

Cover Page Info for Cover of RNA Establ Record

Name Augur Creek

Region R06 Station PNW

State Oregon County Lake

Boundary Certified on - Appendix I

TMIS # 00435 AD

Date Reg Forester signed 1 3 / - 99 AD

Lat 42 degrees 33 North

Long 120 degrees 46 West

| <u>1980 SAF</u> | <u>Acres</u> | <u>Ha</u> |
|--------------------|--------------|-----------|
| 208 Whitebark Pine | 855 | 346 |
| 218 Lodgepole Pine | 102 | 41 |
| 211 White Fir | 1110 | 449 |
| 237 Ponderosa Pine | 110 | 44 |
| Non-forested | | 7 |
| TOTAL | 2195 | 887 |

really 18 according to ER - 16

AD (10)

| <u>1966 Kuchler</u> | <u>Acres</u> | <u>Ha</u> |
|--------------------------------|--------------|-----------|
| Ponderosa shrub forest (Pinus) | 2179 | 880 |
| Non-Forested | 16 | 7 |
| TOTAL | 2195 | 887 |

Access (under **location**) map vs description both

Original maps or photocopies? Photocopies

Photos included? no

Abutted by non-FS land? Yes private land

SAF & Kuchler types consistent? No

Climate records Nearest weather station 29 & 75 miles climate record 38 & 63 years

Fauna & Flora authorities Burt W H and R P Grossenheider 1976 Hickman J C 1993 Hitchcock C L and Cronquist A 1973 Leonard W P et al 1993 Little Elbert Jr 1979 Nussbaum R A et al 1983 Verts J and L N Caraway 1984

Land use conflicts? Grazing? Trails? Recreation? Grazing is still allowed as a pass through and may be more than incidental some trails exist but recreation conflicts are minor at this time

Commercial Forest Land no in Wilderness no

* Classify at Subsection level if possible a 5-digit code (or 6-digit if beginning with M) If not possible then at Section level

June 1999

ESTABLISHMENT REPORT FOR

AUGUR CREEK RNA [Fremont National Forest, Paisley Ranger District]

IN ACCORDANCE WITH FSM 4063 42, THE FOLLOWING DISTRIBUTION IS MADE

___ WO / FOREST MANAGEMENT RESEARCH STAFF (original copy) 1

___ R-6 / Lands and Minerals (Landownership status)

___ PNW / RNA Coordinator (Sarah Greene)

___ Supervisors Office and RD

RO / Environmental Coordination

DECISION NOTICE / DESIGNATION ORDER
And
FINDING OF NO SIGNIFICANT IMPACT

ESTABLISHMENT OF THE AUGUR CREEK RESEARCH NATURAL AREA

Fremont NF Land and Resource Management Plan
Amendment Number 15

USDA Forest Service
Fremont National Forest
Paisley Ranger District

Introduction

The 1989 Record of Decision for the *Fremont National Forest Land and Resource Management Plan* (Forest Plan) recommended the establishment of the Dear Horse Rim White Pine Research Natural Area (RNA) and reserved for further study an area in the Augur Creek drainage as a potential RNA. These recommendations were the result of an analysis of factors in 36 CFR 219.25 and Forest Service Manual 4063.41. Results are documented in the Forest Plan and Final Environmental Impact Statement. Following public scoping and in consultation with Forest Service ecologists, the Forest Plan was amended in 1999 (Plan amendment No. 15) to combine the Dead Horse Rim - Whitebark Pine proposed RNA with the Augur Creek Reserve and the Augur Creek Addition into the proposed 2195 acre Augur Creek RNA.

This environmental analysis evaluates a proposal to amend the Forest Plan by changing the "candidate" Augur Creek RNA to an "established" RNA (the proposed action). Two alternatives are documented in this analysis: the proposed action and "no action" (continue managing as a candidate RNA).

The Augur Creek RNA Establishment Record (1999) describes the current condition of the proposed RNA in detail. The purpose of formally establishing the proposed Augur Creek RNA is to contribute to a series of RNAs designated to "illustrate adequately or typify for research or educational purposes the important forest and range types in each forest region, as well as other plant communities that have special or unique characteristics of scientific interest and importance" (36 CFR 251.23). The proposed Augur Creek RNA will contribute to a series of RNAs by providing examples of unfilled RNA cell needs (or communities) for the following: Lodgepole pine/long-stemmed sedge, Whitebark pine/lodgepole pine, Ponderosa pine/white fir/snowberry, Ponderosa pine/white fir/snowbrush. The RNA proposal will provide long-term protection and recognition of these cell types. The RNA proposal represents unfilled cell need and is based on the relatively undisturbed conditions of these cell types in the area at this time. Comments received from agency specialists and from interested members of the public support the establishment of an RNA in the area. Site conditions and public concerns have been reviewed during this analysis and no important changes have occurred since the Forest Plan EIS was signed. Conditions and environmental effects of designation are much the same as described in Chapter IV, p. 165 of the Forest Plan FEIS. The Augur Creek area will provide an appropriate site for inclusion in the national network for protection of these cell types.

Decision

By the authority delegated to me by the Chief of the Forest Service (FSM 4063) it is my decision to select **Alternative A** (proposed action) and establish the 2,195 acre Augur Creek RNA. The Forest Plan is hereby amended to change the Augur Creek RNA from a "candidate RNA to an "established RNA. This is a nonsignificant amendment to the Forest Plan.

This decision is based on the **Establishment of the Augur Creek Research Natural Area** environmental assessment and is selected to establish the RNA as described in the Augur Creek Establishment Record.

Public Involvement

Scoping was conducted during the process of updating information to determine whether to proceed with the combining of areas, renaming, and establishment of the RNA. Public scoping was initiated on November 4, 1994, when a letter describing the Proposed Action showing the finalized boundary was sent out, inviting input from 265 individuals or organizations on the Paisley Ranger District and Supervisors Office. Fremont National Forest mailing lists. These lists included government agencies, The Klamath Tribe, timber companies, environmental and other special interest groups, and individuals who have expressed an interest in Forest activities. The Nature Conservancy specialists reviewed the existing condition of the RNA and drafted the Establishment Record in January 1996.

Twenty-eight comments were received. Twenty-three of the comments were in favor of establishment and five were opposed to the proposed RNA. Many did not make a comment other than stating they were for or against the proposal.

Non-supportive comments ranged from the size of the RNA (too big to small), opposition to exclusion of grazing on the area, adverse forest health issues that should be looked at before RNA designation occurs, possible thinning in the white fir, the internal trail system could be further developed, no additional knowledge would be gained by the RNA designation (existing RNAs on Forest are not used), economic impact of the designation of the RNA by reducing the timber base, and the impact of reducing the Forest Service grazing allotment to local livestock operators. Other written comments supported the need to preserve a network of study and research, which could only be brought about by the establishment of the RNA.

The scoping analysis and updating the draft Establishment Record resulted in the 1999 decision to create the proposed Augur Creek RNA.

Finding of No Significant Impact (FONSI)

I have determined through the environmental assessment that this is not a major federal action that would significantly affect the quality of the human environment; therefore, an environmental impact statement is not needed. This determination is based on the following factors:

Grazing

An accepted casual or incidental level of livestock use of less than 20% that is consistent with RNA management is recommended by the Forest Supervisor and Station Director.

Recreation

Dispersed recreation would be allowed to the extent that it does not reduce the research or education values of the area and no physical improvements other than maintenance of existing trails would be considered

Context

Although this is an addition to the national system of RNAs both short term and long term physical and biological effects are limited to the local area

Intensity

There are no known effects on public health and safety

There are no known effects on historic or cultural resources actual or eligible National Register of Historic Places sites park lands prime farmlands wetlands or wild and scenic rivers Effects on ecologically critical areas are minimal

There are no uncertain effects on the human environment Effects do not involve unique or unknown risks and are not likely to be controversial

The decision is not likely to establish a precedent for future actions with significant effects

The decision will not adversely affect an endangered or threatened species or its critical habitat

The decision is consistent with Federal State and local laws and requirements for the protection of the environment

Implementation

Implementation of this decision will not occur until *seven* days after publication of the legal notice of this decision in **The Oregonian**

Appeal Rights

The Forest Supervisor of the Fremont National Forest will notify the public of this decision and mail a copy of the Decision Notice / Designation Order to all persons interested in or affected by the decision This decision is subject to appeal pursuant to 36 CFR Part 217 A copy of the Notice of Appeal must be in writing and submitted to

**Chief USDA - Forest Service
ATTN NFS Appeals
14th and Independence Avenue SW
Washington D C 20090-6090**

The notice of appeal must be prepared pursuant to 36 CFR 217.9 (b) and be submitted within 45 days from the date of legal notice of this decision Legal notice of this decision will appear in **The Oregonian**

Contact Person


For further information regarding this decision or the Augur Creek RNA contact Orlando Gonzales Fremont National Forest HC10 Box 337 Lakeview OR 97630 Phone (541) 947 6275

for Roy Rozemelt

Robert W Williams
Regional Forester
Pacific Northwest Region

June 2, 1999

Date

PUBLIC NOTICES

CLASS 8
Public Notices 8

Public Notices 8

Public Notices 8

NOTICE OF DECISION

On June 2, 1999 USDA Forest Service Regional Forester for the Pacific Northwest Region (Portland Oregon) made a decision to establish a 2195 acre Augur Creek Research Natural Area on the Paisley Ranger District of the Fremont National Forest in Lake County Oregon. This decision will be implemented after June 19 1999.

A copy of the Decision Notice/Designation Order and Finding of No Significant Impact is available upon request from the Regional Office Environmental Coordination P.O. Box 3623 Portland Oregon 97208.

This decision is subject to appeal pursuant to Forest Service regulation 36 Code of Federal Regulation (CFR) Part 217. Any written Notice of Appeal must be fully consistent with 36 CFR 217.9 (Content of a Notice of Appeal) and must include the reasons for appeal. Any written appeal must be postmarked or received by the Appeal Deciding Officer Chief Mike Dornbeck, USDA Forest Service ATTN: NFS Appeals, P.O. Box 96090 Washington D.C. 20090-6090 within 45 days of the date of this legal newspaper notice.

For further information regarding Augur Creek RNA, contact Orlando Gonzales, Fremont National Forest, HC190 Box 337 Lakeview, Oregon 97630 phone 541 947-6275.

**Environmental Assessment
Establishment of the Augur Creek Research Natural Area
Paisley Ranger District
Fremont National Forest
Lake County, Oregon**

Purpose and Need for Action

This environmental assessment evaluates the proposal to amend the Fremont National Forest Land and Resource Plan (the Forest Plan) to change the status of the Proposed Augur Creek RNA on the Paisley Ranger District to an established status. This assessment will document the analysis of the Proposed Action and one Alternative.

The purpose of formally establishing the proposed Augur Creek RNA is to contribute to a series of RNA s designated to "illustrate adequately or typify for research or educational purposes the important forest and range types in each forest region as well as other plant communities that have special or unique characteristics of scientific interest and importance" (36 CFR 251.23). The proposed Augur Creek RNA will contribute to a series of RNA s by providing examples of unfiled RNA cell needs (or communities) for the following: Lodgepole pine/long stolon sedge, Whitebark pine lodgepole pine, Ponderosa pine white fir/snowberry, Ponderosa pine white fir/snowbrush. The RNA proposal will provide long term protection and recognition of these cell types. The RNA proposal represents unfiled cell need and is based on the relatively undisturbed conditions of these cell types in the area at this time. Comments received from agency specialists and from interested members of the public support the establishment of an RNA in the area. Site conditions and public concerns have been reviewed during this analysis and no important changes have occurred since the Forest Plan EIS was signed. Conditions and environmental effects of designation are much the same as described in Chapter IV p 165 of the Forest Plan FEIS. The Augur Creek area will provide an appropriate site for inclusion in the national network for protection of these cell types.

DESCRIPTION OF THE AREA

Elevations of the proposed Augur Creek RNA range from 6,100 feet at the southeast end to a high point of 8,134 feet at the northwestern end. The defining environmental characteristic for natural communities within the analysis area is usually soil depth. Most of the area is dominated by old growth forest of ponderosa pine white fir lodgepole and Whitebark pine. Open ponderosa pine forests occur in some of the lower elevation areas. In the Whitebark Pine portion there are two shrubby areas dominated by mountain big sagebrush. The timbered sites exhibit a variety of stand conditions that include mistletoe infestations and bark beetle attacks. The area has fourteen natural communities or plant associations represented within its boundaries. These plant communities were lumped into four types for mapping purposes (Map #4 Establishment Record). Three associations were determined from the fourteen communities: they are Upland Forested Plant Associations, Riparian Zone Associations, and Non forested Associations. Additional information can be found in the Augur Creek establishment report.

CURRENT CONDITION

The Augur Creek RNA Establishment Report (1999) describes the current condition of the area in detail. The area is part of a narrow transition zone between the upland forests of the east Cascades physiographic province and the basin and range province lying to the north and east. The following RNA cell needs (or elements) on the east slope Oregon Cascades physiographic province are included:

Lodgepole Pine Zone

Lodgepole pine/long stolon sedge community Within the proposed RNA this association can be found on the north slopes in the head of the drainage of Augur Creek (in the southeast corner) and at lower elevations. Lodgepole pine is clearly dominant within this vegetational zone with Whitebark pine becoming less noticeable in the lower elevations. Mistletoe is common in the lodgepole pines. Reproduction is evident for both conifer species although the lodgepole pines are generally more abundant in the understory. The understory in this association falls short of natural development or size with essentially no shrub layer. Approximately 50-90% of the ground surface is covered by a dense layer of needle litter and rocks cover 10-40%. Total herb cover is quite low except for the small meadow openings at drainage heads. The most important forest herb is long stolon sedge (*Carex pensylvanica*) with up to 50% ground cover. Other common herbs are Wheelers bluegrass (*Poa nervosa*) tailcup lupine (*Lupinus caudatus*) blue leaf penstemon (*Penstemon glaucinus*) a sensitive species, sidebells wintergreen (*Pyrola secunda*) and western needlegrass (*Stipa occidentalis*). The white fir lodgepole pine/long stolon sedge needlegrass (*Abies concolor* *Pinus contorta* var *murrayana*/*Carex pensylvanica* *Stipa occidentalis*) forest that occurs in the transition from lodgepole pine to white fir forest is usually strongly dominated by lodgepole pine. Below the transition zone lodgepole pine drops out and white fir dominates.

Whitebark pine lodgepole pine community The high elevation portion of the RNA except for several shrub inclusions on shallow soil with southerly exposures is vegetated by a forest co-dominated by lodgepole pine and Whitebark pine (*Pinus contorta* var *murrayana* and *Pinus albicaulis*). This forest type is characteristic of upper slope ridgetop positions at elevations greater than 5000 feet. The lodgepole pine Whitebark pine association forms a closed though not dense forest with lodgepole pine (and Whitebark pine as co-dominates). The understory of this association is generally quite sparse consisting of a few herbs and grasses. Other species that occur in small amounts in this vegetative association are Blue leaf penstemon (*Penstemon glaucinus* a USFWS Category 2 candidate species) is a sensitive species which is particularly prominent at higher elevations on flat ridge tops. Mountain sagebrush is found in small inclusions in upper elevation ponderosa pine and lodgepole pine forests where soils are shallow and rocky. Also green tinged paintbrush (*Castilleja chlorotica* a USFWS Category 2 candidate species) grows in forest openings dominated by mountain big sagebrush and other herbaceous species.

Mixed Conifer Zones

Ponderosa pine white fir/snowberry and Ponderosa pine white fir/snowbrush community In the ponderosa pine forests which dominate much of the Augur Creek RNA white fir is quite common and in some areas is quite dense dominating the lower and middle layers. However single story open groves of large ponderosa pines tend to characterize these forests. The understory and herbaceous species in white fir and ponderosa pine forests are very similar. Common shrubs occurring within these associations are pinemat manzanita (*Arctostaphylos nevadensis*) greenleaf manzanita (*Arctostaphylos patula*) creeping Oregon grape (*Berberis repens*) squaw currant (*Ceanothus prostratus*) snowbrush (*Ceanothus velutinus*) and common snowberry (*Symphoricarpos albus*). Herbaceous cover falls short of development in some areas but quite dense and diverse in others particularly in the vicinity of seeps and springs. Long stolon sedge (*Carex pensylvanica*) is the dominant understory herb only at higher elevations. Woolly mules ears (*Wyethia mollis*) western hawkweed (*Hieracium albertinum*) linanthastrum (*Linanthastrum nuttallii*) are common at lower elevations. *Pyrola* species (*Pyrola* spp.) are also

common including achlorophyllous types Grasses are common in ponderosa pine forests with Idaho fescue and Ross sedge being prominent Also mountain sagebrush is found in small inclusions in the upper elevation ponderosa pine and lodgepole pine forests where soils are shallow and rocky

Alternatives and Environmental Consequences

Alternative A, The Proposed Action

The proposed action is to establish the Augur Creek Research Natural Area of 2,195 acres as described in the establishment record (Augur Establishment Record 1999) and the change of management area designation Environmental Assessment (Change of Management Area Designation EA Fremont NF Plan Amendment No 15 1999)

This action would provide research opportunities with management following direction provided in the Forest Plan Specifically a management and monitoring plan will be developed by Research with management actions in the interim guided by the Forest Plan (MA8 page 166) Management of the area requires protection against inappropriate encroachment Research within the proposed RNA could then make a comparison of the transition between the lower level of ponderosa pine to the white fir and to the higher level of lodgepole pine and Whitebark pine These studies may give managers detailed information on certain ecosystems for better management

The acreage and boundary of the RNA in MA #8 (the Augur Creek RNA) would be finalized with this action

Wildlife habitat improvements would not be allowed Timber harvest and firewood gathering would not be allowed Special use permits would be limited to research and related activities Transportation facilities would have minimum impacts on the area Helispots for fire control would not be allowed Insect and disease outbreaks would not be suppressed Wildfires that endanger the RNA values would be extinguished as quickly as possible Prescribed fire would be carried out only in conjunction with approved research or to meet management plan objectives

The environmental consequences of implementing Alternative A include augmentation of the baseline ecological data presently provided by the Pacific Northwest Region RNA program Conversely allocation them to other uses would leave voids in the baseline data and research opportunities available through the RNA program The Final Environmental Impact Statement (FEIS) for the Forest Plan Chapter IV Pages 171 172 with the exception of recommending the area for withdrawal from mineral entry describes the direct effects in detail Salable mineral material sources would not be developed surface occupancy would not be allowed and the area would be recommended for withdrawal from mineral entry Because the Forest has no known locatable or leasable minerals in the area it is unlikely that the area contains significant metallic mineral or geothermal energy resources There are no reported hardrock mining claims in the RNA proposal

The RNA proposal is located within the Lakes Grazing Allotment Water sources within the RNA proposal include Augur Creek and a number of unnamed tributaries A minor amount of cattle grazing has occurred in the past Establishment of this RNA is not expected to have a direct effect on domestic livestock grazing under present levels but the long term objective is to eliminate grazing from the RNA (W Aney Paisley District Ranger 1998) Livestock grazing would continue at an incidental use level of less than 20% within the area

Semi primitive recreation including activities such as hunting hiking camping and horseback riding may currently occur in the RNA at low levels These activities may continue after establishment unless conflicts with RNA management objectives develop Approximately 5.5 miles of trails traversing through the RNA will be maintained in a minimum development status

Establishment of the RNA supports the Oregon Natural Heritage Act and would help maintain species and genetic diversity in the area over the long term

The proposed boundary descriptions and their subsequent adaptation would have no effect on the importance and use of the area for research and education The boundary description has been established to clarify the RNA boundary of Management Area #8 It is listed in the Augur Creek Establishment Report appendix

Alternative B No Action

Alternative B continues management of the Augur Creek RNA as a proposed RNA according to direction in the Forest Plan Management direction would continue until the Forest Plan is revised or replaced The boundary would remain as shown in the Forest Plan as amended This management direction would include protection from inappropriate activities in the proposed Augur Creek RNA

The environmental consequences of implementing Alternative B are limited to short term losses of opportunities to manage the area in a natural condition if timber management roading intense livestock grazing or mineral development did occur However in today's political or scientific climate The area is not a prime candidate for intensive management The timber and forage resources are limited due to elevation physical and climatic conditions These consequences are detailed in the FEIS for the Forest Plan Chapter IV pages 171-172 An exception is the Forest would not recommend the area for withdrawal from mineral entry with implementation of Alternative B As with Alternative A it is unlikely locatable or leasable mineral/energy resources are present

The environmental effect could be a change in the vegetative composition within the Augur Creek Addition of the proposed RNA The proposed area would be available for timber production The result may be a loss of opportunity for research in the area This Forest cell type may have to be located elsewhere

AGENCIES AND PERSONS CONSULTED

Scoping was conducted during the process of updating information to determine whether to proceed with establishment of the RNA as proposed in the Forest Plan Public scoping was initiated on November 4, 1994 when a letter describing the Proposed Action showing the finalized boundary was sent out inviting input from 265 individuals or organizations on the Paisley Ranger District and Supervisors Office Fremont National Forest mailing lists These lists included government agencies The Klamath Tribe timber companies environmental and other special interest groups and individuals who have expressed an interest in Forest activities The Nature Conservancy specialists reviewed the existing condition of the RNA and drafted the Establishment Record in January 1996

Twenty eight comments were received. Twenty three of the comments were in favor of establishment and five were opposed to the proposed RNA. Many did not make a comment other than stating they were for or against the proposal.

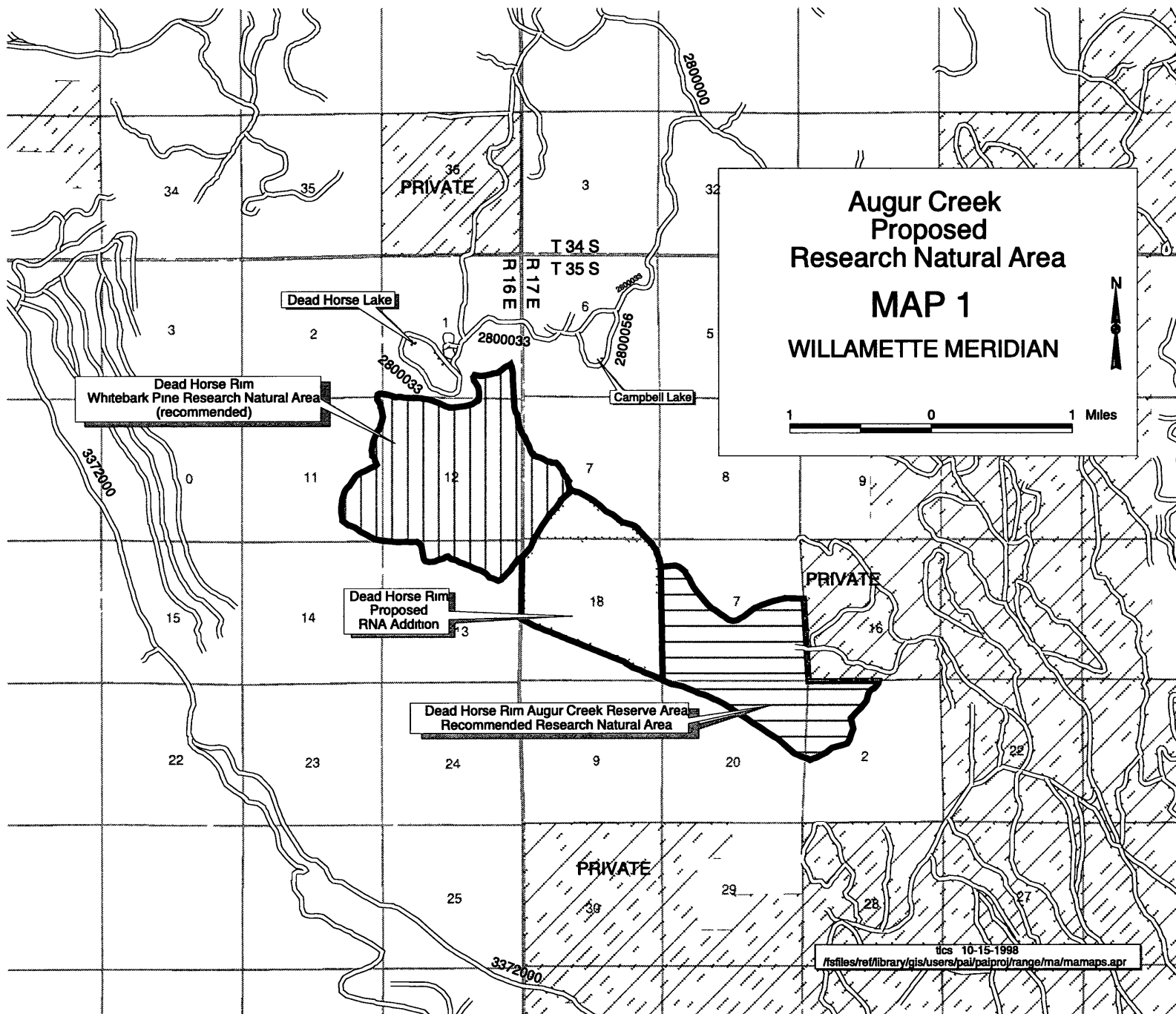
Non supportive comments ranged from the size of the RNA (to big to small) opposition to exclusion of grazing on the area, adverse forest health issues that should be looked at before RNA designation occurs (possible thinning in the white fir), the internal trail system could be further developed, no additional knowledge would be gained by the RNA designation (existing RNAs on Forest are not used), economic impact of the designation of the RNA by reducing the timber base, and the impact of reducing the Forest Service grazing allotment to local livestock operators. Other written comments supported the need to preserve a network of study and research which could only be brought about by the establishment of the RNA. Based on the scoping comments, there are no significant issues.

References

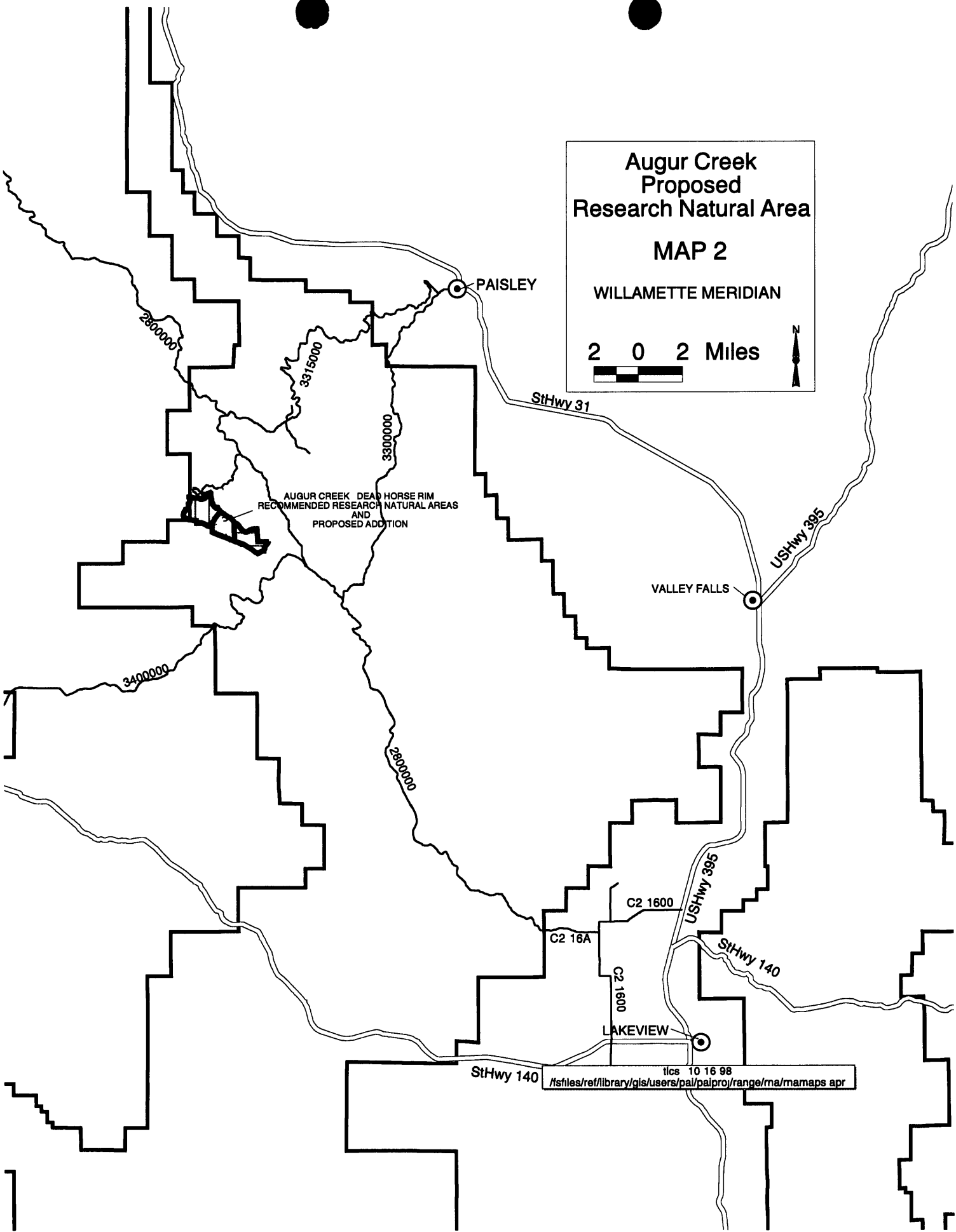
USDA Forest Service 1989 *Land and Resource Management Plan* Fremont National Forest Lakeview Oregon

USDA Forest Service 1999 *Environmental Assessment Change of Management Area Designation and Combining the Dead Horse Rim - White Bark Pine RNA, the Augur Creek Addition, and The Augur Creek Reserve into the Proposed Augur Creek RNA* Forest Plan Amendment No. 13 Fremont National Forest Lakeview Oregon

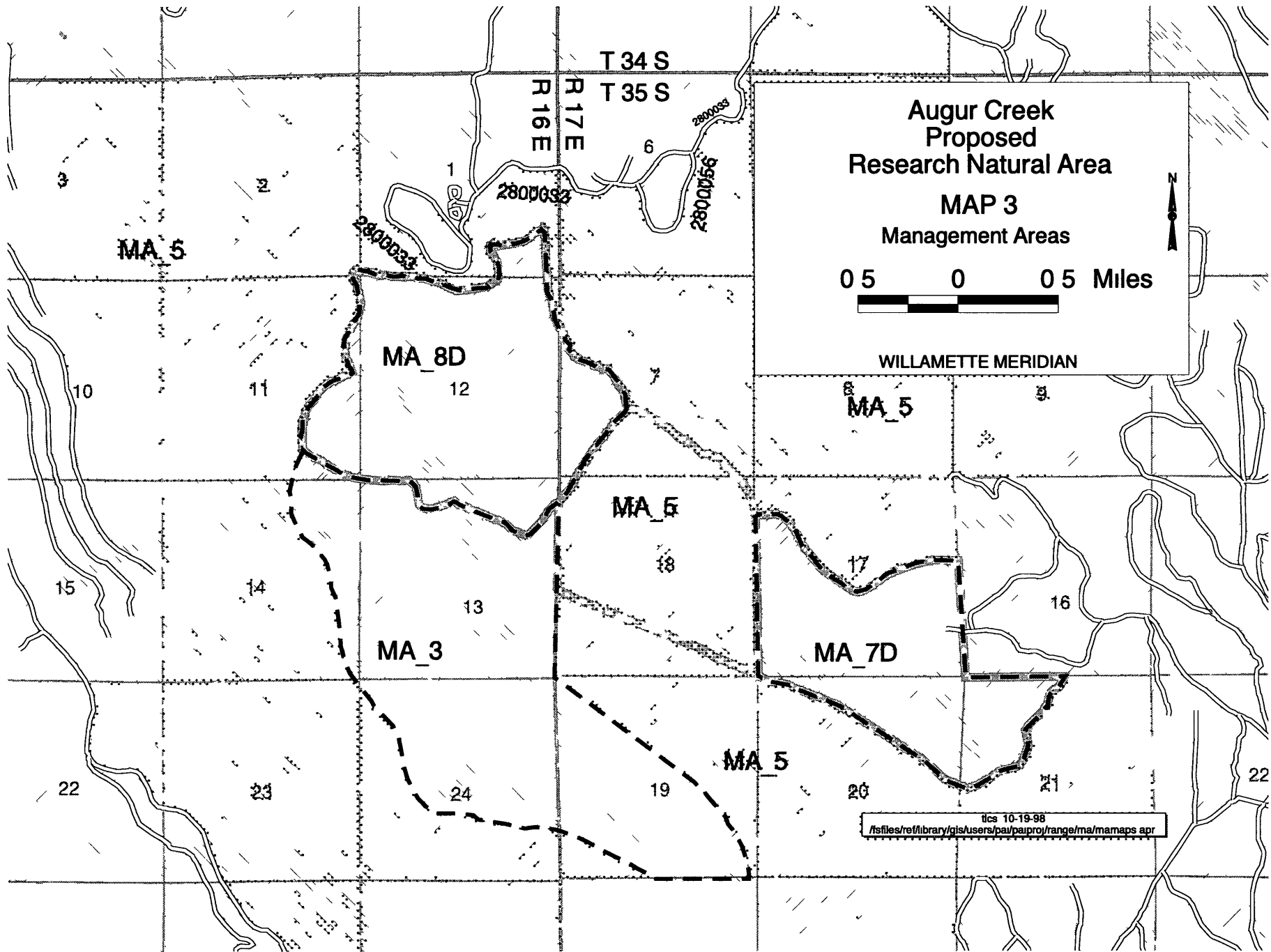
USDA Forest Service 1999 *Establishment Record for the Augur Creek RNA* Fremont National Forest Lakeview Oregon



**Augur Creek
Proposed
Research Natural Area**
MAP 2
WILLAMETTE MERIDIAN
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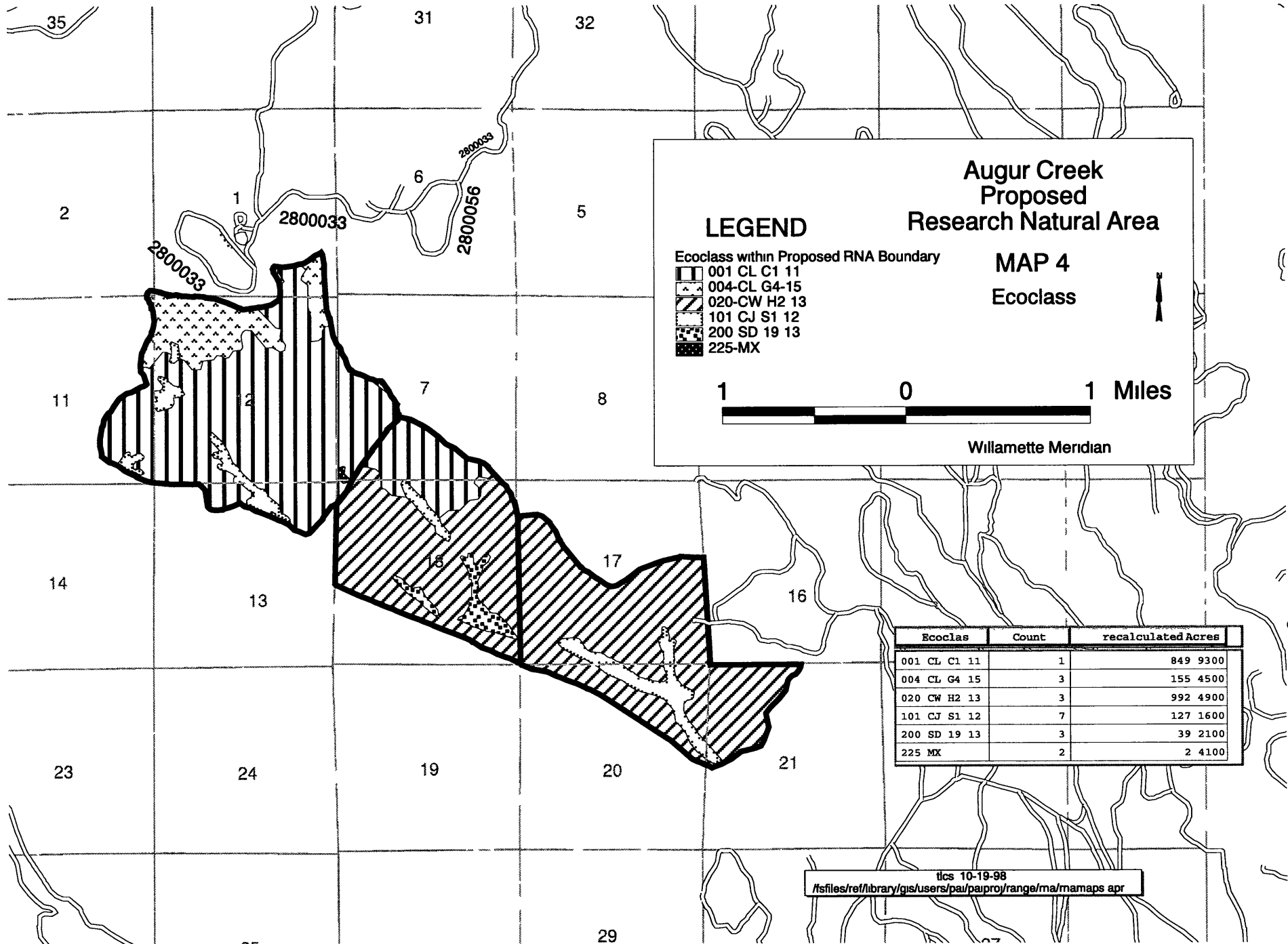
**Augur Creek
Proposed
Research Natural Area**

**MAP 3
Management Areas**



WILLAMETTE MERIDIAN

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Augur Creek Proposed Research Natural Area

MAP 4

Ecoclass

LEGEND

Ecoclass within Proposed RNA Boundary

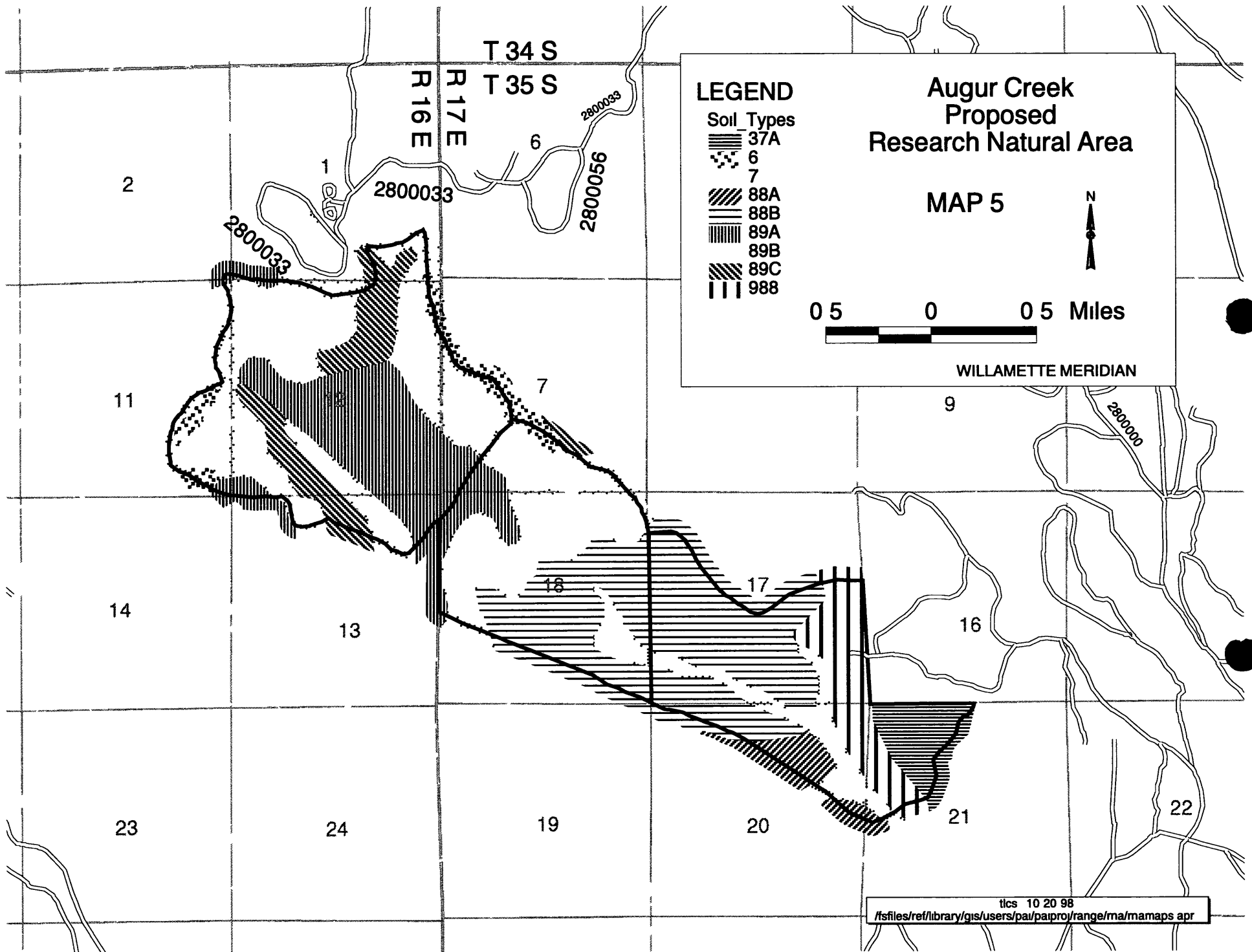
- 001 CL C1 11
- 004-CL G4-15
- 020-CW H2 13
- 101 CJ S1 12
- 200 SD 19 13
- 225-MX

1 0 1 Miles

Willamette Meridian

| Ecoclas | Count | recalculated Acres |
|--------------|-------|--------------------|
| 001 CL C1 11 | 1 | 849 9300 |
| 004 CL G4 15 | 3 | 155 4500 |
| 020 CW H2 13 | 3 | 992 4900 |
| 101 CJ S1 12 | 7 | 127 1600 |
| 200 SD 19 13 | 3 | 39 2100 |
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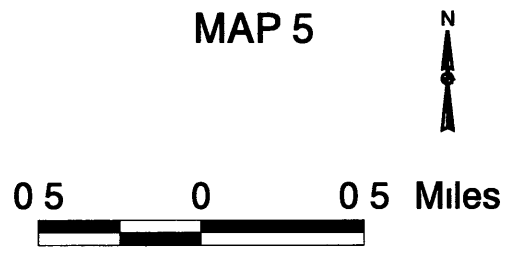


LEGEND

- Soil Types
- 37A
 - 6
 - 7
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 - 89A
 - 89B
 - 89C
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**Augur Creek
Proposed
Research Natural Area**

MAP 5



WILLAMETTE MERIDIAN

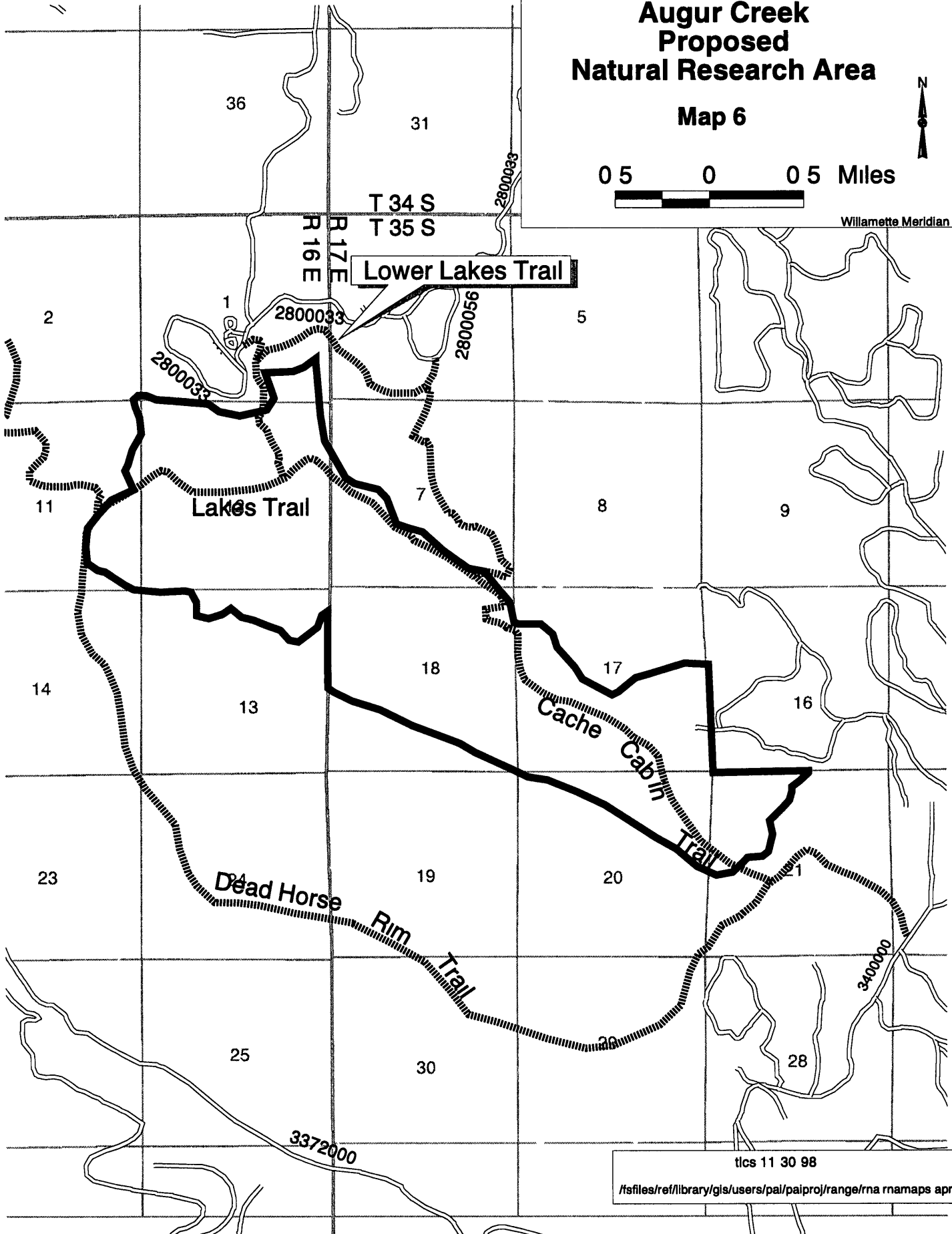
Augur Creek Proposed Natural Research Area

Map 6

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Willamette Meridian



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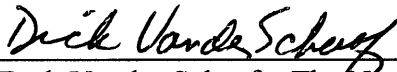
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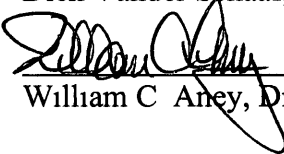
RESEARCH NATURAL AREA ESTABLISHMENT RECORD

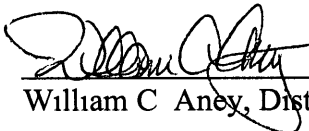
Augur Creek Research Natural Area

Fremont National Forest
Lake County, Oregon



The undersigned certify that all applicable land management planning and environmental analysis requirements have been met and that boundaries are clearly identified in accordance with FSM 4063 21, Mapping and Recordation and FSM 4063 41 5 e(3) in arriving at this recommendation

Prepared by  Date 1-14-99
Dick Vander Schaaf, The Nature Conservancy

 Date 2/17/99
William C Aney, District Ranger, Paisley Ranger District

Recommended by  Date 2/23/99
William C Aney, District Ranger, Paisley Ranger District

Recommended by  Date 3/4/99
Charles R Graham, Forest Supervisor, Fremont National Forest

Concurrence by  Date 3/23/99
 Thomas Mills, Director, Pacific Northwest Research Station

Vertical text along the right edge of the page, possibly a page number or header.

ESTABLISHMENT RECORD FOR
AUGUR CREEK RESEARCH NATURAL AREA
WITHIN FREMONT NATIONAL FOREST
LAKE COUNTY, OREGON

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INTRODUCTION

The Augur Creek Research Natural Area is located in Lake County, Oregon, on the Paisley ranger District, Fremont National Forest (Map 1, Map 2) The Research Natural Area (RNA) spans an elevational gradient from a wet meadow at 6100 feet (1860 m) to the Dead Horse Rim with a highpoint at 8134 feet (2479 m) (Map 3) The area contains 2195 acres (888 ha) in the following three units the 880 acre (356 ha) MA 8 Dead Horse Rim-Whitebark Pine proposed RNA, the 694 acre (281 ha) Augur Creek reserve which would be changed from MA 7 (Special Management Area) to MA 8 (Research Natural Area), and 621 acre (114 ha) Augur Creek Addition which would be changed from MA 5 (Timber and Range Production) to MA 8 (Research Natural Area) (Fremont National Forest Land and Resource Management Plan 1989) The flora of Augur Creek RNA is representative of the transition zone between the East Cascades and Basin and Range physiographic provinces with elements of both provinces present Most of the area is dominated by old growth forest of ponderosa pine¹, white fir, ponderosa pine-white fir, lodgepole pine and lodgepole pine-whitebark forests Open ponderosa pine forest occurs in some of the lower elevation areas In the Dead Horse Rim portion there are two shrubby areas dominated by mountain big sagebrush Along Augur Creek and several unnamed small tributaries, and in a few other wet areas riparian zone vegetation occurs

Land Management Planning

The Dead Horse Rim Whitebark Pine portion of the proposed Augur Creek RNA was included as a candidate RNA in the FEIS for the Fremont National Forest (Fremont National Forest Final Environmental Impact Statement 1989)², in the Forest Plan (Fremont National Forest Land and Resource Management Plan 1989) and in the Record of Decision (Fremont National Forest Record of Decision 1989) In the above documents, the southeast portion of the proposed Augur Creek RNA was classified as the 655 acre (265 ha) Augur Creek Reserve Area (Management Area 7) If no replacement was found for this area within 3 years then it was to be reevaluated as a RNA

The portion of the proposed Augur Creek RNA between these two areas was classified as Management Area 5 At the suggestion of Dr William Hopkins the entire area was considered as the present proposed Augur Creek RNA

¹ Nomenclature for vascular plants follows Hitchcock and Cronquist (1973) Scientific names listed in appendix 2

² Author's names in parentheses refer to references cited

A Forest Plan Amendment was signed by Forest Supervisor Charles Graham on (date**), establishing the 2195 acres (888ha) as the proposed Augur Creek RNA. The RNA was proposed to meet four unfilled natural area cell needs in the East Slope Cascades Physiographic Province as identified by the Oregon Natural Heritage Advisory Council (1993).

Lodgepole Pine Zone

- #22 Lodgepole pine/long-stolon sedge association
- #25 Whitebark pine lodgepole pine forest on the eastern margin of the East Slope Cascades

Mixed Conifer Zones

- #33 Ponderosa pine white fir/snowberry association
- #34 Ponderosa pine-white fir/snowbrush association

OBJECTIVE

The objectives of the Augur Creek RNA are

Preserve in a relatively undisturbed condition the whitebark pine-lodgepole pine and ponderosa pine-white fir/snowberry and ponderosa pine-white fir/snowbrush forests

Maintain examples of open ponderosa pine forests

Protect and study the significant populations of the United States Fish and Wildlife Service (USFWS) Category 2 candidate species *Penstemon glaucinus* and *Castilleja chlorotica*

Serve as a reference area for study, as a baseline area for determining long-term ecological changes, and as a monitoring area to determine effects of management techniques and practices applied to similar ecosystems

JUSTIFICATION

Augur Creek RNA was selected to represent whitebark pine-lodgepole pine forest and typical ponderosa pine forests of ponderosa pine-white fir/snowberry and ponderosa pine-white fir/snowbrush. Augur Creek meets unfilled RNA cell needs for these three associations, and is representative of transition areas in the East Cascades which border the Basin and Range Province (Oregon Natural Heritage Advisory Council 1993). This large tract of fairly accessible ponderosa pine forest presents ample opportunities for research into the environmental relations of ponderosa pine forest and the fir invasion of these forests. The high elevation portion offers the opportunity for gathering baseline data on undisturbed lodgepole pine and whitebark pine-lodgepole pine forest.

Two plant species present in the area, *Penstemon glaucinus* and *Castilleja chlorotica* are listed as Regional Forester's sensitive species and USFWS Category 2 candidate species. Under a Conservation Strategy developed by the Fremont National Forest, there are two populations of

ALTERNATIVES AND ENVIRONMENTAL CONSEQUENCES

Alternative A Proposed Action

The proposed action will change the Management Area designation of the Augur Creek Reserve and the Augur Creek Addition to Management Area 8 (RNA). These two areas will be combined with the Dead Horse Rim - Whitebark Pine area to form the proposed Augur Creek RNA. Research within the proposed RNA could then make a comparison of the transition between the lower level of ponderosa pine to the white fir and to the higher level of lodgepole pine and Whitebark pine. These studies may give managers detailed information on certain ecosystems for better management.

This action would provide research opportunities with management following direction provided in the Forest Plan. Specifically, a management and monitoring plan will be developed by Research with management actions in the interim guided by the Forest Plan (MA8 page 166). Management of the area requires protection against inappropriate encroachment. The acreage and boundary of the RNA in MA #8 (the Augur Creek RNA) would be finalized with this action.

Wildlife habitat improvements would not be allowed. Timber harvest and firewood gathering would not be allowed. Special use permits would be limited to research and related activities. Transportation facilities would have minimum impacts on the area. Helispots for fire control would not be allowed. Insect and disease outbreaks would not be suppressed. Wildfires that endanger the RNA values would be extinguished as quickly as possible. Prescribed fire would be carried out only in conjunction with approved research or to meet management plan objectives.

The environmental consequences of implementing Alternative A are the same as those described in the Final Environmental Impact Statement (FEIS) for the Forest Plan Chapter IV Pages 171-172 with the exception of recommending the area for withdrawal from mineral entry. Salable mineral material sources would not be developed. Surface occupancy would not be allowed and the area would be recommended for withdrawal from mineral entry. Because the Forest has no known locatable or leasable minerals in the area, it is unlikely that the area contains significant metallic mineral or geothermal energy resources. There are no reported hardrock mining claims in the RNA proposal.

The RNA proposal is located within the Lakes Grazing Allotment. Water sources within the RNA proposal include Augur Creek and a number of unnamed tributaries. A minor amount of cattle grazing has occurred in the past. Establishment of this RNA is not expected to have a direct effect on domestic livestock grazing under present levels, but the long term objective is to eliminate grazing from the RNA (W. Aney, Paisley District Ranger, 1998). Livestock grazing would continue at an incidental use level of less than 20% within the area.

Semi-primitive recreation, including activities such as hunting, hiking, camping, and horseback riding, may currently occur in the RNA at low levels. These activities may continue after establishment unless conflicts with RNA management objectives develop. Approximately 3.5 miles of trails traversing through the RNA will be maintained in a minimum development status.

Establishment of the RNA supports the Oregon Natural Heritage Act and would help maintain species and genetic diversity in the area over the long term.

each species within the proposed RNA that are to be managed as "Protected" populations. This means that vegetation will be managed only in order to improve habitat for these populations.

PRINCIPAL DISTINGUISHING FEATURES

1 Whitebark pine-lodgepole pine association

The entire high elevation portion of the RNA, except for several shrub inclusions on shallow soil with southerly exposures, is vegetated by a forest co-dominated by lodgepole pine and whitebark pine covering a total of 850 acres (344 ha). This forest type is characteristic of upper slope ridgetop positions at elevations greater than 5000 feet (2134 m), on poorly developed sandy soils formed from mafic tuffs, breccias and basalt, with poorly developed, sandy soils that formed in place. The lodgepole pine-whitebark pine association forms a closed, though not dense, forest with lodgepole pine and whitebark pine as codominants. The two species are generally of similar sizes, ages, and abundances. The understory of this association is generally quite sparse consisting of a few herbs and grasses. Such forests are known from a few other locations east of the Cascades in central Oregon.

The whitebark pine/lodgepole pine forest contains an important portion of the distribution of USFWS Category 2 candidate species blue-leaved penstemon (*Penstemon glaucinus*). This forb is a Forest Service sensitive species which is particularly prominent at higher elevations on flat ridgetops in the RNA, where it covers from 1-5% of the ground surface. Populations within the RNA have been identified as "rotected" populations under the Conservation Strategy developed by the Forest Service. The species grows on shallow, pumice-derived soils which are sandy in nature and generally of low fertility. The individual plants often grow at the base of overstory pines or shrubs but occasionally are found growing in the open. The plant has a matted growth form, often displaying many flower heads on a productive year. The species is a regional endemic of the southern East Cascades Mountains.

2 Lodgepole Pine/long-stolon sedge association

On the north slopes, in the drainage head in the southeast, and at lower elevations, lodgepole pine is clearly dominant with whitebark pine often dropping out of the forest altogether. The larger trees range from 35 to 63 feet (10.7-19.2 m) in height, 8.5-15.6 inches (21.6-39.6 cm) dbh and 72-158 years in age (Hopkins 1976), exhibiting a straight and erect growth form, as opposed to a krummholz form typical of whitebark communities in a timberline situation. Mistletoe are common in the lodgepole pines. Reproduction is evident for both conifer species, although the lodgepole pines are generally more abundant in the understory.

The understory is depauperate in this association, with essentially no shrub layer. Approximately 50-90% of the ground surface is covered by a dense layer of needle litter, and rocks cover 10-40%. Total herb cover is quite low, except for the small

Upland Forested Plant Associations

Estimated
Acres(Hectares)

Lodgepole pine-whitebark pine/gay penstemon
(Hopkins 1979)

and

Lodgepole pine/squirreltail long-stolon sedge
(Hopkins 1979)

855(346)

White fir-lodgepole pine/long-stolon sedge-needlegrass
(Hopkins 1979)

102(41)

White fir-ponderosa pine/snowberry/starwort
(Hopkins 1979)

and

White fir ponderosa pine/manzanita Oregon grape)
(Hopkins 1979)

605(245)

Mixed conifer/snowbrush (Volland 1976)

and

Ponderosa pine/wooly wyethia (Hopkins 1979)

505(204)

1110

Riparian Zone Associations (Kovalchik 1979)

Ponderosa pine/common snowberry -floodplain association

and

White fir/queencup beadleily

and

Willow/aquatic sedge association

110(44)

and

short-beaked sedge association

and

beaked sedge association

Non-forested Associations (these associations do not have
published classifications)

Mountain big sage

15(6)

Mountain-mahogany thickets

3(1)

Total 2195ac(888ha)

Maps

Augur Creek RNA is located on the following USGS 7 5 minute topographic quadrangle maps Lee Thomas Crossing and Coffeepot Creek, Oregon 1966 (Map 3) The Fremont National Forest Visitors Map, 1996 is useful for general information about ownership and access

Photos

The following aerial photos of the Augur Creek RNA site are available in the Forest Supervisor's and District Ranger's offices

July 18, 1988 USDA-F 12-616020C 2588-53 to 56
July 18, 1988 USDA-F 12 616020C 2588 68 to 71
July 18 1988 USDA-F 12-616020C 2588-90 to 92
July 18, 1988 USDA-F 12-616020C 2588-102 to 104
July 18, 1988 USDA F 12-616020C 2588-113 to 116
July 18, 1988 USDA-F 12-616020C 2588-164 to 168
July 18, 1988 USDA-F 12-616020C 2588-186 to 191

AREA BY TYPES

The flora of Augur Creek RNA is representative of the transition zone between the East Cascades and Basin and Range physiographic provinces with elements of both provinces present The vegetation of the Dead Horse Rim portion of the RNA was surveyed by Seyer (1979) and the entire RNA was surveyed by Titus (Titus, field notes 1995) during initial recommendation of the site for RNA status as well in preparation of drafting this document The following determination of habitat types and their distribution has been made from the survey information and from aerial photo interpretation

Augur Creek RNA falls into the ponderosa shrub forest of Kuchler (1966) and into four Society of American Forester forest types whitebark pine, lodgepole pine, white fir, and interior ponderosa pine (Eyre 1980) These very broad classifications are divided into the forested plant associations listed below Information regarding plant associations of the RNA is found in the plant association guide of Hopkins (1979) The Volland (1976) plant association guide to the Central Pumice Zone is also helpful Kovalchik (1987) describes the riparian zones of the RNA which are of very limited extent Fourteen plant associations have been identified in the RNA, twelve of which correlate to types described in Hopkins (1979), Volland (1976) and Kovalchik (1987) Due to extensive interdigitation of plant associations the following types were lumped into four types for mapping purposes (Map 4)

also a regional endemic but has been found growing further north than blue-leaved penstemon

LOCATION

The proposed Augur Creek Research Natural Area is located on the Fremont National Forest, Paisley Ranger District, at 42°33 N latitude, 120°46 W longitude. The tract is located primarily in section 12 and portions of sections 1, 11, 13 in T35S, R16E and primarily in sections 7, 18, 17, 20, and small portions of section 19, 21 in T35S, R17E. It is located 0.2 air miles (0.3 km) south of Dead Horse Lake, 6.2 air miles (10 km) northeast of Gearhart Mountain and 1.6 air miles (2.6 km) southwest of Paisley in Lake County.

Area

Total area for the Augur Creek Research Natural Area is approximately 2195 acres (888 ha).

Elevation

Augur Creek RNA is located at an elevation of 6100 feet (1860 m) at the southeast end to a high point of 8134 feet (2479 m) at the northwestern part of the RNA.

Access

Augur Creek RNA is most easily accessed from the town of Paisley (see Map 2). To access the Dead Horse Rim portion of the RNA from Paisley, proceed west and southwest on FS road #33 for 1.8 miles (2.9 km), to FS road #28 which is followed northwest for 8.5 miles (13.7 km) to the turn-off of FS road #28 033. This road is followed 4.2 miles (6.8 km) southwest to Dead Horse Lake. Approximately 0.1 mile before reaching Dead Horse Lake (northeast of the Lake) a trailhead is located. This trail ascends into the RNA.

To access the southeastern portion of the RNA from the junction of FS roads #33 and #28, head northwest on FS road #28 for 2.3 miles (3.7 km) to the junction with FS road #34. Head west on FS road #34 for 1 mile (1.6 km) to the junction with the first road heading north—this road is on private land. Stick to the main dirt road (passable by automobile) and after ~1.5 miles (~2.4 km) arrive at the north end of the wet meadow at the southeast corner of the RNA.

A third access is by means of the Dead Horse Rim Trail which commences on FS road #34 1.5 miles (2.4 km) west of the junction of FS road #34 with FS road #28. The unmarked trailhead is immediately west of the FS road #34 crossing of North Fork Augur Creek. The trail proceeds northwest and reaches the southwest corner of the RNA after ~0.8 miles (1.3 km). If this trail is followed for another 7.0 miles (11.3 km) it arrives at the far west end of the RNA on Dead Horse Rim. See the Recreation Values section for more information about the trails.

meadow openings at drainage heads. The most important species in the forest grass/herb layer is long stolon sedge, with up to 50% ground cover. Other common plants are Wheelers bluegrass, tailcup lupine, blue leaf penstemon (a sensitive species), sidebells wintergreen, and western needlegrass. The white fir lodgepole pine/long stolon sedge needlegrass forest that occurs in the transition from lodgepole pine to white fir forest is usually strongly dominated by lodgepole pine. Below the transition zone lodgepole pine drops out and white fir dominates.

3 Open ponderosa pine forests (ponderosa pine-white fir/snowberry, ponderosa pine-white fir/snowbrush association)

In the ponderosa pine forests which dominate much of the Augur Creek RNA, white fir is quite common and in some areas is quite dense dominating the lower and middle layers. However, single story open groves of large ponderosa pines tend to characterize these forests.

The understory and herbaceous species in white fir and ponderosa pine forests are very similar. Common shrubs are pinemat manzanita, greenleaf manzanita, creeping Oregon-grape, squawcurrant, snowbrush, and common snowberry. Herbaceous cover is depauperate in some areas but quite dense and diverse in others, particularly in the vicinity of seeps and springs. Long-stolon sedge is the dominant understory herb only at higher elevations. Woolly mules-ears, western hawkweed, and linanthastrum are common at lower elevations. *Pyrola* species are also common including achlorophyllous types. Grasses and grass-like plants are common in ponderosa pine forests with Idaho fescue and Ross' sedge being prominent.

4 Mountain big sage association

Mountain sagebrush is found in small inclusions in the upper elevation ponderosa pine and lodgepole pine forests where soils are shallow and rocky. Big sagebrush dominates the shrub layer with cover values often >50%. The understory species found growing with the sagebrush are generally infrequent or not found at all in the surrounding forest understory. Tailcup lupine, spreading phlox, linanthastrum, King's sandwort, and bottlebrush squirreltail are common herbaceous species. Cryptogams are infrequent, low moss (<1%) cover occurs only in localized areas.

The mountain big sage inclusions in the whitebark-pine/lodgepole pine forest contain an important portion of the distribution of USFWS Category 2 candidate species green-tinged paintbrush. The populations within the RNA are identified by the Fremont National Forest as populations to be protected under the Conservation Strategy developed by the Forest. This forb grows in forest openings dominated by mountain big sagebrush and other herbaceous species. The forest openings usually occur in the higher elevation whitebark pine-lodgepole pine association but can be found in lodgepole pine-white fir forests at times as well. The species grows singly or in clumps that consist of generally less than 5 flowering stems. It is thought that the species may parasitize nearby shrubs, a common occurrence in the *Castilleja* genus. The species is

PHYSICAL AND CLIMATIC CONDITIONS

Physical Conditions

Augur Creek RNA lies in the East Cascades physiographic province at the western edge of the Basin and Range physiographic province, a zone characterized by northwest-trending fault block mountains and basins with internal drainage. In this mountainous portion of the Fremont National Forest east of the Mazama originated pumice zone, basaltic eruptive centers are common. The nearby Gearhart Mountain, a dome shaped shield volcano, dominates the topography. The Dead Horse Rim area is a block-fault uplift close to Gearhart Mountain in height. Together, they constitute two of the highest forested areas in south-central Oregon.

The northwestern portion of the RNA consists of a steep north-facing slope, rising from 7400 feet (2255 m) at the shore of Dead Horse Lake to a broad, flat ridge top at 8000 feet (2438 m). The boundary of the RNA lies approximately half-way between the lake and the ridgetop. The ridge connects through a saddle to a major fault line, Dead Horse Rim, to the west. The highest points in the RNA are to the west (8134 feet (2479 m)) and east (8064 feet (2458 m)) of the saddle. The steep slope on the east side of the ridge descending to Campbell Lake is not included in the RNA. Steep slopes do occur at the headwall of Dead Horse Creek along the southwest slopes of the ridge and south and southeast slopes of Dead Horse Rim. Most of the slopes in the rest of the RNA are gentle and follow the southeastward flow of Augur and unnamed tributary creeks. These creeks are deeply incised in places. A ridge with a high point of 6900 feet (2103 m) separates the Augur Creek drainages from the large wet meadow at the southeast terminus of the RNA. At the creek heads, along the creeks, and in the wet meadow at the southeast end of the RNA, riparian zone vegetation occurs.

Climatic Conditions

Augur Creek RNA is located in a semiarid region in the rain shadow east of the Cascades. The majority of the annual precipitation falls as snow in winter. Summers are hot and dry, although intense local thunderstorms occur irregularly. Prevailing winds are from the west and southwest. Frosts can occur at any time in the year.

The closest recording National Oceanographic and Atmospheric Administration (NOAA) weather station with complete yearly records to the Augur Creek RNA is located at Summer Lake, Oregon, 29 miles (47 km) to the north of the RNA. Augur Creek is at a greater elevation than Summer Lake and therefore would experience a colder and moister climate.

The Crater Lake, Oregon recording NOAA weather station is located 75 miles (120 km) west of the RNA at an elevation similar to the RNA. Augur Creek RNA is further east than Crater Lake and therefore would experience a more continental climate with greater temperature extremes. The effect of a decrease in precipitation eastwards due to the rainshadow of the Cascades should not have a major effect due to the high elevation of the RNA, however, precipitation is somewhat greater at Crater Lake than at Augur Creek RNA. In any case, the great elevational gradient found at Augur Creek RNA (2000 feet (610 m)) would create dramatically different climatic conditions over the breadth of the RNA. The monthly climatic

data for Summer Lake averaged over the past 38 years (1958-1996) and for Crater Lake averaged over the past 63 years (1930-1993) are listed below

Climatic Records for Summer Lake, Oregon, Elevation 4193 feet (1336 m)
(National Oceanographic and Atmospheric Administration 1996)

Mean annual temperature 48.6°F(9.2°C)
 Mean annual precipitation 12.09 inches (30.71cm)
 Mean annual high temperature 95.0°F(35.0°C)
 Mean annual low temperature 1.0°F(-18.3°C)
 Mean days/year between killing frosts 89

Monthly Mean Temperature and Precipitation

| Month | Mean Temperature | | Mean Precipitation | |
|-----------|------------------|------|--------------------|------|
| | °F | °C | inches | cm |
| January | 34.8 | 1.6 | 1.39 | 3.53 |
| February | 41.1 | 5.1 | 1.04 | 2.64 |
| March | 44.5 | 6.9 | 1.05 | 2.67 |
| April | 51.7 | 10.9 | 0.79 | 2.01 |
| May | 61.9 | 16.6 | 1.04 | 2.64 |
| June | 66.5 | 19.2 | 1.00 | 2.54 |
| July | 68.2 | 20.1 | 0.48 | 1.22 |
| August | 70.4 | 21.3 | 0.54 | 1.37 |
| September | 61.1 | 16.2 | 0.57 | 1.45 |
| October | 53.3 | 11.8 | 0.91 | 2.31 |
| November | 38.0 | 3.3 | 1.49 | 3.78 |
| December | 30.2 | -1.0 | 1.77 | 4.50 |

Climatic Records for Crater Lake, Oregon Elevation 6475 feet (1974 m)
(National Oceanographic and Atmospheric Administration 1993)

Mean annual temperature 37.5°F(3.1°C)
 Mean annual precipitation 65.64 inches (166.73cm)
 Mean annual high temperature 82.0°F(27.8°C)
 Mean annual low temperature 3.0°F(-19.4°C)
 Mean days/year between killing frosts 6

Monthly Mean Temperature and Precipitation

| Month | Mean Temperature | | Mean Precipitation | |
|-----------|------------------|------|--------------------|-------|
| | F | C | inches | cm |
| January | 26.0 | 3.3 | 9.66 | 24.53 |
| February | 26.6 | -3.0 | 7.78 | 19.76 |
| March | 27.3 | -2.6 | 7.91 | 20.09 |
| April | 31.4 | -0.3 | 4.60 | 11.68 |
| May | 38.1 | 3.4 | 7.41 | 18.82 |
| June | 46.0 | 7.8 | 1.95 | 4.95 |
| July | 53.9 | 12.2 | 0.6 | 1.70 |
| August | 54.4 | 12.4 | 1.29 | 3.28 |
| September | 54.2 | 12.3 | 2.38 | 6.05 |
| October | 41.1 | 5.1 | 4.75 | 12.07 |
| November | 30.5 | 3.6 | 10.56 | 26.82 |
| December | 26.4 | 0.1 | 10.84 | 27.53 |

DESCRIPTION OF VALUES

Flora

The flora of Augur Creek RNA is representative of the transition zone between the East Cascades and Basin and Range physiographic provinces with elements of both provinces present. Augur Creek RNA has four plant groupings represented within its boundaries for the purpose of the discussion of the flora (Map 4). The fourteen plant associations listed on pages 6 and 7 have been lumped into four types due to broad overlaps in understory plant distribution and the extensive interdigitation of plant communities. These communities are arranged on edaphic gradients of soil depth and drainage across a broad elevational range.

The plant groupings are characterized as follows:

1 Lodgepole pine/whitebark pine, lodgepole pine, and white fir/lodgepole pine forests (includes lodgepole pine-whitebark pine/gay penstemon association (Hopkins 1979), lodgepole pine/squirreltail long-stolon sedge association (Hopkins 1979), and white fir-lodgepole pine/long stolon sedge needlegrass association (Hopkins 1979))

2 Ponderosa pine, white fir/ponderosa pine, white fir forests (includes white fir-ponderosa pine/snowberry/starwort association (Hopkins 1979), white fir-ponderosa pine/manzanita-Oregon grape association (Hopkins 1979), mixed conifer/snowbrush (Volland 1976), and ponderosa pine/wooly wyethia association (Hopkins 1979))

3 Mountain big sagebrush and mountain-mahogany (includes mountain big sagebrush (unpubl association) and mountain-mahogany shrublands (unpubl association))

4 Riparian zone vegetation (includes ponderosa pine/common snowberry-floodplain association, white fir/queencup beardless association, willow/aquatic sedge association, short-beaked sedge association, and beaked sedge association (Kovalchik 1987))

The Dead Horse Rim portion of Augur Creek RNA falls within the Kuchler ponderosa pine shrub forest zone, in the broad sense, east of the Pumice zone in which lodgepole pine forests are often persistent. Ecologically, however, the high elevation of the site causes it to correspond to the subalpine fir zone of eastern Washington and Oregon which is characteristic of areas above 4264-5576 feet (1300-1700 m) (Franklin and Dryness 1973). Whitebark pine, a constituent of this zone, is typically important in the more xeric portions of the state, as in the eastern and southern parts of the Cascades and Wallows. It is one of the most adaptive timberline tree species, capable of growing erect at higher elevations than either subalpine fir or mountain hemlock and is often persistent, dominating the highest elevational zones of coniferous trees in western America. The entire high elevation portion of the RNA, except for several shrub inclusions on shallow soil with southerly exposures, is vegetated by a forest dominated by lodgepole pine and whitebark pine covering a total of 850 acres (344 ha). This forest type is characteristic of upper slope ridgetop positions at elevations greater than 5000 feet (2134 m), on poorly developed sandy soils formed in place from mafic tuffs, breccias and basalt. A small patch of mountain-mahogany, ocean spray and snowberry occurs on a rocky ledge in the northeast corner of the area near the lower end of the slope above Dead Horse

Lake, comprising approximately 3 acres (1.2 ha). At the west end of the flat ridgetop, a slight knob with shallow rocky soils is unforested and dominated by a mountain big sage/herb association, with only occasional scattered trees. Three hundred feet (91 m) to the southeast of this knob is the largest unforested area, also vegetated by the mountain big sage/herb association. Total nonforested land comprises approximately 15 acres (6 ha).

The lodgepole pine-whitebark pine association forms a closed (though not dense) forest with lodgepole pine and whitebark pine as co-dominates. The two species are generally of similar sizes, ages, and abundances. Such forests are known from a few other locations east of the Cascades in central Oregon. On the north slopes, in the drainage head in the southeast, and at lower elevations, lodgepole pine is clearly dominant. The larger trees range from 35 to 63 feet (10.7-19.2 m) in height, 8.5-15.6 inches (21.6-39.6 cm) dbh and 72-158 years in age (Hopkins 1976), exhibiting a straight and erect growth form, as opposed to a krummholz form typical of whitebark communities in a timberline situation. Mistletoe (*Arceuthobium americanum*) are common in the lodgepole pines. Reproduction is evident for both conifer species, although the lodgepole pines are generally more abundant in the understory.

The understory is depauperate, with essentially no shrub layer. Approximately 50-90% of the ground surface is covered by a dense layer of needle litter, and rocks cover 10-40%. Total herb cover is quite low, except for the small meadow openings at drainage heads (discussed below). The most dominant vegetative ground cover is long-stolon sedge, with up to 50% ground cover. Other common herbs are Wheeler's bluegrass, tailcup lupine, blue-leaf penstemon (a sensitive species, particularly prominent on the flat ridgetop where it covers from 1-5% of the ground surface), sidebells wintergreen, and western needlegrass.

In the large unforested area at the west end of the ridge, soils are shallow and rocky. The species found here are generally infrequent or not found in the forest understory. Big sagebrush dominates the shrub layer with cover values often >50%. Tailcup lupine, spreading phlox, linanthastrum, King's sandwort, and bottlebrush squirreltail are common herbaceous species. Cryptogams are infrequent, low moss cover (<1%) occurs only in localized areas. Blue-leaved penstemon and green-tinged paintbrush are sensitive locally endemic species found in the shrub-dominated communities and in the whitebark pine lodgepole pine forest on the Dead Horse Rim. Both blue-leaved penstemon and green-tinged paintbrush have G3, S3 ranks with Oregon Natural Heritage Program and under federal status are species of special concern (Oregon Natural Heritage Program 1995).

The rock outcrops on the northeastern side of the ridge have a somewhat different group of species than the big sagebrush association. This area occupies approximately 3 acres (1.2 ha) on a rocky ledge to the west of the trail, on the east side of the RNA near the bottom of the slope above Dead Horse Lake. An association dominated by curl-leaf mountain-mahogany occupies part of the area. Important species consist of mountain big sagebrush, mountain snowberry, gland oceanspray, sulfur buckwheat, linanthastrum, long-stolon sedge, hot rock penstemon, wavy-leaved paintbrush and other species. Occasional ponderosa pine, lodgepole pine and whitebark pine are scattered among the dense shrubs. Gay penstemon (*Penstemon laetus*), an indicator species in the association classification of Hopkins (1979), was not observed in this area.

At elevations below the lodgepole and whitebark pine forests, white fir becomes dominant. The white fir lodgepole pine/long-stolon sedge-needlegrass forest that occurs in the transition from lodgepole pine to white fir forest is usually strongly dominated by lodgepole pine. Below the transition zone lodgepole pine drops out and white fir dominates. At lower elevations white fir is supplanted by ponderosa pine. In the ponderosa pine forests white fir is quite common and in some areas is quite dense with white fir often dominating the lower and middle layers. However, single story open groves with large ponderosa pines still occur.

The understory and herbaceous species in white fir and ponderosa pine forests are very similar. Common shrubs are pinemat manzanita, greenleaf manzanita, creeping Oregon grape, squawcurren, snowbrush, and common snowberry. Herbaceous cover is depauperate in some areas but quite dense and diverse in others, particularly in the vicinity of seeps and springs. Long-stolon sedge is the dominant understory herb only at higher elevations. Woolly mules-ears, western hawkweed, and linanthastrum are common at lower elevations. *Pyrola* species are also common including achlorophyllous types. The mixed conifer/snowbrush association is listed by Volland (1976) as occurring in the Central Oregon Pumice Zone and is not listed by Hopkins (1979) as occurring in the Fremont National Forest. Plant association guides are by no means complete and associations often cross boundaries from one zone to another. Therefore, it should not be surprising that this association occurs in Augur Creek RNA.

The moist and wet meadows are densely covered by a rich variety of graminoids and forbs. A number of characteristic meadow species such as long-stalked clover, pullup muhly, alpine timothy, many-ribbed sedge, short-beaked sedge, beaked sedge, Gray's licorice root, and Thurber bentgrass occur.

Few introduced species were observed. Exotic species when found were located in wet meadows and riparian zones where cattle grazing has occurred. Except for areas grazed by cattle, exotic species were clearly subordinate to native species. The exotic species are capable of invading wherever there is an open niche, which may result from small scale natural or human induced disturbance, or simply represent an unvegetated patch in an unfavorable site.

Mule deer and Rocky Mountain elk populations have undergone dramatic changes in recent years. Elk populations have increased in the last five years and deer have decreased over the last fifty years (Terry Hershey, Wildlife Biologist, Fremont National Forest, pers. comm. 1996). These population fluctuations may have caused changes in the plant communities of the RNA, particularly forest understory forbs. Likewise, beaver may modify riparian zones to a great extent.

In summary, there are several plant associations represented at the RNA and the actual number of taxa is quite high. The flora has not been systematically collected or studied other than those taxa encountered during a botanical inventory conducted during the course of the drafting of the Establishment Record and in the preparation of a previous draft establishment report for Dead Horse Rim (Seyer 1979). Observations by Titus in 1995 have resulted in the following list of plants. The plant associations listed below refer to those noted previously on page 5, however associations were lumped together due to the high degree of overlap and interdigitation which occurs in forests of similar overstory type.

Fauna

Faunal species have not been systematically studied or inventoried in Augur Creek RNA. Observations of animal species taken during surveys conducted at the site as well as surveys on nearby areas are included below. Terrestrial vertebrates most likely to be encountered in the RNA are listed in Appendix 3, based on the habitat types present and the known range of these species.

Peregrine falcons and bald eagles are known to inhabit the Fremont National Forest, and are listed as threatened species by the USFWS. The Augur Creek RNA does not provide habitats preferred by these species, and only incidental use should be expected.

Because the RNA contains later-successional forests, species associated with these habitats should be more common in the RNA than in some other areas of the forest. Many cavity nesting birds, for example, should find ideal habitat in the closed-canopy lodgepole pine forests and in the more open canopied, late successional ponderosa pine stands of the RNA.

Goshawks, a late-successional forest hawk, use the RNA. The closest known nest site is 1.5 miles (2.4 km) from the RNA, and the area has suitable habitat for nesting and feeding.

The RNA is in an area of important summer range for mule deer and Rocky Mountain elk. Elk populations have increased dramatically in the past five years and deer populations are apparently much lower than they were fifty years ago (Terry Hershey, pers. comm. 1996).

Aquatic

Aquatic habitats at Augur Creek RNA are represented in the riparian zones by creeks, springs and wet meadows. Many of the creeks and springs flow year round. The distinct riparian zones along the creeks contain a flora similar to that of the wet meadows. These aquatic habitats may provide breeding habitat for the Pacific treefrog and western toad as well as providing an important source of open water for a wide array of fauna.

The invertebrate resources of these aquatic habitats are unknown. Aquatic invertebrates provide the basis for many food chains.

Geology

Geology of Augur Creek RNA has not been described in detail and general texts of Oregon geology do little to describe the area (Baldwin 1964). Augur Creek RNA lies in the East Cascades physiographic province at the western edge of the Basin and Range physiographic province. The bedrock over most of the RNA is composed of basalt, tuff, and andesite. In this mountainous portion of the Fremont National Forest east of the Mazama-originated pumice zone, basaltic eruptive centers are common. The nearby Gearhart Mountain, a dome-shaped shield volcano, dominates the topography. The Dead Horse Rim area is a block-fault uplift close to Gearhart Mountain in height. The RNA slopes downhill to the southeast from Dead

Horse Rim along the valley of Augur Creek and ridges parallel to Augur Creek and tributaries
The creeks occupy some deep canyons in the RNA

The Basin and Range physiographic province to the east is characterized by northwest-trending fault block mountains and basins with internal drainage. It is also underlain with basalt flows that date back to the late Miocene period.

Soils

The residuum and colluvium of the bedrock has formed soils that are typical cryothents, ashy, shallow to moderately deep, and usually overlying buried residual soils. Soils are mostly poorly developed with no B horizon, and are poorly to moderately fertile. Drainage is generally good with permeability rapid to very rapid in the ashy soils, but moderate to slow in the residual soils.

The Fremont Forest Soil Resource Inventory (1979) shows ten soil mapping units present within the boundary of the RNA (Map 5). Mapping units are analogous to soil types with special reference being made to the landforms on which they are found as well as to the vegetation present on them. The soil mapping units are described in Appendix 4.

Lands

Augur Creek RNA is bordered on the south, west, southeast and north by lands which are managed by the National Forest. Lands to the north, south, east, and southeast of the RNA are classified as Management Area 5. These lands are managed with an emphasis on timber and range production. The MA 5 lands adjacent to the RNA have not been entered for timber harvest. On the eastern end of the RNA on the north and south boundaries the land is classified as old growth forest Management Area 14. These areas represent about 2 miles of the boundary of the RNA and are presently old-growth forest. Grazing occurs in these MA 14 areas. The western portion of the southern boundary of the RNA is bounded by Special Wildlife Area Management Area 3 lands. This area encompasses the Dead Horse Rim basin and Dead Horse Creek. This area is also old-growth forest. Approximately 1.25 miles of the eastern boundary is adjacent to private land. These private lands have been clear-cut and presently have a 15 foot (4.6 m) tall plantation. The lands to the north of the RNA, which contain campgrounds on Dead Horse and Campbell Lakes, are Management Unit 6A. Management Unit 6A emphasizes scenic viewsheds. Management Unit 6A lands are considered for timber management in the Fremont National Forest Final Environmental Impact Statement (1989) while maintaining scenic values. The Management Area 6A lands have not had any recent timber harvesting near Augur Creek RNA.

Cultural

A complete cultural resources inventory has not been conducted in the RNA. The known cultural resources of significance located within the Augur Creek RNA are the Dead Horse Rim and Cache Cabin Trails. The Dead Horse Rim Trail is a hiking and horse trail and the

Cache Cabin trail is appropriate for hiking use only. The southern portion of the Dead Horse Rim Trail was part of the historic Bly-Paisley wagon road which predates any other transportation links in the area. The Cache Cabin Trail was the original route up to the Campbell Rim fire lookout of which only the foundation exists today. The historic value of these trails was recognized by their inclusion in a Passport in Time project. As part of the Passport in Time project, three interpretive signs are proposed: one will address the historic significance of the Bly-Paisley wagon road, another will interpret the historic aspect of the Cache Cabin Trail, and the third will speak of the fire lookout site on the Cache Cabin Trail at the top of Campbell Rim. Three direction/distance signs will also be needed. At the time of this survey none of these signs had been installed. See Recreation Values section below for a discussion of the trail system in the RNA.

IMPACTS AND POSSIBLE CONFLICTS

Mineral Resources

There are no reported hardrock mining claims in Augur Creek RNA. Mineral resources are not usually found associated with lands such as those found within the RNA. The RNA will be proposed for withdrawal of mineral entry upon formal establishment.

Grazing

The wet meadow at the southeast edge of the RNA and meadows along Augur Creek and other creeks are presently used by cattle permitted to graze the area as part of the South Lakes pasture of the Bear Lakes allotment. The RNA is used primarily as a route to trail livestock from one end of the allotment to another, although the forage in small meadows and in the uplands is used to some degree by this stock. Utilization levels have generally been under 20% in the RNA.

Bank erosion has occurred that is due in part to livestock use along these creeks. In addition, evidence of grazing can be found in other parts of the RNA. Exotic species when found were located in the wet meadows where cattle grazing has occurred. Common exotic species were dandelion, Canada thistle, white clover and prostrate knotweed, along with cheat grass, smooth brome, and Kentucky bluegrass.

Livestock grazing is not needed to maintain the objectives for which the RNA is being established (to maintain the terrestrial or riparian plant communities within the RNA). An accepted casual or incidental level of livestock use that is consistent with RNA management needs to be established by the Forest Supervisor and Station Director.

Timber

There are merchantable timber resources located within the Augur Creek RNA Designation and establishment of the RNA will remove the site from potential timber harvest. The area is currently not roaded, and there are no plans to harvest timber in the area in the near future.

Watershed Values

There are important watershed values present at Augur Creek RNA. Establishment of the RNA will help protect the headwaters of Augur Creek and its tributaries. This in turn will help maintain high water quality for fisheries and other downstream users in Augur Creek. Augur Creek is a tributary to Dairy, Elder, and then South Creek, which then flows into the Chewaucan River. These drainages all support a redband trout (*Onchorhynchus mykiss*), populations of which are currently being considered for listing as threatened or endangered by the USFWS. Eastern brook trout also occur in these drainages, but are believed to be absent from Augur Creek in the RNA (Scott Peets, Fremont NF North Zone Fisheries Biologist, Paisley OR).

Recreation Values

Three trails access the Augur Creek RNA and provide a quality outdoor backcountry experience (Map 6). These are the Cache Cabin, Dead Horse Rim (#139) and Lakes (#140) Trails. These trails offer various travel loop possibilities which increase their attractiveness to the outdoor recreationist. Portions of the Cache Cabin Trail and Dead Horse Rim Trail are historic in origin and are part of the Passport in Time project (see Cultural section above).

1 The Dead Horse Rim Trail begins at an unmarked trailhead on Forest Service Road #34 just west of North Fork Augur Creek on private land. It comes within about 200 yards (183m) of the southeastern boundary of the RNA and then heads southwest away from the RNA to meet Dead Horse Rim. The trail then briefly runs along the western boundary of the RNA to a junction with the Lakes Trail, and then leads away from the RNA to a trailhead at Lee Thomas Meadow on Forest Service Road #34 11. This trail receives light hiker and horse use and is designed and managed for horse use.

2 The Cache Cabin Trail begins where the Dead Horse Rim Trail crosses Augur Creek at the southeastern corner of the RNA and enters the RNA along Augur Creek. The trail then heads through the RNA north along a small tributary of Augur Creek and subsequently climbs a ridge between Augur Creek and the tributary. The trail steeply ascends the ridge to reach Campbell Rim. The trail junctions with the Lakes Trail on top of the Rim near the site of an old fire lookout. This trail receives light hiker use and is too steep for horses. Trail management is light and consists of removing downed timber and maintaining blazes. No tread development work is planned.

3 The Lakes Trail is accessible from both Dead Horse and Campbell Lakes and via a mid-entry trail between the two lakes. All three access routes ascend to Campbell Rim where the trail proceeds along the ridge top in the RNA. Trail management includes some tread work on the ascent but management is light on the summit ridge where the trail is a blazed cleared route through the woods. This trail through the high elevation portion of the RNA receives moderate use.

Overall it appears that casual recreational use has not seriously impacted the RNA to date. Recreational use could increase the trampling of rare plant species, increase fire danger, and introduce exotic plant species into the area in the future. The level of use by hunters, mushroom gatherers and other recreationists is unknown.

Wildlife and Plant Values

Past and present population fluctuations in deer and elk may be causing changes in the plant communities of the RNA (Terry Hershey, pers comm). Two sensitive plant species are located within the RNA. Establishment of the RNA may help maintain populations of these species. No listed animal taxa have been detected within the RNA. The rare plants are as follows (Oregon Natural Heritage Program 1995).

| <u>Species</u> | <u>Federal Status</u> | <u>TNC Rank</u> |
|-------------------------|-----------------------|-----------------|
| blue-leaved penstemon | Sensitive | G3,S3 |
| green-tinged paintbrush | Sensitive | G3,S3 |

TNC ranking of G3,S3 refers to global and state rankings, respectively. These species are rare, uncommon, or threatened, but not immediately imperiled, with 21-100 occurrences (populations) throughout the range of the species.

Special Management Area Values

There are no congressionally designated or special management areas present within the RNA.

Transportation Plans

There are roads adjacent to the RNA on the private land and one dirt track continues into the RNA a short distance. The RNA does not block any transportation plans for logging operations on adjacent lands.

MANAGEMENT PRESCRIPTION

Management and protection of Augur Creek RNA will be directed towards maintaining natural ecological processes. Activities of humans that disturb or modify ecological processes will be discouraged.

Augur Creek RNA is included, along with other RNAs, in the Fremont National Forest Plan in Management Area 8, Research Natural Areas (Fremont National Forest Land and Resource Management Plan 1989). Standards and guidelines for management are noted in the Forest Plan for the Management Area.

Vegetation Management

Standards and guidelines for RNAs, Management Area 8, address vegetation management under several different headings (Fremont National Forest Land and Resource Management Plan 1989) The overall management direction for all RNAs is to preserve the naturally occurring physical and biological processes at the site

Wildfire will be actively suppressed Fire suppression will use methods and equipment that will minimize disturbance to the special features of the area (Fremont National Forest Land and Resource Management Plan 1989) Prescribed burning will be used only as specified in approved research projects or when needed to meet RNA management goals The management goal of preserving the ponderosa pine forests on the site will require regular prescribed burns However, a portion of each of the four Natural Area Cells should be left unburned to serve as a baseline of undisturbed types

Thinning of the white fir may be required as part of a burning regime in order to maintain overstory of ponderosa pine forests, without this treatment, a fuel ladder may carry fire into the crowns of the mature pines

Grazing is not needed to maintain the objectives for which the RNA is being established Currently, most livestock use of this area occurs as stock are trailed from one portion of the surrounding allotment to another Utilization is light, and impacts are consistent with the purposes of the RNA Therefore, this type and intensity of use will be accepted as appropriate for this RNA

An Allotment Management Plan for the Bear Lakes Allotment is currently under preparation by the Fremont National Forest This AMP will classify the RNA as unsuitable for grazing, and forage produced in the RNA will not be included in calculation of the total available forage for livestock The RNA will be used by livestock only as they are moved through the allotment, and the permittee will be responsible for maintaining the light level of use and discouraging use by livestock after they are moved through the RNA

A casual and incidental level of use by livestock is here defined as up to 20% utilization of grasses This level of use should not degrade healthy ponderosa pine forests and the forest herbaceous understory, diminish the capacity of the system to support cool ground fires, encourage riparian zone erosion, or increase the invasion of exotic species Contingent on funding, monitoring will continue as part of permit administration to verify the appropriateness of the 20% maximum utilization level

Introduced species and weedy native species are a concern in the RNA Dandelion, Canada thistle, white clover and prostrate knotweed are the most common exotic species and mostly occur in grazed areas Canada thistle is an "A" species on the state of Oregon noxious weed list, and should be managed when found Monitoring in the form of biennial surveys of the RNA should be conducted to detect extent and spread of exotic species, contingent on available funding

ADMINISTRATION RECORDS AND PROTECTION

Administration and protection of Augur Creek RNA will be the responsibility of the Fremont National Forest. The District Ranger, Paisley Ranger District, has direct responsibility.

The Director of the Pacific Northwest Research Station will be responsible for any studies or research conducted in the area, and requests to conduct research in the RNA should be referred to that office. The Director will evaluate research proposals and coordinate all studies and research in the area with the District Ranger. All plant and animal specimens collected in the course of research conducted in the area will be properly preserved and maintained within university or federal agency herbaria and museums, approved by the Pacific Northwest Research Station.

Records for the Augur Creek RNA will be maintained in the following offices:

Forest Supervisor, Fremont National Forest, Lakeview, Oregon
District Ranger, Paisley Ranger District, Paisley, Oregon
Director, Pacific Northwest Research Station, Portland, Oregon
Forest Sciences Laboratory, Oregon State University, Corvallis, Oregon

Archiving

The Pacific Northwest Research Station will be responsible for maintaining the Augur Creek RNA research data file and list of herbarium and species samples collected. The Forest Sciences Lab in Corvallis, Oregon is establishing a data base for maintaining research data and lists of species for all RNAs in the region. Computerized files for the RNA will be maintained at the Forest Sciences Lab.

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APPENDIX 1

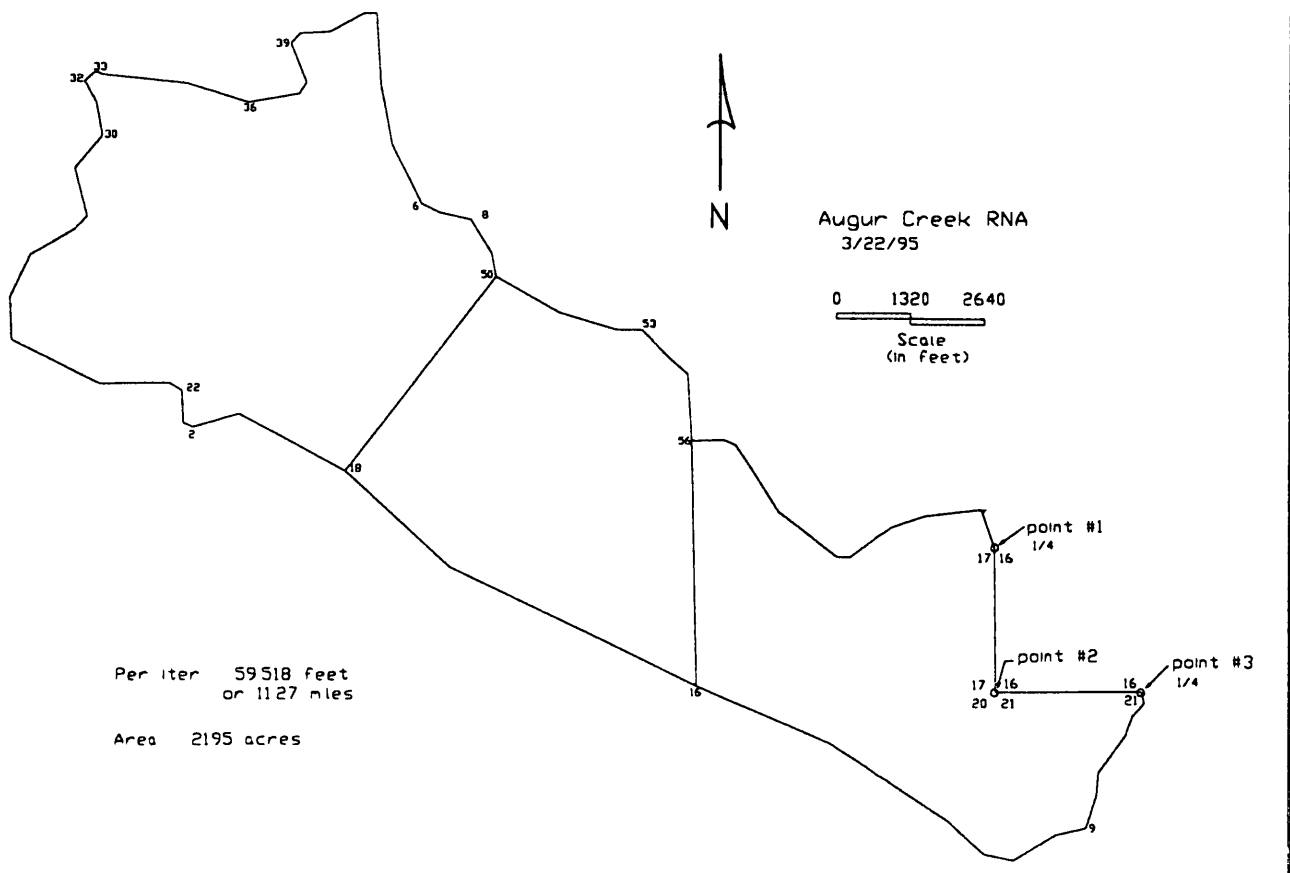
AUGUR CREEK
RESEARCH NATURAL AREA

The Augur Creek Research Natural Area located in Sections 7 8, 17 18 20 and 21, T 35 S , R 16 E and Sections 1, 2 11 12 and 13, T 35 S R 17 E , Willamette Meridian Lake County Oregon More particularly described as follows, Beginning at the 1/4 section corner for sections 16 and 17 T 35 S R 17 E , W M and True Point of Beginning, thence (1) S 00°33' E 2497 9 feet and adjoining the Weyerhaeuser Company property to the section corner of sections 16 17, 20 and 21 thence (2) N 89°57' E 2577 5 feet and adjoining the Weyerhaeuser Company property to the 1/4 section corner of sections 16 and 21 thence (3) S 13°02' E 205 3 feet to a point thence (4) S 40° 42' W 315 6 feet to a point, thence (5) S 19°59' W 356 5 feet to a point thence (6) S 36°23' W , 816 9 feet to a point, thence (7) S 03°38' W , 374 0 feet to a point thence (8) S 17°16' W , 624 0 feet to a point thence (9) S 77°10' W 544 3 feet to a point, thence (10) S 60°04' W 448 9 feet to a point, thence (11) S 59°10' W 437 2 feet to a point, thence (12) N 77°36' W , 527 3 feet to a point thence (13) N 47°27' W 882 1 feet to a point thence (14) N 57°35' W 2511 3 feet to a point thence (15) N 67°06' W 2566 4 feet to a point thence (16) N 64°28' W 4758 0 feet to a point thence (17) N 48°00' W 2505 9 feet to a point thence (18) N 61°07' W 2114 3 feet to a point thence (19) S 73°23' W 841 8 feet to a point thence (20) N 67°07' W 187 2 feet to a point, thence (21) N 01°49' W 584 4 feet to a point thence (22) N 59°17' W 263 2 feet to a point thence (23) S 89°35' W 1256 2 feet to a point thence (24) N 62°31' W 1683 7 feet to a point thence (25) N 01°47' W 764 4 feet to a point thence (26) N 24°27' E 828 3 feet to a point thence (27) N 59°15' E 889 6 feet to a point thence (28) N 41°56' E 307 8 feet to a point thence (29) N 13°28' W 871 1 feet to a point, thence (30) N 38°28' E 744 9 feet to a point thence (31) N 10°07' W 607 9 feet to a point thence (32) N 26°40' W 423 6 feet to a point thence (33) N 46°03' E 256 9 feet to a point thence (34) S 59°21' E 121 7 feet to a point thence (35) S 83°51' E 1521 4 feet to a point thence (36) S 72°08' E 921 2 feet to a point, thence (37) S 72°11' E 216 9 feet to a point thence (38) N 79°32' E , 892 1 feet to a point thence (39) N 33°18' E 238 2 feet to a point thence (40) N 21°32' W 750 8 feet to a point thence (41) N 41°23' E 233 4 feet to a point thence (42) N 86°49' E , 527 3 feet to a point thence (43) N 60°44' E 676 6 feet to a point thence (44) S 89°30' E 224 0 feet to a point, thence (45) S 03°35' E 1283 1 feet to a point, thence (46) S 10°50' E 1087 2 feet to a point thence (47) S 26°39' E , 1167 5 feet to a point, thence (48) S 3°38' E 365 9 feet to a point thence (49) S 77°22' E 565 9 feet to a point, thence (50) S 31°39' E 701 7 feet to a point thence (51) S 10°37' E 422 1 feet to a point thence (52) S 60°00' E 1275 4 feet to a point thence (53) S 72°27' E 1019 0 feet to a point thence (54) S 89°55' E 451 5 feet to a point, thence (55) S 42°58' E 631 5 feet to a point thence (56) S 48°05' E 497 9 feet to a point thence (57) S 03°26' E 1184 1 feet to a point, thence (58) N 88°49' E 577 3 feet to a point thence (59) S 66°44' E 228 2 feet to a point

thence (60) S $33^{\circ}06'$ E 1385 9 feet to a point thence (61) S $53^{\circ}23'$ E
1290 1 feet to a point thence (62) S $87^{\circ}45'$ E 224 1 feet to a point thence
(63) N $55^{\circ}12'$ E , 898 6 feet to a point, thence (64) N $71^{\circ}48'$ E 655 9 feet
to a
point thence (65) N $83^{\circ}32'$ E , 1002 1 feet to a point thence (66) S $19^{\circ}46'$
E 705 2 feet to the Point of Beginning The following description contains
2195 acres more or less

Peter A Olson

Peter A Olson
Forest Land Surveyor
24 March 1995



textured Buried soils are stony, moderately thick, and moderately fine to moderately coarse textured Bedrock is interbedded soft, reddish brown tuff or hard, gray basalt or andesite They are massive to highly fractured and competent Depth to bedrock ranges from 40-75 inches (102-191 cm) This landtype occurs on steep slopes associated with shield volcanoes, block faults, and basaltic eruptive centers Slopes are greater than 40% Elevations range from 5800-7800 feet (1768-2377 m) and supports lodgepole pine, long-stolon sedge, lupines, Ross s sedge, pinemat manzanita, bottlebrush squirreltail, and western needlegrass The soil is well drained Permeability is rapid or very rapid in the ashy soils and moderate to slow in the buried soils Litter Needles, leaves, twigs, and decomposing organic matter, 0-1 inches (0-2.5 cm) thick Surface layers Very dark grayish brown, brown, or yellowish brown ashy loamy sand to coarse sand, single grain, 10-40% coarse fragments by volume, loose, nonplastic, pH ranges from 5.8-7.0, 3-8 inches (7.6-20 cm) thick Subsoil layers Yellowish brown, brownish yellow, or very pale brown ashy loamy sand to coarse sand, single grain or very weak, medium granular structure, 20-60% coarse fragments by volume, loose, nonplastic, pH ranges from 6.0 to 7.0, 13-30 inches (33-76 cm) thick Buried soil Dark brown, brown, or dark reddish brown stony loam, clay loam or sandy loam, moderate, fine subangular blocky structure, 30-75% angular and subround coarse fragments by volume, friable, slightly plastic to plastic, pH ranges from 6.0-7.0, 20-36 inches (51-91 cm) thick

Mapping Unit 98 Has shallow to deep pumiceous soils overlying buried residual soils located on high elevation upland flats The unit is characterized by having little ground cover vegetation, exposed mineral soil, and stunted lodgepole pine Surface soils are very thin or thin and coarse textured, Subsoils are gravelly, thin to thick and coarse textured Buried soils are gravelly or cobbly, moderately coarse to moderately fine textured, and moderately thick Bedrock is mostly interbedded hard, gray basalt or andesite and soft, reddish brown tuff Rhyolite and breccias also underlie some areas Depth to bedrock ranges from 30->80 inches (76->203 cm) This landtype occurs on high elevation upland flats, plateaus, and tablelands on slopes up to 25% Elevations range from 5900-7800 feet (1798-2377 m) and supports lodgepole pine with generally very little ground cover vegetation of any type Some areas contain scattered pinemat manzanita, and lupines The soil is well drained Permeability is rapid or very rapid in the pumiceous soils and moderate to slow in the buried soil Litter Needles, leaves, twigs, and decomposing organic matter, 0-1 inches (0-2.5 cm) thick Surface layers Very dark grayish brown, dark brown, dark yellowish brown pumiceous loamy sand or gravelly loamy sand, very weak, medium granular or subangular blocky structure, 0-40% pumice gravel by volume, loose, nonplastic, pH ranges from 6.5-7.5, 8-24 inches (20-61 cm) thick Subsoil layers Yellowish brown, brownish yellow, or very pale brownish loamy sand to coarse sand, single grain or very weak, medium granular structure, 20-60% coarse fragments by volume, loose, nonplastic, pH ranges from 6.0 to 7.0, 13-30 inches (33-76 cm) thick Also, light gray, yellow, pale yellow and black pumiceous coarse sand, single grain, 0-30% pumice gravel by volume, loose, nonplastic, pH ranges from 6.5-7.5, 15-25 inches (38-64 cm) thick Buried soil Dark brown or brown gravelly or cobbly sandy loam, loam, or clay loam, weak, fine subangular blocky structure, 20-60% coarse fragments by volume, friable, slightly plastic to plastic, pH ranges from 6.0-7.0, 15-30 inches (38-76 cm) thick

Mapping Unit 89A Has shallow to moderately deep ashy soils overlying buried residual soils at high elevations with lodgepole pine timber types Surface soil layers are very thin to thin and coarse textured Subsoil layers are thin to moderately thick and coarse textured Buried soils are moderately thick, stony and medium or moderately fine textured Bedrock is interbedded soft, reddish brown tuff or hard, gray basalt or andesite They range from highly fractured to massive Depth to bedrock ranges from 40-75 inches (102-191 cm) This landtype high elevation gently rolling tablelands, plateaus, or wide basins associated with eruptive centers Slopes range from 0-15% Slopes range from 0-15% Elevations range from 5800-7800 feet (1768-2377 m) and supports lodgepole pine, long-stolon sedge, lupines, Ross s sedge, pinemat manzanita, bottlebrush squirreltail, and western needlegrass The soil is well drained Permeability is rapid or very rapid in the ashy soils and moderate to slow in the buried soils Litter Needles, leaves, twigs, and decomposing organic matter, 0-1 inches (0-2.5 cm) thick Surface layers Very dark grayish brown, dark brown, dark yellowish brown, or dark reddish brown, ashy loam sand, very weak, medium granular structure, 0-10% coarse fragments by volume, loose, nonplastic, pH ranges from 5.8-7.0, 4-10 inches (10-25) cm thick Subsoil layers Brownish yellow, very pale brown, dark yellowish brown, or brown ashy loam sand to coarse sand, single grain or very weak medium granular structure, 10-50% coarse fragments by volume, loose, nonplastic, pH ranges from 6.0 to 7.6, 8-32 inches (20-81 cm) thick Buried soil Brown, dark reddish brown, or dark yellowish brown stony loam, clay loam, or silty loam, moderate, fine subangular blocky structure, 30-70% angular and subround coarse fragments by volume, friable, slightly plastic to plastic, pH ranges from 6.0-7.0, 18-36 inches (46-91 cm) thick

Mapping Unit 89B Has shallow to moderately deep ashy soils overlying buried residual and colluvial soils with lodgepole pine timber types at high elevations Surface soil layers are very thin to thin and coarse textured Subsoil layers are thin to moderately thick and coarse textured Buried soils are stony moderately thick, and moderately fine to moderately coarse textured Bedrock consists of hard, gray basalt or andesite or interbedded soft, reddish brown tuff These rocks are massive to highly fractured and competent Depth to bedrock ranges from 40-75 inches (102-191 cm) This landtype occurs on moderately steep slopes associated with basaltic eruptive centers, block faults, and shield volcanoes Slopes range from 16-40% Elevations range from 5800-7800 feet (1768-2377 m) and supports lodgepole pine, long stolon sedge, lupines, Ross s sedge, pinemat manzanita, bottlebrush squirreltail, and western needlegrass The soil is well drained Permeability is rapid or very rapid in the ashy soils and moderate to slow in the buried soils Litter Needles, leaves, twigs, and decomposing organic matter, 0-1 inches (0-2.5 cm) thick Surface layers Very dark grayish brown, brown yellowish brown ashy loamy sand to coarse sand, single grain, 10-40% coarse fragments by volume, loose, nonplastic, pH ranges from 5.8-7.0, 3-8 inches (7.6-20) cm thick Subsoil layers Yellowish brown, brownish yellow, or very pale brownashy loamy sand to coarse sand, single grain or very weak, medium granular structure, 20-60% coarse fragments by volume, loose, nonplastic, pH ranges from 6.0 to 7.0, 13-30 inches (33-76 cm) thick Buried soil Dark brown, brown, or dark reddish brown stony loam, clay loam or sandy loam, moderate, fine subangular blocky structure, 30-75% angular and subround coarse fragments by volume, friable, slightly plastic to plastic, pH ranges from 6.0-7.0, 20-36 inches (51-91 cm) thick

Mapping Unit 89C Has shallow to moderately deep ashy soils overlying buried residual and colluvial soils with lodgepole pine timber types at high elevations Surface soil layers are very thin to thin and coarse textured Subsoil layers are thin to moderately thick and coarse

weak fine subangular blocky structure, 5-35% coarse fragments by volume, soft, friable pH ranges from 6.0 to 7.2, 3-8 inches (8-20 cm) thick Subsoil layers Dark reddish brown or dark brown gravelly, cobbly, or stony clay loam or occasionally loam, moderate fine or medium subangular blocky structure, 20-80% coarse fragments by volume, hard, plastic, pH ranges from 5.8 to 7.5, 3-18 inches (8-46 cm) thick

Mapping Unit 88A Has shallow to moderately deep ashy soils over reddish brown residual soils with mixed timber types Surface and subsurface soil layers are thin and coarsely textured Buried soil layers are stony, thin to moderately thick, and medium or moderately fine textured Bedrock is soft to hard, interbedded tuff, basalt, and andesite They are massive to highly fractured and competent Depth to bedrock ranges from 28-60 inches (71-152 cm) This landtype occurs on gently rolling plateaus and tablelands on cool, moist sites Slopes range from 0-15% Elevations range from 5400-7400 feet (1646-2256 m) and supports mixed conifers, lupines, mountain big sage, Ross's sedge, gooseberries and currants, bottlebrush squirreltail, long-stolon sedge, pinemat manzanita and snowbrush The soil is well drained Permeability is rapid or very rapid in the ashy soils and moderate or slow in the buried soils Litter Needles, leaves, twigs, and decomposing organic matter, 0.5-3 inches (1.3-7.6 cm) thick Surface layers Very dark grayish brown to dark yellowish brown ashy loamy sand, single grain or very weak, medium granular structure, 0-20% pumice gravel by volume, loose nonplastic, pH ranges from 6.0 to 7.0, 8-16 inches (20-41 cm) thick Subsoil layers Brown or yellowish brown ashy loamy sand or sand, single grain, 10-40% pumice gravel by volume, loose nonplastic, pH ranges from 6.2 to 7.2, 6-12 inches (15-30 cm) thick Buried soil Dark reddish brown, strong brown, or dark brown stony clay loam, silty clay loam, or loam, moderate, fine subangular blocky structure, 20-70% subround coarse fragments by volume, friable, plastic, pH ranges from 6.0-7.0, 14-30 inches (36-76 cm) thick

Mapping Unit 88B Has shallow to moderately deep ashy soils overlying buried residual and colluvial soils with mixed timber types Surface soils are very thin to thin and coarsely textured, and subsoils are thin and coarse textured Buried soil layers are stony, moderately thick, and medium or moderately fine textured Bedrock is hard, gray basalt or andesite or soft, reddish brown interbedded tuff They are competent and range highly fractured to massive Depth to bedrock ranges from 35-65 inches (89-165 cm) This landtype occurs on moderately steep slopes associated with basaltic eruptive centers, block faults, and shield volcanoes on slopes from 16-40% Slopes range from 0-15% Elevations range from 5500-7400 feet (1676-2256 m) and supports mixed conifers, lupines, gooseberries and currants, Ross's sedge, woods strawberry, bottlebrush squirreltail, long-stolon sedge, pinemat manzanita and snowbrush The soil is well drained Permeability is rapid or very rapid in the ashy soils and moderate to slow in the buried soils Litter Needles, leaves, twigs, and decomposing organic matter, 0.5-3 inches (1.3-7.6 cm) thick Surface layers Very dark grayish brown or dark brown ashy loamy sand, very weak, medium granular structure, 0-20% pumice gravel by volume, loose, nonplastic, pH ranges from 6.0-7.0, 3-10 inches (7.6-25.4 cm) thick Subsoil layers Yellowish brown or brown ashy loamy sand or sand, single grain, 10-40% pumice gravel by volume, loose, nonplastic, pH ranges from 6.0 to 7.0, 10-18 inches (25-46 cm) thick Buried soil Dark brown, brown, or reddish brown stony loam or clay loam, moderate, fine subangular blocky structure, 20-70% subround coarse fragments by volume, friable, slightly plastic to plastic, pH ranges from 6.0-7.0, 18-36 inches (46-91 cm) thick

APPENDIX 4

Soil Mapping Units

Mapping Unit 6 Rugged rocky landforms at higher elevations This mapping unit consists of steep, rocky, and stony patches slopes and ridges at higher elevations with stringers and patches of white fir, lodgepole pine, and whitebark pine Trees are generally sparse and pinemat manzanita and snowbrush may be present Soils are shallow, stony, and loamy Bedrock outcrops are common and consist of basalt, andesite, rhyolite and breccia Talus areas and outcrops dominate the unit Vegetation includes mountain big sagebrush, gland ocean spray, pinemat manzanita, snowbrush, and curl-leaf mountain mahogany Slopes range up to 80% and elevations range from 6400 8400 feet

Mapping Unit 7 Alluvial-colluvial stringers This mapping unit consists of narrow stringers of alluvial-colluvial soils occurring adjacent to stream channels Soils are generally deep but they have a wide range of textures, drainage, gravel and stone content, and vegetation

Mapping Unit 16 Very deep to extremely deep soils derived from alluvial and colluvial deposits on upland basins Surface soils are thin and medium to moderately fine textured Subsoils are thick to very thick and moderately fine textured Lower part of subsoil is mottled, gleyed, and may have a hardpan and sand or gravel lenses locally Bedrock is interbedded soft, reddish brown or brown tuff and hard, gray basalt or andesite Depth to consolidated bedrock ranges from 60 inches (152 cm) to over 144 inches (366 cm) Typically, landtype 16 occurs on broad, gently sloping upland basins Slopes are less than 5% Elevation ranges from 5500 to 7500 feet and supports semi-moist or moist meadow vegetation consisting of sedges, meadow foxtail, Kentucky bluegrass, rushes, slender hairgrass, and mountain big sage Litter Leaves and stems, 0 to 0 25 inches (0 6 cm) thick Surface layers Very dark to dark grayish brown silt loam or clay loam, weak to moderate, medium, granular structure, soft to hard, slightly plastic, pH ranges from 5 6 to 6 6, 5 inches (13 cm) to 10 inches (25 cm) thick Subsoil layers Very dark gray to black clay loam or silty clay loam strong, fine to medium subangular blocky structure lower subsoil is strongly mottled, gleyed, and has massive structure, very hard plastic to very plastic, pH ranges from 6 0 to 7 0, over 40 inches (102 cm) thick, intermittent hardpan is hard and strongly cemented

Mapping Unit 37A Has moderately deep to deep, stony and residual reddish brown soils with mixed timber types Surface soil layers are very thin or thin and medium or moderately coarsely textured Subsoils are moderately thick to thick and moderately fine or medium textured Large basalt boulders commonly occupy a large part of the soils surface Bedrock is interbedded hard, gray basalt or soft, reddish brown tuff The tuff rock is soft and massive The basalt layers are hard and highly fractured Depth to bedrock ranges from 25-48 inches (64-122 cm) This landtype occurs on gently rolling plateaus and tablelands at medium to high elevations Slopes range from 0 to 15 percent Elevations range from 5500-7500 feet (1676-2286 m) and supports mixed conifers, snowbrush, pinemat manzanita, squaw carpet, Saskatoon, woolly mules-ears, Ross's sedge, gooseberries and currants, spreading phlox, bottlebrush squirreltail, creeping Oregon-grape, lupines, and mountain big sage The soil is well drained Permeability is moderate to rapid in the surface soils and moderate to slow in the subsoils Litter Needles, leaves, twigs, and decomposing organic matter, 0 5 to 3 inches thick Surface layers Dark brown to black loam or sandy loam, weak, medium granular and

Geomyidae

Thomomys mazama
Thomomys talpoides

Mazama pocket gopher
northern pocket gopher

Heteromyidae

Perognathus parvus

Great Basin pocket mouse

Muridae

Peromyscus maniculatus
Neotoma cinerea
Onychomys leucogaster
Reithrodontomys megalotis

deer mouse
bushy tailed woodrat
northern grasshopper mouse
western harvest mouse

Dipodidae

Zapus princeps

western jumping mouse

Erethizontidae

Erethizon dorsatum

porcupine

Canidae

Canis latrans

coyote

Ursidae

Ursus americanus

black bear

Mustelidae

Martes americana
Mustela frenata
Mustela erminea
Spilogale gracilis
Mephitis mephitis
Taxidea taxus

marten
long tailed weasel
ermine
western spotted skunk
striped skunk
badger

Felidae

Felis rufus
Felix concolor

bobcat
mountain lion or cougar

Cervidae

Odocoileus hemionus
Cervus canadensis

mule deer
Rocky Mountain elk

Castoridae

Castor canadensis

beaver

("E" = exotic non-native species, "*" = taxa listed by the Oregon Natural Heritage Program (Oregon Natural Heritage Program 1995))

Passerella iliaca
Melospiza lincolni

fox sparrow
Lincoln s sparrow

Fringillidae

Carpodacus cassinii
Loxia curvirostra
Carduelis pinus
Coccothraustes vespertinus

Cassin's finch
red crossbill
pine siskin
evening grosbeak

Soricidae

Sorex vagrans

vagrant shrew

Talpidae

Scapanus orarius

Pacific mole

Verperilionidae (these taxa require extensive surveys to ascertain presence or absence)

*Antrozous pallidus**
Eptesicus fuscus
*Lasionycteris noctivagrans**
Lasiurus cinereus
Myotis californicus
*Myotis evotis**
Myotis lucifugus
*Myotis volans**
*Myotis yumanensis**
Corynorhinus townsendi
*pallescens**
Corynorhinus townsendi
*townsendi**

pallid bat
big brown bat
silver-haired bat
hoary bat
California myotis
long-eared myotis
little brown myotis
long-legged myotis
Yuma myotis

pale western big-eared bat or Townsend's big eared

Pacific big eared bat or Townsend s big-eared bat

Ochotonidae

Ochotona princeps

pika

Leporidae

Sylvilagus nuttalli
Lepus americanus
Lepus californicus

mountain cottontail
snowshoe hare
blacktail jackrabbit

Sciuridae

Glaucomys sabrinus
Spermophilus beldingi
Spermophilus lateralis
Spermophilus townsendi
Tamias amoenus
Tamias minimus
Tamiasciurus douglasii

northern flying squirrel
Belding ground squirrel
golden-mantled ground squirrel
Townsend s ground squirrel
yellow-pine chipmunk
least chipmunk
chickaree or Douglas' squirrel

Muscicapidae

| | |
|----------------------------|----------------------|
| <i>Sialia currucoides</i> | mountain bluebird |
| <i>Catharus ustulatus</i> | Swainson's thrush |
| <i>Catharus guttatus</i> | hermit thrush |
| <i>Myadestes townsendi</i> | Townsend's solitaire |
| <i>Turdus migratorius</i> | American robin |
| <i>Ixoreus naevius</i> | varied thrush |

Lanidae

| | |
|----------------------------|-------------------|
| <i>Lanius ludovicianus</i> | loggerhead shrike |
| <i>Lanius excubitor</i> | northern shrike |

Mimidae

| | |
|-----------------------------|---------------|
| <i>Oreoscoptes montanus</i> | sage thrasher |
|-----------------------------|---------------|

Bombycillidae

| | |
|----------------------------|---------------|
| <i>Bombycilla cedrorum</i> | cedar waxwing |
|----------------------------|---------------|

Sturnidae

| | |
|-----------------------------|-------------------|
| <i>Sturnus vulgaris</i> (E) | European starling |
|-----------------------------|-------------------|

Vireonidae

| | |
|-------------------------|----------------|
| <i>Vireo solitarius</i> | solitary vireo |
| <i>Vireo gilvus</i> | warbling vireo |

Emberizidae

| | |
|----------------------------------|------------------------|
| <i>Vermivora celata</i> | orange-crowned warbler |
| <i>Dendroica coronata</i> | yellow-rumped warbler |
| <i>Oporornis agilis</i> | MacGillivray's warbler |
| <i>Wilsonia pusilla</i> | Wilson's warbler |
| <i>Piranga ludoviciana</i> | western tanager |
| <i>Chlorura chlorura</i> | green-tailed towhee |
| <i>Spizella passerina</i> | chipping sparrow |
| <i>Poocetes gramineus</i> | vesper sparrow |
| <i>Chondestes grammacus</i> | lark sparrow |
| <i>Spizella breweri</i> | Brewer's sparrow |
| <i>Zonotrichia atricapilla</i> | golden-crowned sparrow |
| <i>Zonotrichia leucophrys</i> | white-crowned sparrow |
| <i>Euphagus cyanocephalus</i> | Brewer's blackbird |
| <i>Molothrus ater</i> | brown-headed cowbird |
| <i>Dendroica petechia</i> | yellow warbler |
| <i>Dendroica townsendi</i> | Townsend's warbler |
| <i>Geothlypis trichas</i> | common yellowthroat |
| <i>Spizella arborea</i> | American tree sparrow |
| <i>Passerculus sandwichensis</i> | savannah sparrow |
| <i>Melospiza melodia</i> | song sparrow |
| <i>Passerina amoena</i> | lazuli bunting |
| <i>Pipilo erythrophthalmus</i> | rufous-sided towhee |

Picoides albolarvatus white-headed woodpecker
Colaptes auratus northern flicker
Sphyrapicus ruber red-breasted sapsucker
Melanerpes lewis Lewis s woodpecker
Sphyrapicus nuchalis red naped sapsucker
Sphyrapicus thyroideus Williamson's sapsucker
Leuconerpes albolarvatus black-backed woodpecker
*Dryocopus pileatus** pileated woodpecker

Tyrannidae

Contopus borealis olive-sided flycatcher
Contopus sordidulus western wood-pewee
Empidonax oberholseri dusky flycatcher
Empidonax wrightii gray flycatcher
Empidonax hammondi Hammond's flycatcher
Empidonax traillii willow flycatcher

Corvidae

Cyanocitta stelleri Steller's jay
Corvus corax common raven
Nucifraga columbiana Clark's nutcracker

Paridae

Parus atricapillus black-capped chickadee
Parus gambeli mountain chickadee

Aegithalidae

Psaltriparus minimus bushtit

Sittidae

Sitta carolinensis white-breasted nuthatch
Sitta canadensis red-breasted nuthatch
Sitta pygmaeus pygmy nuthatch

Certhidae

Certhia americana brown creeper

Troglodytidae

Troglodytes aedon house wren
Catherpes mexicanus canyon wren
Troglodytes troglodytes winter wren
Salpinctes obsoletus rock wren

Sylviidae

Regulus calendula ruby crowned kinglet
Regulus satrapa golden-crowned kinglet

| | |
|-----------------------------------|-------------------------------|
| <i>Accipiter striatus</i> | sharp-shinned hawk |
| <i>Accipiter gentilis</i> | northern goshawk |
| <i>Buteo jamaicensis</i> | red-tailed hawk |
| <i>Aquila chrysaetos</i> | golden eagle |
| <i>Accipiter cooperii</i> | Cooper's hawk |
| <i>Buteo swainsoni</i> | Swainson's hawk |
| <i>Buteo regalis</i> | ferruginous hawk |
| <i>Pandion haliaetus</i> | osprey |
| <i>Haliaeetus leucocephalus</i> * | bald eagle |
| Falconidae | |
| <i>Falco sparverius</i> | kestrel |
| <i>Falco columbarius</i> * | merlin |
| <i>Falco peregrinus</i> * | peregrine falcon |
| Phasianidae | |
| <i>Bonasa umbellus</i> | ruffed grouse |
| <i>Dendragapus obscurus</i> | blue grouse |
| Columbidae | |
| <i>Zenaidura macroura</i> | mourning dove |
| Strigidae | |
| <i>Bubo virginianus</i> | great-horned owl |
| <i>Glaucidium gnoma</i> | northern pygmy owl |
| <i>Asio otus</i> | long-eared owl |
| <i>Strix nebulosa</i> | great gray owl |
| Caprimulgidae | |
| <i>Chordeiles minor</i> | common nighthawk |
| Apodidae | |
| <i>Chaetura vauxi</i> | Vaux's swift |
| Hirundinidae | |
| <i>Tachycineta bicolor</i> | tree swallow |
| <i>Tachycineta thalassina</i> | violet-green swallow |
| <i>Petrochelidon pyrrhonota</i> | cliff swallow |
| <i>Stelgidopteryx serripennis</i> | northern rough-winged swallow |
| Trochilidae | |
| <i>Selasphorus rufus</i> | rufous hummingbird |
| <i>Stellula calliope</i> | calliope hummingbird |
| <i>Archilochus alexandri</i> | black-chinned hummingbird |
| Picidae | |
| <i>Picoides pubescens</i> | downy woodpecker |
| <i>Picoides villosus</i> | hairy woodpecker |

APPENDIX 3

Potential Fauna of the Augur Creek Research Natural Area

Organized by family, with scientific and common name

Sources Burt and Grossenhieder 1976, Verts and Carraway 1984, Csuti et al 1997, National Geographic Society 1987, Nussbaum et al 1983, Leonard et al 1993, M Gebben, Wildlife Biologist, Bly Ranger District, Fremont National Forest, pers comm 1995

Salmonidae

| | |
|----------------------------------|---------------------|
| <i>Oncorhynchus mykiss</i> | redband trout |
| <i>Salvelinus fontinalis</i> (E) | eastern brook trout |

Anguidae

| | |
|-------------------------|---------------------------|
| <i>Elgaria coerulea</i> | northern alligator lizard |
|-------------------------|---------------------------|

Scinidae

| | |
|-----------------------------|---------------|
| <i>Eumeces skiltonianus</i> | western skink |
|-----------------------------|---------------|

Colubridae

| | |
|------------------------------|---------------------------|
| <i>Contia tenuis</i> | sharptail snake |
| <i>Thamnophis ordinoides</i> | northwestern garter snake |
| <i>Thamnophis sirtalis</i> | common garter snake |
| <i>Masticophis taeniatus</i> | striped whipsnake |
| <i>Hypsiglena torquata</i> | night snake |

Ambystomatidae

| | |
|--------------------------------|----------------------|
| <i>Ambystoma macrodactylum</i> | long-toed salamander |
|--------------------------------|----------------------|

Pelobatidae

| | |
|---------------------------------|-----------------------|
| <i>Scaphiopus intermontanus</i> | Great basin spadefoot |
|---------------------------------|-----------------------|

Bufoidae

| | |
|--------------------|--------------|
| <i>Bufo boreas</i> | western toad |
|--------------------|--------------|

Hylidae

| | |
|---------------------|------------------|
| <i>Hyla regilla</i> | Pacific treefrog |
|---------------------|------------------|

Gruidae

| | |
|------------------------|----------------|
| <i>Grus canadensis</i> | sandhill crane |
|------------------------|----------------|

Cathartidae

| | |
|-----------------------|----------------|
| <i>Cathartes aura</i> | turkey vulture |
|-----------------------|----------------|

Accipitridae

| | | | | |
|--------------------------------|--------------------------|---|---|---|
| <i>Eleocharis bella</i> | delicate spikerush | | | X |
| <i>Eleocharis palustris</i> | common spikerush | | | X |
| <i>Festuca occidentalis</i> | western fescue | X | | X |
| <i>Hordeum brachyantherum</i> | meadow barley | | | X |
| <i>Juncus balticus</i> | Baltic rush | | | X |
| <i>Juncus ensifolius</i> | dagger leaf rush | | | X |
| <i>Juncus tenuis</i> | slender rush | | | X |
| <i>Luzula campestris</i> | field woodrush | | | X |
| <i>Luzula parviflora</i> | smallflowered woodrush | X | | X |
| <i>Melica bulbosa</i> | oniongrass | X | X | X |
| <i>Muhlenbergia filiformis</i> | pullup muhly | | | X |
| <i>Phleum alpinum</i> | alpine timothy | | | X |
| <i>Poa nervosa</i> | Wheeler's bluegrass | X | | X |
| <i>Poa palustris</i> | fowl bluegrass | | | X |
| <i>Poa pratensis</i> (E) | Kentucky bluegrass | | | X |
| <i>Poa sandbergii</i> | Sandberg's bluegrass | X | X | |
| <i>Scirpus microcarpus</i> | small-fruited bulrush | | | X |
| <i>Sitanion hystrix</i> | bottlebrush squirreltail | X | X | X |
| <i>Stipa occidentalis</i> | western needlegrass | X | X | X |
| <i>Trisetum spicatum</i> | spike trisetum | | | X |

Species identifications were determined from Little (1979) for trees and Hitchcock and Cronquist (1973) and Jepson (1993) for shrubs, forbs and graminoids ("E" = exotic non native species, "*" = taxa listed by the Oregon Natural Heritage Program [Oregon Natural Heritage Program 1995])

| | | | | |
|--|-----------------------------|---|---|---|
| <i>Pyrola chlorantha</i> | greenish wintergreen | X | | |
| <i>Pyrola picta</i> | white vein wintergreen | X | | |
| <i>Pyrola secunda</i> | sidebells wintergreen | X | X | |
| <i>Ranunculus aquatilis</i> var <i>capillaceus</i> | water buttercup | | | X |
| <i>Ranunculus eschscholtzii</i> | subalpine buttercup | | | X |
| <i>Rorippa</i> spp | cross | | | X |
| <i>Rumex crispus</i> (E) | curly dock | X | | X |
| <i>Senecio integgerum</i> | western groundsel | X | X | X |
| <i>Sidalcea oregana</i> var <i>spicata</i> | Oregon checker-mallow | X | | X |
| <i>Silene douglasii</i> var <i>douglasii</i> | Douglas silene | X | | X |
| <i>Silene menziesii</i> | Menzies' silene | X | | X |
| <i>Silene nuda</i> ssp <i>insectivora</i> | fringed campion | X | | X |
| <i>Silene oregana</i> | Oregon silene | X | | X |
| <i>Smilacina stellata</i> | starry false Solomon's seal | X | | |
| <i>Spiranthes romanzoffiana</i> | ladies-tresses | | | X |
| <i>Spraguea umbellata</i> | pussypaws | X | X | |
| <i>Stellaria crispa</i> | crisp sandwort | | X | X |
| <i>Stellaria jamesiana</i> | sticky starwort | | X | X |
| <i>Taraxacum officinale</i> (E) | dandelion | | X | X |
| <i>Thalictrum venulosum</i> | veiny meadowrue | | X | X |
| <i>Tragopogon dubius</i> (E) | yellow salsify | | X | X |
| <i>Trifolium repens</i> (E) | white clover | | | X |
| <i>Trifolium longipes</i> | long-stalked clover | | | X |
| <i>Valerian acutiloba</i> | downy-fruited valerian | | X | |
| <i>Veratrum californica</i> | California false hellebore | | | X |
| <i>Veronica americana</i> | American brooklime | | X | X |
| <i>Vicia americana</i> | American vetch | | X | X |
| <i>Viola nuttallii</i> | Nuttall's violet | | X | X |
| <i>Viola purpurea</i> | goosefoot violet | X | X | X |
| <i>Wyethia mollis</i> | woolly mules ears | | X | |
| <i>Zigadenus venosus</i> | meadow death camas | | | X |

GRAMINOIDS

| | | | | |
|-------------------------------|-------------------|---|---|---|
| <i>Agrostis thurberiana</i> | Thurber bentgrass | X | | X |
| <i>Alopecurus geniculatus</i> | meadow-foxtail | | | X |
| <i>Bromus inermis</i> (E) | smooth brome | X | X | |
| <i>Bromus tectorum</i> (E) | cheat grass | | | X |
| <i>Carex aquatilis</i> | aquatic sedge | | | X |
| <i>Carex geyeri</i> | elk sedge | | X | X |
| <i>Carex lanuginosa</i> | woolly sedge | | | X |
| <i>Carex multicosata</i> | many-ribbed sedge | | X | X |
| <i>Carex pennsylvanica</i> | long-stolon sedge | X | X | X |
| <i>Carex rossi</i> | Ross's sedge | | X | |
| <i>Carex rostrata</i> | beaked sedge | | | X |
| <i>Danthonia unispicata</i> | onespike oatgrass | | | X |
| <i>Deschampsia cespitosa</i> | tufted hairgrass | | | X |
| <i>Deschampsia elongata</i> | slender hairgrass | | | X |

| | | | | |
|---|---------------------------|---|---|---|
| <i>Habenaria dilatata</i> var <i>leucostachya</i> | white bog orchid | X | | |
| <i>Hesperochiron pumilus</i> | dwarf hesperochiron | | | X |
| <i>Hieracium albertinum</i> | western hawkweed | X | X | X |
| <i>Hieracium albiflorum</i> | white-flowered hawkweed | | | X |
| <i>Hieracium cynoglossoides</i> | hounds-tongue hawkweed | | | X |
| <i>Hydrophyllum capitatum</i> | wool breeches | X | | |
| <i>Hypericum anagalloides</i> | bog St John's-wort | X | | X |
| <i>Kelloggia galloides</i> | Kelloggia | | X | |
| <i>Lathyrus lanszwertii</i> | thick leaved peavine | X | | X |
| <i>Ligusticum grayi</i> | Gray's lovage | | | X |
| <i>Linanthus harknessii</i> | Harkness' linanthus | | X | X |
| <i>Linanthastrum nuttallii</i> | linanthastrum | X | X | X |
| <i>Linum micranthum</i> | small-flowered white flax | X | X | X |
| <i>Lithophragma bulbifera</i> | bulbiferous fringecup | | | X |
| <i>Lomatium triternatum</i> | line leaved lomatium | | X | X |
| <i>Lupinus caudatus</i> | tailcup lupine | X | X | X |
| <i>Madia minima</i> | small-head tarweed | | | X |
| <i>Mertensia ciliata</i> | ciliate bluebells | X | | X |
| <i>Microsteris gracilis</i> | microsteris | | | X |
| <i>Mimulus floribundus</i> | purple-stem monkeyflower | X | | X |
| <i>Mimulus guttatus</i> var <i>guttatus</i> | yellow monkeyflower | X | | X |
| <i>Mimulus primuloides</i> | primrose monkeyflower | X | | X |
| <i>Monardella odoratissima</i> | monardella | | X | |
| <i>Montia chamissoi</i> | water montia | | | X |
| <i>Montia perfoliata</i> | miner's lettuce | X | | X |
| <i>Navarretia minima</i> | least navarretia | X | X | X |
| <i>Nemophila pedunculata</i> | meadow nemophila | | | X |
| <i>Orthocarpus attenuatus</i> | narrow-leaved owl-clover | | | X |
| <i>Osmorhiza chilensis</i> | sweet-cicely | X | | X |
| <i>Paeonia brownii</i> | peony | X | X | |
| <i>Penstemon davidsonii</i> | Davidson's penstemon | X | X | |
| <i>Penstemon deustus</i> var <i>heterander</i> | hot rock penstemon | X | X | |
| <i>Penstemon glaucinus</i> * | blue-leaved penstemon | X | X | |
| <i>Penstemon rydbergii</i> | Rydberg's penstemon | | | X |
| <i>Perideridia gairdneri</i> | Gairdner's yampah | | | X |
| <i>Phacelia hastata</i> | whiteleaf phacelia | X | X | X |
| <i>Phlox diffusa</i> | spreading phlox | | | X |
| <i>Plagiobothrys scouleri</i> | Scouler's popcorn-flower | X | X | |
| <i>Plantago lanceolata</i> (E) | English plantain | | | X |
| <i>Polygonum aviculare</i> (E) | prostrate knotweed | X | | X |
| <i>Polygonum bistortoides</i> | American bistort | | | X |
| <i>Polygonum douglasii</i> | Douglas' knotweed | | | X |
| <i>Polygonum kelloggi</i> | Kellogg's knotweed | | | X |
| <i>Polygonum polygaloides</i> | pokeweed fleecflower | | | X |
| <i>Potentilla spp</i> | cinquefoil | | | X |
| <i>Pterospora andromeda</i> | pinedrops | | | X |
| <i>Prunella vulgaris</i> | self-heal | X | | X |
| <i>Pyrola asarifolia</i> | alpine wintergreen | X | | |

| | | | | |
|--|-------------------------|---|---|---|
| <i>Antennaria argentea</i> | silvery pussytoes | X | | |
| <i>Antennaria luzuloides</i> | woodrush pussytoes | X | | |
| <i>Antennaria geyeri</i> | pinewoods pussytoes | X | | |
| <i>Apocynum androsaemifolium</i> | spreading dogbane | X | | X |
| <i>Arabis holboellii</i> var <i>retrofracta</i> | Hobell's rockcress | X | X | |
| <i>Arabis platysperma</i> | flatseed rock cress | X | X | |
| <i>Arabis suffrutescens</i> | woody rock cress | X | X | |
| <i>Aquilegia formosa</i> | red columbine | X | | |
| <i>Arenaria kingii</i> var <i>glabrescens</i> | King's sandwort | | X | |
| <i>Arnica chamissonis</i> ssp <i>foliosa</i> var <i>incana</i> | leafy arnica | | | X |
| <i>Aster chilensis</i> ssp <i>adscendens</i> | long-leaved aster | X | | |
| <i>Athyrium filix femina</i> | lady fern | X | X | X |
| <i>Brodiaea hyacinthina</i> | hyacinth brodiaea | | | X |
| <i>Caltha biflora</i> | white marshmarigold | | X | X |
| <i>Camassia quamash</i> | camas | | | X |
| <i>Castilleja applegatei</i> | wavy-leaved paintbrush | | X | X |
| <i>Castilleja chlorotica</i> * | green-tinged paintbrush | X | | X |
| <i>Chenopodium fremontii</i> var <i>atrovirens</i> | Fremont's goosefoot | | X | X |
| <i>Cirsium arvense</i> (E) | Canada thistle | | | X |
| <i>Claytonia lanceolata</i> | western springbeauty | | X | X |
| <i>Clintonia uniflora</i> | queencup beadleily | | | X |
| <i>Collinsia parviflora</i> | blue-eyed Mary | | X | |
| <i>Collomia linearis</i> | narrow-leaf collomia | | | X |
| <i>Corallorhiza maculata</i> | spotted coral root | | X | X |
| <i>Crepis acuminata</i> | long-leaved hawksbeard | | X | X |
| <i>Crepis atrabarba</i> | slender hawksbeard | | X | X |
| <i>Cryptantha torreyana</i> | Torrey's cryptantha | | X | X |
| <i>Delphinium</i> spp | larkspur | | X | X |
| <i>Descurainia pinnata</i> | western tansymustard | | | X |
| <i>Descurainia richardsonii</i> var <i>viscosa</i> | mountain tansymustard | | X | X |
| <i>Descurainia sophia</i> | flick weed | | | X |
| <i>Dodecatheon jeffreyi</i> | Jeffrey's shooting star | | X | X |
| <i>Epilobium angustifolium</i> | fireweed | | | X |
| <i>Epilobium paniculatum</i> | tall annual fireweed | | X | X |
| <i>Equisetum arvense</i> | common horsetail | X | X | X |
| <i>Erigeron</i> spp | daisy | | | X |
| <i>Eriogonum umbellatum</i> | sulfur buckwheat | X | | X |
| <i>Eriophyllum lanatum</i> | Oregon sunshine | | X | |
| <i>Fragaria vesca</i> | woods strawberry | | X | X |
| <i>Fritillaria atropurpurea</i> | chocolate lily | | X | X |
| <i>Galium aparine</i> | cleavers | | | X |
| <i>Gayophytum decipiens</i> | deceptive groundsmoke | | | X |
| <i>Gayophytum diffusum</i> | spreading groundsmoke | | X | X |
| <i>Geranium richardsonii</i> | white geranium | | X | |
| <i>Gilia aggregata</i> var <i>aggregata</i> | scarlet gilia | | X | X |
| <i>Gnaphalium palustre</i> | lowland cudweed | | X | X |
| <i>Goodyera oblongifolia</i> | rattlesnake plantain | | X | |
| <i>Habenaria unalascensis</i> | Alaska rein-orchid | | X | |

APPENDIX 2

Plant Species Found in Augur Creek Research Natural Area

| Scientific name | Common name | Plant Associations | | | |
|---|-----------------------------|--------------------|---|---|---|
| | | 1 | 2 | 3 | 4 |
| TREES | | | | | |
| <i>Abies concolor</i> | white fir | X | X | X | X |
| <i>Abies lasiocarpa</i> | subalpine fir | X | | | |
| <i>Pinus albicaulis</i> | whitebark pine | X | | X | |
| <i>Pinus contorta</i> var <i>murrayana</i> | lodgepole pine | X | X | X | X |
| <i>Pinus ponderosa</i> | ponderosa pine | X | X | X | X |
| <i>Populus tremuloides</i> | trembling aspen | | X | X | X |
| SHRUBS AND SUBSHRUBS | | | | | |
| <i>Amelanchier alnifolia</i> | Saskatoon | | X | X | |
| <i>Arceuthobium americanum</i> | American dwarf mistletoe | X | X | | |
| <i>Arceuthobium campylopodum</i> | western dwarf mistletoe | X | X | | |
| <i>Arctostaphylos nevadensis</i> | pinemat manzanita | X | X | X | |
| <i>Arctostaphylos patula</i> | greenleaf manzanita | X | X | | |
| <i>Artemisia tridentata</i> var <i>vaseyana</i> | mountain big sagebrush | X | X | X | X |
| <i>Berberis aquifolium</i> | Oregon grape | X | X | X | |
| <i>Berberis repens</i> creeping | Oregon grape | X | X | X | |
| <i>Ceanothus prostratus</i> | squaw carpet | | X | X | |
| <i>Ceanothus velutinus</i> | snowbrush | X | X | X | |
| <i>Cercocarpus ledifolius</i> | curl-leaf mountain-mahogany | | X | X | |
| <i>Chrysothamnus nauseosus</i> | gray rabbitbrush | | | X | |
| <i>Chrysothamnus viscidiflorus</i> | green rabbitbrush | | X | X | |
| <i>Holodiscus dumosus</i> | gland oceanspray | | X | X | |
| <i>Ribes cereum</i> | squaw currant | X | X | X | |
| <i>Ribes montigenum</i> | mountain gooseberry | | X | | |
| <i>Ribes velutinum</i> | plateau gooseberry | | X | | |
| <i>Rosa nutkana</i> | Nootka rose | | X | | |
| <i>Rosa woodsii</i> | Wood's rose | | X | | |
| <i>Salix geyeriana</i> | Geyer willow | | | | X |
| <i>Sambucus racemosa</i> | red elderberry | X | X | X | |
| <i>Symphoricarpos albus</i> | common snowberry | | X | | X |
| <i>Symphoricarpos mollis</i> | creeping snowberry | | X | | |
| <i>Symphoricarpos oreophilus</i> | mountain snowberry | X | X | X | |
| FORBS | | | | | |
| <i>Achillea millefolium</i> | yarrow | | X | | X |
| <i>Agastache urticifolia</i> | nettle-leaf horse-mint | | | | X |
| <i>Agoseris aurantiaca</i> | orange agoseris | | | | X |
| <i>Allium acuminatum</i> | tapertip onion | | X | | X |