STEAMBOAT MOUNTAIN RESEARCH NATURAL AREA

Supplement No. 20[1]

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The Research Natural Area described in this supplement is administered by the Forest Service, an agency of the U.S. Department of Agriculture. Forest Service Research Natural Areas are located within Ranger Districts, which are administrative subdivisions of National Forests. Normal management and protective activities are the responsibility of District Rangers and Forest Supervisors. Scientific and educational uses of these areas, however, are the responsibility of the research branch of the Forest Service. Scientists interested in using areas in Oregon and Washington should contact the Director of the Pacific Northwest Research Station (319 S.W. Pine Street, Portland, Oregon 97204) and outline the activities planned. If extensive use of one or more Forest Service Research Natural Areas is planned, a cooperative agreement between the scientist and the Forest Service may be necessary. The Forest Supervisor and the District Ranger administering the affected Research Natural Area will be informed by the Research Station Director of mutually agreed on activities. When initiating work, a scientist should visit the administering Ranger Station to explain the nature, purpose, and duration of planned studies. Permission for brief visits to observe Research Natural Areas can be obtained from the District Ranger.

Steamboat Mountain Research Natural Area is part of a Federal system of such tracts established for research and educational purposes. Each Research Natural Area constitutes a site where natural features are preserved for scientific purposes and natural processes are allowed to dominate. Their main purposes are to provide:

1. Baseline areas against which effects of human activities can be measured;
2. Sites for study of natural processes in undisturbed ecosystems; and
3. Gene pool preserves for all types of organisms, especially rare and endangered types.

The Federal system is outlined in "A Directory of the Research Natural Areas on Federal Lands of the United States of America."[3]

Of the 96 Federal Research Natural Areas established in Oregon and Washington, 45 are described in "Federal Research Natural Areas in Oregon and Washington: A Guidebook for Scientists and Educators" (see footnote 1). Supplements to the guidebook describe Research Natural Areas added to the system.

The guiding principle in management of Research Natural Areas is to prevent unnatural encroachments or activities that directly or indirectly modify ecological processes. Logging and uncontrolled grazing are not allowed, for example, nor is public use that might impair scientific or educational values. Management practices necessary for maintenance of ecosystems may be allowed.

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[1]Supplement No. 20 to "Federal Research Natural Areas in Oregon and Washington: A Guidebook for Scientists and Educators," by Jerry F. Franklin, Frederick C. Hall, C.T. Dyrness, and Chris Maser. (Pacific Northwest Forest and Range Experiment Station, 1972).

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[3]Federal Committee on Ecological Reserves. A directory of the Research Natural Areas on Federal lands of the United States of America. Washington, DC: U.S. Department of Agriculture, Forest Service; 1977.

Federal Research Natural Areas provide a unique system of publicly owned and protected examples of undisturbed ecosystems where scientists can conduct research with minimal interference and reasonable assurance that investments in long-term studies will not be lost to logging, land development, or similar activities. In return, a scientist wishing to use a Research Natural Area is obligated to:

1. Obtain permission from the appropriate administering agency before using the area;[4/]
2. Abide by the administering agency's regulations governing use, including specific limitations on the type of research, sampling methods, and other procedures; and
3. Inform the administering agency on progress of the research, published results, and disposition of collected materials.

The purpose of these limitations is to:

1. Insure that the scientific and educational values of the tract are not impaired;
2. Accumulate a documented body of knowledge about the tract; and
3. Avoid conflict between studies.

Research must be essentially nondestructive; destructive analysis of vegetation is generally not allowed, nor are studies requiring extensive modification of the forest floor or extensive excavation of soil. Collection of plant and animal specimens should be restricted to the minimum necessary to provide voucher specimens and other research needs. Under no circumstances may collecting significantly reduce population levels of species. Collecting must also be carried out in accordance with applicable State and Federal agency regulations. Within these broad guidelines, appropriate uses of Research Natural Areas are determined by the administering agency.

[4/]Six agencies cooperate in this program in the Pacific Northwest: U.S. Department of Agriculture—Forest Service; U.S. Department of the Interior—Bureau of Land Management, Fish and Wildlife Service, and National Park Service; U.S.Department of Energy; and U.S. Department of Defense.

STEAMBOAT MOUNTAIN RESEARCH NATURAL AREA

Subalpine fir and Pacific silver fir-mountain hemlock forest communities with wet meadows, a small lake, and rock outcrops and talus.

The Steamboat Mountain Research Natural Area (RNA) was established in August 1973 as an example of subalpine forest communities in the Cascade Range of southern Washington. The 551-ha RNA also includes three major wet meadows or montane mires, a small lake, and areas of rock outcrops and talus. Steamboat Mountain RNA includes excellent examples of *Abies lasiocarpa* forests of the Cascade Range, including pure stands on midslopes and upper slopes of southern and western exposure, old-growth *Abies amabilis-Tsuga mertensiana* on north slopes, and a mixture, particularly on lower slopes and flats.[5/]

Steamboat Mountain RNA is in the Mount Adams Ranger District, Gifford Pinchot National Forest, in Skamania County, Washington, 29 km northwest of Trout Lake (fig. 1). It is located primarily in sections 30 and 31, T. 8 N., R. 9 E., and sections 35 and 36, T. 8 N., R. 8 E.; small portions are in section 25, T. 8 N., R. 8 E., section 1, T. 7 N., R. 8 E., and section 6, T. 7 N., R. 9 E., Willamette Meridian (lat. 46°8' N.; long. 121°44' W.). It is bounded by Forest Service roads except along the north and northeast margins.

[5/]Scientific and common names of plant species are listed in table 1.

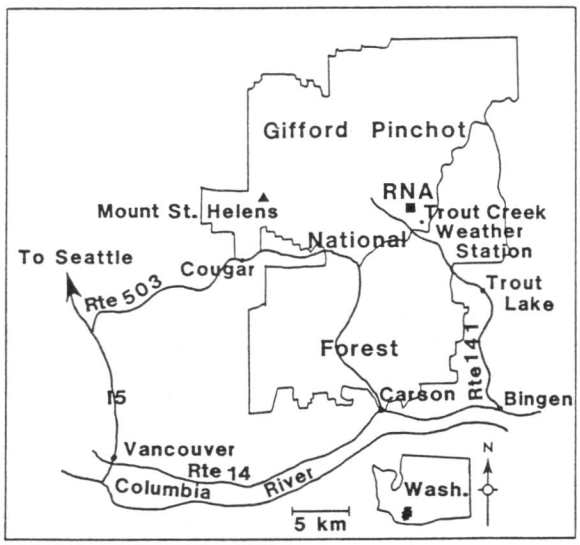

Figure 1.—Location of Steamboat Mountain Research Natural Area.

Access and Accommodations

To reach the natural area from the Mount Adams Ranger Station, Trout Lake parking lot, proceed left (west) on Highway 141 for 1 mile (fig. 1). Turn right (north) on F.S. Road 88 and continue for 13.5 miles to the junction of roads 88, 8851, and 8841 (known locally as the big tire). Take road 8851 (straight ahead) and continue for 4 miles to the junction of roads 8851 and 8871. Turn right on 8871 and continue for 0.25 mile to the junction of 8871 and 8871095. Turn right on the 8871095 road and continue for 1.5 miles to the end of the road. The RNA is on the right (south) side of the road. There is a sign at the end of the road. The nearest commercial accommodations are in Cougar or Carson, Washington; camping facilities are available at several campgrounds in the area. These are best located on a Gifford Pinchot National Forest recreation map, available at the Mount Adams Ranger Station in Trout Lake or the Supervisor's Office in Vancouver, Washington.

Environment

The RNA includes the north, west, and south slopes of Steamboat Mountain, an elongated ridge running in a southeast-northwest direction (fig. 2). Elevation ranges from 1190 m at Tillicum Creek at the northwest corner of the RNA to 1654 m at the summit of the mountain. Slopes are steep, 30 to 60 percent, except at the northern, western, and southern margins of the mountain where gently sloping to undulating topography is common. There are cliffs and steep slopes on the north side of the summit ridge.

The entire RNA is associated with volcanic rock types. Steamboat Mountain is underlain by a typical regional sequence of Tertiary (Miocene-Pliocene) extrusive and sedimentary rocks, including the Miocene Eagle Creek Formation and Yakima Basalts, the latter exposed at the summit (Schuster and others 1978). The mountain occupies an east-west-trending syncline at the northern extent of the Indian Heaven fissure zone, a basalt field dominated by numerous volcanic centers and at least 14 groups of lava flows. Three volcanic centers, marked by three cinder cones on the west shoulder of Steamboat Mountain, are believed to have been active between 14,500 and 20,000 years ago, resulting in localized subglacial basalt and pillow palagonite extrusions. Twin Buttes cinder cones, 3 km southwest of Steamboat Mountain, are thought to be slightly younger than the Fraser glaciation that occurred less than 12,000 years ago (Schuster and others 1978). Much of the surface is mantled by aerially deposited volcanic ejecta, including the "J" tephra deposit of Mount St. Helens (Mullineaux and others 1975). A regional heat flow study documents that there is no large heat source in the vicinity of the RNA. Average heat gradients from a drill hole 2.5 km south of the RNA ranged from 30.5 to 48.5 °C/km (Schuster and others 1978).

Soils are Podzols (Cryorthods), Brown Podzolics (Haplorthods), and azonal soils (Cryandepts) developed on Pleistocene and Recent tephra deposits. Profiles are not well developed, and distinct A2 horizons are usually absent. Surface horizons are generally thin and of moderately coarse to very coarse texture with 15 percent or more rock inclusions; they are rapidly drained. Subsurface horizons (B and C) are typically moderately thick to very thick with a somewhat finer texture than on the surface, 25 to 55 percent rocks, and very well drained.

Figure 2.—Southwestern slope of Steamboat Mountain Research Natural Area. Big Mosquito Lake and meadows in foreground are not in the RNA.

Climate is wet and cold during the winter; snowpack varies from 200 to 300 cm. Summers are relatively warm and dry. The nearest year-round weather station is at the Mount Adams Ranger Station in Trout Lake. This is more than 600 m lower than the RNA and probably not very applicable to the weather there. The closest weather station at Trout Creek (fig. 1) is operable only during the summer fire season. Average maximum and minimum temperatures for June to September 1972-78 were 20.8 °C (69.5 °F) and 7.4 °C (45.4 °F). Average rainfall for the same period was 3.25 cm (data on file at Mount Adams Ranger Station, Trout Lake, Washington).

Biota

Plant Communities

The forests within Steamboat Mountain RNA are Society of American Foresters (SAF) cover types 205 Mountain Hemlock and 206 Engelmann Spruce-Subalpine Fir (Eyre 1980). Both fall within Küchler's (1964) Fir-Hemlock Forest (*Abies-Tsuga*) type.

The eight major vegetation mapping units in Steamboat Mountain RNA are shown in figure 3. A checklist of the vascular plants and their habitats has been published for Steamboat Mountain RNA (Schuller and Frenkel 1981). It should be referred to for a more complete floristic listing than is given here.

Tree species in approximate order of abundance are *Abies amabilis, A. lasiocarpa, Tsuga mertensiana, A. procera, Pseudotsuga menziesii, Pinus monticola, Picea engelmannii,* and *T. heterophylla.* The first three comprise 90 percent or more of the stems, with *A. amabilis* the climax species throughout most of the area.

The *Abies lasiocarpa* unit is found on the upper two-thirds of the southwest slope and on a portion of the northwest slope of Steamboat Mountain (ABLA in fig. 3). An *A. lasiocarpa/Vaccinium membranaceum/Xerophyllum tenax* cover type community dominates much of this area (fig. 4). There is substantial cover of *A. amabilis* and *Tsuga mertensiana;* understory species are *Rubus lasiococcus, Pyrola secunda, Anemone deltoidea, Bromus vulgaris,* and *Nothochelone nemorosa.* The average basal area per hectare for this type is 44.2 m^2. Average tree height is 25 m for *A. lasiocarpa,* 32 m for *A. amabilis.*

The *Abies lasiocarpa* unit may be successional to Brockway and others' (1983) Pacific Silver Fir/Big Huckleberry/Beargrass Association. Their typical plant cover values do not include nearly as much *Abies lasiocarpa* as occurs at Steamboat Mountain. Because stands on the south slope are only 130 years old, given more time the stands will probably have less *A. lasiocarpa* and more *A. amabilis.* In the absence of catastrophic fire or disease, portions of this community could also develop into stands with sufficient *Tsuga mertensiana* to be classified as Brockway and others' (1983) Mountain Hemlock/Big Huckleberry Association.

A moist forest mapped as PIEN in figure 3 surrounds small areas of open wetland on the lower south and west slopes. This forest is dominated by an *Abies amabilis-Picea engelmannii-Tsuga mertensiana/Vaccinium membranaceum* community. This successional community supports a floristically rich herbaceous understory including *Clintonia uniflora, Cornus canadensis, Oxalis trilliifolia, Valeriana sitchensis,* and *Viola orbiculata* (fig. 5). Both *Vaccinium membranaceum* and *V. ovalifolium* are frequent. This area can be classified as either the Pacific Silver Fir/Big Huckleberry/Queencup Beadlily Association or the Mountain Hemlock/Big Huckleberry Association (Brockway and others 1983). The abundance of *Picea engelmannii* gives this community its unique character compared with the upland forests in the RNA.

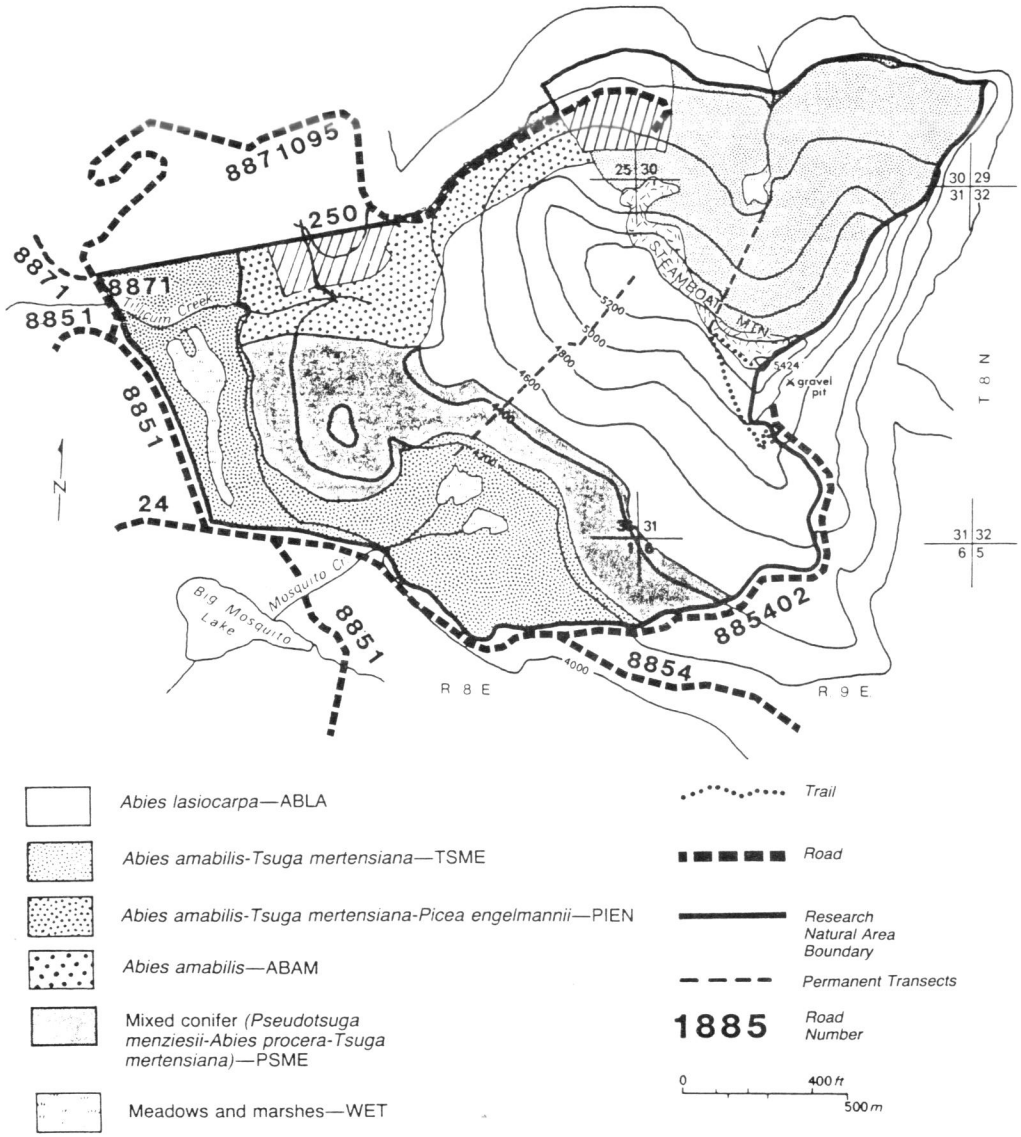

Figure 3.—Major vegetation cover types in Steamboat Mountain Research Natural Area.

Figure 4.—Abies lasiocarpa *community with* Vaccinium membranaceum *in the understory, Steamboat Mountain Research Natural Area.*

Figure 5.—Abies amabilis-Picea engelmannii *community with floristically rich herbaceous understory at Steamboat Mountain Research Natural Area.*

A band of forest, mapped as PSME in figure 3, lies at the base of the southwest slope of Steamboat Mountain and represents a drier cover type dominated by a *Pseudotsuga menziesii-Abies procera-A. amabilis/ Vaccinium membranaceum* community. Quite variable in composition, this type includes *Vaccinium membranaceum* as the most common shrub, but *Pachistima myrsinites, V. ovalifolium,* and *Menziesia ferruginea* are also present. The herbaceous understory can become well developed, and it usually includes *Rubus lasiococcus, Clintonia uniflora, Xerophyllum tenax, Viola orbiculata, Trillium ovatum,* and *Hieracium albiflorum.* Basal areas are greater than those of the adjacent mapped cover types because of the occurrence of *P. menziesii.* Basal area averages 52.2 m²/ha and ranges from 43.8 to 60.3 m²/ha. This forest type may be successional to Brockway and others' (1983) climax Pacific Silver Fir/Vanilla Leaf-Queencup Beadlily Association. Stands in this association typically occupy southerly aspects and have moderately deep and well-drained soils (fig. 6).

The cool north slopes of Steamboat Mountain RNA are dominated by an older *Abies amabilis-Tsuga mertensiana/Rhododendron albiflorum-Vaccinium* plant community (TSME in fig. 3; fig. 7). *Rubus lasiococcus, R. pedatus, Clintonia uniflora,* and *Smilacina stellata* are commonly found in the herb layer (fig. 5). Basal area in these stands, dominated by *A. amabilis* and *Tsuga heterophylla,* averages 52 m²/ha and ranges from 25.1 m²/ha at midslope to 87.7 m²/ha toward the bottom near the lake (fig. 8). Basal area for dead trees ranged from 3.5 m²/ha at midslope to 15.5 m²/ha at the bottom. Tree heights average 32 m for *A. amabilis* and 30 m for *T. mertensiana.* This forest type belongs to Brockway and others' (1983) Pacific Silver Fir/Cascade Azalea Association, found primarily on gentle north slopes averaging 1290 m in elevation. Deep snowpacks, a short growing season, frequent frost and cold temperatures, and moist soils are common on these sites.

Closely related to the previous type is the relatively homogeneous *Abies amabilis/Vaccinium membranaceum* forest cover type, with the understory dominated by *Vaccinium membranaceum* (ABAM in fig. 3). Brockway and others' (1983) classification suggests the Pacific Silver Fir/Big Huckleberry/Queencup Beadlily Association. Although this ABAM type generally occurs in environmentally moderate areas, it is also found on frost-prone, high-elevation sites similar to those at Steamboat Mountain.

Cliffs, rocky areas, and scree slopes occupy a strip along the ridge and north slope of the summit (ROCK in fig. 3). This area provides a variety of microhabitats that account for much of the floristic richness, especially where soil has accumulated (figs. 9 and 10). Some species frequently found are *Cryptogramma crispa, Lomatium martindalei, Luetkea pectinata, Mertensia paniculata, Phyllodoce empetriformis, Phlox diffusa, Pinus albicaulis, Sedum divergens,* and many members of the Gramineae.

Figure 6.—Pseudotsuga menziesii *stand at toeslope, Steamboat Mountain Research Natural Area.*

Figure 7.—Abies amabilis-Tsuga mertensiana *community with understory of* Rhododendron albiflorum, *Steamboat Mountain Research Natural Area.*

Figure 8.—Open stand and heavy litter in Tsuga mertensiana *community at Steamboat Mountain Research Natural Area.*

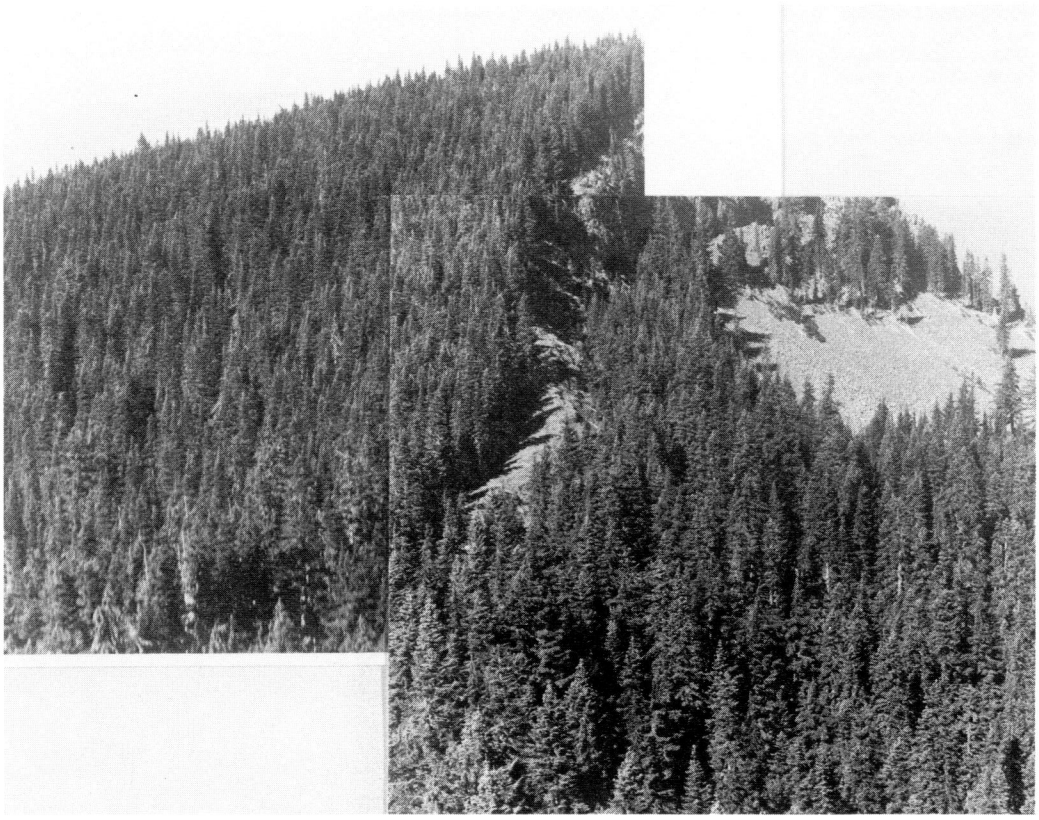

Figure 9.—Composite view of talus slopes, canopy of Abies amabilis-Tsuga mertensiana *community in the right foreground, and* Abies lasiocarpa *on the left.*

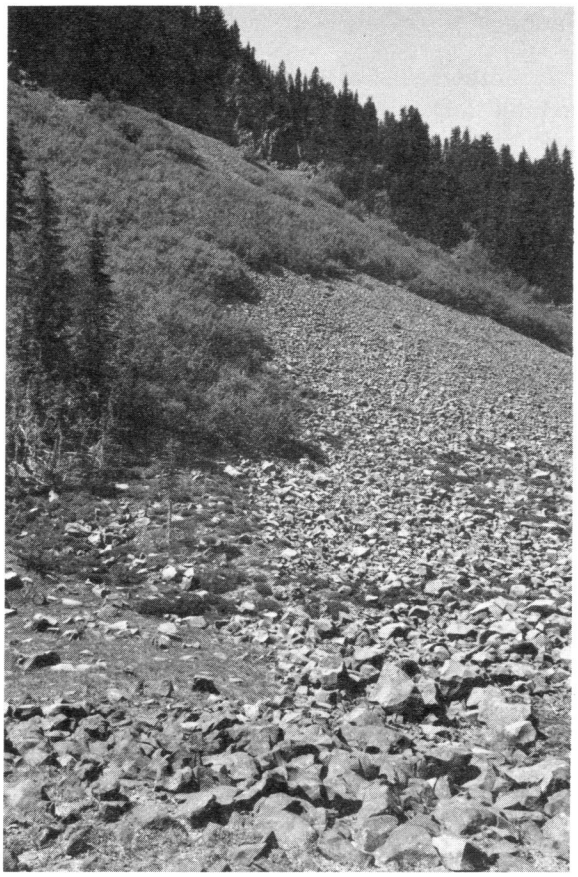

Figure 10.—Closeup of talus slope on north side, Steamboat Mountain Research Natural Area.

Aquatic Habitats

The aquatic habitats within Steamboat Mountain RNA are typical of the subalpine forest zone in the high Cascades. Four wetlands, comprising 19 ha, are in the southwest and northeast portions of the RNA (WET in fig. 3). One of these includes a small lake due north of the summit. The area is commonly used by elk. The other three wetlands are large bogs or montane mires. They are the most floristically rich vegetation types within Steamboat Mountain RNA, comprising 36 percent of the vascular plant species list (Schuller and Frenkel 1981). The most western mire is drained by Tillicum Creek, and the two smaller mires to the south are drained by Mosquito Creek.

Based on transect analysis by W.H. Moir (data on file at Forestry Sciences Laboratory, Research Work Unit 4151, Corvallis, Oregon), the mires exhibit concentric zonation with a somewhat drier outer ring dominated by the shrubs *Spiraea densiflora, Menziesia ferruginea,* and *Salix phylicifolia. Carex aquatilis* is the common understory plant in the outer ring (fig. 11). Forming an inner belt is the *Salix pedicellaris* community including considerable cover of *Vaccinium occidentale, Carex aquatilis, C. luzulina, Aster occidentalis,* and *Dodecatheon jeffreyi.* In the center, the wettest community contains much *Sphagnum* spp. and is dominated by *V. occidentale, C. sitchensis, Dodecatheon jeffreyi,* and *Agrostis thurberiana.* These montane mire communities resemble communities described by Frenkel and others (1986). The Steamboat Mountain mires represent typical mires of the southern Washington Cascade Range and offer outstanding opportunities for research (fig. 12).

In the northwest corner of the RNA a small stand of shrub-dominated vegetation in the riparian zone of Tillicum Creek marks a transition between the herb-dominated wetlands and the cool, moist *Abies amabilis-Tsuga mertensiana-Picea engelmannii* forest. This tangled riparian shrub assemblage includes as prominent species *Alnus sinuata, Spiraea douglasii, Salix phylicifolia,* and *Viburnum edule.*

Figure 11.—Outer ring of montane mire dominated by Menziesia ferruginea *and* Carex aquatilis, *Steamboat Mountain Research Natural Area.*

Figure 12.—Transect across a montane mire at Steamboat Mountain Research Natural Area, showing a Vaccinium/Carex *community, with shrub community and* Picea engelmannii *in the background.*

Fauna

A tentative list of amphibians and reptiles is in table 2. Dominant species of the herpetofauna are: *Dicamptodon copei, Ambystoma gracile, Ascaphus truei, Bufo boreas, Hyla regilla, Rana cascadae,* and *Thamnophis sirtalis.* Large breeding populations of *R. cascadae* occur in the two wet meadows and in the small lake; *A. gracile* breeds in considerable numbers in the small lake. Both neotenic and transformed individuals of *A. gracile* were noted in the late 1960's. An exceptional opportunity exists here to study isolated populations of several amphibian species.

The local avifauna is typical for this portion of the Cascade Range. Especially common on the site are: ravens, cedar waxwings, varied thrushes, golden-crowned kinglets, chestnut-backed chickadees, winter wrens, pine siskins, red-breasted nuthatches, and red crossbills (late August census).

Mammals that are likely to occur on the Steamboat Mountain Research Natural Area are listed in table 3. The area provides especially good habitat for the following species, all of which are known to utilize the area: black bear, marten, elk, black-tailed deer, hoary marmot, and pika. The nonforested habitats on the natural area serve to enrich the mammalian fauna. The wet meadows and meadow-lake system provide excellent habitat for both the Richardson's and heather voles, and the talus fields for the pika, hoary marmot, and bushy-tailed woodrat.

Table 4 is a list of the beetles identified for the area.

Research

During 1972 a series of permanent plots and transects were established within the natural area to provide baseline data on vegetation composition and to allow for measurement of changes in composition, structure, and stand boundaries. Included are (1) a permanent transect, with plots every 100 m, established starting from the base of the south slope to the ridgetop, and down the north side to just east of the small lake (fig. 3); (2) a series of plots in other selected forest stands; and (3) a 200-m transect across a forest-bog ecotone. These were established cooperatively by the USDA Forest Service and the Coniferous Forest Biome, International Biological Program.

In nineteen 1000-m^2 plots, all trees larger than 5 cm in diameter at breast height (d.b.h.) were tagged, measured for d.b.h., and vigor coded; and a sample of tree heights was taken. Data for basal area and tree heights referred to in previous sections come from these plots.

Plots were remeasured in 1984. At that time there were 50 dead trees, and 43 had grown into the 5-cm-d.b.h. category. The annual mortality rate is 0.825 percent which is relatively low for forests in the western Cascades. Sixty-six percent of the mortality was *Abies lasiocarpa*, all on the south slope. Most of this mortality was attributed to natural tree senescence. Other causes of mortality were suppression, windsnap, and snow or ice breakage.

The RNA has also been used for studies of annual cone production, seeding habits, and seed quality of *Abies amabilis, A. lasiocarpa, Picea engelmannii,* and *Tsuga mertensiana* (Franklin 1968, Franklin and others 1974). The data as of 1973 (part of a set collected throughout the Cascades) show that upper-slope species produce medium to heavy cone crops at 2- to 3-year intervals at most locations. The 1968 crop was the heaviest observed. Annual cone counts are still being made. Other studies include subalpine community types in the high Cascades and their relation to environmental features (Franklin 1966, Minore and Dubrasich 1978) and successional relationships in subalpine forests (Franklin 1966, Franklin and Mitchell 1967).

Additional research could focus on: (1) actual and potential forest and wetland productivity; (2) influence of human activities on environmental quality (serving as an undisturbed control area); (3) behavior and influence of various forest pathogens, especially balsam woolly aphid (*Adelges piceae*); (4) relationship of fauna to varied vegetation types; (5) aquatic biology of an undisturbed subalpine lake; (6) holocene vegetation study employing stratigraphic assemblages of pollen together with datable tephra layers derived from sequences of volcanic eruptions; (7) recovery of vegetation from clearcut areas along the north boundary in comparison with adjacent intact *Abies amabilis* forests; and (8) comparison of naturally regenerated and planted clearcuts at high elevations.

History of Disturbance

The only known major natural disturbance in the RNA has been fire. Tree ages differ on each side of the mountain. On the south side, tree ages at breast height range from 97 years for a *Picea engelmannii* to 151 years for an *Abies lasiocarpa.* Average age on the south side is 131 years. Stand ages on the north side are considerably older, indicating a longer time since fire. The oldest and the youngest trees, both *A. amabilis,* are 396 and 193 years old; the average age is 256 years.

Two small (18 ha) clearcuts are located along the north margin. Both units were cut in 1971 (fig. 3). Unit 5 was broadcast burned in 1974 and planted that fall with *Abies procera.* Subsequent plantings in 1974 and 1979 included *A. procera, Picea engelmannii, Pinus monticola,* and *A. lasiocarpa.* The stand is fully stocked and includes *A. amabilis* and *Pseudotsuga menziesii* as well. The *Pseudotsuga* is doing poorly at this elevation. Unit 6 was well stocked with young trees after logging so it was not broadcast burned. The stand is fully stocked with *Abies lasiocarpa, A. procera, A. amabilis, Tsuga mertensiana,* and *T. heterophylla.*

Maps and Aerial Photographs

Special maps applicable to Steamboat Mountain RNA are: **Topographic**—7-1/2′ Steamboat Mountain (1970), Sleeping Beauty (1970), Lone Butte (1965), and Quartz Creek Butte (1965); Washington quadrangles, scale 1:24,000, issued by the U.S. Geological Survey; and **Geologic**—Geologic Map of Washington, scale 1:500,000 (Huntting and others 1961). The District Ranger (Mount Adams Ranger District) or Forest Supervisor (Gifford Pinchot National Forest, Vancouver, Washington) can provide information on the most recent aerial photographs and forest type maps for the area.

Metric and English Equivalents

1 centimeter (cm) = 0.4 inch
1 meter (m) = 3.3 feet
1 kilometer (km) = 0.6 mile
1 hectare (ha) = 2.5 acres

Table 1—Partial list of plants found in Steamboat Mountain Research Natural Area[1/]

Plant	Scientific name	Common name
Trees	*Abies amabilis* (Dougl.) Forbes	Pacific silver fir
	Abies lasiocarpa (Hook.) Nutt.	Subalpine fir
	Abies procera Rehder	Noble fir
	Picea engelmannii Parry ex Engelm.	Engelmann spruce
	Pinus albicaulis Engelm.	Whitebark pine
	Pinus monticola Dougl. ex D. Don	Western white pine
	Pseudotsuga menziesii (Mirbel) Franco	Douglas-fir
	Tsuga heterophylla (Raf.) Sarg.	Western hemlock
	Tsuga mertensiana (Bong.) Carr.	Mountain hemlock
Shrubs	*Alnus sinuata* (Regel) Rhydb.	Sitka alder
	Menziesia ferruginea Smith	Fool's huckleberry
	Pachistima myrsinites (Pursh) Raf.	Mountain-box
	Phyllodoce empetriformis (SW.) D. Don	Red mountainheather
	Rhododendron albiflorum Hook.	Cascades azalea
	Rubus lasiococcus Gray	Dwarf blackberry
	Rubus pedatus J.E. Smith	Strawberry-leaf blackberry
	Salix pedicellaris Pursh.	Bog willow
	Salix phylicifolia L.	Tea-leaved willow
	Spiraea densiflora Nutt.	Subalpine spirea
	Spiraea douglasii Hook.	Douglas' spirea
	Vaccinium membranaceum Dougl.	Big huckleberry
	Vaccinium occidentale Gray	Westernbog huckleberry
	Vaccinium ovalifolium Smith	Early blueberry
	Valeriana sitchensis Bong.	Sitka valerian
	Viburnum edule (Michx.) Raf.	Moosewood viburnum

See footnotes at end of table.

Table 1—Partial list of plants found in Steamboat Mountain Research Natural Area[1/] (continued)

Plant	Scientific name	Common name
Herbs	*Achlys triphylla* (Smith) DC.	Deerfoot vanillaleaf
	Agrostis thurberiana Hitchc.	Thurber bentgrass
	Anemone deltoidea Hook.	Threeleaf anemone
	Aster occidentalis (Nutt.) T. & G.	Western mountain aster
	Bromus vulgaris (Hook.) Shear	Columbia brome
	Carex L.	Sedge
	Carex aquatilis Wahl.	Water sedge
	Carex luzulina Olney	Woodrush sedge
	Carex rostrata Stokes	Beaked sedge
	Carex sitchensis Prescott	Sitka sedge
	Clintonia uniflora (Schult.) Kunth	Queencup beadlily
	Cornus canadensis L.	Bunchberry
	Cryptogramma crispa (L.) R. Br.	Rock-brake
	Dodecatheon jeffreyi van Houtte	Jeffrey's shooting star
	Eleocharis palustris (L.) R. & S.	Common spike-rush
	Hieracium albiflorum Hook.	White-flowered hawkweed
	Lomatium martindalei Coult. & Rose	Martindale's lomatium
	Luetkea pectinata (Pursh) Kuntze	Luetkea
	Mertensia paniculata (Ait.) G. Don	Smooth panicle bluebells
	Nothochelone nemorosa (Dougl.) Straw	Woodland beard-tongue
	Oxalis trilliifolia Hook.	Great oxalis
	Phlox diffusa (Benth.)	Spreading phlox
	Pyrola secunda L.	One-sided wintergreen
	Sedum divergens Wats.	Spreading stonecrop
	Smilacina stellata (L.) Desf.	Starry solomonplume
	Tofieldia glutinosa (Michx.) Pers.	Sticky tolfieldia
	Trillium ovatum Pursh	White trillium
	Viola orbiculata Geyer	Round-leaved viola
	Xerophyllum tenax (Pursh) Nutt.	Beargrass
Moss	*Sphagnum* spp. L.[2/]	Sphagnum

[1/] Nomenclature follows Hitchcock and Cronquist (1976).

[2/] Nomenclature follows Conrad and Redfearn (1979).

Table 2–Tentative list of amphibians and reptiles for Steamboat Mountain Research Natural Area[1/]

Order	Scientific name	Common name
Caudata	**Ambystoma gracile*	Northwestern salamander
	**Ambystoma macrodactylum*	Long-toed salamander
	**Dicamptodon copei*	Cope's salamander
	Dicamptodon ensatus	Pacific giant salamander
	Ensatina eschscholtzi	Ensatina
	**Taricha granulosa*	Rough-skinned newt
Anura	**Ascaphus truei*	Tailed frog
	**Bufo boreas*	Western toad
	**Hyla regilla*	Pacific treefrog
	**Rana cascadae*	Cascades frog
Squamata:		
Lizards	*Gerrhontus coeruleus*	Northern alligator lizard
Snakes	*Charina bottae*	Rubber boa
	**Thamnophis ordinoides*	Northwestern garter snake
	**Thamnophis sirtalis*	Common garter snake

*Known to occur in the area.

[1/]Nomenclature follows Stebbins (1966). Information supplied by Chris Maser, wildlife biologist, U.S. Department of the Interior, Bureau of Land Management (Forestry Sciences Laboratory, Corvallis, Oregon).

Table 3–Tentative list of mammals for Steamboat Mountain Research Natural Area[1/]

Order	Scientific name	Common name
Insectivora	*Neurotrichus gibbsi*	Shrew-mole
	Scapanus orarius	Coast mole
	Sorex bendirii	Marsh shrew
	Sorex obscurus	Dusky shrew
	Sorex palustris	Northern water shrew
	Sorex trowbridgeii	Trowbridge shrew
	Sorex vagrans	Wandering shrew
Chiroptera	*Eptesicus fuscus*	Big brown bat
	Lasionycteris noctivagrans	Silver-haired bat
	Lasiurus cinereus	Hoary bat
	Myotis californicus	California myotis
	Myotis evotis	Long-eared myotis
	Myotis lucifugus	Little brown myotis
	Myotis volans	Long-legged myotis
	Myotis yumanensis	Yuma myotis
	Plecotus townsendi	Townsend big-eared bat

See footnote at end of table.

Table 3—Tentative list of mammals for Steamboat Mountain Research Natural Area[1/] (continued)

Order	Scientific name	Common name
Lagomorpha	*Lepus americanus*	Snowshoe hare
	Ochotona princeps	Pika
Rodentia	*Aplodontia rufa*	Mountain beaver
	Castor canadensis	Beaver
	Clethrionomys gapperi	Gapper red-backed vole
	Erethizon dorsatum	Porcupine
	Eutamias townsendi	Townsend chipmunk
	Glaucomys sabrinus	Northern flying squirrel
	Marmota caligata	Hoary marmot
	Microtus longicaudus	Long-tailed vole
	Microtus oregoni	Oregon vole
	Microtus richardsoni	Richardson's vole
	Neotoma cinerea	Bushy-tailed woodrat
	Peromyscus maniculatus	Deer mouse
	Phenacomys intermedius	Heather vole
	Spermophilus saturatus	Cascade mantled ground squirrel
	Tamiasciurus douglasi	Chickaree
	Thomomys talpoides	Northern pocket gopher
	Zapus princeps	Pacific jumping mouse
Carnivora	*Canis latrans*	Coyote
	Felis concolor	Mountain lion or cougar
	Lynx rufus	Bobcat
	Martes americana	Marten
	Mustela erminea	Short-tailed weasel or ermine
	Mustela frenata	Long-tailed weasel
	Mustela vison	Mink
	Spilogale putorius	Spotted skunk
	Ursus americanus	Black bear
Artiodactyla	*Cervus canadensis*	Elk or wapiti
	Odocoileus h. columbianus	Black-tailed deer

[1/]Nomenclature follows Burt and Grossenheider (1976). Mammals listed are believed to use the area at some time of year. Information supplied by Chris Maser, wildlife biologist, U.S. Department of the Interior, Bureau of Land Management (Forestry Sciences Laboratory, Corvallis, Oregon).

Table 4—Beetles collected in Steamboat Mountain Research Natural Area[1/]

Order	Scientific name
Coleoptera	*Acanthocinus obliquus*
	Anoploclera chrysocoma
	Buprestis rusticorum
	Chrysobothris cavinipennis
	Chrysobothris monticola
	Melanophila drummondi
	Monochamus oregonensis
	Pachyta armata
	Scaphinotus a. angusticollis

[1/]Beetles collected and identified by Chris Maser, wildlife biologist, U.S. Department of the Interior, Bureau of Land Management (Forestry Sciences Laboratory, Corvallis, Oregon). Specimens compared with Oregon State University, Department of Entomology, insect collection.

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