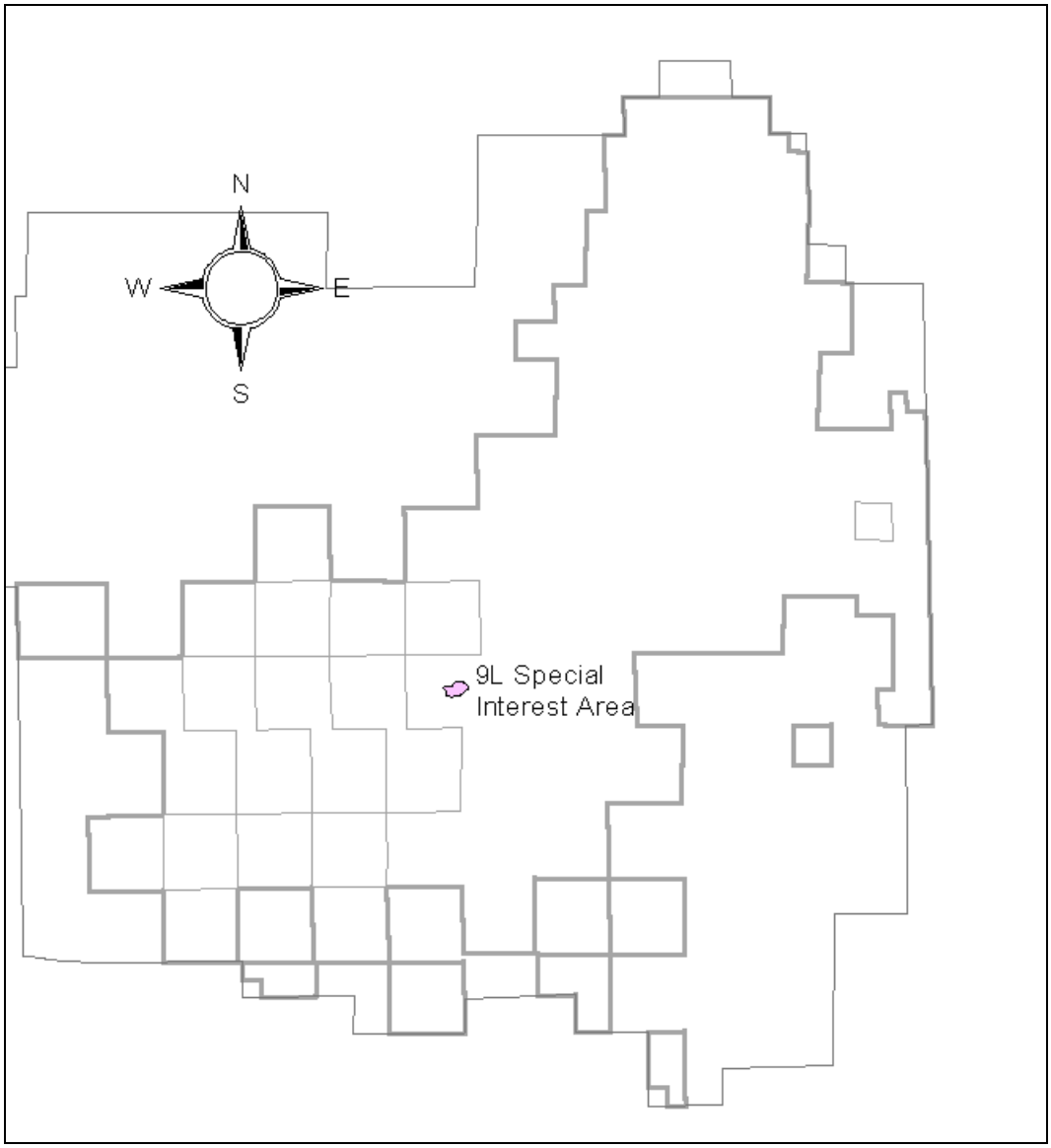
Map 4-20 Mineral LSR Stand Structure



Map 4-21 Mineral LSR Dominant Tree Species



Map 4-22 Mineral LSR Special Sites



Nisqually LSR

The Nisqually LSR is a complex of six separate blocks, three of which are alternate sections separated by Matrix.

Riparian Conditions

Existing conditions for riparian resources and functions will be described in the Nisqually (FY97) and Puyallup River (FY98) watershed analyses and are not developed here.

Unique Species and Habitats

The Nisqually LSR has a relatively large expanse of younger habitat in the middle of the LSR. Most of this habitat is in the small-tree structural stage and should develop into late-successional habitat in the next 50 years or longer. Silvicultural treatment that accelerates the development of late-successional habitat would be beneficial in these areas. Some of these are 80-100 years of age and would benefit from thinning. Many of the less mobile species are small mammals, terrestrial amphibians and terrestrial mollusks which use down wood. Increasing the level of down wood in these areas should result in increased habitat connectivity for these species.

The Nisqually LSR contains very little large tree, large patch habitat. (See Map 4-3, page 4-31). The existing large patch habitat is in the northern piece of this LSR and probably extends into Mount Rainier National Park. Relatively large blocks of unfragmented mid- to late-successional forest are also found along Skate Creek. It is likely that there is additional suitable habitat in the park that is adjacent to habitat within the LSR. This LSR contains a large amount of closed small tree habitat, which reduces the effects of fragmentation (edge effects).

Non-forest vegetation types incapable of supporting late-successional habitat, including rock, shrublands and meadows are concentrated in the eastern portion of the LSR near Skate mountain and Dixon mountain (Table 4-34, page 4-116 and Map 4-23, page 4-69).

Bear Prairie is located in this LSR, an 80 acre seasonally flooded wet meadow with human-created potholes and small ponds. It is an important area for nesting and migratory waterfowl, shorebirds, mammals such as beaver and river otter, amphibians and many other species.

This LSR contains cliffs such as Stonewall Ridge, and other rocky outcrops that provide both summer and winter ranges for mountain goats.

There are alpine and subalpine habitats at Dixon, Skate, and Lookout mountains.

Skate Creek runs through the LSR, a larger stream that provides habitat for harlequin ducks, wintering bald eagles and other species.

Butter Creek RNA and Mount Rainier National Park provide habitat for species such as the gray wolf, wolverine, grizzly bear and other wide-ranging species.

The Nisqually LSR contains Cora, Bertha May, Pothole and Granite lakes which are higher elevation, mid-size lakes.

The Nisqually LSR has 44,357 acres of spotted owl Critical Habitat Unit WA-36. This approximates 59 percent of the unit. The entire Nisqually LSR is designated a marbled murrelet critical habitat. (See Map 4-1, page 4-22.)

There are 13 northern spotted owl nest sites within the Nisqually LSR and 12,700 acres of nesting, roosting, and foraging habitat.

Vegetation Conditions

Twenty-nine percent of this LSR (14,796 acres) is occupied by forest stands in age classes up to 80 years old, most of which are young plantations which originated from past clearcutting 20-40 years ago, and are stocked at levels (300-400 trees per acre) considered to be appropriate for rapid growth through age 40 to 50.

About 8 percent of the area (3,900 acres) is in the 10-20 year range. Most of these plantations have not had any stocking control treatment (thinnings), and are stocked at levels ranging from 500 to 1500 trees per acre. Heights of these trees range from 10 feet in the youngest stands to 30 feet in the older stands. Some stands may have very uniform stocking of only the trees which were planted, while others may have a great variety of species and sizes of trees due to natural seeding which followed the planting.

The composition of these young stands is similar to that described for the Mineral LSR.

The remainder of the LSR is occupied by mature stands (100+ years old) of Douglas-fir, western hemlock, noble fir, Pacific silver fir, and minor amounts of associated conifers and hardwoods. Douglas-fir is the dominant tree, and these stands have rich understories of other shade-tolerant tree species, shrubs and herbs. The higher elevations have a smaller representation of Douglas-fir, and many more true fir species with smaller tree sizes.

In the oldest stands (200+ years), many of the desired old-growth characteristics are present in varying degrees - standing snags, large woody material on the floor, very large diameter trees, multiple layers of tree canopies, and gaps.

Disturbance History

Very distinct age classes are mapped across this LSR, and they reveal a pattern of fire history and intensities for the older age classes. (See Map 4-11b). About 24 percent of the area (12,365 acres) is in age classes greater than 200 years old, and is located mostly in the western half of the LSR. Another 20 percent (10,147 acres) is from 100-150 years old, and is located mostly in the northern part of the LSR. Ten percent of the area (5,197 acres) is about 90-100 years old, and is all located in the eastern part of the LSR.

Because this LSR borders on wilderness areas it may be at a greater risk from wildfire because we are limited in our ability to aggressively suppress wildfire in wilderness areas.

Fire

There have been no large stand replacement fires for over 200 years in the Nisqually LSR.

Because this LSR borders on wilderness areas it may be at a greater risk from wildfire because we are limited in our ability to aggressively suppress wildfire in wilderness areas.

Snags and Down Wood

Data from the Forest's Continuous Vegetation Survey shows the following averages for snags and down logs in stands over 80 years old. The sample size for this data was small and observations contained a great deal of variability.

Table 4-21 Down Wood -Nisqually LSR

Large end Diameter	Pieces per acre	Cumulative Length per Acre	Percent Ground Cover
16 inches	212	3,606 feet	11

Table 4-22 Snags - Nisqually LSR

Average DBH	Snags per Acre
16 inches	37

Human Uses

Campgrounds

There are no developed campgrounds but many dispersed sites in the Nisqually LSR.

Trails

There are 30 miles of system trails, 7 of which allow motorized use, in the Nisqually LSR.

Recreation

The Nisqually LSR, particularly the area accessed by the Skate Creek Road, is a popular recreation area for hunting, fishing, dispersed camping, horseback riding, and mushroom gathering.

Special Forest Products

The area of the Nisqually LSR receives the highest use by special forest products collectors of any area on the Randle and Packwood Ranger Districts. Products collected include Matsutake mushrooms, Christmas trees, beargrass, salal; there are stewardship contracts for bough cutting.

Special Uses

Within the Nisqually LSR, there are special use permits for a powerline, a telephone line, and a water transmission line. There are also special use permits for road maintenance with Lewis County and Mount Rainier National Park. There are three placer mining claims in the Nisqually LSR.

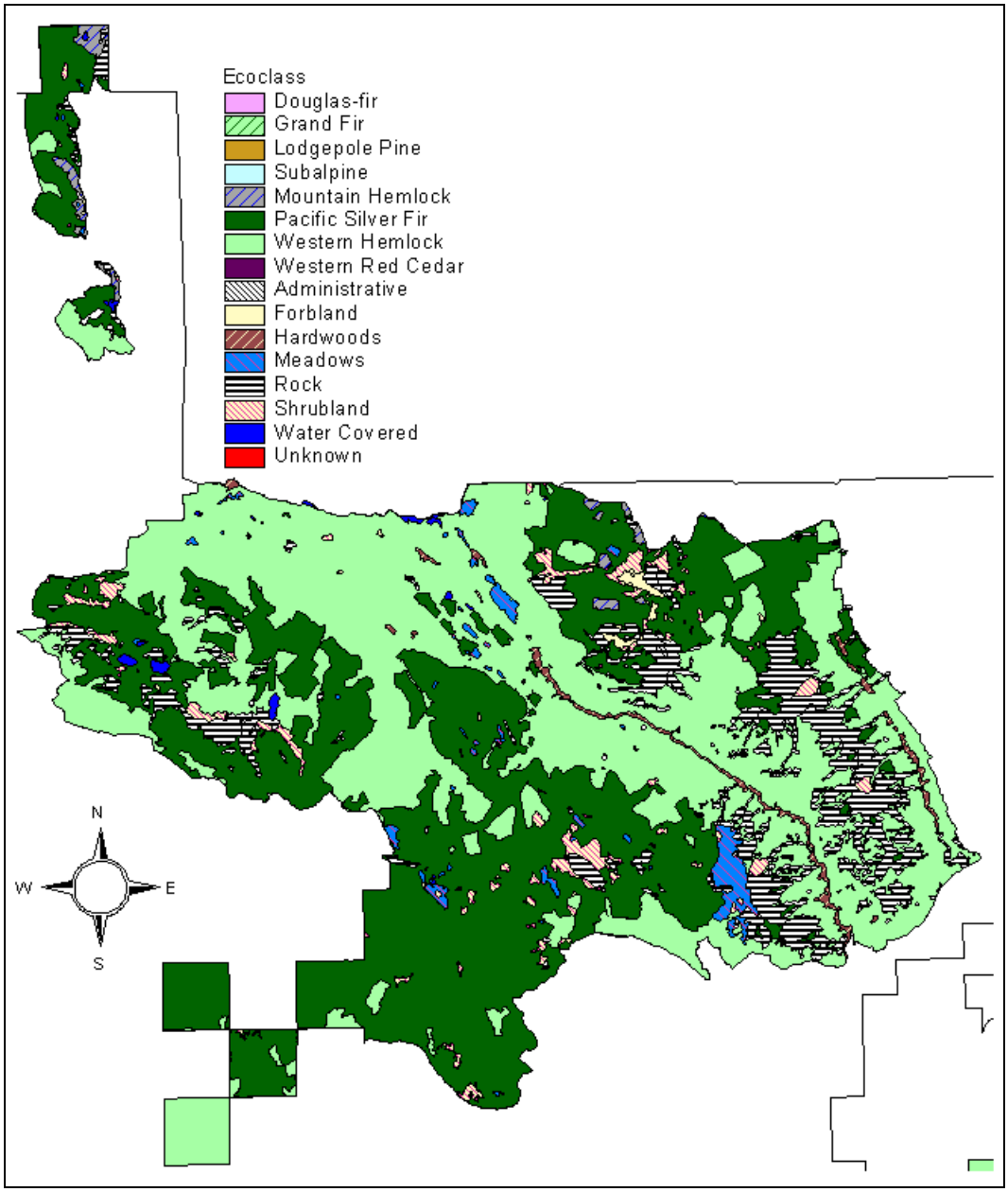
Social Significance

Portions of this LSR are adjacent to the Glacier View and Tatoosh Wildernesses.

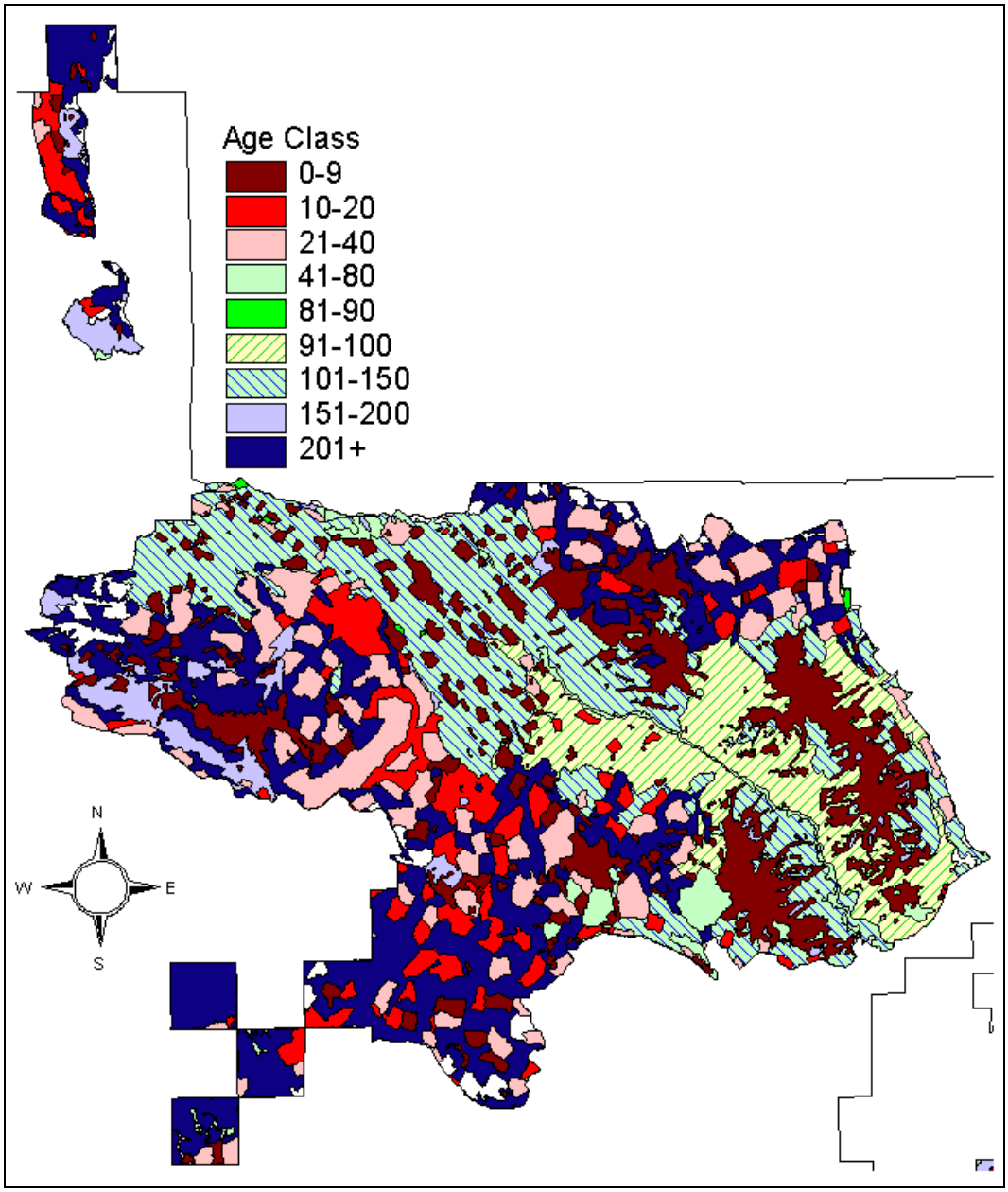
The Deer Creek RARE II roadless area lies in the north tip and the Dixon Mountain RARE roadless area lies in the southeast corner of the Nisqually LSR. RARE II roadless areas are described in detail in Forest Plan EIS Appendix C.

One of three fire lookouts on the Forest, High Rock, is located in the Nisqually LSR.

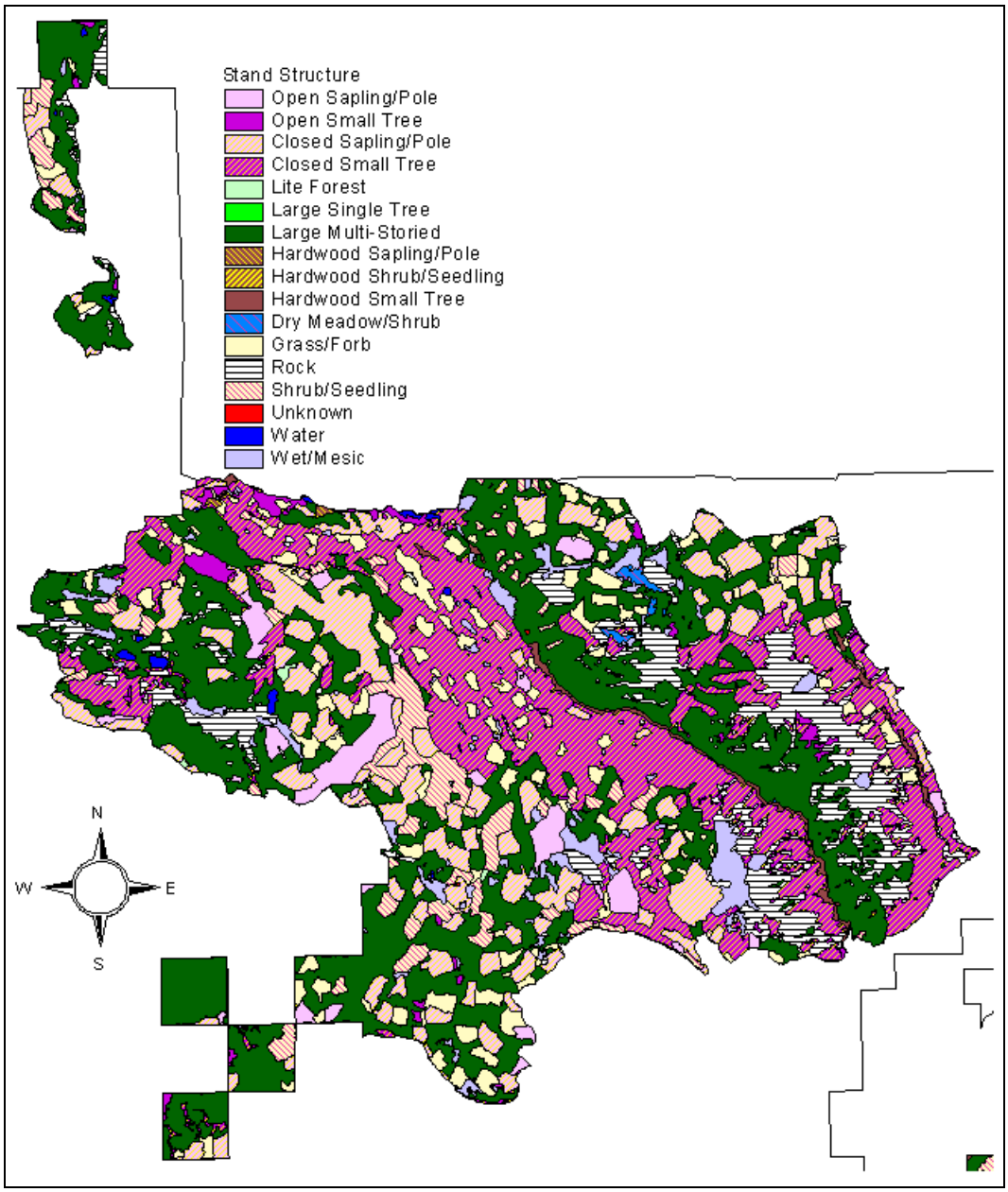
Map 4-23 Nisqually LSR Ecoclass



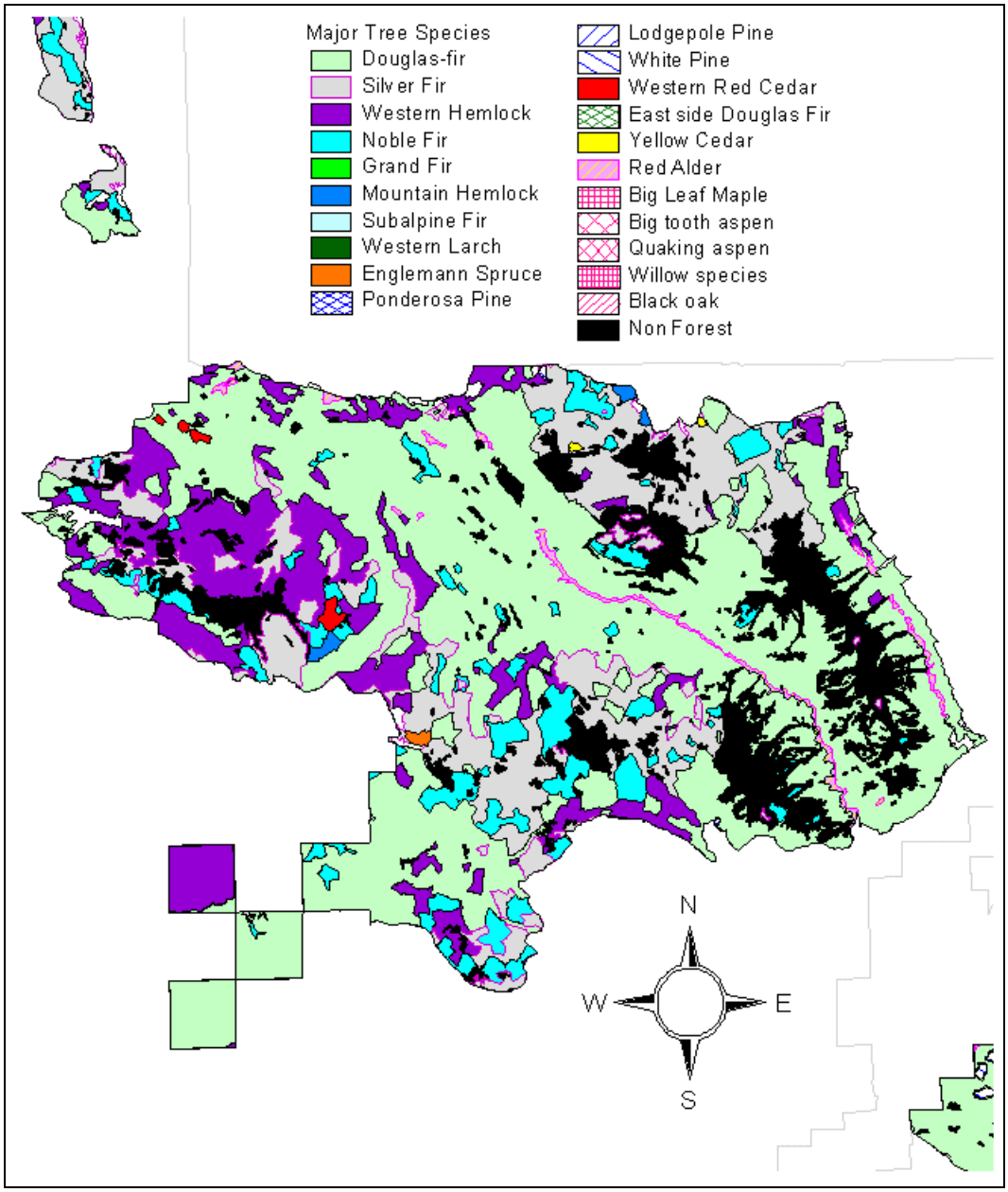
Map 4-24 Nisqually LSR Age Class



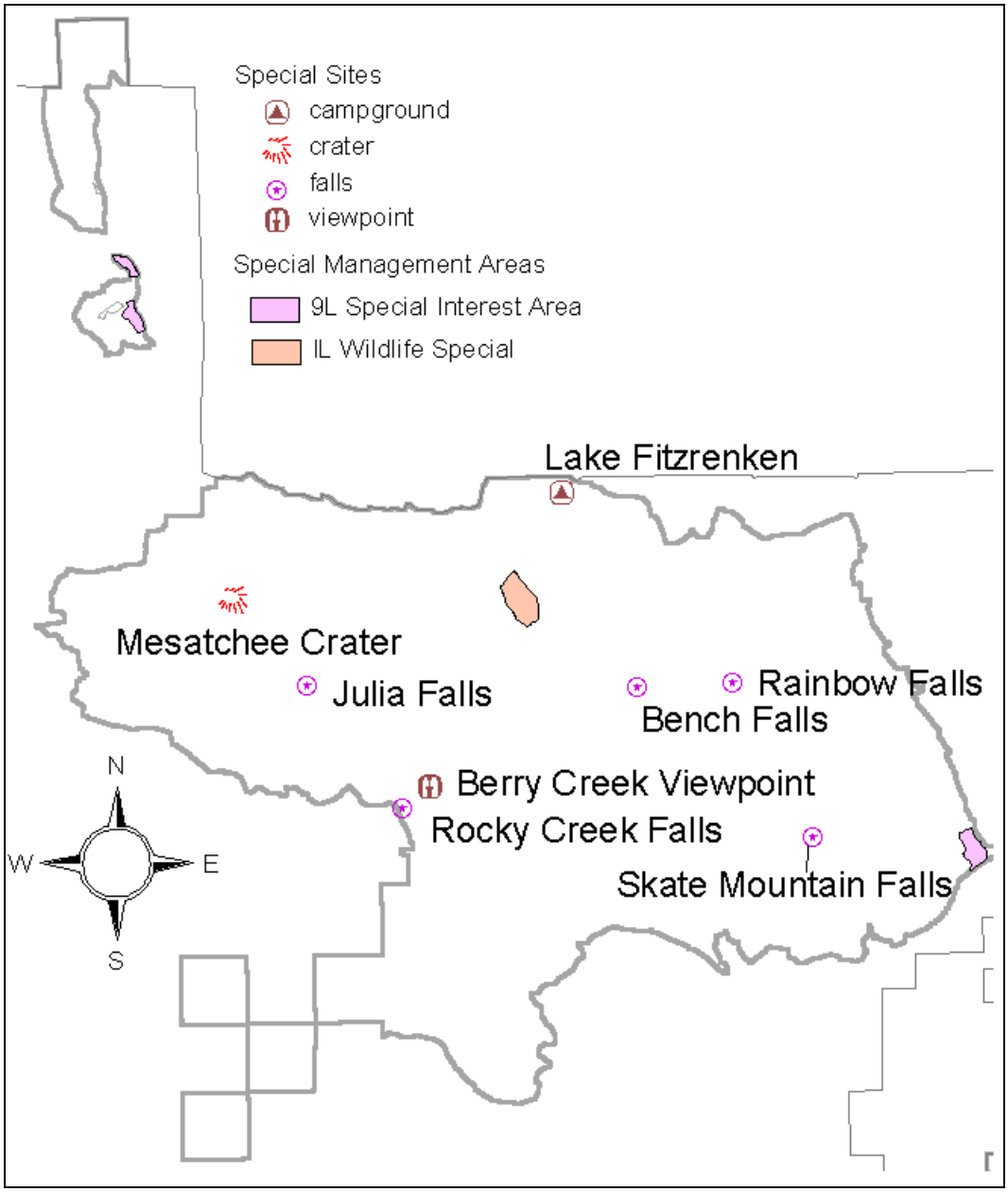
Map 4-25 Nisqually LSR Stand Structure



Map 4-26 Nisqually LSR Dominant Tree Species



Map 4-27 Nisqually LSR Special Sites



Packwood LSR

Riparian Conditions

Existing conditions for riparian resources and functions will be described in the Clear Fork Cowlitz River (FY98) and Upper Cowlitz (FY97) watershed analyses and are not repeated here.

Unique Species and Habitats

The Packwood LSR contains little large tree, large patch habitat. (See Habscapes Map 4-3, page 4-31) but there is a large amount in the adjacent wilderness area. Large tree habitat within the LSR is highly fragmented, however, this LSR contains a large amount of closed small tree habitat, which reduces the effects of fragmentation (edge effects).

The Packwood LSR contains mountain goat summer and winter range.

There are two special interest areas (9L) mapped in the southern portion of this LSR.

The Packwood LSR contains an abundance of cliffs, rocky outcrops, and steep, broken terrain which is important mountain goat winter range.

Some white oak "balds" are present.

The Cowlitz River (including the Muddy Fork and Clearfork branches, and the Ohanapecosh River) runs through the LSR and provides a migration corridor for waterfowl and other species, harlequin duck nesting habitat, bald eagle winter habitat, and nesting ospreys habitat.

The Packwood LSR borders the Goat Rocks and William O. Douglas Wildernesses and several unroaded areas which provide habitat for wolves and other wide ranging species.

The Packwood LSR contains two known Larch Mountain salamander sites.

It contains several small lakes and ponds such as Snyder and Hager Lakes and borders Packwood Lake which provides habitat for eagles, loons, ospreys, and otters.

Critical Habitat Unit WA-37 contains 38,077 acres of the Packwood LSR. This LSR covers 56 percent of the unit. (See Map 4-1, page 4-22.)

There are 11 northern spotted owl nest sites within this LSR and 18,700 acres of nesting, roosting, and foraging habitat.

Vegetation Conditions

Twenty-nine percent (13,311 acres) of this LSR is in age classes up to 80 years old, most of which are young plantations which originated from past clearcutting 20-40 years ago. They are stocked at levels (300-400 trees per acre) considered to be appropriate for rapid growth through age 40 to 50.

About 7 percent (3,007 acres) is in the 10-20 year class. Most of these plantations have not had any stocking control treatment (thinnings), and are stocked at levels ranging from 500 to 1500 trees per acre. Heights of these trees range from 10 feet in the youngest stands to 30 feet in the older stands. Some stands may have very uniform stocking of only the trees which were planted, while others may have a great variety of species and sizes of trees resulting from natural seeding which followed the planting. There is a shift to dominance by the trees and away from shrubs, herbs and grasses in these stands.

Forty-two percent (18,801 acres) of this LSR is in stands over 200 years old. Even though the distribution of this age class looks fairly even on Map 4-29, the vegetative structure and composition changes as the plant zone changes from western hemlock to Pacific silver fir. Large Douglas-fir dominate stands in the hemlock zone and decrease in size and numbers in the silver fir zone.

Other stands ranging in age from 100 to 200 years old are well distributed throughout the LSR.

Like the Nisqually LSR, there is a moderate percentage of non-forest (12 percent - 5,331 acres), and it is mostly located in the northern portion of the LSR.

Snags and Down Wood

Data from the Forest's Continuous Vegetation Survey shows the following averages for snags and down logs in stands over 80 years old. The sample size for this data was small and observations contained a great deal of variability.

Table 4-23 Down Wood - Packwood LSR

Large end Diameter	Pieces per acre	Cumulative Length per Acre	Percent Ground Cover
12 inches	206	2,767 feet	6

Table 4-24 Snags - Packwood LSR

Average DBH	Snags per Acre
14 inches	38

Disturbance History

Fire

There have been no large stand replacement fires for over 200 years in the Packwood LSR.

Because this LSR borders on wilderness areas it may be at a greater risk from wildfire because we are limited in our ability to aggressively suppress wildfire in wilderness areas.

Insects and Disease

The southern half of the Packwood LSR has a high incidence of *Phelinus weirii* root rot and many of the young plantations which were planted to Douglas-fir trees 15-30 years ago may be delayed in reaching the desired future condition if they need to be replanted with less susceptible species.

Human Uses

Recreation

State Highway 12 crosses the LSR between Packwood and White Pass. The Ohanapecosh entry to Rainier National Park, La Wis Wis campground and the Palisades picnic area attract many recreationists. Packwood Lake, adjacent to the Goat Rocks Wilderness, is another popular recreation destination in the LSR.

Facilities

Within the Packwood LSR there are three developed campgrounds, La Wiss, Summit, and Soda.

Trails

There are 50 miles of system trails in the Packwood LSR, none allow motorized use.

Special Forest Products

There is a moderately high level of special forest products collection in the Packwood LSR. Activities include stewardship bough sales, beargrass, salal and mushroom collecting.

Special Uses

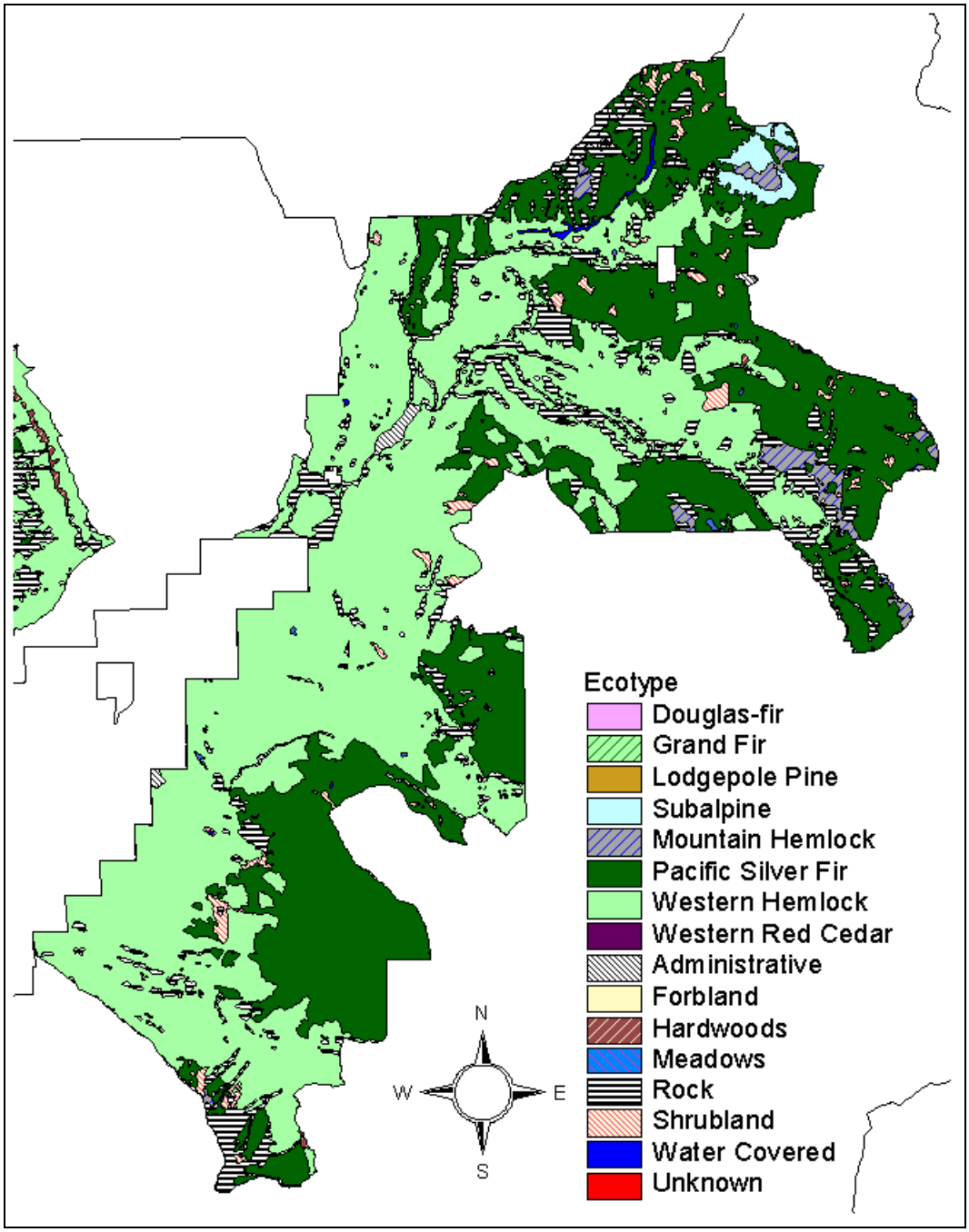
There are several special use permits related to the operation of Packwood Lake hydro power plant. There are also other permits related to road maintenance and easements, a powerline, and a water transmission line.

Social Significance

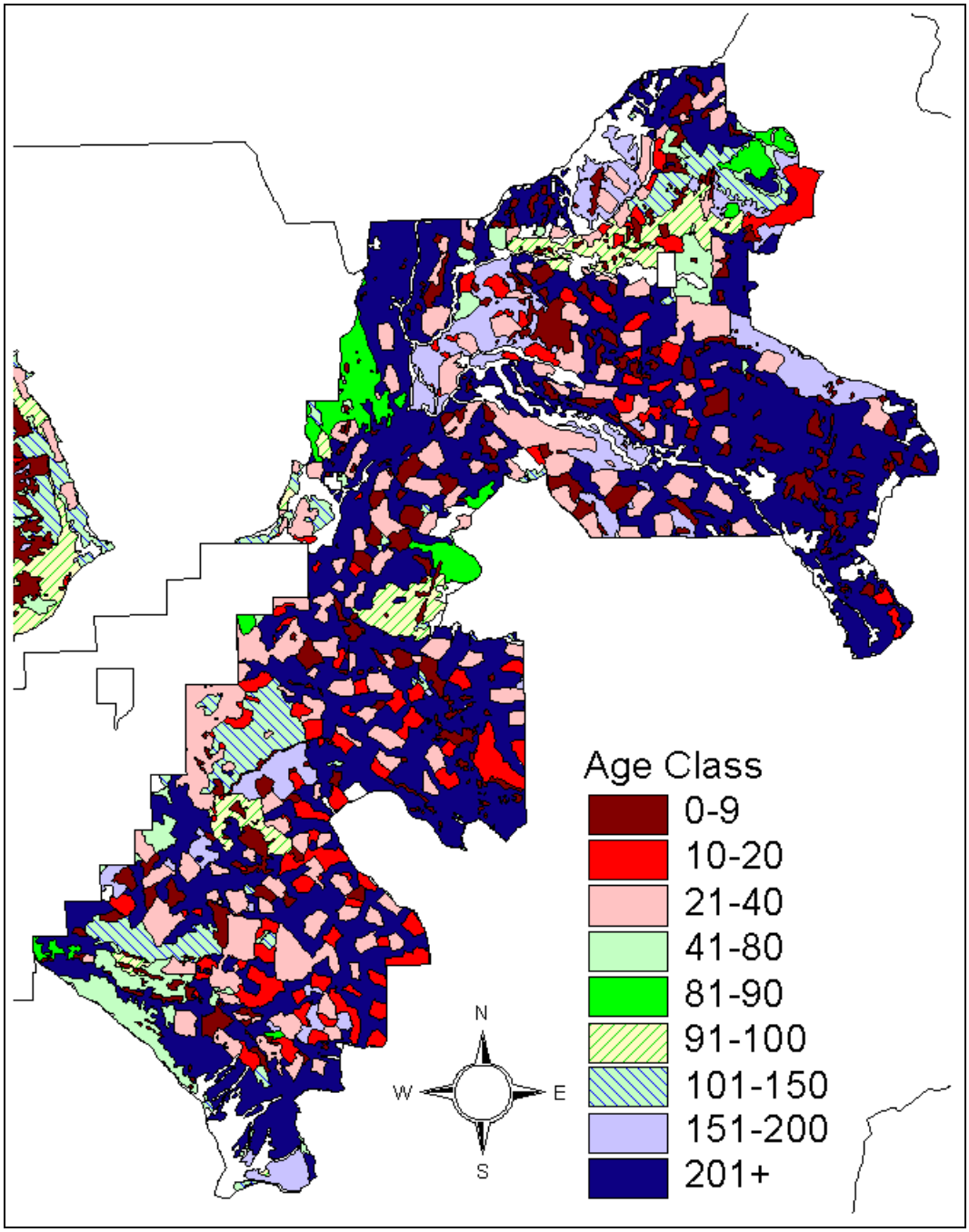
The Packwood LSR contains six RARE II roadless areas: Laughing Water, Carlton Ridge, Backbone, Cortright, Coal Creek Bluff and Packwood Lake. State Highway 12, a major travel route over White Pass and a designated State Scenic Highway traverses the LSR from east to west.

Portions of the Muddy Fork and Clear Forks of the Cowlitz River in the Packwood LSR have been recommended to Congress as National Scenic Rivers. Portions of Ohanapecosh River in the LSR have been designated as “Further Study Rivers” and will be managed to protect scenic values pending the completion of suitability analysis.

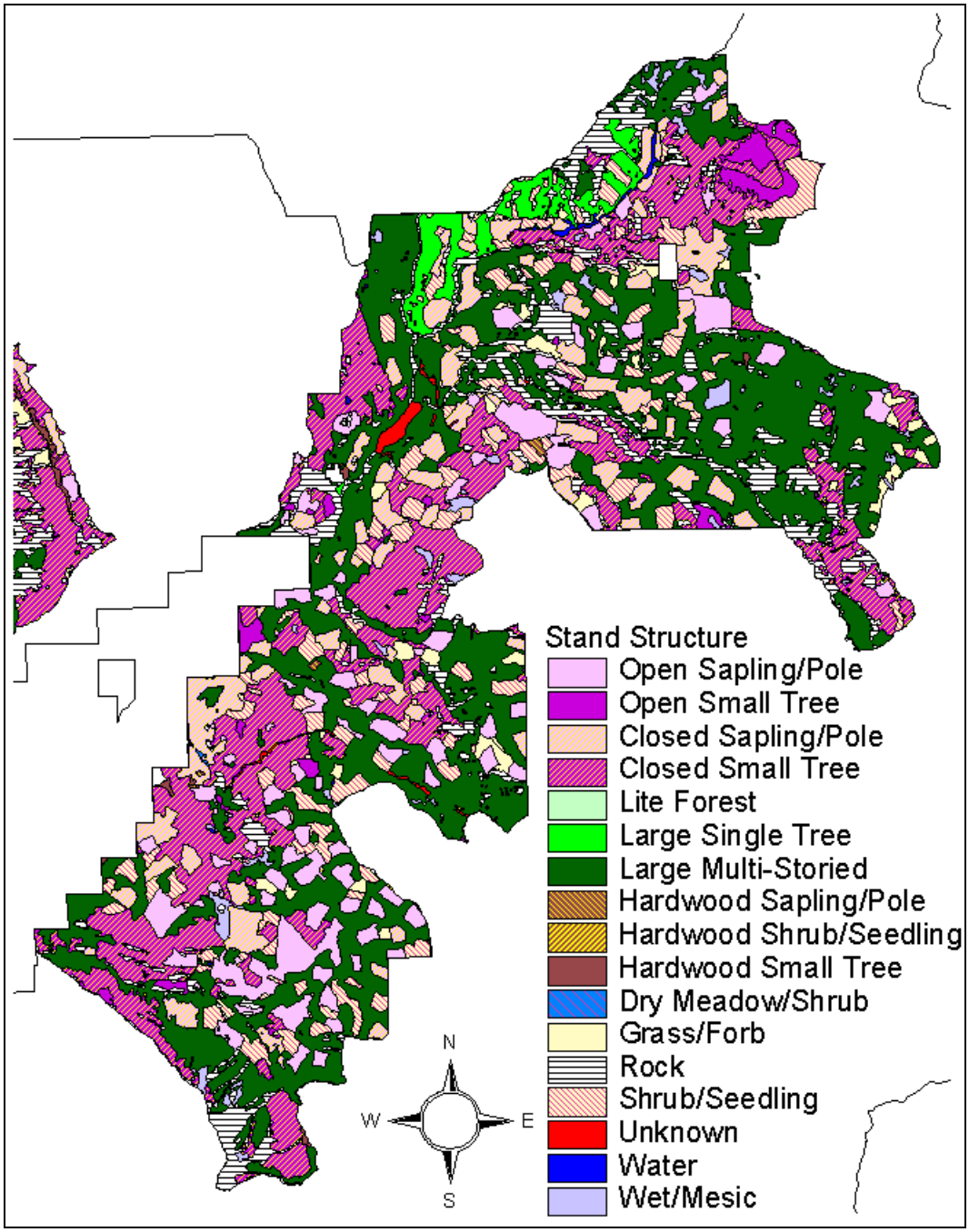
Map 4-28 Packwood LSR Ecoclass



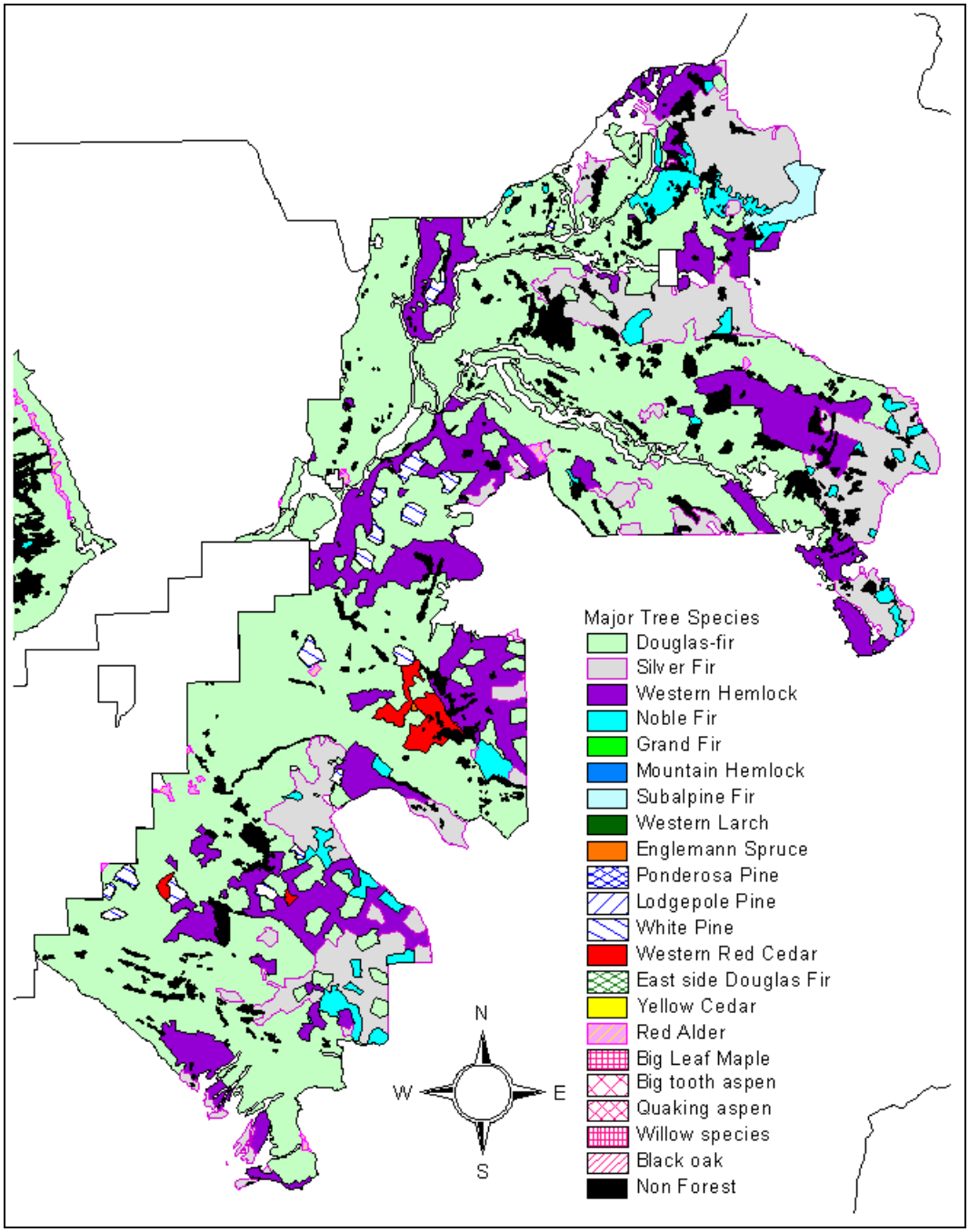
Map 4-29 Packwood LSR Age Class



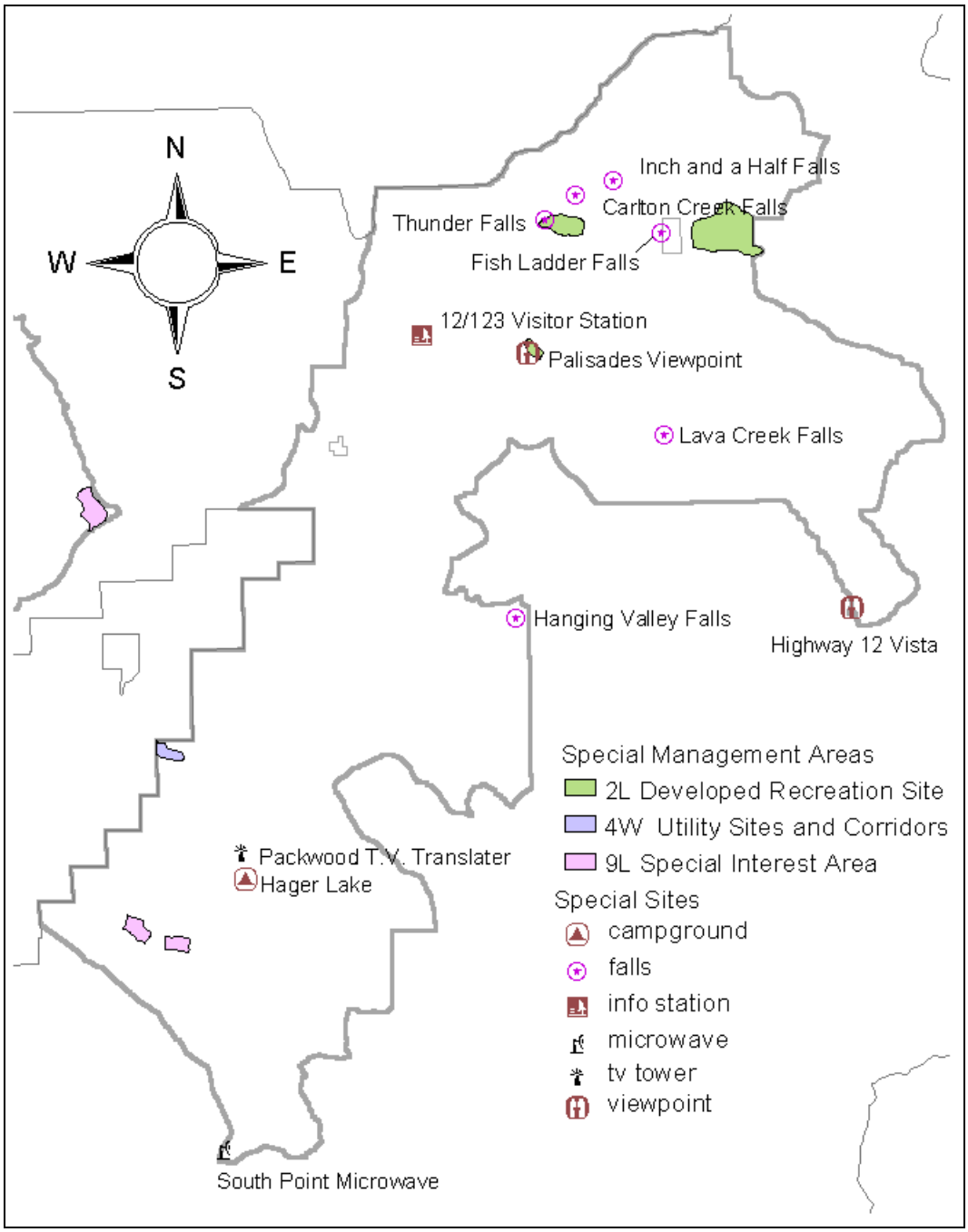
Map 4-30 Packwood LSR Stand Structure



Map 4-31 Packwood LSR Dominant Tree Species



Map 4-32 Packwood LSR Special Sites



Peterson LSR/MLSA

For the purposes of this assessment, we have combined LSR 151 with the Managed Late-Successional Area. Field review of these areas shows they are similar in climate, vegetation, wildlife, terrain, and historical uses.

Riparian Conditions

Existing conditions for riparian resources and functions are described in the *Trout Lake Creek* (FY96) and *Cave/Bear Creek* (FY97*) Watershed Analyses* and are not repeated here.

Unique Species and Habitats

The Peterson LSR contains large amounts of large tree, large patch habitat with dispersed habitat linking these patches. (See Map 4-3, page 4-31). Indications are that this LSR is only moderately fragmented, and movement through the LSR by these species is probably not severely restricted.

Peterson Prairie is a unique meadow opening, sustained historically through burning.

Numerous caves are present in this area. These caves are generally shallow lava tubes. Caves form unique plant habitat at their entrances, and may be used as roosting sites by bats, including the sensitive Townsend's big eared bat.

There are populations of sensitive plants fringed pinesap and pale blue-eyed grass in the LSR.

The Peterson LSR is within Critical Habitat Unit WA-41. A portion of the Wind LSR is also within this unit. The Peterson LSR only makes up 11,927 acres or 7 percent of the unit. The Peterson and Wind LSRs together comprise 96,725 acres or 57 percent of WA-41. (See Map 4-1, page 4-22.)

There are 6 northern spotted owl nest sites within this LSR and 6,500 acres of nesting, roosting, and foraging habitat.

Vegetation Conditions

The Peterson LSR lies primarily within the Grand Fir and Pacific silver fir zones, with a minor amount in the Mountain Hemlock Zone. Currently, the Peterson LSR is comprised of a matrix of late-successional forest and younger forest stands, with patch clearcuts dispersed throughout. Late-successional stands are composed of Douglas-fir, grand fir, Pacific silver fir, and western hemlock, with lesser amounts of western redcedar, ponderosa pine, western larch, mountain hemlock, Engelmann spruce, and lodgepole pine. In most stands Douglas-fir dominates the upper canopy layer, shade-tolerant Pacific silver fir or grand fir, mountain hemlock and western hemlock compose the understory.

In the eastern portion of the LSR, which is in the grand fir zone, fire exclusion has allowed increased development of the shade-tolerant tree understory. Stand thinning and partial removal of the early seral overstory has not been common in the Peterson LSR. Plantations are primarily composed of Douglas-fir, with minor amounts of ponderosa pine, Engelmann spruce, western larch and other species.

Snags and Down Wood

Data from the Forest's Continuous Vegetation Survey shows the following averages for snags and down logs in stands over 80 years old. The sample size for this data was small and observations contained a great deal of variability.

Table 4-25 Down Wood - Peterson LSR

Large end Diameter	Pieces per acre	Cumulative Length per Acre	Percent Ground Cover
7 inches	187	1,142 feet	3

Table 4-26 Snags - Peterson LSR

Average DBH	Snags per Acre
12 inches	16

High road density and gently sloping terrain facilitated the past removal of down trees for firewood in the southern half of the LSR. This has noticeably reduced the down log component in stands that otherwise meet the criteria for late-successional or old-growth. Since the designation of the LSR and elimination of firewood cutting, the down-wood component is increasing.

Disturbance History

Fire

Peterson Prairie area, which is in the Grand Fir Zone, historically experienced longer fire return intervals and fewer light ground fires than the drier Gotchen LSR, also located east of the Cascade crest. The Peterson Prairie area may have been maintained in a more open condition by Native American burning, to maintain small meadows and for ease of travel. The first exploration party in this area noted the change in forests on the east slope of the Cascades, changing from dense forest of the western slope to open forests with grassy understories.

Insects and Disease

The Peterson LSR has the potential to suffer from spruce budworm, mainly within those stands in the Grand Fir Zone. Although small amounts of spruce budworm have been detected within the LSR, it has not experienced the outbreak that is affecting the Gotchen LSR, which is four miles to the northeast.

Other insect and disease activity is occurring primarily at the sub-stand scale, creating small canopy gaps. Windthrow has been confined to individual trees or small groups.

Historic Uses

Timber management began in the 1930s or 40s, with removal of individual ponderosa pine and Douglas-fir from the Cave Creek area, which includes the southern portion of the LSR. The primary method of timber management has been clearcut harvest, most of which has occurred since the 1950s. Shelterwood harvests have been a common practice in the past 20 years in the southwestern corner of the LSR. About 800 acres within the LSR consist of old shelterwood harvests, with partial overstory stocking still intact.

Human Uses

Facilities

Facilities within the Peterson LSR include: Peterson Prairie Guard Station and Campground, Ice Caves and Natural Bridges interpretive sites, Atkisson Sno*Park, Flattop Mountain utility site, and Coyote Seed Orchard.

Roads

Forest Roads 24 and 60 are main Forest arterials and are managed for high quality scenery (partial-retention VQO). At 3.5 miles of road per square mile, the road density in the Peterson LSR is the second highest of LSRs on the Forest.

Special Forest Products

Mushrooms, huckleberries, beargrass, and vine maple transplants are common products collected from the Peterson LSR. This LSR contains some of the most productive huckleberry areas on the Forest.

Special Uses

Within the Peterson LSR is a camp operated under permit to a club and a communication site.

Grazing

Two allotments occur within the Peterson LSR. The Ice Caves Cattle Allotment covers most of this LSR. The LSR provides 41 percent of the land base for the Ice Caves Allotment. Approximately 200 head use this allotment from June to September. A water diversion (Lost Creek Ditch) provides additional water during the grazing period.

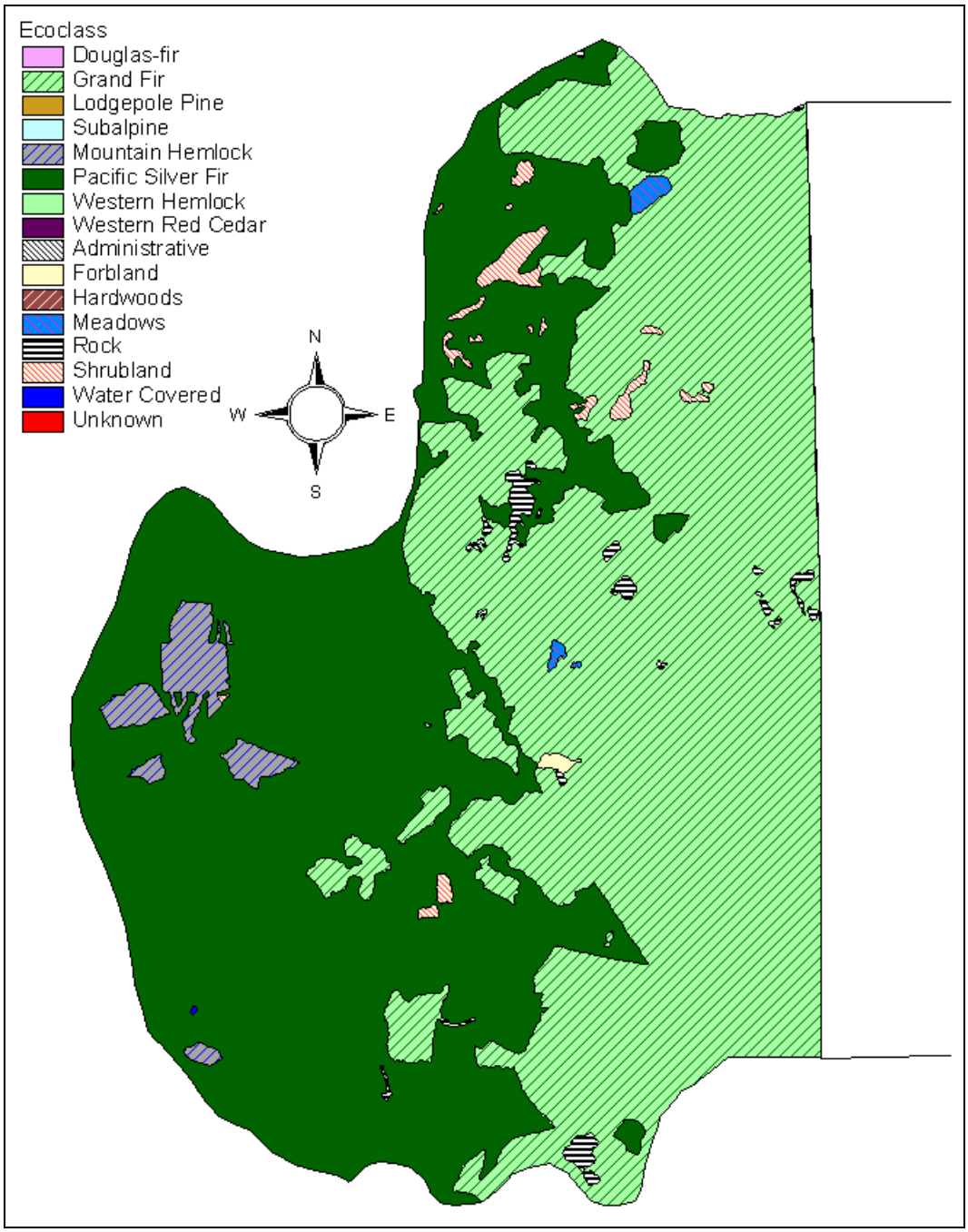
The Twin Buttes Sheep and Goat Allotment covers the remaining 1,854 acres in the northern tip of the LSR. Only 2 percent of this allotment is within the LSR. Up to 1,150 head of sheep are permitted for this allotment; however, the Peterson LSR portion of this allotment is not often used.

Social Significance

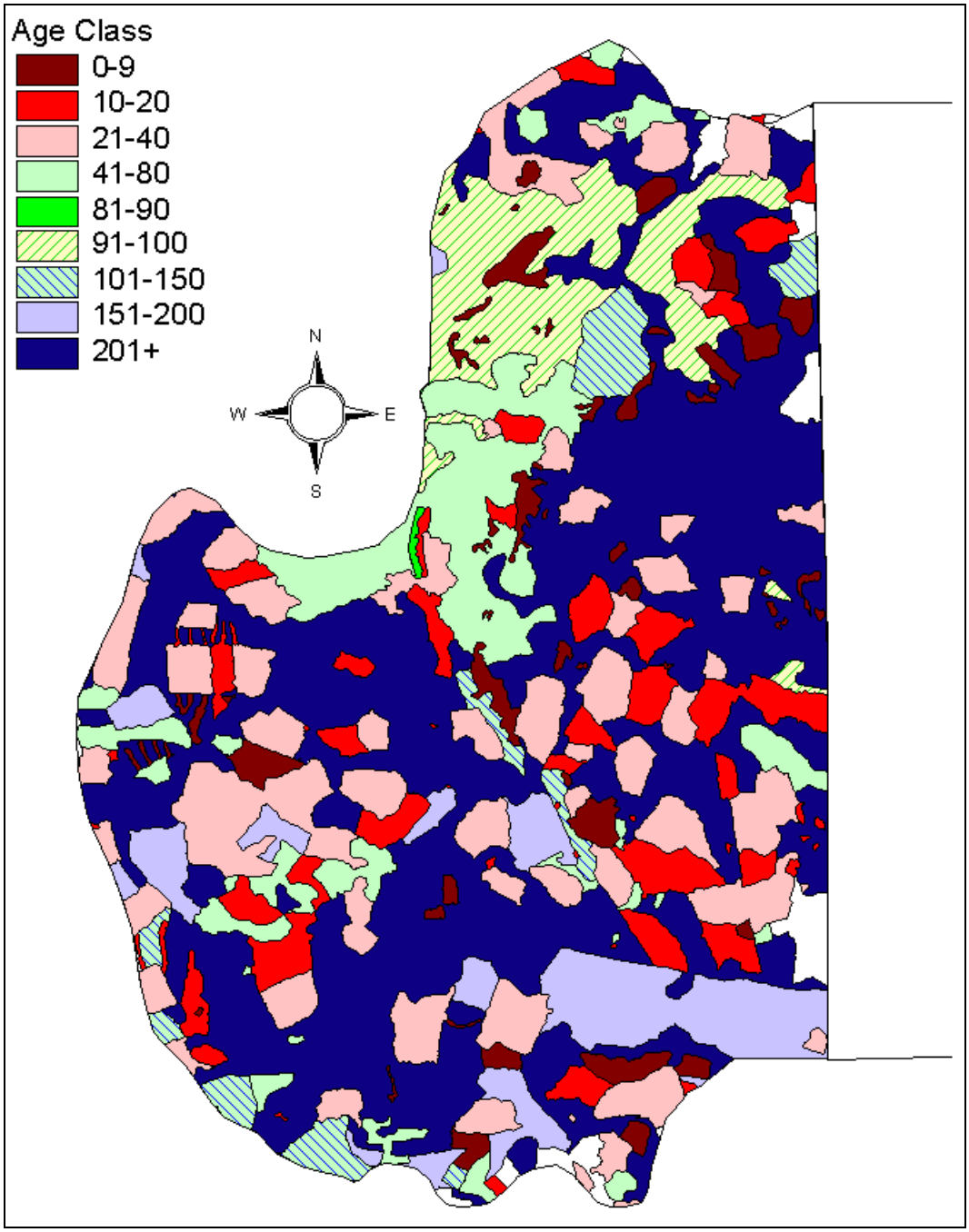
This is land ceded by the Yakama Indian Nation and is subject to the Yakama Indian Treaty of 1855.

The McClellan expedition in the 1880's documented their travels through this area in detail. They noted forests that were much more open than those of today. Interpretive signs in the vicinity of Peterson Prairie display the changed conditions to Forest visitors.

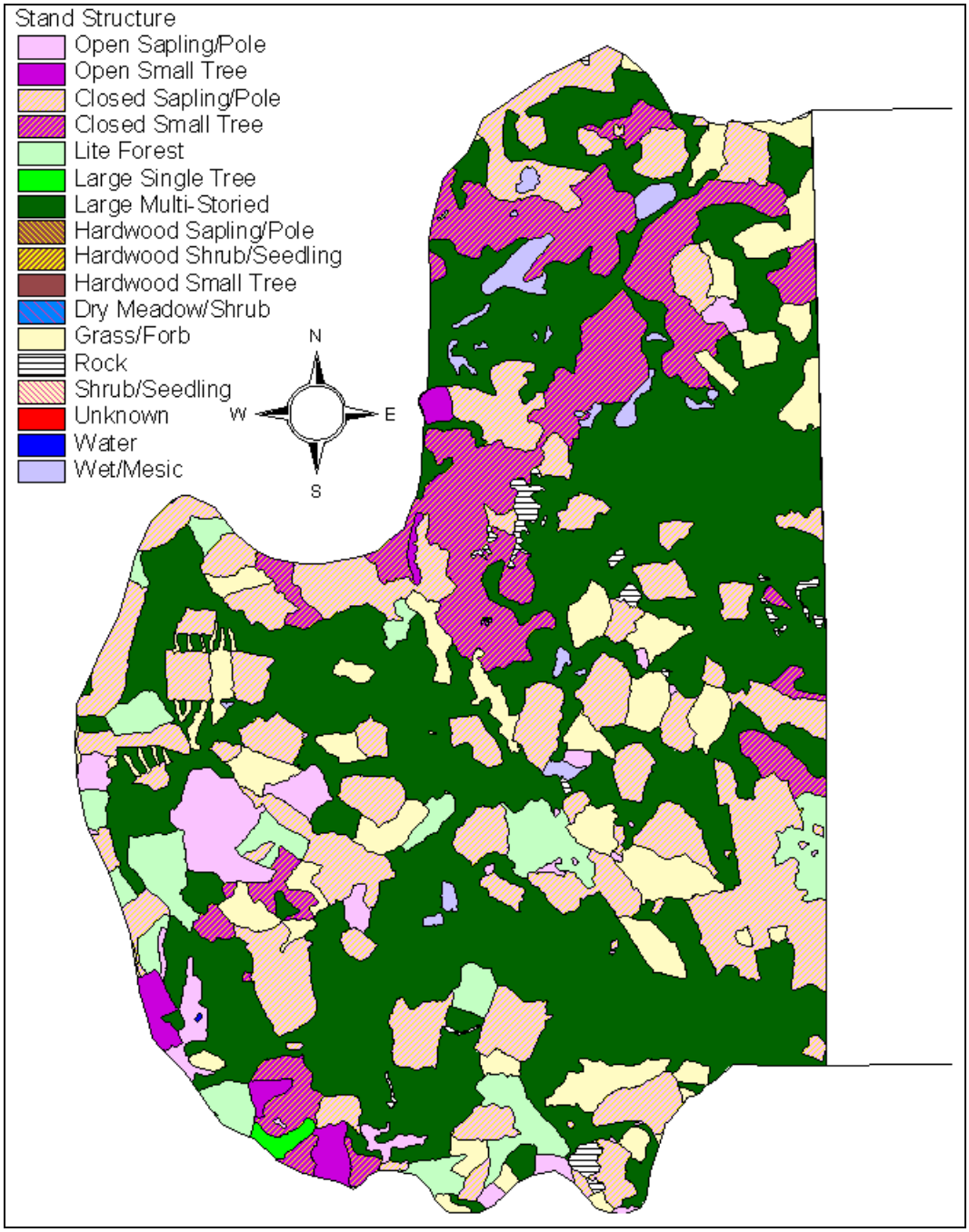
Map 4-33 Peterson LSR/MLSA Ecoclass



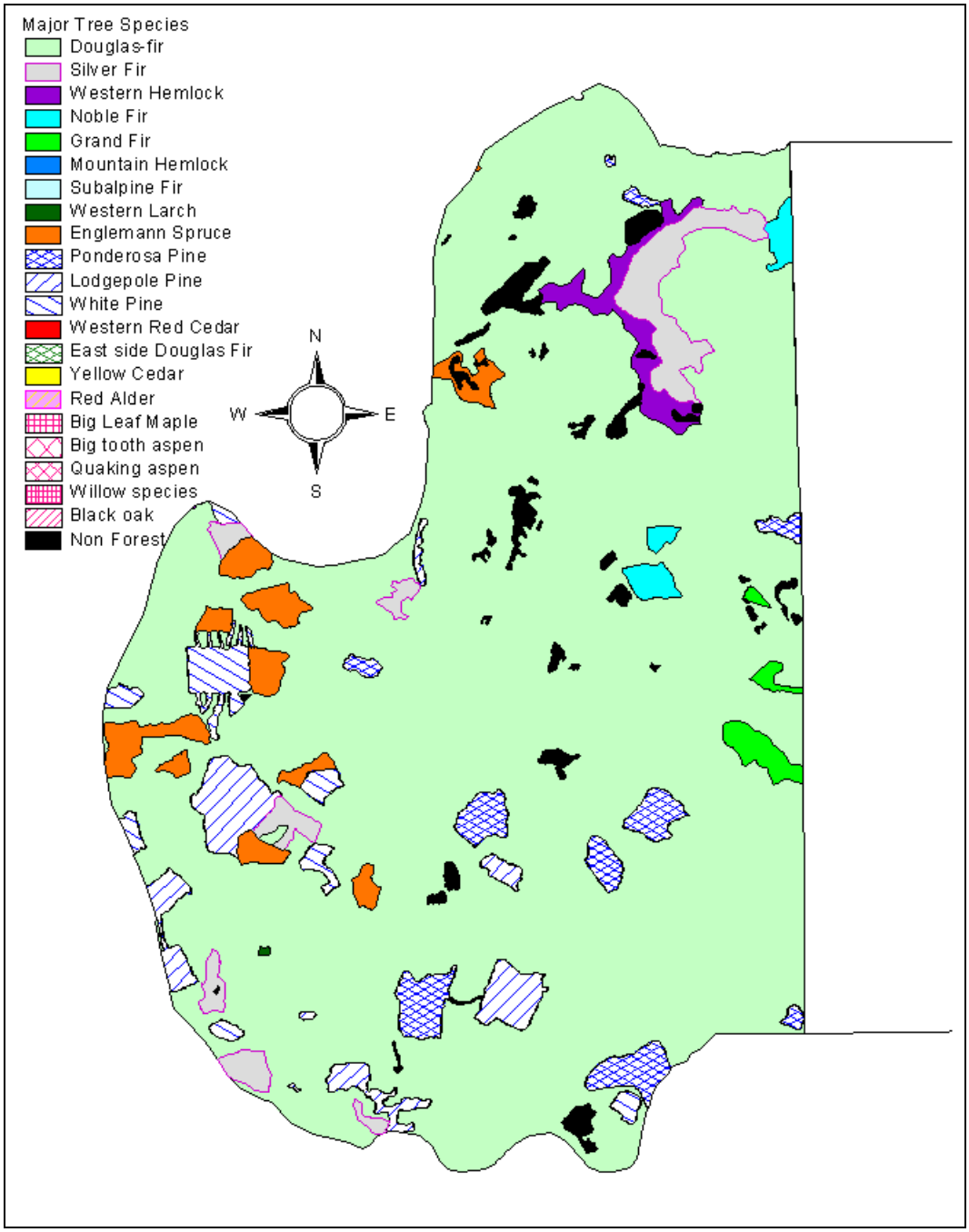
Map 4-34 Peterson LSR Age Class



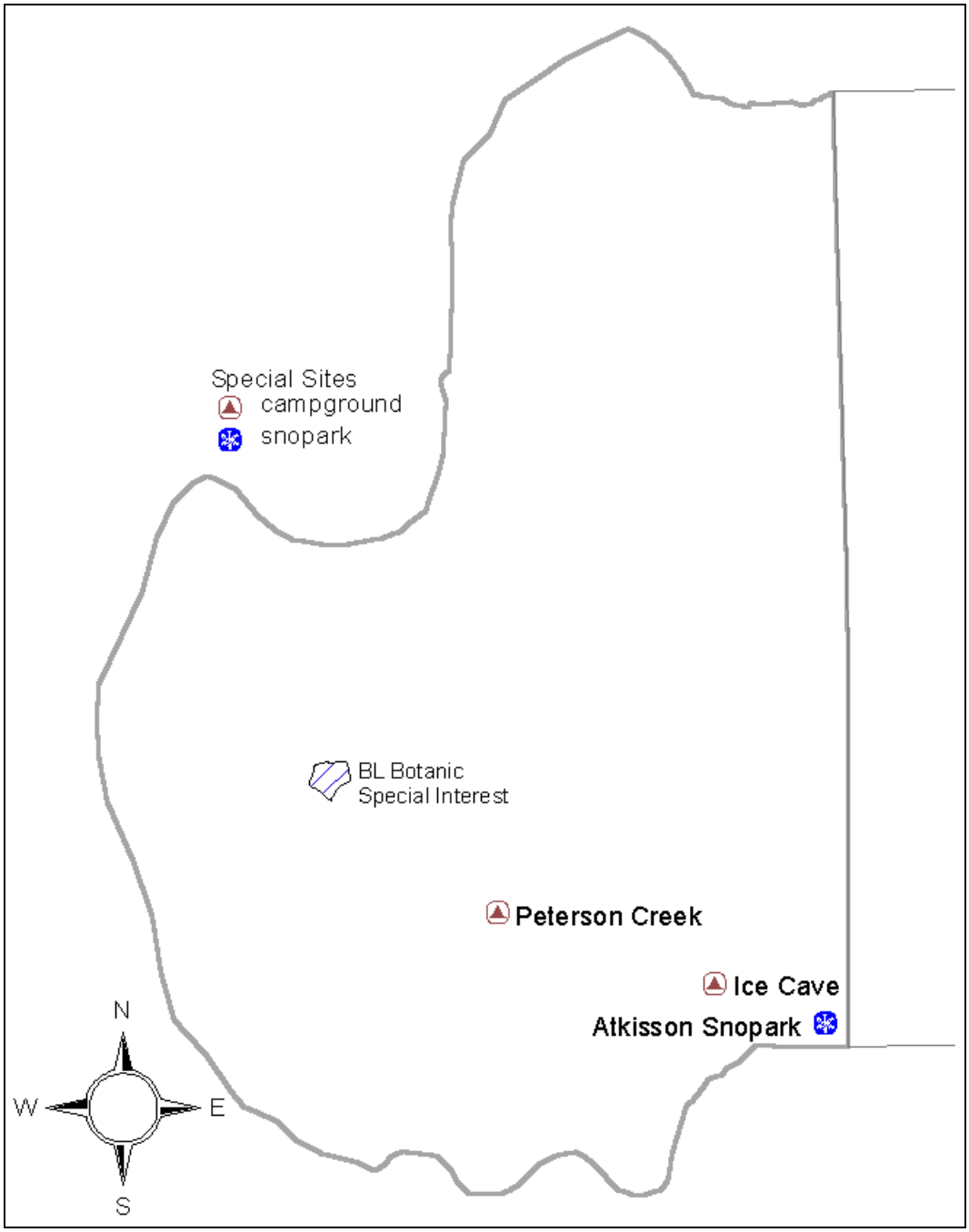
Map 4-35 Peterson LSR Stand Structure



Map 4-36 Peterson LSR Dominant Tree Species



Map 4-37 Peterson LSR Special Sites



Quartz LSR

Riparian Conditions

Existing conditions for riparian resources and functions are described in the *Lower Cispus West Watershed Analysis* and are not repeated here.

Unique Species and Habitats

A large percentage of the LSR is unfragmented late and mid-seral habitat, but little effective habitat exists between this LSR and any other LSR due to fire history, volcano activity, and timber harvesting. The northern half of the Quartz LSR contains primarily large patch habitat, with additional large patch habitat adjacent to the east. (See Map 4-3, page 4-31.) The southern half is highly fragmented.

The Quartz Creek Big Trees grove is a special interest area (BL) located along the southeastern edge of the LSR.

The Quartz LSR is bordered to the north and west by private and state land; most of the adjacent ownerships have been logged.

Critical Habitat Unit WA-38 encompasses the Lewis, Quartz, and Woods LSRs. The Quartz LSR comprises 6,636 acres or 4 percent of the unit. All three LSRs cover approximately 79 percent of Critical Habitat Unit WA-38. (See Map 4-1, page 4-22.)

There are 4 northern spotted owl nest sites within this LSR and 5,500 acres of nesting, roosting, and foraging habitat.

Vegetation Conditions

Quartz LSR is close to desired conditions, having over 70 percent of the area in mature and older age classes. It is a productive area capable of producing high quality late-successional habitat.

Eleven percent of this LSR is in age classes up to 80 years old. Most of these stands are young plantations which originated from past clearcutting 20-40 years ago, and are stocked at levels considered to be appropriate for rapid growth through age 40 to 50 (300-400 trees per acre).

About 400 acres of the area is in the age 10-20 year range. Most of these plantations have not had any stocking control treatment (thinnings), and are stocked at levels ranging from 500 to 1500 trees per acre. Heights of these trees range from 10 feet in the youngest stands to 30 feet in the older stands. Some stands may have very uniform stocking of only the trees which were planted, while others may have a great variety of species and sizes of trees due to natural seeding which followed the planting. There is a shift to dominance by the trees and away from shrubs, herbs and grasses in these stands.

Most of the remainder of this LSR is split between two other age classes. About 32 percent is in the 100-150 year class, and about 39 percent is in the 200+ year class. Most of these stands are considered late-successional or old-growth, and contain most of the desired characteristics for LSR stands - very large trees, standing snags, multiple tree canopy layers and gaps, and large woody material on the forest floor.

Snags and Down Wood

Data from the Forest's Continuous Vegetation Survey shows the following averages for snags and down logs in stands over 80 years old. The sample size for this data was small and observations contained a great deal of variability.

Table 4-27 Down Wood - Quartz LSR

Large end Diameter	Pieces per acre	Cumulative Length per Acre	Percent Ground Cover
13 inches	450	4,820 feet	12

Table 4-28 Snags - Quartz LSR

Average DBH	Snags per Acre
22 inches	13

Disturbance History

The age class pattern in the Quartz LSR (Map 4-39) shows a history of stand-replacing fires. There has been little disturbance from timber harvesting activities.

Human Uses

Facilities

There are no developed campgrounds. There is one developed day-use site, Quartz Creek Big Trees.

Trails

In the Quartz LSR there are 35 miles of system trails, none permit motorized use.

Special Forest Products

Because of its relative remoteness, there is very little special forest products collection in the Quartz LSR.

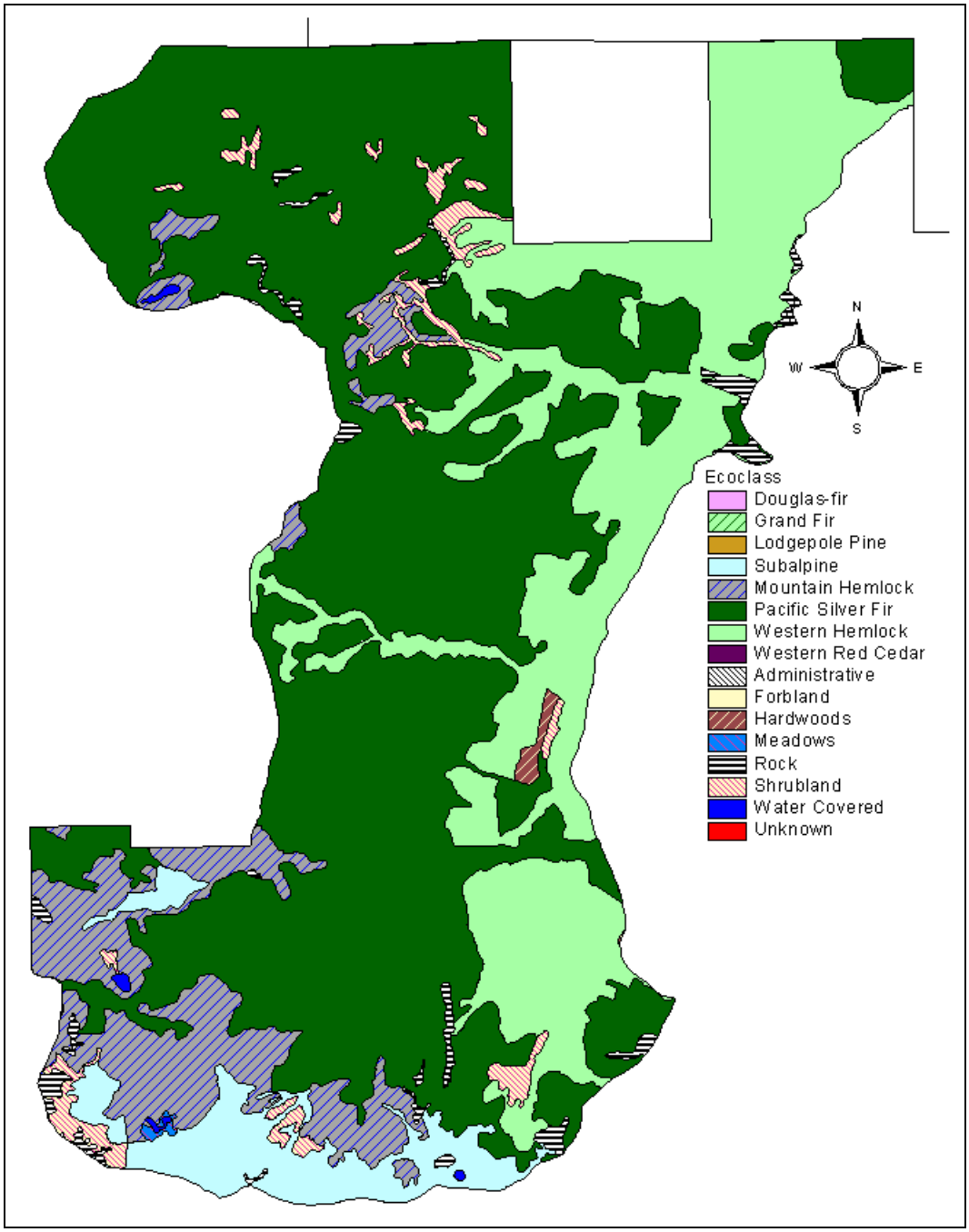
Special Uses

There is one road maintenance agreement with an adjacent landowner and a permit for a tailhold granted to a timber company. There is one placer mining claim in the Quartz LSR.

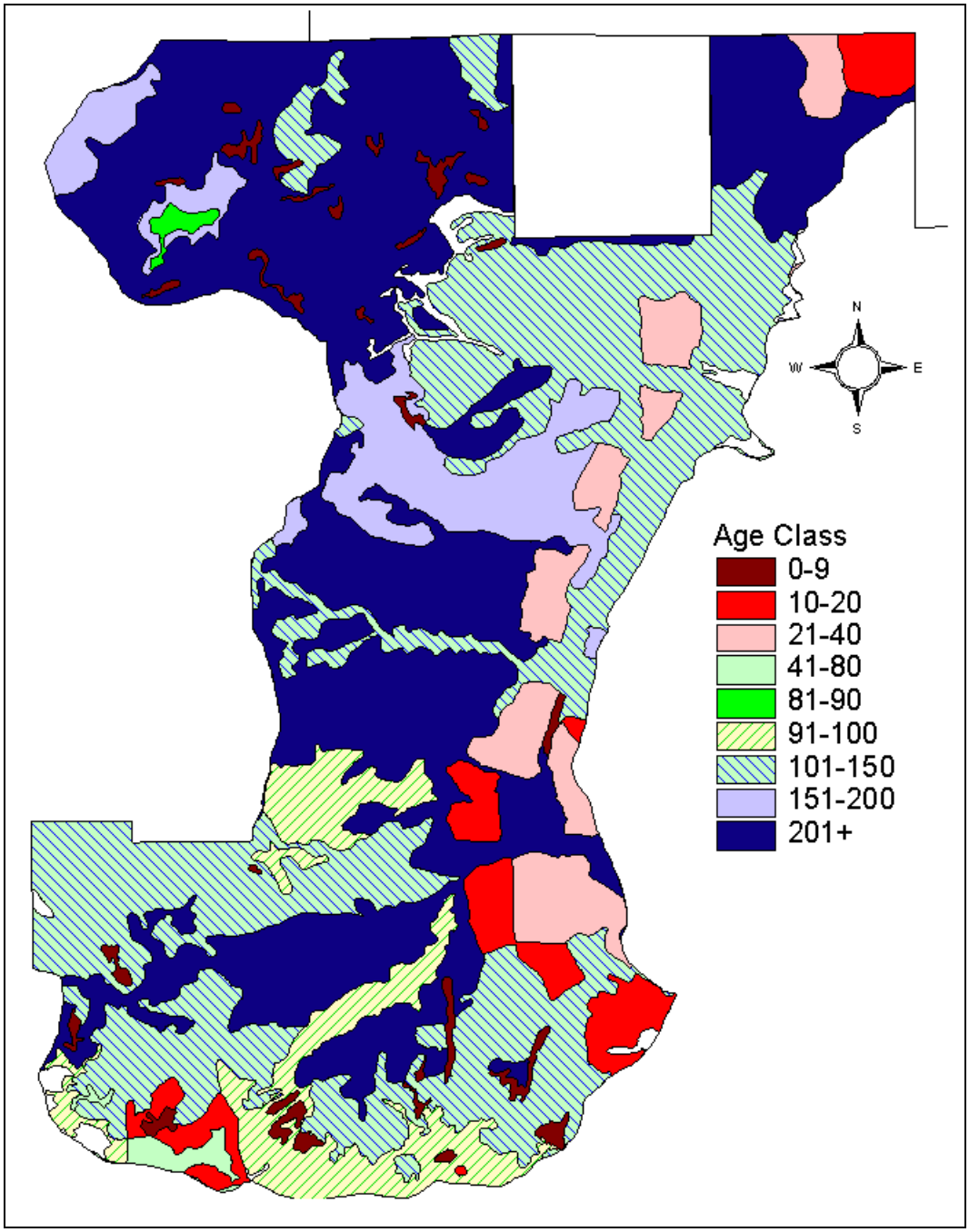
Social Significance

Most of this LSR is within the Tumwater RARE II roadless area.

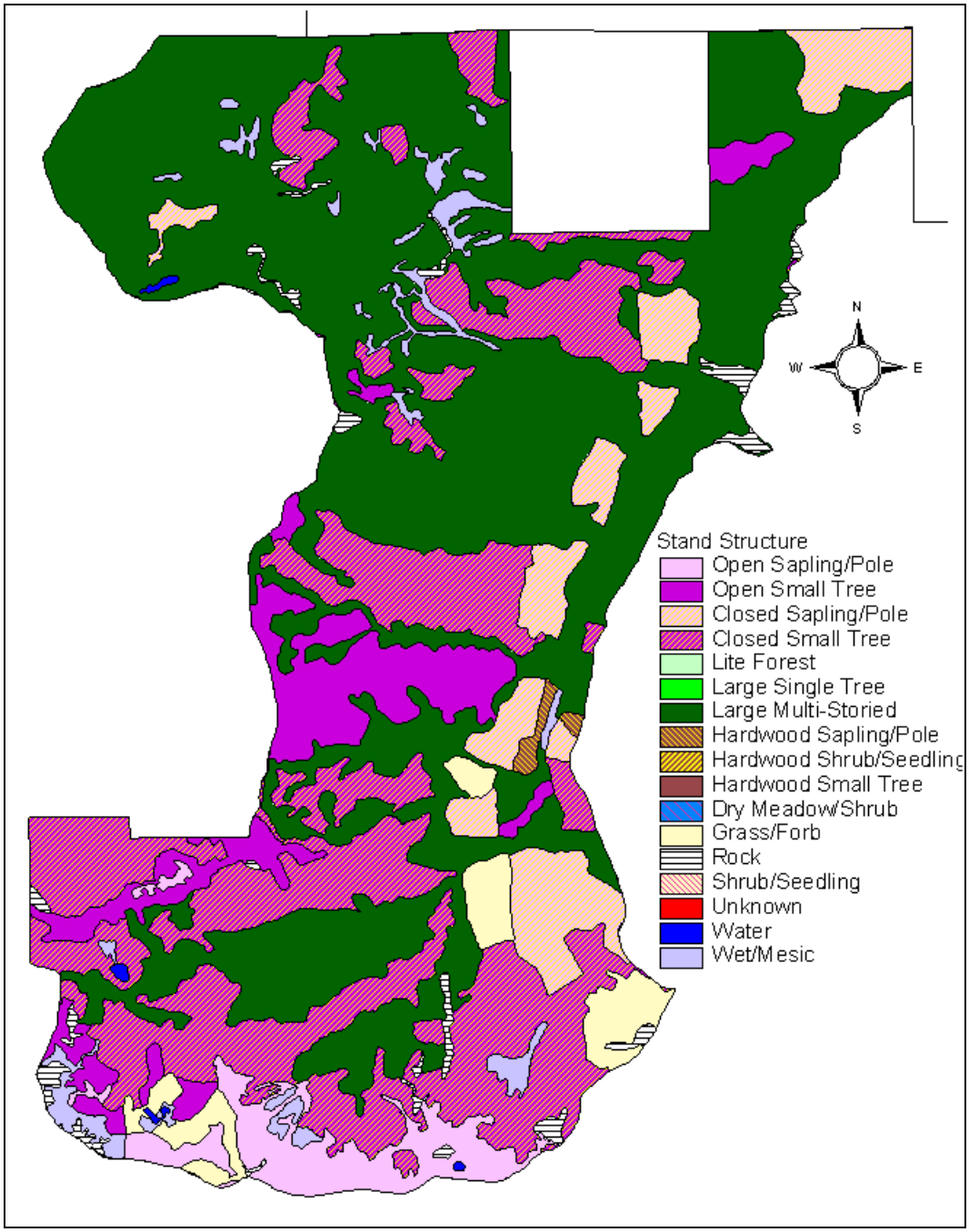
Map 4-38 Quartz LSR Ecoclass



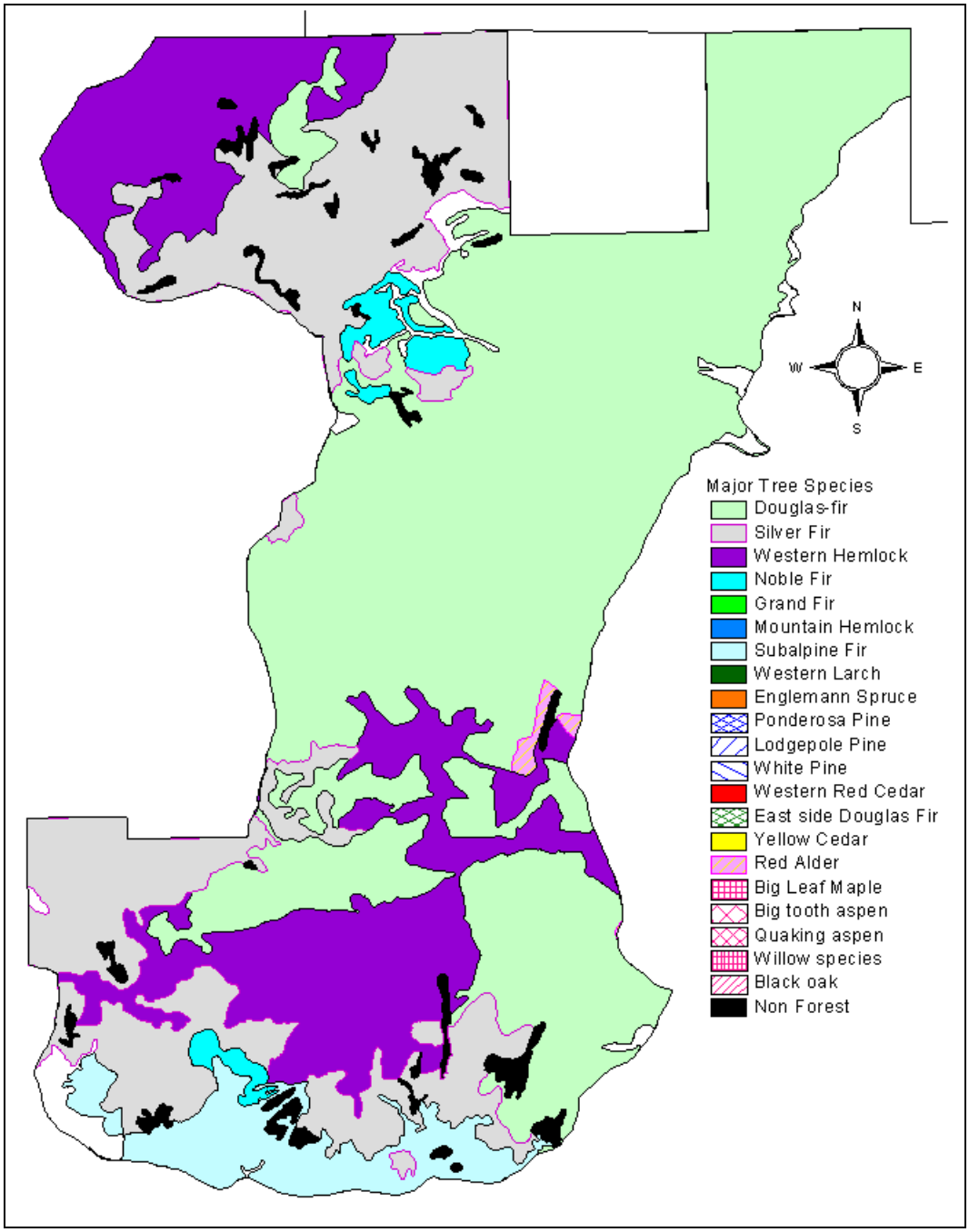
Map 4-39 Quartz LSR Age Class



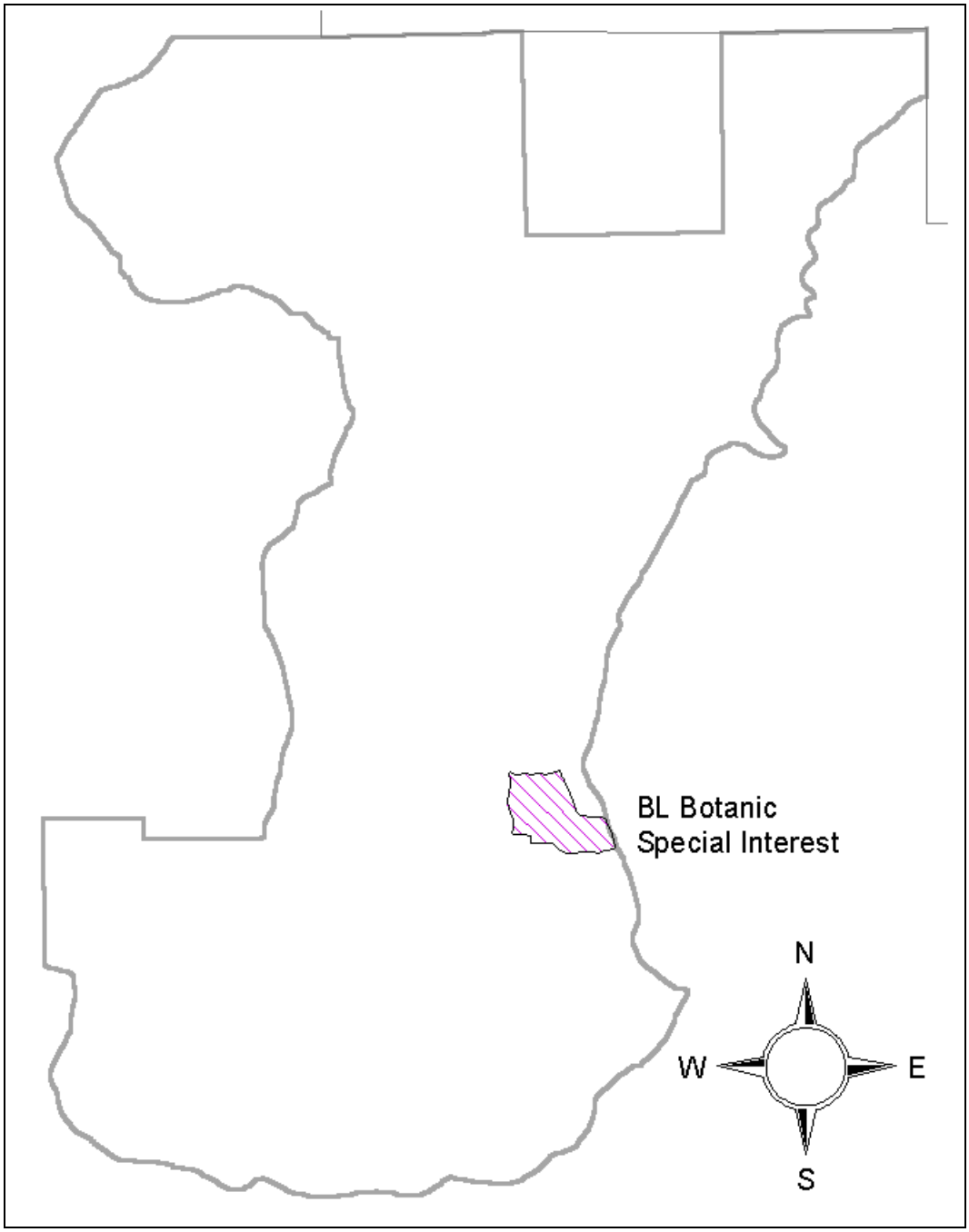
Map 4-40 Quartz LSR Stand Structure



Map 4-41 Quartz LSR Dominant Tree Species



Map 4-42 Quartz LSR Special Sites



Wind LSR

Riparian Conditions

Existing conditions for riparian resources and functions are described in the Wind, Little White Salmon and Lower North Fork Lewis River Watershed Analyses and are not repeated here.

Unique Species and Habitats

The Wind LSR has a relatively large expanse of younger habitat in the middle of the LSR. Most of this habitat is in the small-tree structural stage and should develop into late-successional habitat in the next 50 years or longer. Silvicultural treatment that accelerates the development of late-successional habitat would be beneficial in these areas. Some of these are 80-100 years of age and would benefit from thinning. Many of the less mobile species are small mammals, terrestrial amphibians and terrestrial mollusks which use down wood. Increasing the level of down wood in these areas should result in increased habitat connectivity for these species.

The Wind LSR contains extensive large tree, large patch habitat throughout that is fairly well connected by aggregated and dispersed habitat. (See Map 4-3, page 4-1.) The Trapper Creek Wilderness also contributes a large amount of large tree, large patch habitat to the middle of the LSR landscape. Large amounts of closed small tree habitat within the LSR reduce the effects of fragmentation (edge effects).

Important connectivity areas adjacent to the Wind LSR include the Big Lava Bed (east), Indian Heaven Wilderness (northeast), and Trapper Creek Wilderness (middle).

To the south, the Columbia River serves as a natural barrier to most species. The area around Dog Mountain is the primary connection to the Columbia River which is within federal jurisdiction. The area to the Columbia River is in the dryer portion of the Western Hemlock Zone and contains some Douglas-fir plant associations. Oak balds are common.

The high elevation of Paradise Hills, north of Wind LSR in Matrix, breaks the link between the Wind and Lewis LSRs.

Special habitats unique to the Wind LSR are varied and distributed across the landscape:

- Very old forest stands (greater than 300 years) exist within 15 Wind LSR subwatersheds and range in size from 67 to 2,341 acres. T.T. Munger RNA and Government Mineral Springs are examples.
- Scattered populations of Oregon white oak include Weigle Hill (proposed RNA) and Carson Depot. This species is the only oak in Washington state and has undergone dramatic decline in the last 150 years.
- Upland ridgetop meadows include Grassy Knoll and Big Huckleberry Mountain.
- Wetlands include Black Creek Swamp, Oregon Ash Forest at Whistle Punk trail, Cold Springs, and Tyee Springs.
- Caves, lava beds, and bridges provide foraging, roosting, hibernating, and maternity habitat for bats.
- Cliffs (Dry Creek subwatershed) and talus provide nesting habitat for raptors, including the peregrine falcon.

- This is the only LSR within the range of a number of Survey and Manage molusk species. Molusks are found in riparian areas near the Columbia River. (See Table 4-8, page 4-1.)
- The Wind LSR contains two Critical Habitat Units; WA-40 and WA-41. The LSR covers 9,998 acres or 83 percent of WA-40 and 84,798 acres or 49 percent of WA-41. Critical Habitat Unit WA-41 also contains the Peterson LSR. Thus, 96,725 acres or 57 percent of WA-41 is designated as an LSR. (See Map 4-1, page 4-1.)
- There are 28 northern spotted owl nest sites in this LSR and 33,500 acres of nesting, roosting, and foraging habitat.

Vegetation Conditions

The Wind LSR is characterized by large areas of even-aged coniferous forest that range in age from 65 to 150 years old, interspersed with remnants of older forest up to 500 years old and patch clearcuts less than 40 years old. Stands below 3000 feet elevation are in the western hemlock plant association. Most stands above 3000 feet elevation transition into the Pacific silver fir zone.

Early-successional stands are generally stocked with young trees and provide forage and openings for wildlife. Young stands tend to be overstocked and over crowded with young trees. Early-successional stands that occur in riparian areas are generally lacking in large trees that provide woody debris, bank stability, and shade for streams. Young stands that originated after harvest and recent wildfire are lacking in many of these components. There are over 70,000 acres of young stands within the LSR that are lacking in one or more of the components mentioned above, much of which resulted from the Siouxon and Yacolt burns.

Mid-successional stands are developing characteristics and attributes of late-successional stands (large diameters, layering, species diversity, and woody debris). Late-successional stands occur mainly along the drainage bottoms in the western hemlock zone with some above 3,500 feet elevation in the true fir zone. Forest stands in the late-successional category contain the full range of plant species, tree sizes, tree ages, and woody debris the make up a diverse forest ecosystem.

Over the past 40 years, the practice of regeneration harvest by patch clearcutting has created an even distribution of openings across the landscape. Over 30,000 acres of patch clearcutting has occurred since 1955. Individual patches range from 10 to 60 acres and are comprised of early-successional young stands. Outside of the Wilderness Area and the Research Natural Areas very little contiguous late-successional forest remains in the LSR.

Snags and Down Wood

Data from the Forest's Continuous Vegetation Survey shows the following averages for snags and down logs in stands over 80 years old. The sample size for this data was small and observations contained a great deal of variability.

Table 4-29 Down Wood - Wind LSR

Large end Diameter	Pieces per acre	Cumulative Length per Acre	Percent Ground Cover
14 inches	252	4,309 feet	12

Table 4-30 Snags - Wind LSR

Average DBH	Snags per Acre
15 inches	24

Disturbance History

Fire

In 1902, the Siouxon and Yacolt Burns occurred within the LSR. The Siouxon fire consumed almost all of the stands in the Siouxon drainage except the upper eastern portion. The Yacolt fire only burned a small area within the Wind LSR.

Because this LSR borders on wilderness areas it may be at a greater risk from wildfire because we are limited in our ability to aggressively suppress wildfire in wilderness areas.

Disease

Forest diseases for the most part are within endemic levels within the Wind River and Siouxon drainages. The types of diseases of concern are root diseases, stem diseases, and branch diseases.

Two principal root diseases are Phellinus and Armillaria. Phellinus root disease is widespread and is not considered a serious problem if infestation is less than 15 percent of an area. There are a few areas in Trout Creek and Dry Creek where the rate of infestation exceeds 15 percent. Armillaria root disease is also widespread but is not considered a threat to forest health.

Of the several stem diseases white pine blister rust is the most widespread. Managers are enhancing white pine survival by planting genetically resistant stock and pruning lower branches on white pine.

Hemlock dwarf mistletoe is the most prevalent stem disease throughout the range of western hemlock in the Wind LSR. In multi-story stands with an infected overstory, the disease can be especially damaging because young trees are continually re-infected from the overstory. Areas of heavy infection occur in the old-growth stands of Trout Creek and Dry Creek drainages. These stands will remain infected until a stand replacement event occurs.

Windthrow damage has been a major concern throughout the watershed. The amount of windthrow increased as the amount of clearcutting increased. Most damage occurred along the exposed edges of newly harvested cutting units. Ridge lines and ridge saddles are also areas prone to windthrow damage. In the future, the incidence of windthrow in the LSR should decrease as stands mature and develop wind firmness.

Insects and losses to insects are a part of the natural processes taking place within the forest ecosystem. Many insects occur in the basin at endemic levels. The most damaging insect is the Douglas-fir beetle which colonizes dead and dying Douglas-fir. Windthrow and logging slash provide a prime habitat for this beetle. The beetle will also invade stands weakened by drought and/or root disease. When populations build up in dead or weakened trees, adjacent live healthy trees can often be killed. Salvage logging was employed in the past to remove beetle killed trees. In the future, the amount of beetle activity will depend on contributing factors like drought and windthrow. Trees killed by beetles will provide for snags and coarse woody debris.

Historic Uses

After settlement, vegetative patterns were influenced by roading and timber harvesting. The first timber harvesting in the Wind River watershed occurred when the area began to be settled in the 1870s. The first sawmills were built in the 1880s while logging began in the lower Wind River valley bottoms.

By 1900 human activity began to have a noticeable effect on vegetation within the watershed.

The first Forest Service timber sale was made in 1912 to Wind River Lumber Company. The sale enabled the company to invest in railroad logging equipment and access timber that had been inaccessible. Until 1925 numerous sales were made to the Wind River Lumber Company and the railroad extended up the Wind River to Paradise Creek. The company was forced out of business after the Wind River valley burn of 1925 consumed logging equipment plus 4.5 million board feet of felled and bucked timber. Until about 1948 subsequent timber harvest occurred primarily on private lands within the LSR. Beginning in 1948, timber sales were again being offered in the Wind River watershed. In the ensuing years large investments were made into forest road systems, fire protection, reforestation, timber stand improvement, and forest genetics in the watershed. To meet congressionally mandated harvest levels, the Wind River Ranger District sold between 40 million and 100 million board feet of timber annually from 1950 to 1993. A large portion of this timber came out of the Wind LSR area. The preferred harvest method was regeneration patch clearcuts followed by planting. By 1995 over 30,000 acres of mature forest within the Wind LSR had been regenerated and converted to early-successional plantations.

Human Uses

Facilities

The Wind LSR contains the Crest, Panther Creek, and Beaver Campgrounds, Hemlock Lake day-use area, and Panther Creek Falls interpretive site. A natural gas line and a BPA transmission line cross the LSR. Also located in the Wind LSR are the City of Carson domestic water supply pipeline, Government Mineral Springs and Craven's Crag repeater installation. The Forest Service maintains a guard station, Wind River Ranger Station, Planting Creek Seed Orchard and the former Wind River Nursery. The Wind River Experimental Forest is located in this LSR.

Special Forest Products

Bough sales, Christmas trees, beargrass, mushrooms, and transplants are harvested from this area. Mushrooms are the most sought after. Firewood and huckleberries are also collected.

Special Uses

The Wind LSR contains a summer home tract near Government Mineral Springs. About 30 summer are authorized under transferable 20 year special use permits. (Lots are typically 1/4 acre.) Structures are owned by the permittees. There are also ten water pipelines, one powerline, and one telephone line under permit in the LSR. There are also several permits related to road easements and maintenance agreements. There is one apiary authorized under a one-year permit.

Social Significance

A portion of the LSR is land ceded by the Yakama Indian Nation and subject to the Yakama Indian Treaty of 1855.

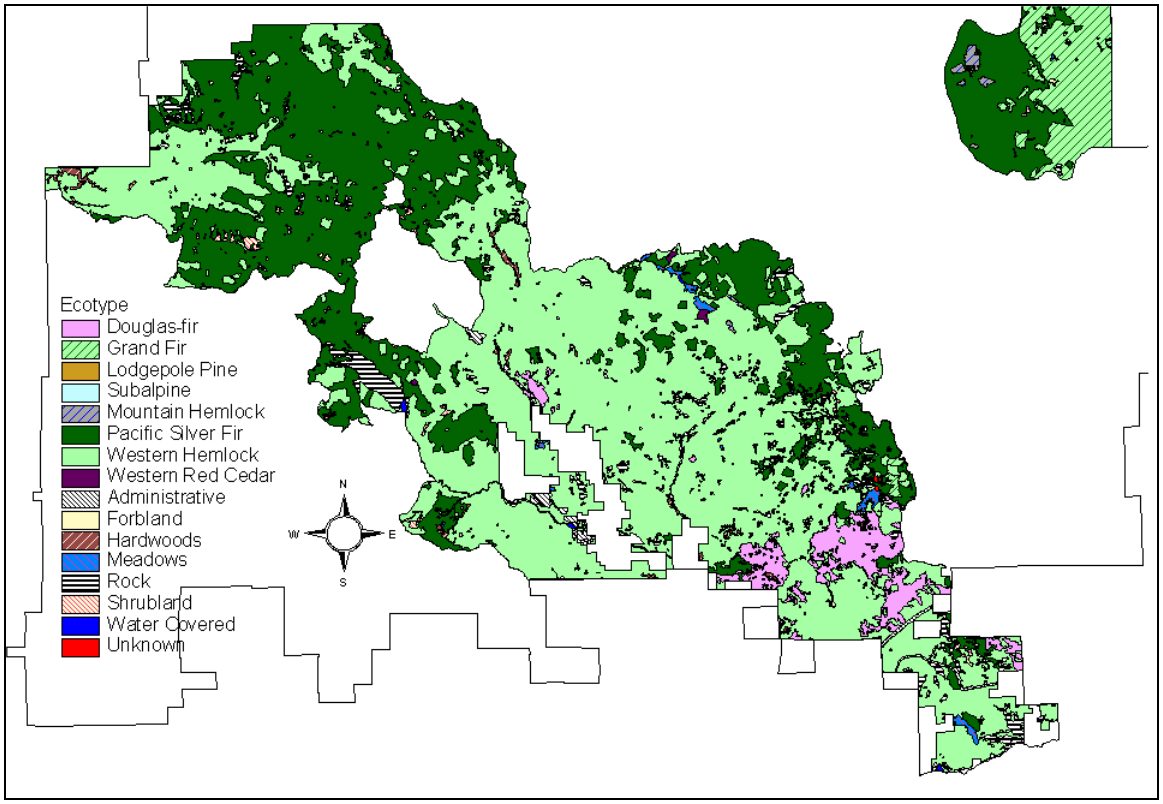
Two segments of Siouxon Creek and one segment of the Wind River in this LSR are “Further Study Rivers” to be evaluated for suitability for Wild and Scenic River designation in a future study. Forest Plan direction provides for protection of values contributing to their potential for classification until the studies are complete.

T.T. Munger and Sister Rocks RNAs are in this LSR. Weigle Hill is a proposed RNA.

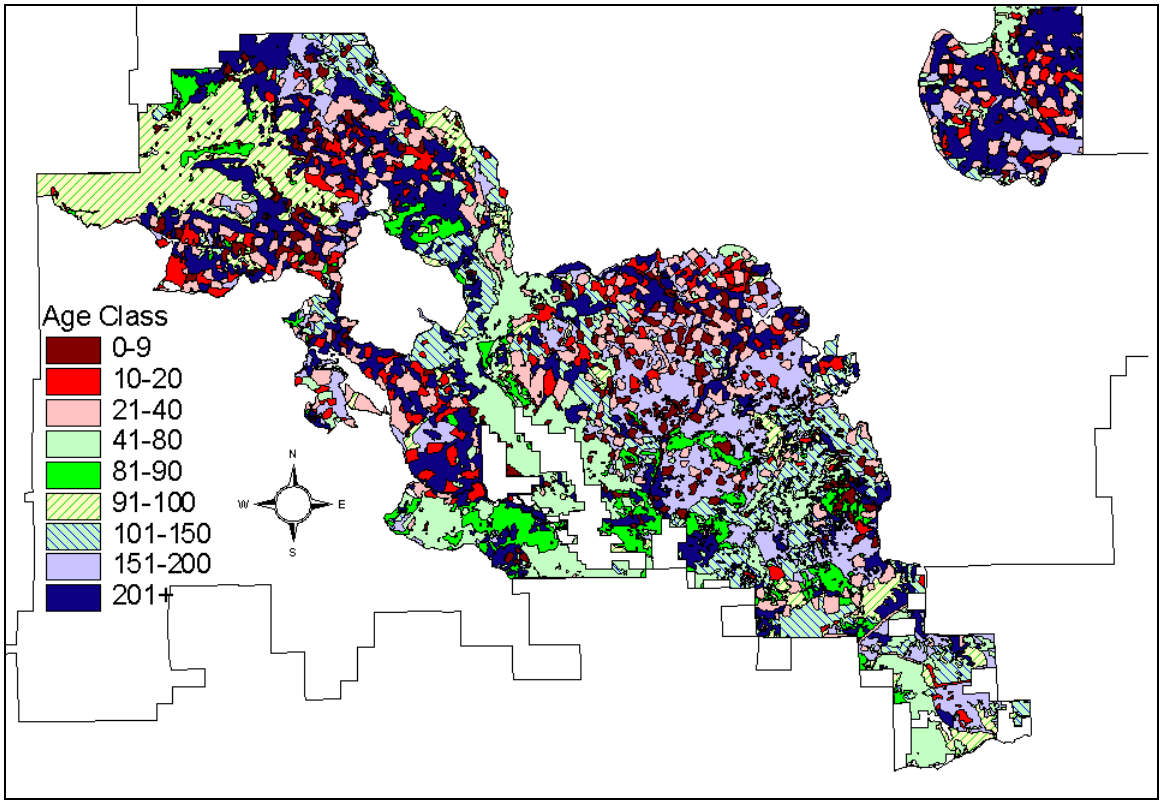
Bear Creek, Siouxon, Big Lava Bed, and Bourbon Roadless Areas were evaluated for wilderness in RARE II.

The Pacific Crest Trail traverses the southeast portion of the LSR.

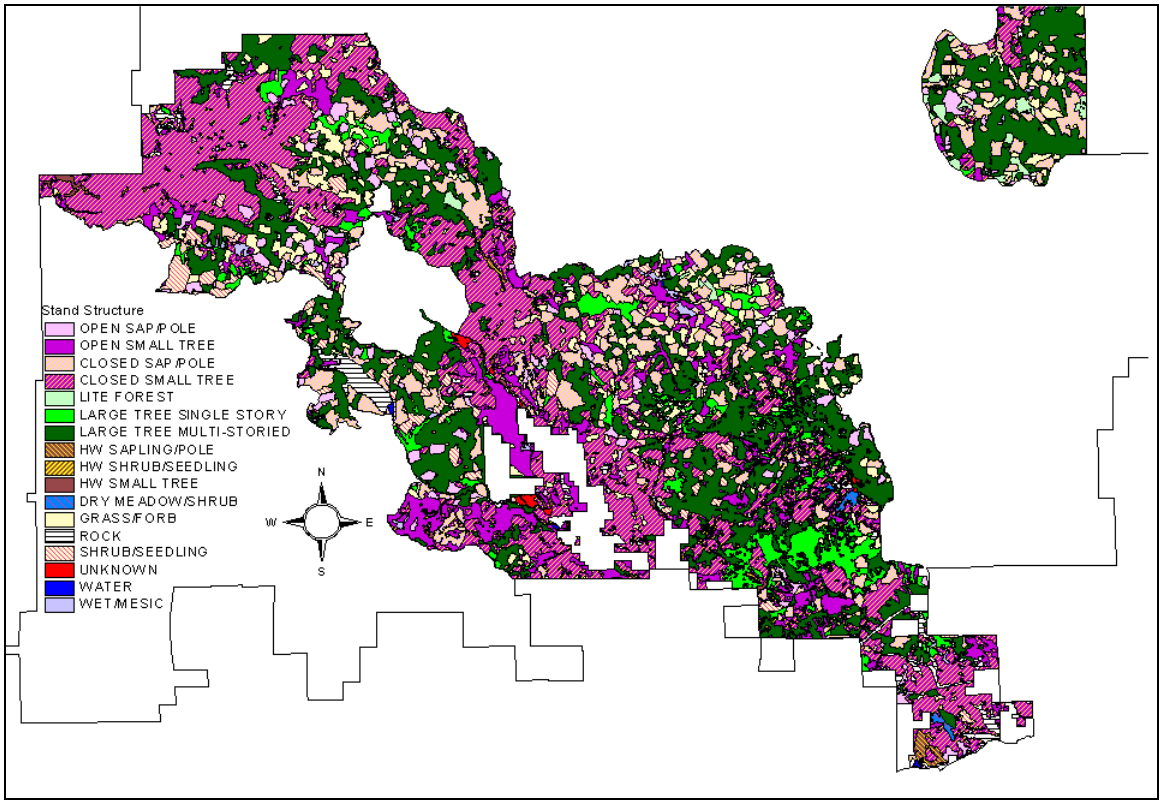
Map 4-43 Wind LSR Ecoclass



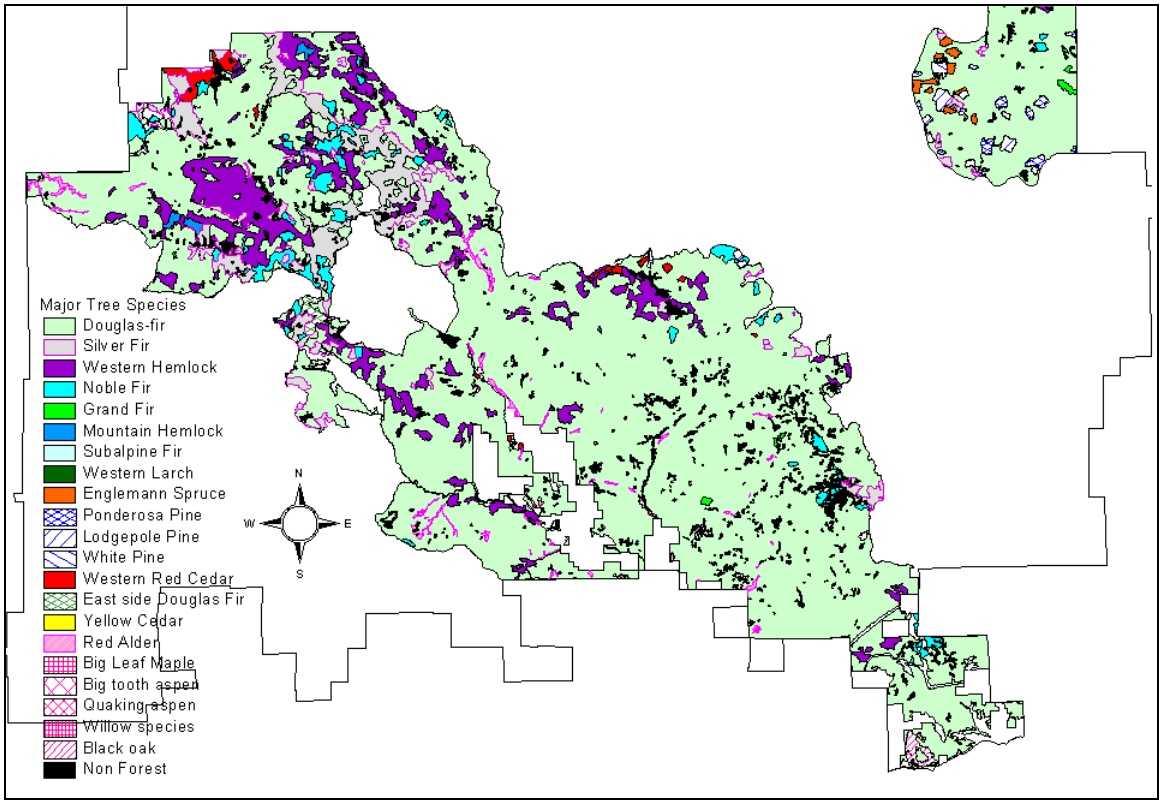
Map 4-44 Wind LSR Age Class



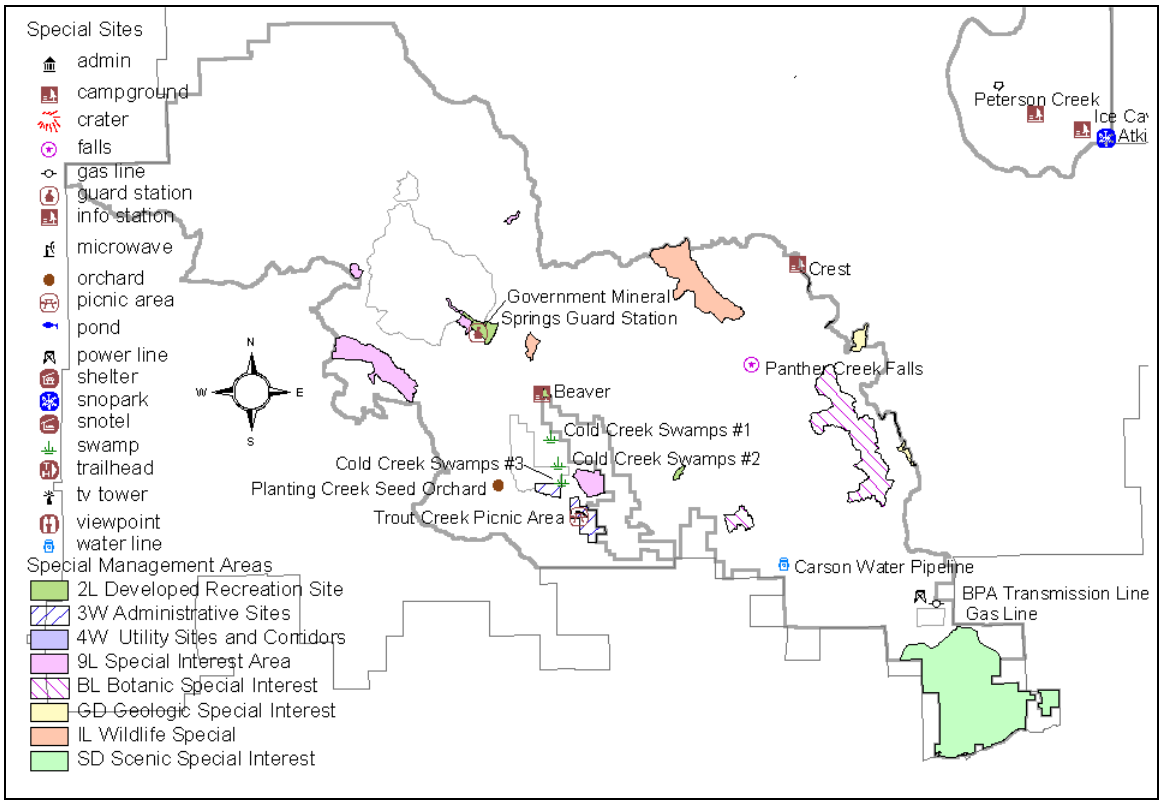
Map 4-45 Wind LSR Stand Structure



Map 4-46 Wind LSR Dominant Tree Species



Map 4-47 Wind LSR Special Sites



Woods LSR

Riparian Conditions

Existing conditions for riparian resources and functions are described in the *Lower Cispus East Watershed Analysis* and are not repeated here.

Unique Species and Habitats

The Woods LSR contains large tree habitat that is fairly fragmented. The majority of large tree habitat is in dispersed patches. (See Map 4-3, page 4-31.) Relatively large blocks of second growth unmanaged forest at the southern end of the LSR resulted from the Cispus Burns at the turn of the century.

Woods LSR contains low elevation coniferous forest with small blocks of classic western hemlock and Douglas fir old-growth forest interspersed. Because of its low elevation it provides winter ranges for deer and elk. Numerous small ponds and streams scattered throughout are important habitat for nesting and migratory waterfowl, shorebirds, mammals, such as beaver and river otter, amphibians, a blue heron rookery, and many other species.

The Cispus River runs through the LSR, and provides habitat and a corridor for harlequin ducks, wintering bald eagles, ospreys, and other species.

The Woods LSR contains Tower Rock, a local landmark and cliff habitat for raptors.

Frequent salvaging and firewood cutting has depleted down woody debris and snags.

Three Survey and Manage mollusk species are suspected and a goshawk pair are known to inhabit the LSR.

Critical Habitat Unit WA-38 encompasses the Woods LSR. The unit also contains the Lewis and Quartz LSRs. The Woods LSR covers 22,978 acres or 14 percent of WA-38. All three LSRs cover approximately 79 percent of Critical Habitat Unit WA-38. (See Map 4-1, page 4-22.)

There are 7 northern spotted owl nest sites within this LSR and 14,800 acres of nesting, roosting, and foraging habitat.

Vegetation Conditions

Forty-five percent (12,689 acres) of this LSR is in stands less than 80 years old. About one third of these acres is in stands between 70 and 80 years old which originated after wildfire in 1918, and is mostly located in the southeastern portion of the LSR. These are even-aged stands of Douglas-fir with moderate amounts of western hemlock in the understory. They are at elevations bordering on the upper limits of the western hemlock zone.

The other two-thirds of this age range is in young plantations which originated from clearcuts over the past four decades. Almost all of them were planted solely with Douglas-fir, but presently show moderate amounts of western hemlock, western redcedar, and associated hardwood species. Most of these plantations are in the 20-40 year age range, and are stocked at levels (300-400 trees per acre) considered to be appropriate for rapid growth through age 40 to 50.

About 6 percent (1,600 acres) are in the 10-20 year class. Most of these plantations have not had any stocking control treatment (thinnings), and are stocked at levels ranging

from 500 to 1500 trees per acre. Heights of these trees range from 10 feet in the youngest stands to 30 feet in the older stands. Some stands may have very uniform stocking of only the trees which were planted, while others may have a great variety of species and sizes of trees due to natural seeding which followed the planting. Forty percent (11,297 acres) of this LSR is in stands over 200 years old. This component is well distributed through the LSR except for the southeast portion which shows evidence of more recent stand-replacing fires. These old stands contain most of the desired characteristics of late-successional stands (i.e., very large trees, multiple layered tree canopies and gaps, standing snags, and large woody material on the forest floor).

Snags and Down Wood:

Table 4-31 and Table 4-32 developed from the Forest's Continuous Vegetation Survey show the following averages for snags and down logs in stands over 80 years old. The sample size for this data was small and observations contained a great deal of variability.

Table 4-31 Down Wood - Woods LSR

Large end Diameter	Pieces per acre	Cumulative Length per Acre	Percent Ground Cover
15 inches	239	4,874 feet	14

Table 4-32 Snags - Woods LSR

Average DBH	Snags per Acre
16 inches	22

Disturbance History

The southeast portion was subjected to stand-replacing fires early in the century. Harvest activity has occurred throughout the LSR.

Human Uses

Facilities

The Woods Creek Watchable Wildlife Area provides visitors wheelchair accessible opportunities to view beaver, waterfowl, deer and elk. A portion of the trail through an old-growth stand also provides opportunities to see old-growth associated wildlife. A Mount St. Helens visitor information center is located on the 25 Road, which is one of the major travel routes for visitors to the Monument.

Popular developed sites within the LSR include the Iron Creek campground and picnic area, Burley Mountain Fire Lookout, and the Cispus Learning Center, a large education and conference center.

The Woods LSR contains an established 32-acre Douglas-fir seed orchard which will provide genetically improved seed into the future. It is uncertain whether it will be a permanent facility.

Special Forest Products

Woods LSR has a wide variety of special forest products collected. The area is accessible year round and has a high demand for salal and fern cutting during the winter months. Other products include personal use firewood, beargrass, mushrooms, boughs, Christmas trees, and transplants.

Special Uses

Within the Woods LSR, there are four water pipelines, a telephone and powerline, and a communications site authorized by special use permit. There are also several easements and road maintenance agreements. The Cispus Learning Center, a popular retreat operated by the Association of Washington Schools is located within the Woods LSR.

Social Significance

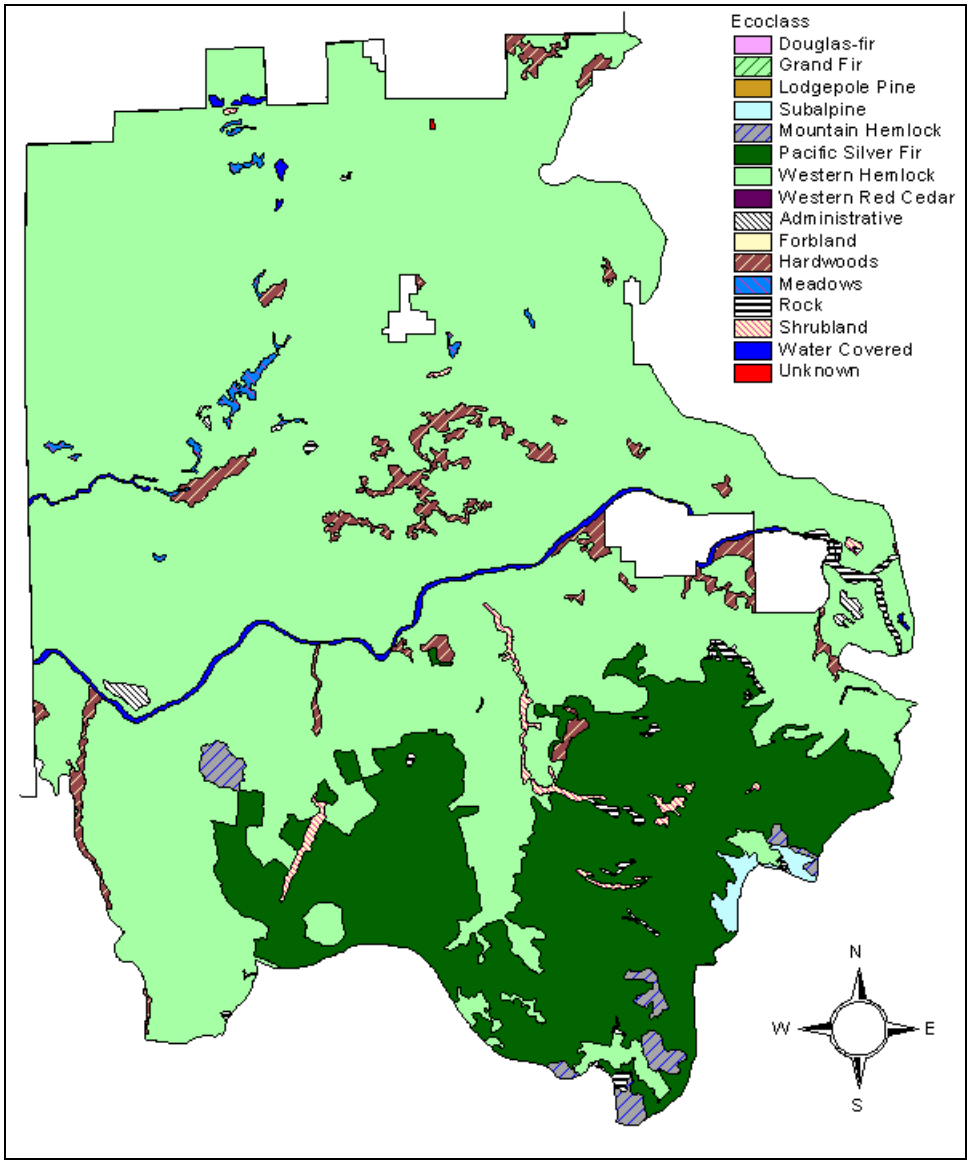
Burley Mountain contains popular huckleberry fields which have a long history of use.

Four blocks of other ownerships are included within the boundary of the Woods LSR.

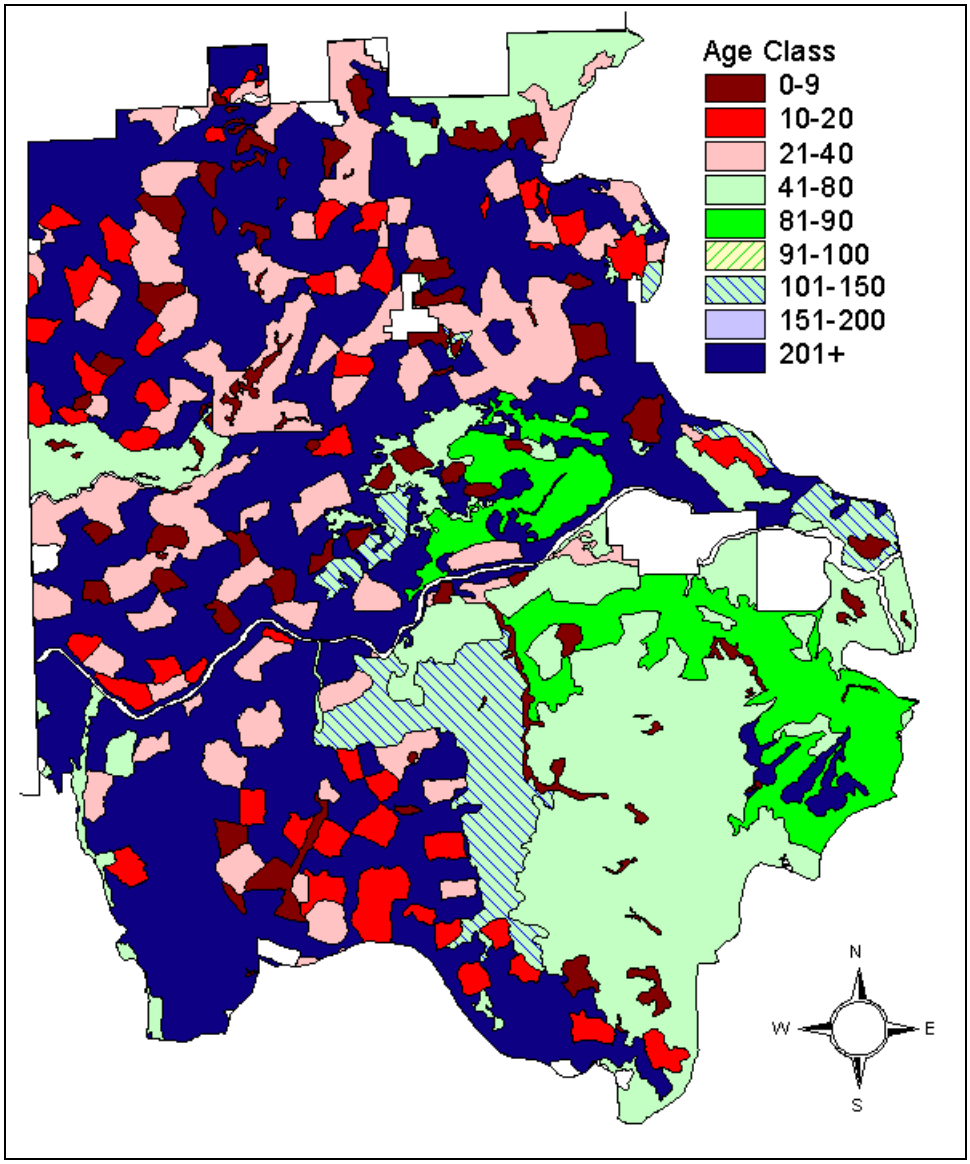
A short segment of Yellowjacket Creek in this LSR is a “Further Study River” to be evaluated for suitability for Scenic River designation in a future study. Forest Plan direction provides for protection of values contributing to their potential for classification until the studies are complete.

The segment of the Cispus River in the LSR was recommended to Congress for Scenic River designation by the 1990 Forest Plan.

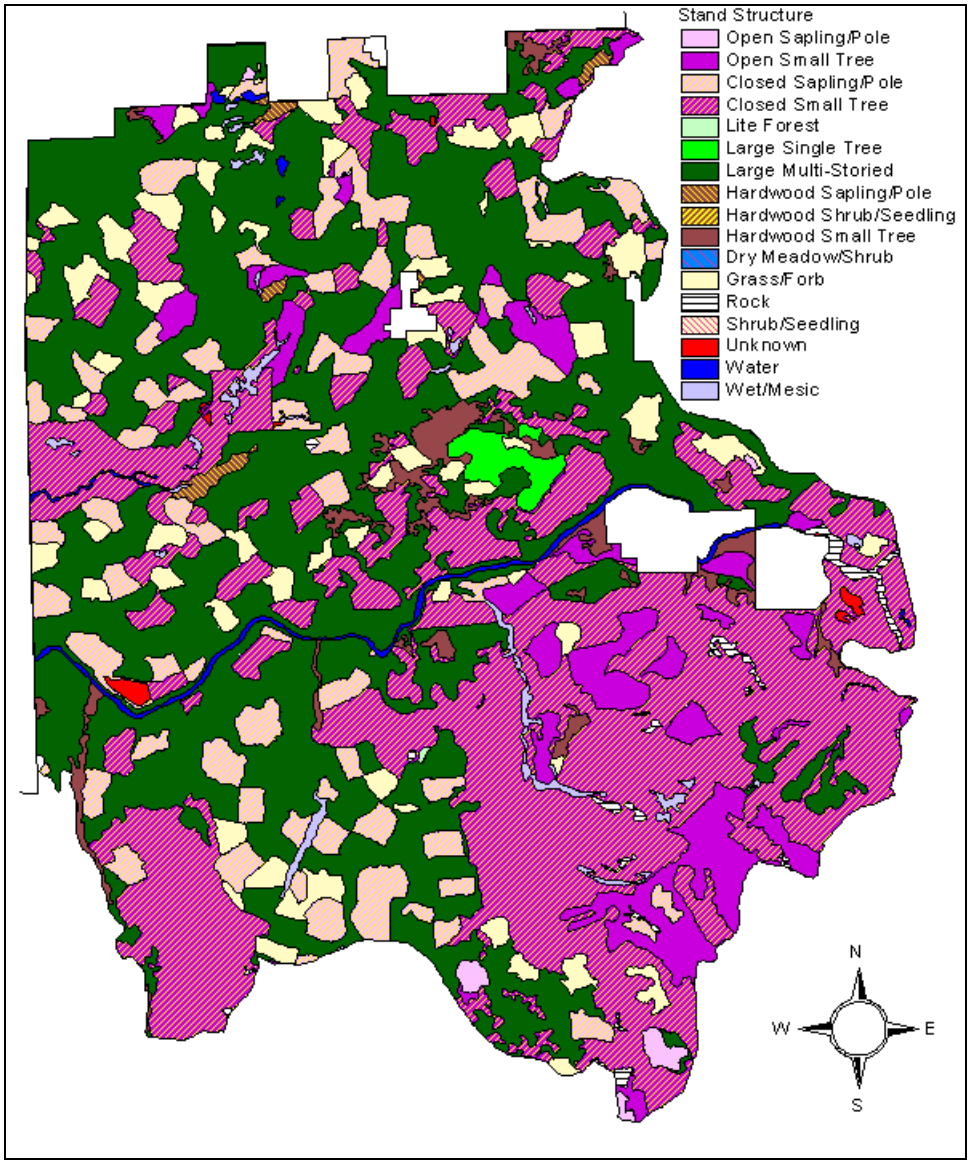
Map 4-48 Woods LSR Ecoclass



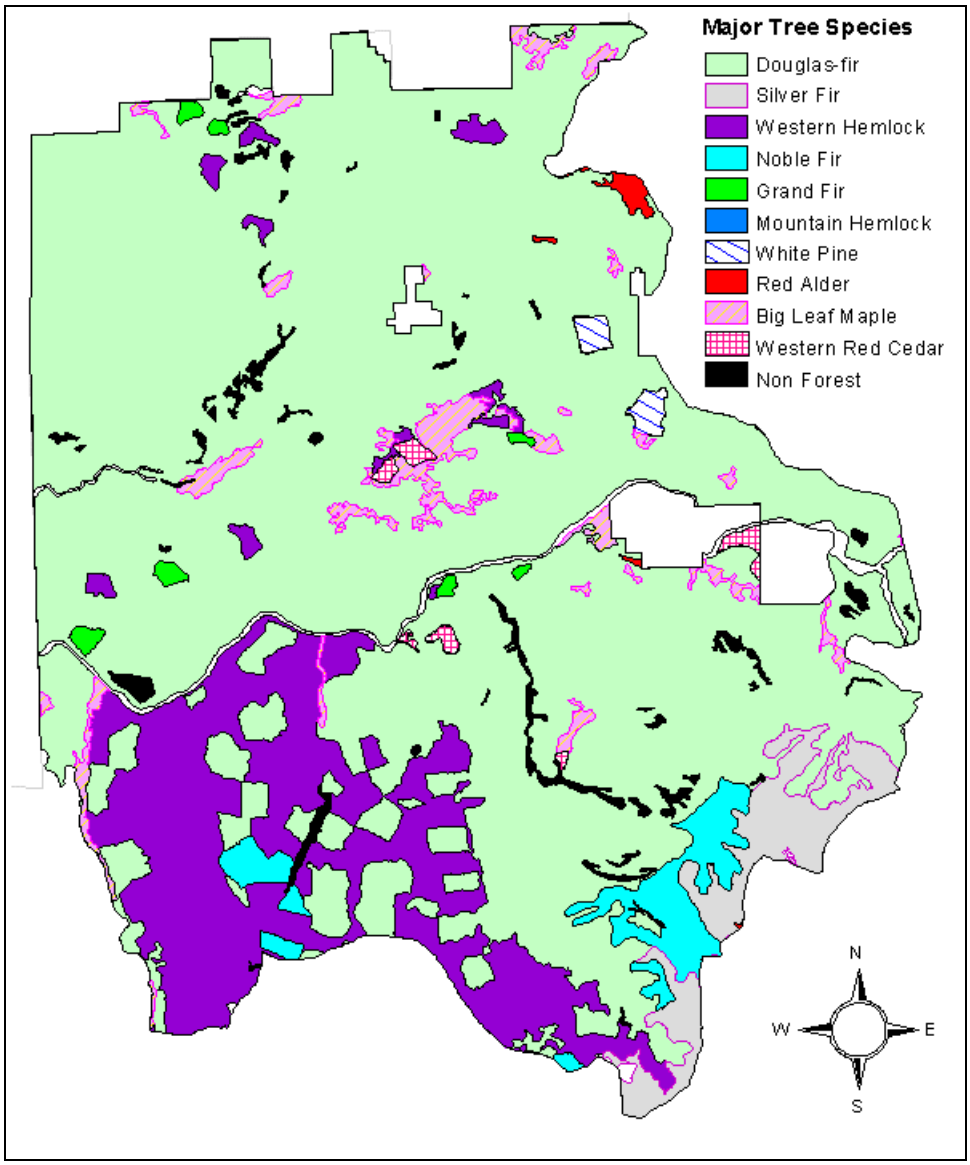
Map 4-49 Woods LSR Age Class



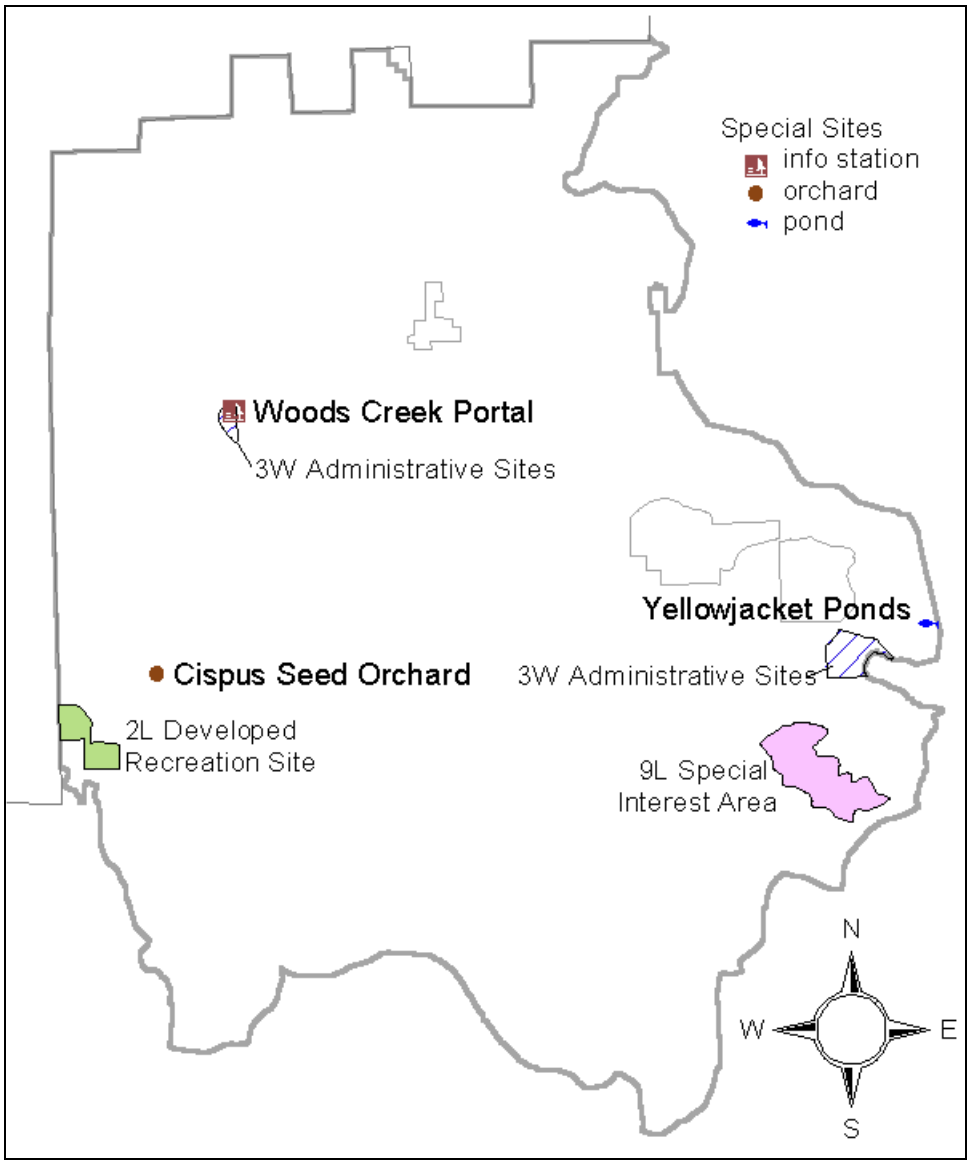
Map 4-50 Woods LSR Stand Structure



Map 4-51 Woods LSR Dominant Tree Species



Map 4-52 Woods LSR Special Sites



Map 4-53 LSR Road Network

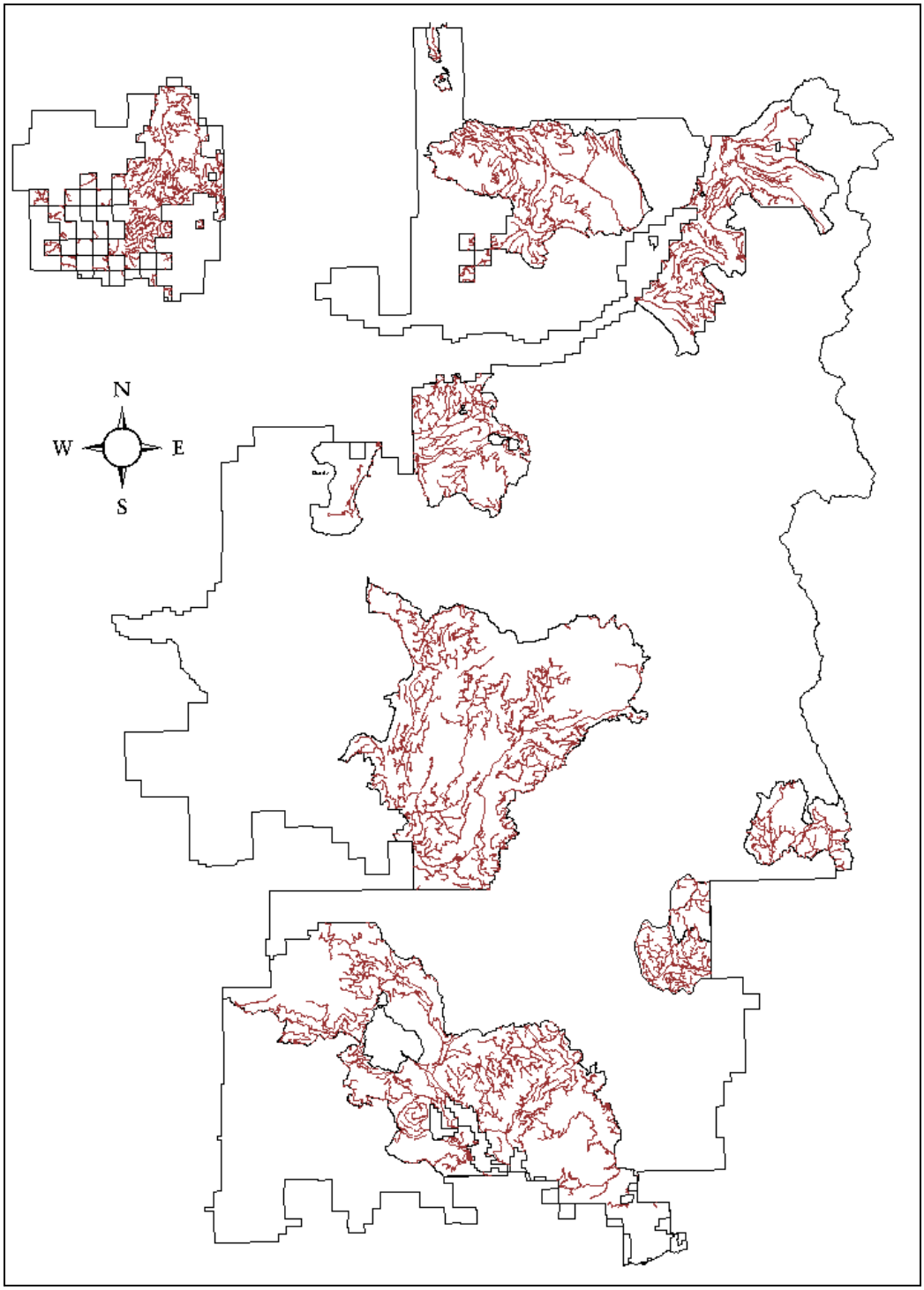


Table 4-33 Plant Zone by LSR

ZONE	Total Acres	LSRs								
		Gotchen	Lewis	Mineral	Nisqually	Packwood	Peterson	Quartz	Wind	Woods
Unknown	2			2					0	
Silver fir	211,510		86,274	8,408	30,910	24,165	6,644	4,592	46,351	4,165
Grand fir	27,690	13,143					8,870		5,677	
Subalpine fir	75	75				0				
Western hemlock	183,964		25,200	29,180	14,636	16,393		1,648	72,977	23,928
Mountain hemlock	24,258	1,955	9,168		5,813	4,552		2,619		150
Total Acres	447,498	15,173	120,642	37,590	51,360	45,110	15,514	8,860	125,006	28,244

Table 4-34 Ecotypes by LSR

Ecotype	Total Acres	LSRs								
		Gotchen	Lewis	Mineral	Nisqually	Packwood	Peterson	Quartz	Wind	Woods
Unknown	663	1	0	523	2	5	1	0	120	11
Admin. Site	988				4	220			706	58
Douglas fir	4,595								4,595	
Forblands	137				117		13		7	
Grand fir	20,544	12,402					7,914		228	
Hardwoods	2,077			55	428	20		21	856	695
Meadow	1,907	7	361	4	736	41	36	7	614	101
Mountain hemlock	5,488	1,612	1,546		291	643	285	818	51	242
Silver fir	185,911	325	76,433	15,131	21,522	15,613	7,019	5,061	39,383	5,424
Subalpine	4,105	722	2,452			386		444		102
Water	711		101	70	155	97	1	12	76	200
West Red Cedar	108								108	
Western Hemlock	197,674		35,110	21,474	22,150	23,018		2,153	72,683	21,085
Total Acres	447,498	15,173	120,642	37,590	51,360	45,110	15,514	8,860	125,006	28,244

Table 4-35 Deer and Elk Winter Range

Winter Range Age Groups	Total Acres	LSRs								
		Gotchen	Lewis	Mineral	Nisqually	Packwood	Peterson	Quartz	Wind	Woods
Unknown	17		0	4	0	1			7	4
0-20 years	9,957	20	2,464	1,148	279	1,174		75	3,063	1,733
21-70 years	20,779		3,580	590	600	2,557		201	8,734	4,518
71-120 years	27,734		4,696	84	1,742	1,678		20	17,155	2,360
121+ years	48,039	330	9,920	4,295	1,537	5,981		860	16,374	8,741
Total Winter Range Acres	106,526	351	20,660	6,121	4,158	11,391		1,157	45,332	17,356
Not Winter Range	340,973	14,822	99,982	31,469	47,201	33,720	15,514	7,703	79,674	10,887
Total Acres	447,499	15,173	120,642	37,590	51,360	45,110	15,514	8,860	125,006	28,244

Table 4-36 Age Classes by LSR

Age Class	Total Acres	LSRs								
		Gotchen	Lewis	Mineral	Nisqually	Packwood	Peterson	Quartz	Wind	Woods
NonForest or Unknown	18,930	109	618	322	6,951	5,331	282	306	4,403	607
<10years	25,915	334	8,069	4,057	3,487	1,910	685	0	6,098	1,276
10-20 years	31,979	521	8,955	5,160	3,900	3,007	1,295	391	7,150	1,600
21-40 years	55,175	269	13,566	7,172	6,254	7,060	2,753	508	13,728	3,865
41-80 years	35,116	2,696	6,112	1,385	1,155	1,334	1,409	52	15,026	5,948
81-90 years	21,210	1,874	8,033		50	1,152	13	25	7,971	2,093
91-100 years	34,392	1,952	7,863	254	5,197	1,544	1,065	585	15,932	
101-150 years	63,418	1,498	21,096	8,991	10,147	2,026	487	2,845	14,771	1,558
151-200 years	39,527	2,375	8,354	4,887	1,855	2,945	1,076	645	17,389	
201+years	121,837	3,545	37,975	5,364	12,365	18,801	6,449	3,502	22,539	11,297
Total Acres	447,498	15,173	120,642	37,590	51,360	45,110	15,514	8,860	125,006	28,244

Table 4-37 Structural Stage Distribution

Structural Stage	Total					LSRs				
	Acres	Gotchen	Lewis	Mineral	Nisqually	Packwood	Peterson	Quartz	Wind	Woods
UNKNOWN	1,660	1	5	526	6	225	1	0	826	69
CLOSED SAP/POLE	47,866	474	8,906	9,137	6,650	4,186	3,370	618	11,789	2,738
CLOSEDSMALL TREE	113,908	7,064	24,854	8,368	11,005	9,491	1,791	2,216	39,623	9,496
DRY MEADOW/SHRUB	459	2	21		117	7			313	
GRASS/FORB	28,459	521	8,608	5,006	3,331	757	1,392	246	6,917	1,683
HWSAPLING/POLE	1,322		476	33	49	41		27	574	122
HW SHRUB/SEEDLING	101		72						30	
HWSMALLTREE	2,126		166	24	423	54		0	810	648
LARGE TREE MULTI-STORIED	144,828	5,277	39,465	12,007	18,134	16,199	7,211	4,434	31,354	10,746
LARGE TREE SINGLE STORY	15,421		6,946			1,039	30		7,211	195
LITE FOREST	1,350	25	69	17	48	1	795		390	5
OPEN SAP/POLE	25,621	550	12,929	1,504	1,559	3,764	471	327	4,409	108
OPEN SMALL TREE	28,703	1,150	12,763	479	570	715	158	630	10,432	1,805
ROCK	18,352	104	3,690	128	4,823	4,368	108	134	4,828	168
SHRUB/SEEDLING	10,798		285	84	2,623	3,439			4,367	
WATER	711		101	70	155	97	1	12	76	200
WET MESIC	5,816	6	1,288	208	1,868	727	186	216	1,059	259
Total Acres	447,498	15,173	120,642	37,590	51,360	45,110	15,514	8,860	125,006	28,244

Table 4-38 Dominant Tree Species

Dominant Tree Species	Total Acres	LSRs								
		Gotchen	Lewis	Mineral	Nisqually	Packwood	Peterson	Quartz	Wind	Woods
Douglas fir	283,567	6,141	67,930	28,114	24,483	24,315	12,922	4,374	94,319	20,970
Pacific silver fir	53,794	10	25,746	3,042	8,674	5,836	453	1,927	7,238	867
Western Hemlock	42,876		9,254	3,886	6,767	6,905	178	1,627	10,383	3,876
Non Forest	26,853	111	5,100	921	6,966	5,426	295	362	6,981	691
Noble fir	21,302		10,738	1,562	3,668	1,297	103	136	3,068	730
Grand fir	7,695	7,404	11				97		69	114
Red Alder	2,379		307	56	474	96		27	714	705
Western Red Cedar	1,866	21	536		118	370	0		756	64
Lodgepole pine	1,614	1,129					422		63	
Subalpine fir	1,160	4	486			264		406		
White pine	1,021	13	12		16	585	254		35	104
Mountain hemlock	842	463		127	5			247		
Ponderosa pine	739	338				3	392		6	
Engelmann spruce	499		60		41	4	394			
Black Oak	482								482	
East side Douglas fir	373								373	
Big leaf maple	227								109	118
Unknown	144	1	0	9	2	5	1		120	6
Willow species	29								29	
Yellow Cedar	22				22					
Big tooth aspen	8								8	
Quaking aspen	4								4	
Western Larch	2						2			
Totals Acres	447,498	15,173	120,642	37,590	51,360	45,110	15,514	8,860	125,006	28,244

Table 4-39 Road Densities by LSR

Road Densities	LSRs								
	Gotchen	Lewis	Mineral	Nisqually	Packwood	Peterson	Quartz	Wind	Woods
Miles	59	415	213	218	201	86	12	427	134
Acres	15,173	120,642	37,590	51,360	45,110	15,514	8,860	125,006	28,244
Road Mi/Sq. Mile	2.5	2.2	3.6	2.7	2.8	3.5	0.9	2.2	3.0

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