

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

4060

May 22, 1979

ESTABLISHMENT REPORT

M I D D L E S A N T I A M

RESEARCH NATURAL AREA



Willamette National Forest
Pacific Northwest Region

Designation Order

By virtue of the authority vested in me by the Secretary of Agriculture under regulation 36 CFR 251.23, I hereby designate as the Middle Santiam Research Natural Area the lands described in the preceding report by Arthur McKee and Jerry F. Franklin, dated June 15, 1977: Said lands shall hereafter be administered as a Research Natural Area subject to the said regulations and instructions thereunder.

Date

Chief

ESTABLISHMENT REPORT
MIDDLE SANTIAM RESEARCH NATURAL AREA
WILLAMETTE NATIONAL FOREST

Principal Distinguishing Features

The 1080 acre (437 ha) Middle Santiam Research Natural Area is covered by old-growth forests of Douglas-fir (Pseudotsuga menziesii [Mirbel] Franco ^{1/}) and western hemlock (Tsuga heterophylla [Raf.] Sarg.). The terrain is typical of the Western Cascades in Oregon—rugged, dissected topography with steep slopes. Elevations range from 1500 feet (457 m) to 4700 feet (1433 m). The RNA includes three drainages tributary to the Middle Santiam River: a steep narrow drainage with a south aspect, and two drainages with north aspects.

Justification

The Middle Santiam Research Natural Area (RNA) fills the need for representative stands of old growth (450+ years) Douglas-fir-western hemlock forests in the western Oregon Cascades. Forests of this age class occurs over wide areas at low to moderate elevations in the Western Cascades and are currently the most important timber resource in this region. The relatively productive habitats which they typically occupy will be subject to intensive timber management in the future.

^{1/} Nomenclature follows Hitchcock, C. L. and A. Cronquist. 1973. Flora of the Pacific Northwest. U. Wash. Press, Seattle.

The Middle Santiam RNA contains excellent examples of this type on a wide range of elevation and aspect. Because of the habitat variety, area size, and inclusion of entire watersheds within the boundary, the Middle Santiam RNA will be an important research facility for the study of natural process and as a "benchmark" area against which the effects of management on similar sites can be compared.

The need for an old-growth Douglas-fir-western hemlock RNA was identified in 1966 when a master list of RNA needs was first drafted by the Pacific Northwest Natural Area Committee. It was apparent that a major gap existed in the RNA system. Research Natural Areas containing low elevation Douglas-fir and Douglas-fir/western hemlock types were concentrated in western Washington. In addition, it lacked of good representations of Douglas-fir. Consequently, the following needs for Oregon's Western Cascades were identified:

1. Very old (450+ years), over mature Douglas-fir-western hemlock forest.
2. Mature (250 years) Douglas-fir-western hemlock forest.
3. Young or rotation age (100-150 years) Douglas-fir forest.

Each of these areas was to be located on soils and landforms typical of commercial forest land in Oregon's Western Cascades, contain a wide variety of habitat and community types, and include entire watersheds.

This master list was subsequently superceded by an interagency plan described in "Research Natural Area Needs in the Pacific Northwest" ^{2/}

^{2/} Dyrness, C. T., Jerry F. Franklin, Chris Maser, Stanton A. Cook, James D. Hall, and Glenda Faxon. 1975. Research Natural Areas Needs in the Pacific Northwest. A Contribution to Land-Use Planning. USDA For. Serv. Gen. Tech. Rep. PNW-38, 231 p.

Middle Santiam RNA fills a specific RNA need listed in this enlarged plan (RNA need #2, table 64, page 125): Old-growth Douglas-fir-western hemlock forest with major stream drainages. At least two terrestrial and one aquatic cell will be filled. The Middle Santiam RNA also fills the first three needs identified in 1966 and approaches the ideal situation mentioned above. It can be used for all aspects of research in undisturbed old-growth Douglas-fir-western hemlock forests as they occur in the western Oregon Cascades.

Middle Santiam's value as an RNA will be increased by its proximity to the H. J. Andrews Experimental Forest which has just been designated a national field research site. Use has already been made of the Middle Santiam RNA by U.S. Forest Service and International Biological Program scientists who needed comparative sites for their work on the H. J. Andrews Forest. Studies underway on the Middle Santiam RNA include: (1) productivity of old-growth forests, (2) composition and successional development of forest communities as related to environmental factors such as soil, aspect, topographic position, etc. and (3) the role of coarse woody debris in stream stabilization and sediment routing in undisturbed old-growth stands. Studies anticipated in the future are: (1) decomposition processes in old-growth stands on different habitat types, (2) nutrient cycling in old-growth stands, (3) seasonal composition and distribution of vertebrate and invertebrate fauna, (4) autecology of Douglas-fir and western hemlock in old-growth ecosystems, and (5) comparative studies of the effects of timber management activities on similar sites.

Location and Access

The Middle Santiam RNA is located in the heart of Oregon's Western Cascades in Linn County. It is centered in Sec. 18, 19 and 20, T12S, R5E Willamette Meridian and includes small portions of Sec. 7, 8, 17 and 29 (fig. 1). The RNA is entirely located on federal lands administered by the Sweet Home Ranger District, Willamette National Forest. It consists of two units north and south of the Middle Santiam River near the western boundary of the Willamette National Forest.

Access to lower portions of the north and south units is by the Weyerhaeuser Company's Middle Santiam road which begins at Green Peter Dam. The Forest Service has an easement over the road for administrative and commercial purposes.

Access to the top of the north unit is by U.S. Forest Service trails 3397 and 3382 to Chimney Peak which is near the northeast corner of the RNA. The trailhead for 3397 is on U.S. Forest Service Road 1169. The distance from the trailhead to Chimney Peak is approximately 7 miles.

Access to the top of the south unit is by U.S. Forest Service roads. From U.S. 20 at Upper Soda, Oregon take U.S. Forest Service road 1263 for 8.4 miles to its junction with 1263 E. Proceed along 1263 E for 2.8 miles to clearcut unit M32 which is on the southeast boundary of the area.

Helipads exist on Chimney Peak and in unit M32.

Boundaries

The boundaries and points referred to in the following description are shown on the accompanying topographic map (fig. 2).

North Unit {350 acres (142 ha)}

Beginning at Point A, located on the crest of the ridge separating the Chimney Creek and "Section 18" watersheds and 200 feet (61 m) north

of the surveyed centerline of the proposed road, the line ascends the watershed boundary in a northerly direction for slightly over 1 mile (1.6 km) to Point B.

Point B is on the crest of the main dividing ridge west northwest of Chimney Peak. From Point B the line follows the crest of the ridge to the west and then west southwest as shown on the map for approximately one-half mile (.9 km) to Point C. From Point C the line descends a south trending ridge onto a benchy point on the ridge at Point D. From Point D the line bears south southwest following the western boundary of a minor watershed tributary to the Middle Santiam River to Point E which is situated 200 feet (61 m) due north of the surveyed centerline of the proposed road. From Point E to Point A the line remains 200 due north of the centerline of the proposed road.

South Unit [730 acres (295)]

Beginning at Point F, located at the top of the knoll in the southern half of section 31, the line curves northeast to north northwest and descends a prominent ridge for approximately 1-1/4 miles (2 km) to the Middle Santiam River at Point G. From Point G the line follows the south bank of the Middle Santiam River to Point H which marks the northwest corner of the watershed in the western portion of the South Unit. From Point H the line ascends the watershed boundary south south-westerly along a prominent ridge to Point I located at the crest of the ridge near the National Forest boundary. The line ascends the crest of the ridge to the southeast from Point I to Point E so as to include all of the watersheds to the north of the ridge in the RNA.

Physical and Climatic Conditions

With the exception of benchy areas adjacent to the Middle Santiam River, slopes tend to be steep and predominately north facing in the south block (figs. 3 and 4) and south facing in the north block (fig. 5). Slopes average

approximately 70 percent north of the river and about 50 percent south of the river.

Bedrock in the area belongs to the Sardine geologic formation which is comprised of igneous flow and pyroclastic rocks. Parent materials are predominantly andesites and basalts at middle to high elevations and tuffs and breccias at low elevations.

Soil characteristics vary with elevation and landform. Upper slopes and ridgetops in the northern portion of the area are characterized by shallow, very stony loam soils derived from andesites and basalts. On more gentle and concave slopes soils derived from igneous flow rocks tend to be gravelly loams which are at least moderately deep (20 to 40 inches [50 to 100 cm]). At lowest elevations within the area, especially on gently sloping and benchy terrain, very deep soils developed from highly weathered tuffs and breccias are encountered. These very productive soils have friable silt loam surface horizons underlain by subsoils of silty clay loam to clay texture.

Many of the soils in the RNA are highly unstable. Deep-seated mass soil movements are particularly conspicuous in the south unit in the form of scarps (fig. 6) and slump benches. A large active slump occupies the interfluvium between the two main drainages in the south block. Instability of this type is quite characteristic of mid-elevations in the Western Cascades and makes the RNA an outstanding site for geomorphic research.

The climate is characteristic of the Western Cascades. Summers are relatively warm and dry while winters are cool and wet. Snow accumulation patterns vary from occasional small deposits which melt in a few days at lowest elevations to snowpacks of several feet in the higher portions of the area which melt off in May or early June. Annual precipitation is

undoubtedly variable over the area, but probably approaches 100 inches (254 cm). Meteorological data from the nearest climatic station (Cascadia) are as follows:

Mean annual temperature	51.0° F
Mean January temperature	37.0° F
Mean July temperature	65.2° F
Mean January minimum temperature	29.3° F
Mean July Maximum temperature	82.0° F
Mean annual precipitation	61.26 in.
Mean precipitation, June through August	4.44 in.

Vegetation ^{3/} (795 percent)

The majority of the Middle Santiam RNA is covered by old-growth forest stands belonging to SAF Forest Cover types:

- 229 Pacific Douglas-Fir (30 percent)
- 230 Douglas-Fir--Western Hemlock (65 percent), and
- 226 Pacific Silver Fir-Hemlock (5 percent).

The acreage of Type 226 is found on upper portions (>3,000 feet or 1000 m) of both the north and south units.

The general composition of the forest is shown in tables 1 and 2. Douglas-fir is the dominant tree species throughout most of the north unit

^{3/} A partial list of vascular plant species found in the RNA, with both common and scientific names, is found as Appendix I of this report.

(south exposed) (table 1) but shares dominance with western hemlock on most plots through the south unit. Western hemlock is the major tree species in reproduction size classes throughout the RNA and the probable major climax species. Western redcedar is common in the south unit and Pacific silver fir at higher elevations. Minor tree species include noble fir, western white pine, sugar pine, bigleaf maple, and Pacific madrone.

The community types found within the RNA provide a cross-section of those known to occur within the Western Hemlock Zone of Oregon's Western Cascades.^{4/}

On the north unit the types range from Douglas-Fir/Western Hemlock/Salal/Beargrass on the driest sites (plots 1, 2, and 3 in table 1) to Douglas-Fir/Western Hemlock/Vine Maple/Swordfern (plots 6 and 8) at the other end of the moisture scale. Although climax Douglas-fir forest are not encountered such dry site indicators as Pacific madrone, sugar pine, creambush oceanspray, Pacific poison oak, western fescue, and Oregon iris are. Salal, beargrass, Oregongrape, and whipple vine are also more common on the north unit.

Community types found on the south unit include Douglas-Fir--Western Hemlock/Oregongrape (plot 10 and 11), and Douglas-Fir--Western Hemlock/Pacific Rhododendron-Salal (plot 15). The shrub and herb strata vary substantially with moisture regime and overstory density. Swordfern, Oregon oxalis, deerfern, and other herbs dominate moist sites (fig. 8). Drier habitats are dominated by shrubs of which Pacific rhododendron,

^{4/} Dyrness, C. T., J. F. Franklin and W. H. Moir. 1974. A Preliminary Classification of Forest Communities in the Central Portion of the Western Cascades in Oregon. Coniferous For. Biome Bulletin No. 4, 123 p.

ble 1. Physical features and coverage of major plants on 8 reconnaissance plots in the north part of the Middle Santiam RNA; all except No. 4 are old-growth stands.

	----- Plot Number -----							
	1	2	3	4	7	6	5	8
Physical Features								
Elevation (feet)	2300	2600	2700	3100	2600	2700	2950	2150
Slope/Aspect	80/S	80/S	80/S	70/WNW	60/S	100/E	15/S	80/SE
Landform	Ridge-top	Ridge	Ridge	Upper 1/3 slope	Mid 1/3 (convex) slope	Mid 1/3 slope	Mid 1/3 slope	Lower 1/3 slope
Tree Cover (mature/reprod)								
Douglas- fir	50/Tr	60/Tr	10/40	70/-	40/-	35/-	10/-	60/-
Western hemlock	-/20	-/30	10/5	30/5	15/60	10/20	75/15	10/30
Sugar pine	2/2	-/Tr	-/1	8/-				
Pacific madrone		+	2/-					
Shrub Cover								
Salal	40	35	30	35	75	Tr	4	
Vine maple	10	10	1		60	45	3	20
Oregongrape	15	30	5	2	Tr	1	7	85
Chinkapin	10		5					
Pacific poison oak	Tr	Tr	1					
Creambush oceanspray	Tr		1					
Baldhip rose	Tr	1	1					Tr
Pacific rhododendron			Tr	20		4	30	
Red huckleberry	2			Tr		1	1	Tr
Hairy manzanita			15					
Herb Cover								
Beargrass	5	10	9	1		Tr	Tr	
Western prince's pine	3	2	5	Tr	Tr	Tr		
Oregon iris		Tr	Tr					
Western fescue	Tr	Tr	Tr					
Trailing blackberry	Tr	Tr	Tr					
Whipple vine	6	4	1			Tr		
White hawkweed	Tr	1	Tr					
Whitevein pyrola	Tr	Tr		Tr	Tr			Tr
Deerfoot vanillaleaf	Tr	2				Tr		Tr
Starflower		Tr	Tr					
Twinflower	8					1	2	Tr
Evergreen violet	2					Tr		Tr
Swordfern			Tr		Tr	5	Tr	15
Merten's coralroot	Tr				Tr	Tr		
Threeleaf anemone	Tr						Tr	

Oregongrape, wine maple, and red and Alaska huckleberries are most important (fig. 9).

Very little area representative of the Pacific Silver Fir Zone ^{5/} occurs in the RNA but there is a significant area of the south unit where both western hemlock and Pacific silver fir reproduction are present (plots 12, 13, and 14 in table 2). The dense understory in these forest is characterized by a tangle of Pacific rhododendron, salal, and beargrass (fig. 10). The transition from temperate to subalpine (Pacific silver fir climax) forest is gradual in the south unit but sharp on the north unit. The causes of the abrupt transition below Chimney Peak are not known but may include thin soils and abrupt changes in snowpack depth and duration. True firs are, in any case, confined to the very highest elevations of the north unit.

Forest productivity (as indicated by site index) varies widely over the RNA. It is at a minimum in the dry Douglas-Fir/Western Hemlock/Salal/Beargrass sites of the north unit and on Western Hemlock-Pacific Silver Fir/Pacific Rhododendron/Beargrass sites at high elevations of the south unit. Maximum diameters of 20 to 40 inches (50 to 100 cm) and heights of 90 to 150 feet (30 to 50 m) are common on such sites.

On well watered slopes, benches, and river terraces forests have moderate to high productivity. Maximum dominant heights range from 225 to 275 feet (69 to 84 m) and maximum diameters range between 55 and 80 inches (140 to 203 cm).

^{5/} Franklin, J. F. and C. T. Dyrness. 1973. Natural Vegetation of Oregon and Washington. USDA For. Serv. Gen. Tech. Rep. PNW-8, 417 p.

Table 2. Physical features and coverage of major plants on 9 reconnaissance plots in the south unit of the Middle Santiam RNA.

	-Plot Number - - - - -								
	9	16	17	10	11	15	14	13	12
Physical Features									
Elevation (feet)	2100	2400	1600	1950	1850	2550	2800	3300	3450
Slope/Aspect	80/N	20/NW	0/-	85/W	5/N	40/N	10/N	60/NW	50/N
Landform	Upper 1/3 slope	Bench	River terrace	Mid 1/3 slope	Bench	Mid 1/3 slope	Ridge-top	Upper 1/3 slope	Upper 1/3 slope
Tree Cover (mature/reprod)									
Douglas-fir	25/-	70/-	40/-	15/-	65/-	5/-	65/-	30/-	15/-
Western hemlock	25/7	35/40	65/35	65/25	35/25	75/20	40/35	20/1	70/2
Western redcedar	25/1		15/-	25/5	5/-	35/1	25/15		30/1
Bigleaf maple	Tr/-								
Pacific silver fir							15/1	-/1	-/2
Noble fir							Tr/-	15/5	2/-
Western white pine									Tr/1
Shrub Cover									
Vine maple	1		35	5	5	2	2		
Pacific rhododendron			2	20	70	65	80	85	75
Oregon grape	1	4	5	20	3	10	1		2
Golden chinkapin				1	1	3	10	7	
Red huckleberry	1	2	5	4	25	20			5
Western yew				5		2			
Western dogwood			3	2					
Salal		1	4		15	15	30	20	3
Alaska huckleberry					10	2	20	25	25
Big huckleberry		1	10		1	1			2
Herb Cover									
Swordfern	60	7	45	3		2			
Oregon oxalis	40	85	40			1			
White inside-out-flower	3	4	6	1					
Deerfern	45	5	2						
Deerfoot vanilla leaf	2	10	1	1					

Table 2. (cont.)

	9	16	17	10	11	15	14	13	12
Herb Cover (cont.)									
Western coolwort	2	2	2	1					
Cutleaf goldthread	1	1	3	10		3			1
Hooker's fairybells	1		4						
White trillium	1	1	1			1			
Evergreen violet		1		2					
Twinflower			5	20	20	5	10		2
Western prince's pine				3	3	2			3
Beargrass				2	1	7	15	40	20
Rattlesnake plantain			1	1		1	1		1
Large pyrola				1					
Trailing blackberry			2	1	1				
Threelobed anemone		2		1					
Bunchberry dogwood		1			25	1		1	
Slender gaultheria							1	3	3

A superlative stand of old-growth occurs on a river terrace in the south unit. This stand was analyzed by an U.S.-Japanese International Biologic Program team.^{6/} A diameter distribution for one hectare (2.47 acres) of this stand shows that most Douglas-fir exceed 45 inches (115 cm) d.b.h. (table 3). Heights of the dominants are from 230 to 262 feet (70 to 80 m). Total stem volume, including bark, is calculated as 3,600 m³/ha, a record amount.

Terrestrial Vertebrates

A tentative checklist of terrestrial vertebrates is presented in Appendix II. It is compiled mainly from species lists for similar sites in the Western Cascades and can, therefore, be viewed only as a list of probabilities for the RNA. Seasonal patterns of distribution, especially for birds and large mammals, would affect species composition at any time, and should be considered. Spotted owls and pileated woodpeckers are two notable birds believed to inhabit the RNA based on a survey by Mr Eric Forseman.

Impacts on Other Resource Values

Timber.

Timber resource values are high on this tract in terms of standing volumes and moderate in terms of site quality and management potential.

^{6/} Fujimori, Takao, Saburo Kawanabe, Hideki Saito, Charles C. Grier, and Tsunahide Shidei. 1976. Biomass and Primary Production in Forest of Three Major Vegetation Zones of the Northwestern United States. J. Japanese Forestry Soc. 58(10):360-373.

The area is generally covered with old-growth stands of Douglas-fir, western hemlock and associated species. Average stand volumes are estimated at 40 to 50 MBF/acre on the south exposure and 70 to 90 MBF/acre on the north exposure. Average site index is around 90 (Douglas-fir) on the south slope and 170 (Douglas-fir) on north slopes. The RNA would be expected capable of producing 560 board ft/acre/year under normal management procedures suggesting an allowable cut loss of 550,000 board ft/year.

In light of current knowledge, the timber resource loss is probably somewhat less than indicated above due to soil stability problems which would limit management activities. The northern unit of the RNA has extremely steep slopes with shallow stony soils and occasional rock outcrops. The southern unit of the RNA is centered on an area of deep but highly unstable soils.

The RNA will not create access problems in adjacent forest areas. This is one reason a road corridor was excluded from the RNA.

Water and Soil.

Establishment of the RNA should have a neutral to beneficial effect on water and soil resources since significant disturbance to this moderately- to highly-unstable landscape will be avoided.

Recreation.

The only current recreational use of the RNA is an occasional fisherman or hunter; it is extremely limited. A corridor along the north side of the river has been eliminated from the RNA to allow for development of recreational

facilities and an access trail and/or road. Because of the heavily timbered steep slope no use of the bulk of the RNA is expected under any circumstances. Recreational use (casual visitation) of the big tree grove on the south side of the river will be carefully watched to insure that significant unnatural impacts do not develop. In addition, the existence and location of this grove will not be advertised in public information programs.

Minerals.

No mineral exploration or mineralized bodies are known to exist within the RNA. The tract will be withdrawn from mineral entry after RNA establishment.

Protection and Management

The objective of management within the RNA will be to maintain natural conditions within the tract for scientific and educational study.

1. Maps.

The area boundary will be shown on the multiple-use map for the Sweet Home Ranger District.

2. Signs.

Permanent boundary markers will be posted on the boundary of the RNA. The markers will be the standard yellow, 7 x 10 inch metal RNA boundary signs (GSA Catalog No. -00-436-9661-9905). Spacing will be at intervals of 250 feet/or less on well defined topographic boundaries and
(76 m)

(61 m)
200 feet/or less in other locations. The project will be the responsibility of the Sweet Home District Ranger, and funds for the signing will be requested immediately after formal establishment of the area.

3. Public Use.

No effort will be made to limit recreational use unless such use begins to conflict with utilization of the area for research purposes or its maintenance in natural condition.

4. Management of lands between RNA and NF boundary.

The narrow strips of forest land (between the western boundary of the RNA and the Willamette NF boundary) were specifically excluded from the RNA so that (a) they could be managed to provide a windfirm stand to the west (windward) of the RNA and (b) some timber harvest could be carried out.

A key management objective for these bounding tracts is to buffer the RNA from unnatural disturbances (windthrow). The Ranger District multiple use plan will provide the necessary management direction to achieve the buffering goal while allowing for timber harvest operations

5. Management of the road and trail corridor.

The road and trail corridor located just north of the river as shown on the attached map consists of approximately 85 acres. The area is largely made up of very impressive stands of large old-growth Douglas-fir and was not included in the RNA to provide recreational access. Management of this area will be largely aimed at: (1) preserving aesthetic qualities in order to enhance recreational enjoyment of this riverside zone and (2) preserving

scientific values of the area. The Willamette National Forest will confer with the Pacific Northwest Forest and Range Experiment Station on specific management activities in the area. Such planning coordination is necessary in order to insure continued suitability for recreation and scientific research.

Public Involvement and Environmental Impact Analysis

The proposal for establishment of Middle Santiam RNA was included as a part of the land use planning process on the Willamette National Forest. It was an element in several alternatives included in the draft environmental impact analysis. Establishment of the RNA was selected as one component of the preferred alternative selected in the Environmental Impact Statement following public input and since submitted to the Council on Environmental Quality.

Appendix I. Partial list of vascular plants in the Middle Santiam Research Natural Area.

<i>Abies amabilis</i>	Pacific silver fir
<i>Abies procera</i>	Noble fir
<i>Acer circinatum</i>	Vine maple
<i>Acer macrophyllum</i>	Bigleaf maple
<i>Achlys triphylla</i>	Deerfoot vanillaleaf
<i>Adenocaulon bicolor</i>	Trail plant
<i>Alnus rubra</i>	Red alder
<i>Amelanchier alnifolia</i>	Saskatoon serviceberry
<i>Anemone delfoidea</i>	Threelfeaf anemone
<i>Apocynum androsaemifolium</i>	Dogbane
<i>Arbutus menziesii</i>	Pacific madrone
<i>Areenthobium campylopodium</i>	Yellow leafless mistletoe
<i>Arctostaphylos columbiana</i>	Hairy manzanita
<i>Arenaria macrophyllum</i>	
<i>Athyrium filix-femina</i>	Ladyfern
<i>Berberis nervosa</i>	Oregongrape
<i>Blechnum spicant</i>	Deerfern
<i>Calypso bulbosa</i>	Calypso
<i>Castanopsis chrysophylla</i>	Golden chinkapin
<i>Ceanothus velutinus</i>	Snowbrush ceanthus
<i>Chimaphila menziesii</i>	Little princes' pine
<i>Chimaphila umbellata</i>	Western prince's pine
<i>Circaea alpina</i>	
<i>Clintonia uniflora</i>	Queencup beadlily
<i>Coptis laciniata</i>	Cutleaf goldthread
<i>Corallorhiza mertensiana</i>	Merten's coralroot
<i>Cornus canadensis</i>	Bunchberry dogwood
<i>Cornus nuttallii</i>	Pacific dogwood
<i>Corylus cornuta californica</i>	
<i>Disporum hookeri</i>	Hooker's fairybells
<i>Dryopteris spinulosa dilatata</i>	
<i>Festuca occidentalis</i>	Western fescue
<i>Gaultheria ovatifolia</i>	Slender gaultheria
<i>Gaultheria shallon</i>	Salal
<i>Glaium triflorum</i>	Sweetscented bedstraw
<i>Goodyera oblongifolia</i>	Rattlesnake plantain
<i>Gymnocarpium dryopteris</i>	Oakfern
<i>Heiracium albiflorum</i>	White hawkweed
<i>Holodiscus discolor</i>	Creambush oceanspray
<i>Iris tenax</i>	Oregon iris
<i>Linnaea borealis</i>	Twinflower
<i>Listera</i>	Twayblade
<i>Ionicera ciliosa</i>	Honeysuckle
<i>Menziesia ferruginea</i>	Rustyleaf
<i>Oxalis oregana</i>	Oregon oxalis

Pedicularis racemosa

Pinus lambertiana

Pinus monticola

Polystichum munitum

Pseudotsuga menziesii

Pteridium aquilinum

Pterospora andromedea

Pyrola asarifolia

Pyrola picta

Rhododendron macrophyllum

Rhus diversiloba

Ribes bracteosum

Rosa gymnocarpa

Rubus nivalis

Rubus parviflorus

Rubus spectabilis

Rubus ursinus

Smilacina stellata

Streptopus amplexifolius

Symphoricarpos mollis

Taxus brevifolia

Thuja plicata

Tiarella trifoliata

Tiarella unifoliata

Trientalis latifolia

Trillium ovatum

Tsuga heterophylla

Vaccinium alaskaense

Vaccinium membranaceum

Vaccinium parvifolium

Vancouveria hexandra

Viola sempervirens

Sugar pine

Western white pine

Sword fern

Douglas-fir

Bracken fern

Pine drops

Large pyrola

Whitevein pyrola

Pacific rhododendron

Pacific poison oak

Stink currant

Baldhip rose

Snow bramble

Thimbleberry

Salmonberry

Trailing blackberry

Starry solomonplume

Twistedstalk

Snowberry

Western yew

Western redcedar

Western coolwort

Starflower

White trillium

Western hemlock

Alaska huckleberry

Big huckleberry

Red huckleberry

White inside-out-flower

Evergreen violet

Appendix 2. A tentative list of terrestrial vertebrate species found on the Middle Santiam Research Natural Area, Willamette National Forest.

KEY:

Elevational distribution: Low (300 to 800 m) - L, Mid (800 to 1200 m) - M, High (1200 + m) - H

Habitats: Upland - UP, Riparian - RI, Talus slopes - TA, Meadows, brushfields, and recent clearcuts - OP, Forest margins - FM, Old-growth *Pseudotsuga-Tsuga* forests - OG, Second growth (130 years) *Pseudotsuga-Tsuga* forests - S, High elevation *Abies* forests - TF

REPTILES AND AMPHIBIANS

<u>Common Name</u>	<u>Scientific Name</u>	<u>Distribution and Habitat</u>
<u>Salamanders</u>		
Family Ambystomatidae		
Pacific giant salamander	<i>Dicamptodon ensatus</i>	L-M, UP+RI
Olympic salamander	<i>Rhyacotriton olympicus</i>	L, RI
Northwestern salamander	<i>Ambystoma gracile</i>	L-H, UP+RI
Family Salamandridae		
Rough-skinned newt	<i>Taricha granulosa</i>	L-H, UP+RI
Family Plethodontidae		
Dunn's salamander	<i>Plethodon dunni</i>	L, UP
Clouded salamander	<i>Aneides ferreus</i>	L, UP
Oregon salamander	<i>Ensatina eschscholtzi</i>	L, UP
Oregon slender salamander	subspecies <i>oregonensis</i> <i>Batrachoseps wrighti</i>	L, UP
<u>Frogs and Toads</u>		
Family Ascaphidae		
Tailed frog	<i>Ascaphus truei</i>	L-M, RI
Family Bufonidae		
Western toad	<i>Bufo boreas</i>	L-H, UP
Family Hylidae		
Pacific tree frog	<i>Hyla regilla</i>	L-M, UP+RI
Family Ranidae		
Red-legged frog	<i>Rana aurora</i>	L, UP+RI
Cascade frog	<i>Rana cascadae</i>	H, UP+RI

Appendix 2. (cont.)

REPTILES AND AMPHIBIANS (cont.)

<u>Common Name</u>	<u>Scientific Name</u>	<u>Distribution and Habitat</u>
<u>Snakes</u>		
Family Boidae Rubber boa	<i>Charina bottae</i>	L-M, UP
Family Colubridae Ringneck snake	<i>Diadophis punctatus</i>	L, UP
Common garter snake	<i>Thamnophis sirtalis</i>	L-H, UP+RI
Northwestern garter snake	<i>Thamnophis ordinoides</i>	L-H, UP
<u>Lizards</u>		
Family Iguanidae Western fence lizard	<i>Sceloporus occidentalis</i>	L, UP
BIRDS		
Family Ardeidae Great blue heron	<i>Ardea herodias</i>	L, RI
Family Anatinae Wood duck	<i>Aix sponsa</i>	L, RI
Family Aythyinae Harlequin duck	<i>Histrionicus histrionicus</i>	L, RI
Family Merginae Common merganser	<i>Mergus merganser</i>	L, RI
Family Cathartidae Turkey vulture	<i>Cathartes aura</i>	L-H
Family Accipitrinae Goshawk	<i>Accipiter gentilis</i>	L-M, OG
Family Buteoninae Red-tailed hawk	<i>Buteo jamaicensis</i>	L-H
Family Tetraonidae Blue grouse	<i>Dendragapus obscurus</i>	L-H
Ruffed grouse	<i>Bonasa umbellus</i>	L-M
Family Columbidae Band-tailed pigeon	<i>Columba fasciata</i>	L-H
Mourning dove	<i>Zenaidura macroura</i>	L-M

Appendix 2. (cont.)

BIRDS (cont.)

<u>Common Name</u>	<u>Scientific Name</u>	<u>Distribution and Habitat</u>
Family Strigidae		
Great horned owl	<i>Bubo virginianus</i>	L-M
Pygmy owl	<i>Glaucidium gnoma</i>	L-M, OG+RI
Spotted owl	<i>Strix occidentalis</i>	L-H, OG
Saw-whet owl	<i>Aegolius acadicus</i>	L-M, OG
Family Caprimulgidae		
Common nighthawk	<i>Chordeiles minor</i>	L-H, OP
Family Apodidae		
Vaux's swift	<i>Chaetura vauxi</i>	L-H, OG
Family Trochilidae		
Rufous hummingbird	<i>Selasphorus rufus</i>	L-H, OP+FM
Family Alcedinidae		
Belted kingfisher	<i>Megaceryle alcyon</i>	L, RI
Family Picidae		
Common flicker	<i>Colaptes-cafer</i>	L-H
Pileated woodpecker	<i>Dryocopus pileatus</i>	L-H, OG
Red-breasted sapsucker	<i>Sphyrapicus varius</i>	L-H, OG
Hairy woodpecker	<i>Dendrocopos villosus</i>	L-H, OG
Downy woodpecker	<i>Dendrocopos pubescens</i>	L-H, S+OG
Family Tyrannidae		
Hammond's flycatcher	<i>Empidonax hammondi</i>	L-M, OG
Western flycatcher	<i>Empidonax difficilis</i>	L-H, OG
Dusky flycatcher	<i>Empidonax oberholseri</i>	L-H, FM
Western wood pewee	<i>Contopus sordidulus</i>	L-H, FM
Family Hirundinidae		
Violet-green swallow	<i>Tachycineta thalassina</i>	C, L-H, OP+RI
Rough-winged swallow	<i>Stelgidopteryx ruficollis</i>	U, L, RI
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	C, L, RI
Family Corvidae		
Gray jay	<i>Perisoreus canadensis</i>	M-H, OG
Steller's jay	<i>Cyanocitta stelleri</i>	L-H, OG
Common raven	<i>Corvus corax</i>	C, L-H
Clark's nutcracker	<i>Nucifraga columbiana</i>	H, OG+FM
Family Paridae		
Black-capped chickadee	<i>Parus atricapillus</i>	L-H, S+OG
Chestnut-backed chickadee	<i>Parus refescens</i>	L-H, S+OG
Family Sittidae		
Red-breasted nuthatch	<i>Sitta canadensis</i>	L-H, OG

Appendix 2. (Cont.)

BIRDS (cont.)

<u>Common Name</u>	<u>Scientific Name</u>	<u>Distribution and Habitat</u>
Family Certhidae Brown creeper	<i>Certhis familiaris</i>	L-H, OG
Family Cinclidae Dipper	<i>Cinclus mexicanus</i>	L-H, RI
Family Troglodytidae Winter wren	<i>Troglodytes troglodytes</i>	L-H, OG
Family Turdidae Robin	<i>Turdus migratorius</i>	L-H
Varied thrush	<i>Ixorens naevius</i>	M-H, OG
Hermit thrush	<i>Hylocichla guttata</i>	L-H, OG
Swainson's thrush	<i>Hylocichla ustulata</i>	L-H, OG
Western bluebird	<i>Sialia mexicana</i>	H, OP+FM
Townsend's solitaire	<i>Myadestes townsendi</i>	L-H, OG+RI
Family Sylviidae Golden-crowned kinglet	<i>Regulus satrapa</i>	M-H, OG
Rudy-crowned kinglet	<i>Regulus calendula</i>	L-H, OG
Family Bombycillidae Cedar waxwing	<i>Bombycilla cedrorum</i>	L-H
Family Sturnidae Starling	<i>Sturnus vulgaris</i>	
Family Vireonidae Solitary vireo	<i>Vireo solitarius</i>	L-M
Family Parulidae Audubon's warbler	<i>Dendroica auduboni</i>	L, L-M, FM
Townsend's warbler	<i>Dendroica townsendi</i>	L-H, OG
Hermit warbler	<i>Dendroica occidentalis</i>	L-H, OG
MacGillivray's warbler	<i>Oporonis tolmei</i>	L, FM
Family Thraupidae Western tanager	<i>Piranga ludoviciana</i>	L-H, OG
Family Fringillidae Evening grosbeak	<i>Hesperiphona vespertina</i>	H, OP+OG
Pine grosbeak	<i>Pinicola enucleator</i>	L-H, OG
Gray-crowned rosy finch	<i>Lencosticte techrocotis</i>	M-H, OG
Pine siskin	<i>Spinus pinus</i>	L-H
Red crossbill	<i>Loxia curvirostra</i>	H, OG
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>	L-H, OP
Oregon junco	<i>Junco oreganus</i>	L-H, OP
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	L-H, OP
Fox sparrow	<i>Passerella iliaca</i>	L-H, OP
Song sparrow	<i>Melospiza melodia</i>	L-H, OP

Appendix 2. (cont.)

MAMMALS

<u>Common Name</u>	<u>Scientific Name</u>	<u>Distribution and Habitat</u>
Order Insectivora		
Shrew mole	<i>Neotrotrichus gibbsi</i>	L-H, RI
Coast mole	<i>Scapanus orarius</i>	L-H, RI
Marsh shrew	<i>Sorex bendirii</i>	L-H, RI
Dusky shrew	<i>Sorex obscurus</i>	L-H
Trowbridge shrew	<i>Sorex trowbridgii</i>	L-H, S+OG
Wandering shrew	<i>Sorex vagrans</i>	L-H
Yaquina shrew	<i>Sorex yaquinae</i>	L-H
Order Chiroptera		
Big brown bat	<i>Eptesicus fuscus</i>	L-H, S
Silver-haired bat	<i>Lasiorycteris noctivagans</i>	L-H, OG
Hoary bat	<i>Lasiurus cinereus</i>	L-H
California myotis	<i>Myotis californicus</i>	L-H, RI
Long-eared myotis	<i>Myotis evotis</i>	L-H, RI
Little brown myotis	<i>Myotis lucifugus</i>	L-H
Long-legged myotis	<i>Myotis volans</i>	L-H
Yuma myotis	<i>Myotis yumanesis</i>	L, RI
Townsend big-eared bat	<i>Plecotus townsendi</i>	L-H
Order Lagomorpha		
Snowshoe hare	<i>Lepus americanus</i>	L-H, S
Pika	<i>Ochotona princeps</i>	M-H, TA
Order Rodentia		
Mountain beaver	<i>Aplodontia rufa</i>	L-M, RI, S+OG
Beaver	<i>Castor canadensis</i>	L, RI
White-footed vole	<i>Arborimus albipes</i>	L, RI
Red tree vole	<i>Arborimus longicaudus</i>	L-M, S+OG
California red-backed vole	<i>Clethrionomys californicus</i>	L-H, S+OG
Porcupine	<i>Erethizon dorsatum</i>	L-H, S
Townsend chipmunk	<i>Eutamias townsendi</i>	L-H, S+OG
Northern flying squirrel	<i>Glaucomys sabrinus</i>	L-H, S+OG
Long-tailed vole	<i>Microtus longicaudus</i>	L
Richardson vole	<i>Microtus richardsoni</i>	L-H
Bushy-tailed wood rat	<i>Neotoma cinerea</i>	L-H, TA
Deer mouse	<i>Peromyscus maniculatus</i>	L-H, S, OG, TF
Chickaree	<i>Tamiasciurus douglasi</i>	L-H, S, OG, TF
Pacific jumping mouse	<i>Zapus trinotatus</i>	L, RI
Order Carnivora		
Coyote	<i>Canis latrans</i>	L-H, OP
Cougar	<i>Felis concolor</i>	L-H
Otter	<i>Lutra canadensis</i>	L-M, RI
Bobcat	<i>Lynx rufus</i>	L-H, OG
Marten	<i>Martes americana</i>	L-H, TA
Short-tailed weasel	<i>Mustela erminea</i>	L-H, TA

Appendix 2. (cont.)

MAMMALS (cont.)

<u>Common Name</u>	<u>Scientific Name</u>	<u>Distribution and Habitat</u>
Long-tailed weasel	<i>Mustela frenata</i>	L-H, TA
Mink	<i>Mustela vison</i>	L-M, RI
Raccoon	<i>Procyon lotor</i>	L-M, RI
Spotted skunk	<i>Spilogale putorius</i>	L-M, OG
Black bear	<i>Ursus americanus</i>	L-H
Red fox	<i>Vulpes vulpes</i> subspecies <i>cascadensis</i>	M-H, OP
Order Artiodactyla		
Roosevelt elk	<i>Cervus canadensis</i> subspecies <i>roosevelti</i>	L-H
Black-tailed deer	<i>Odocoileus hemionus</i> subspecies <i>columbianus</i>	L-H

Recommendation

It is recommended that the Middle Santiam Research Natural Area be established on the lands described in this report.

7-22-77
Date

Submitted: William J. Coyne
District Ranger

Date

Recommended: _____
Forest Supervisor
Willamette National Forest

8-20-77
Date

Recommended: Robert F. Jarant
Director
PNW Experiment Station

Date

Recommended: _____
Regional Forester
Region 6

Date

Approved: _____
Director
Division of Recreation

Date

Approved: _____
Deputy Chief
Research

Date

Approved: _____
Chief

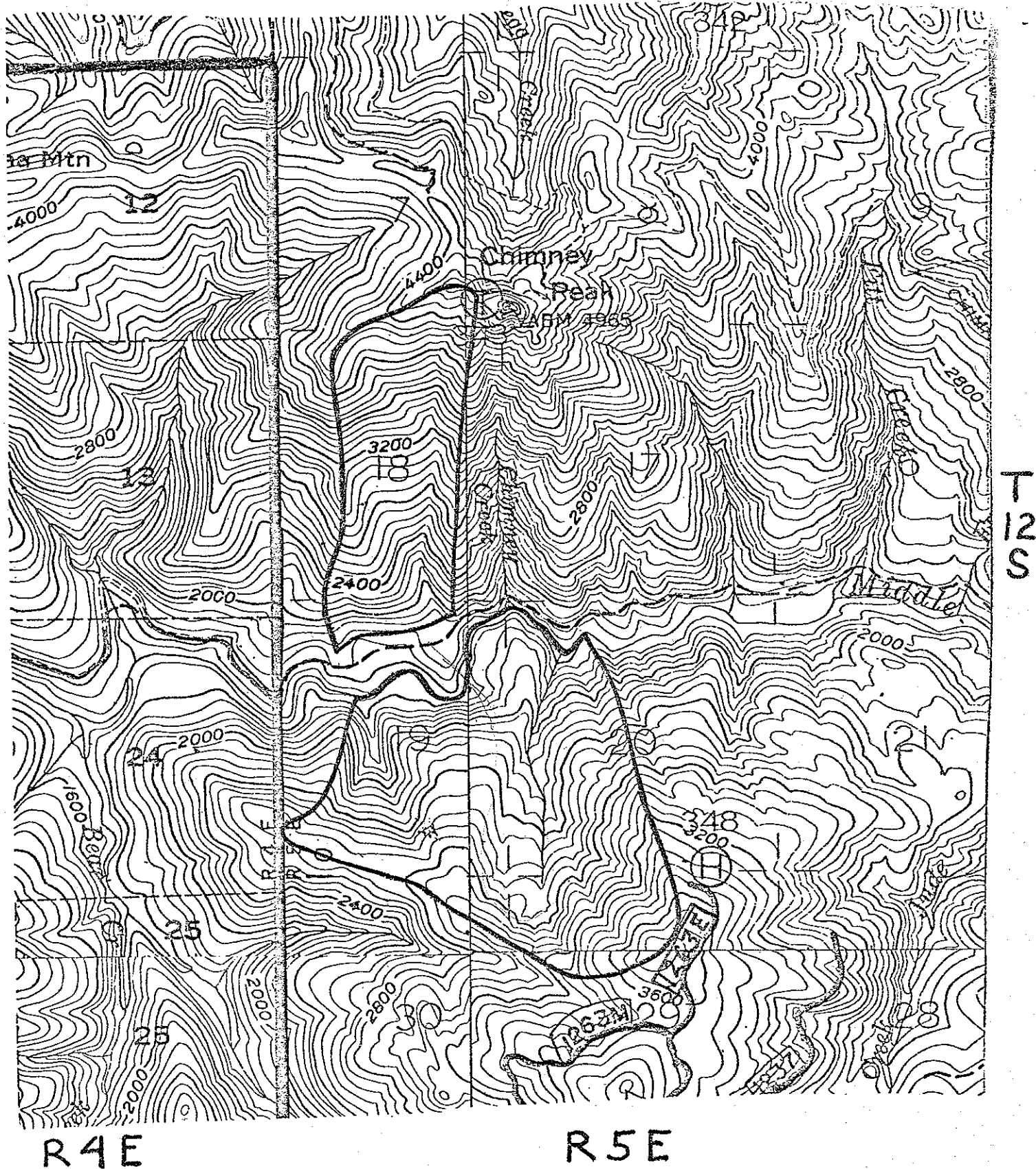


FIGURE 1. LOCATION OF MIDDLE SANTIAM RESEARCH NATURAL AREA WITH REGARD TO LEGAL BOUNDARIES. PORTIONS OF RNA IN SEC. 7, 8, 17, 18, 19, 20, 29, T12S, R5E, WILLAMETTE MERIDIAN.

RNA BOUNDARY _____

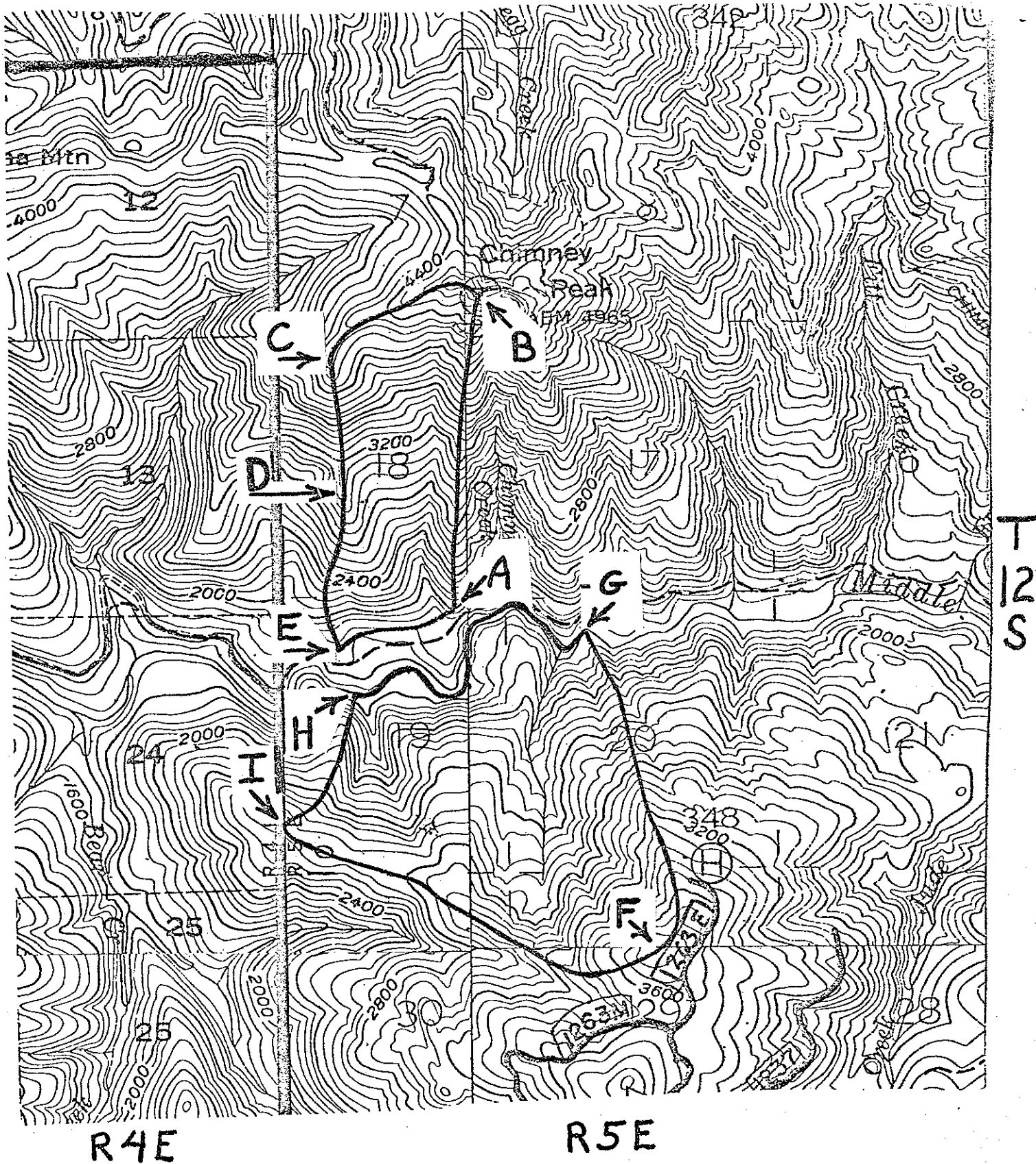
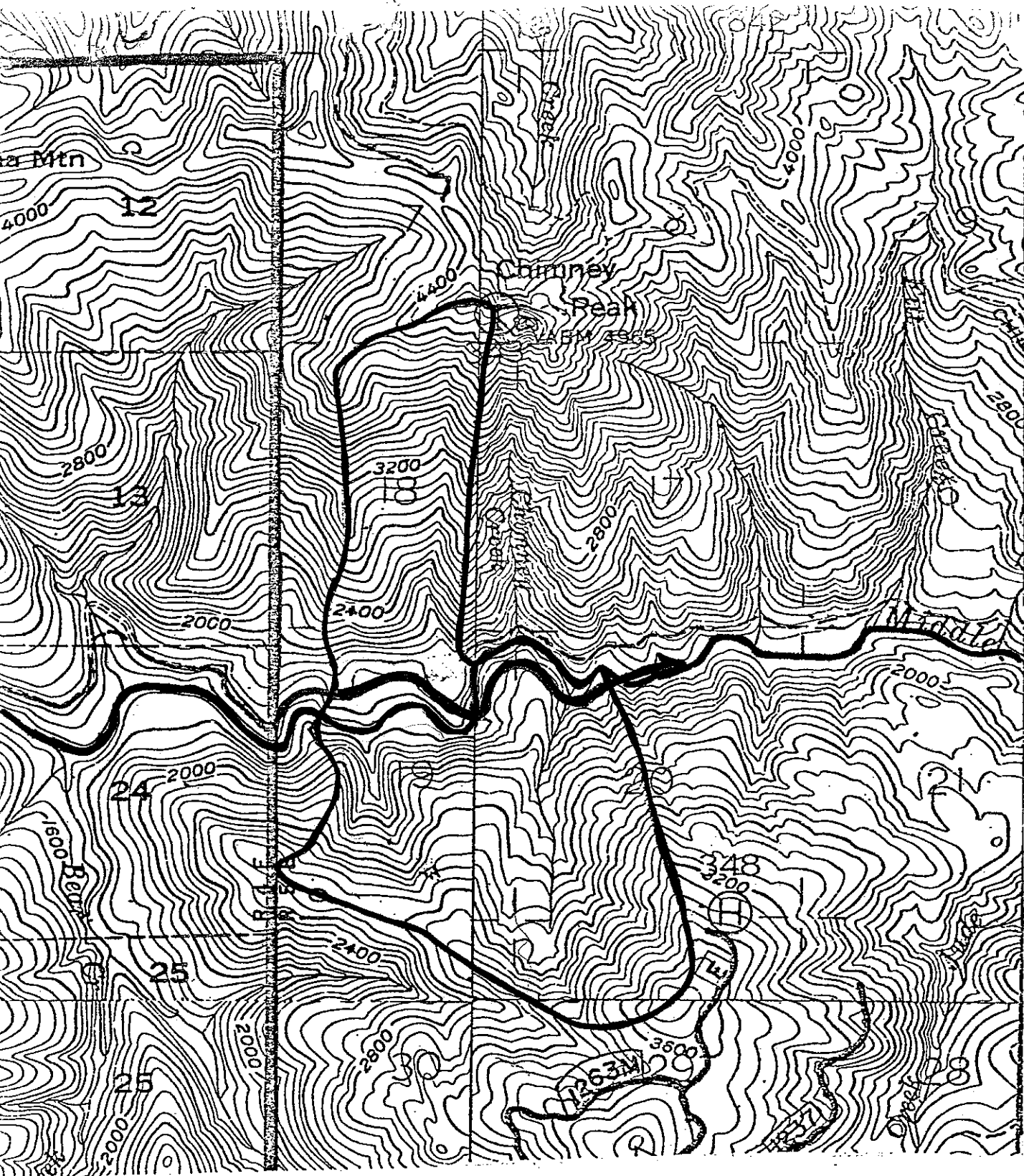


FIGURE 2.--BOUNDARY MAP OF MIDDLE SANTIAM RESEARCH NATURAL AREA SHOWING POINTS REFERRED TO IN BOUNDARY DESCRIPTION.

RNA BOUNDARY 






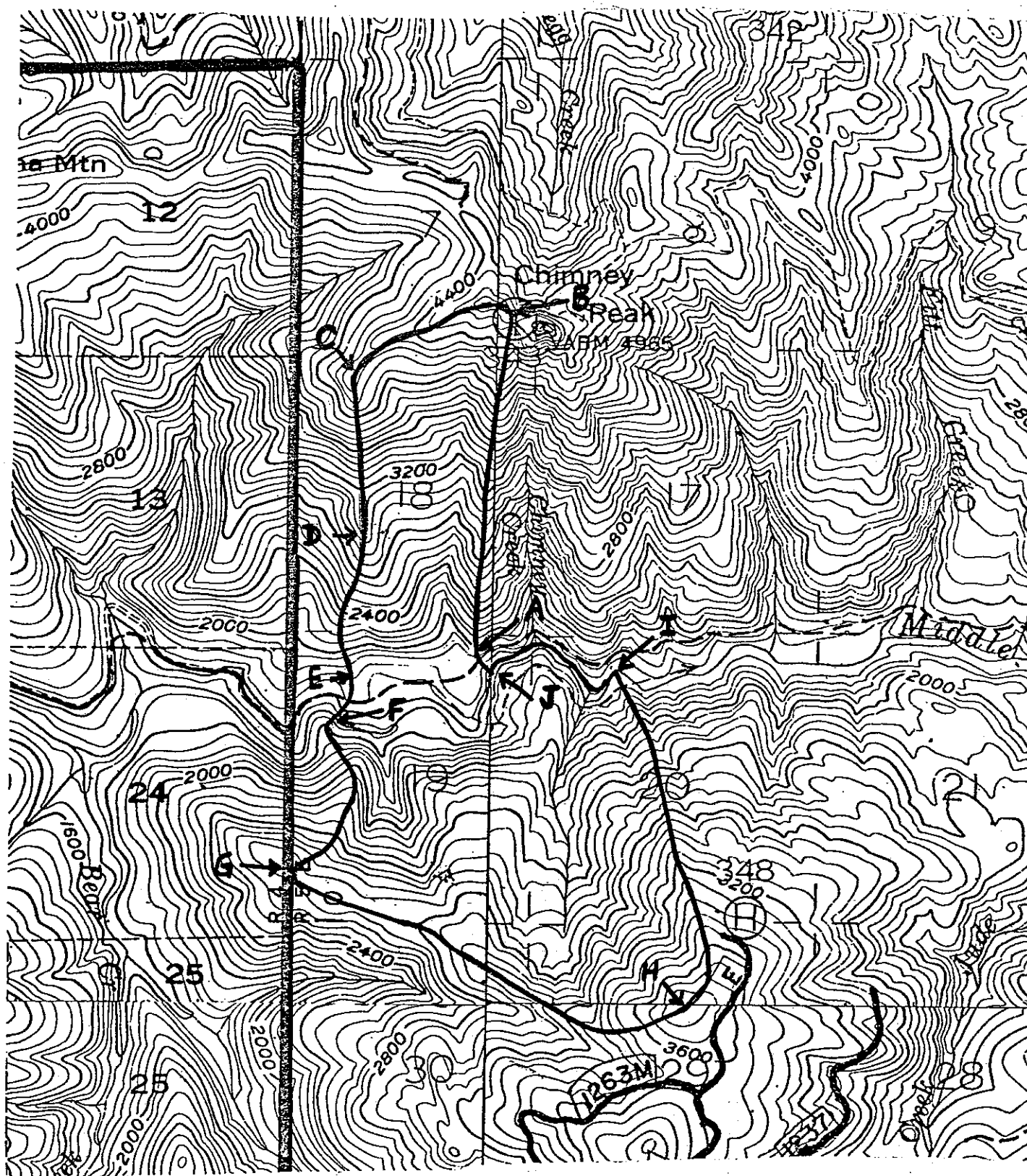
RNA boundary  Road Right-of-Way  River 

Figure 1.--Boundaries of the Middle Santiam Research Natural Area showing topographic conditions and the location of the road right-of-way.

T.
12
S.



R. 4 E.

R. 5 E.

Figure 2.--Boundary map of the Middle Santiam Research Natural Area showing control points referred to in boundary description.

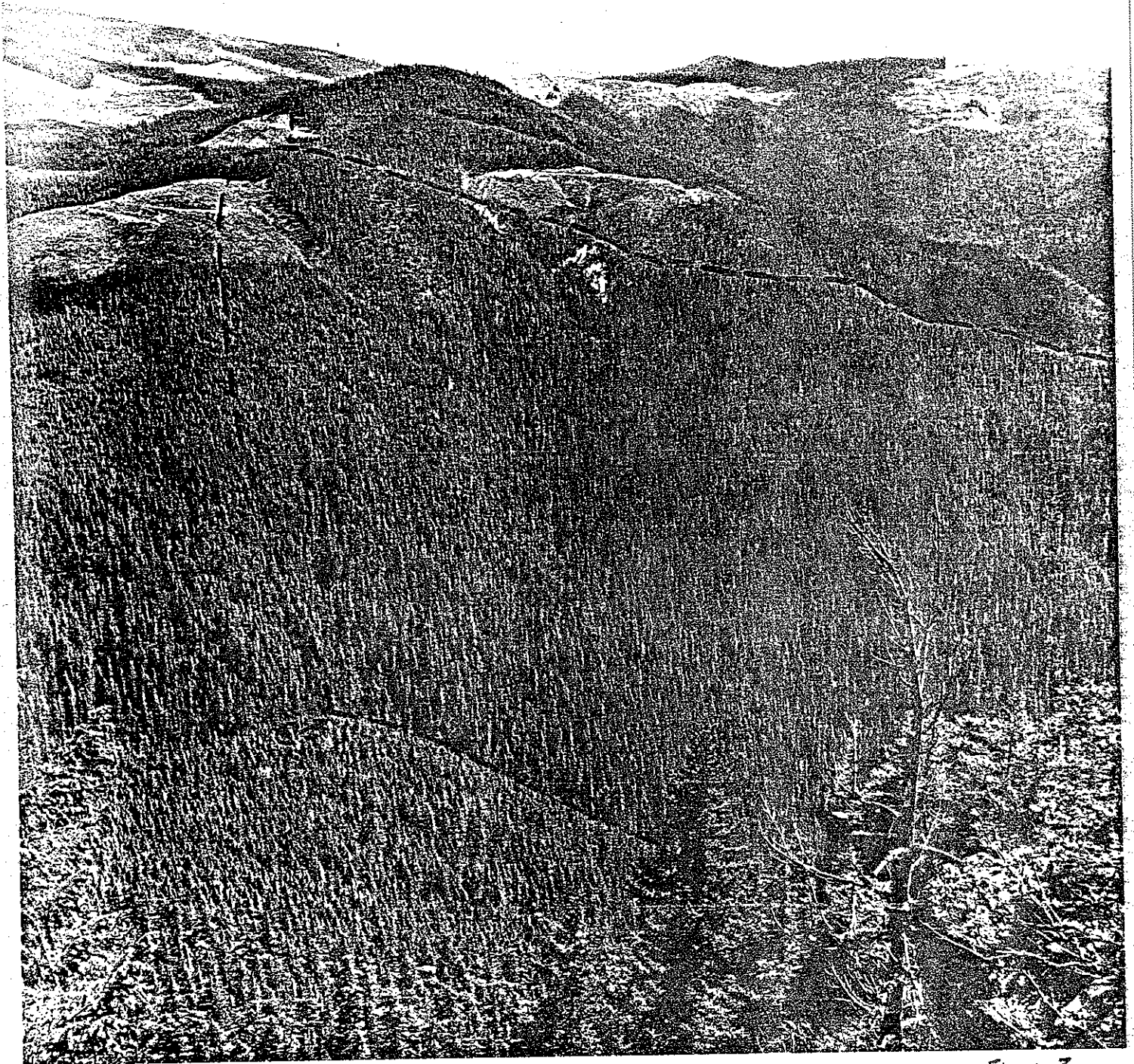


Figure 3

Figure 3.--View of eastern 2/3 or south unit, Middle Santiam RNA, from Chimney Peak. Major stream drainage below scarp faces has been subject to extensive mass soil movement(s) and stream channel is poorly defined over much of its length.

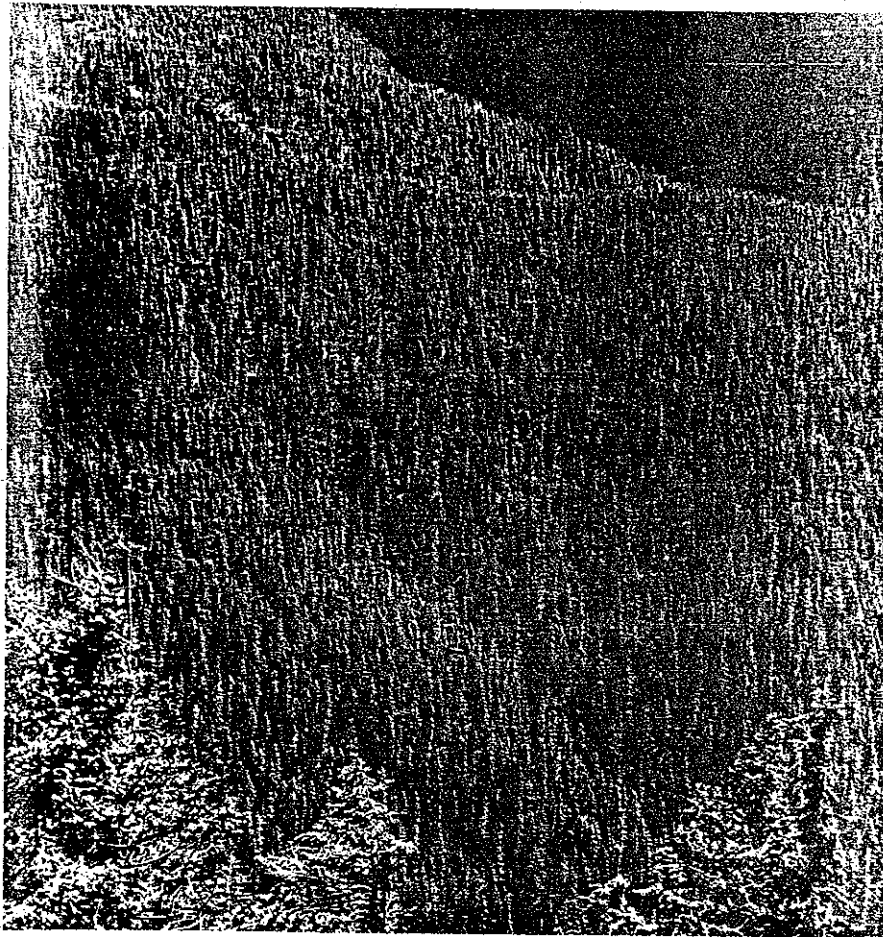


Figure 4

Figure 4.--Stream drainage in western 1/3 of south unit, Middle Santiam RNA. Second order drainage with well defined stream course.

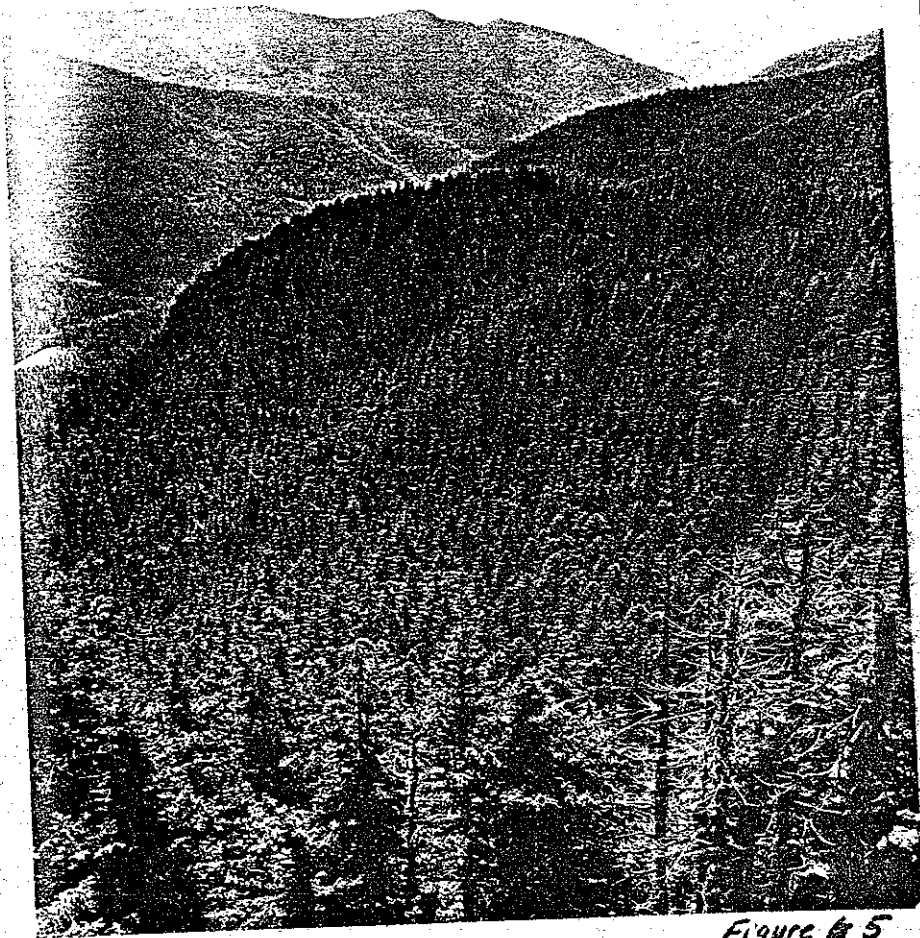


Figure 5

Figure 5.—Mixed Douglas-fir, western hemlock, and noble fir stand on the upper 1/3 of north unit, Middle Santiam RNA, looking southwest from Chimney Peak.



Figure 6.--Erosional scarp in southeast (upper) corner of south unit, Middle Santiam RNA. Deep seated mass soil movements are very active in this drainage. See distant view of area in figure 3.



Fig. 7a

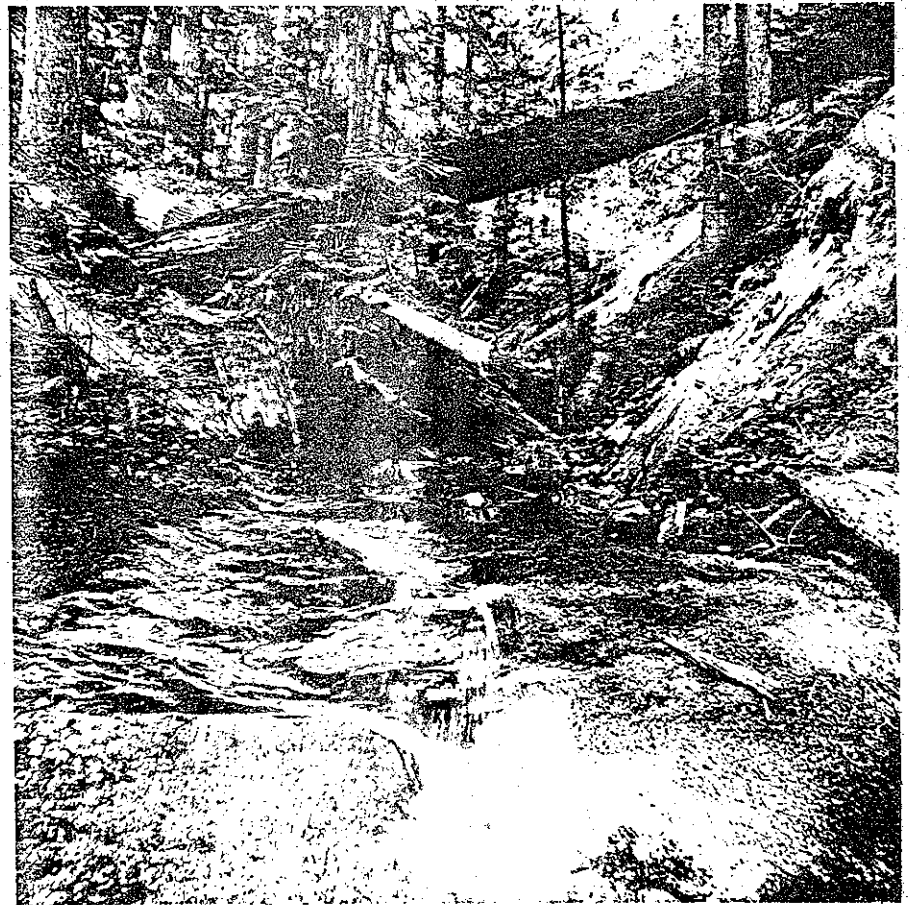


Fig. 7b

Figure 7.--Stream systems in Middle Santiam RNA. (a) Stream in western third of south has heavy riparian vegetation. (b) Stream in northern unit is steep gradient with bedrock frequently forming bottom.



Figure 8.--Massive park-like old-growth groves characterize moist slump benches and river terraces in the south unit, Middle Santiam RNA.



Figure 9.--Typical modal forest stand (Western Hemlock/Oregongrape habitat type), Middle Santiam RNA.

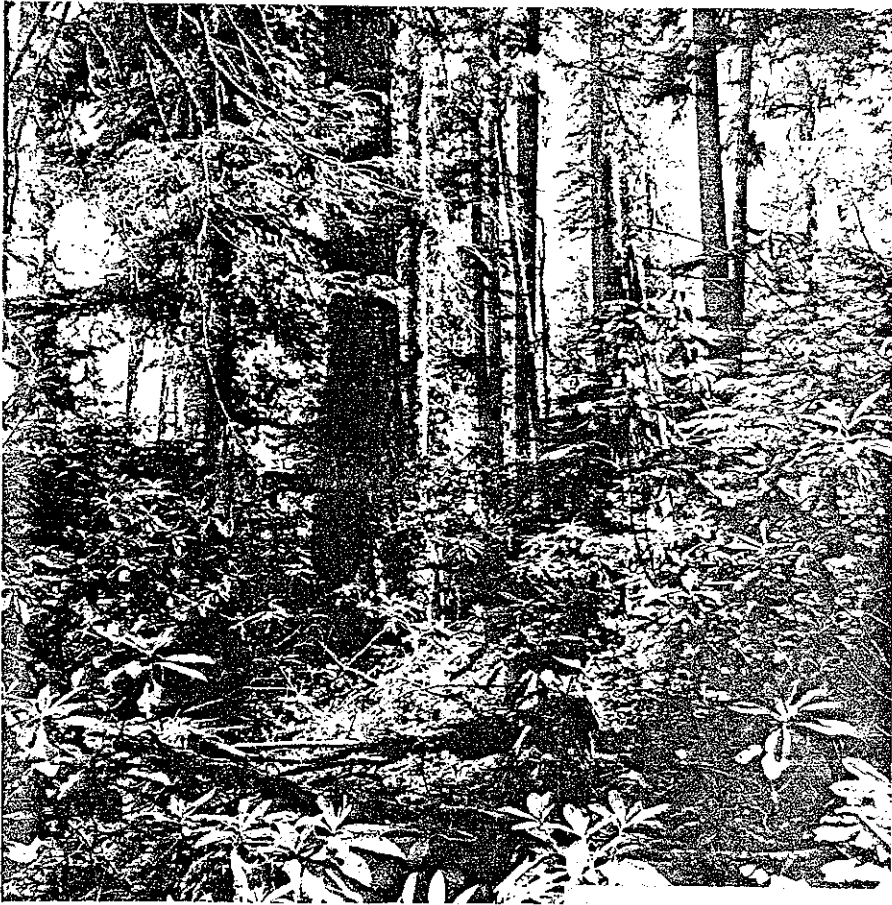


Figure 10.--Jungle-like understories of Pacific rhododendron, salal, beargrass and other plants characterize some of the mid- and high-elevation sites in the south unit, Middle Santiam RNA.