PRESERVE ANALYSIS: SADDLE MOUNTAIN

Prepared by

PAUL B. ALABACK

ROBERT E. FRENKEL

OREGON NATURAL AREA PRESERVES ADVISORY COMMITTEE

to the STATE LAND BOARD

Salem, Oregon
October, 1978

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and

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PREFACE

The purpose of this preserve analysis is to assemble and document the significant natural values of Saddle Mountain State Park to aid in deciding whether to recommend the dedication of a portion of Saddle Mountain State Park as a natural area preserve within the Oregon System of Natural Areas. Preserve management, agency agreements, and management planning are therefore not a function of this document.

Because of the outstanding assemblage of wildflowers, many of which are rare, Saddle Mountain has long been a mecca for botanists. It was from Oregon's botanists that the Committee initially received its first documentation of the natural area values of Saddle Mountain. Several Committee members and others contributed to the report through survey and documentation. Glenn Juday provided unpublished data on old-growth forests; Jean L. Siddall prepared the list of rare, threatened or endangered plant species; and Professor Kenton Chambers, Curator of the Oregon State University Herbarium, provided the Committee with a verified list of vascular plant taxa known to be on Saddle Mountain and a habitat list for the flora. Additional scientific data for this report was gathered during a field survey of Saddle Mountain in May, 1977. In particular, we would like to recognize Kevin Howe for describing the aquatic ecosystems and Professor Robert Storm for his annotated lists of animals either known from the Mountain or expected to be there. Bob Martin and Gregg Bonacker demonstrated their cartographic skills in preparing the final versions of several maps. We also acknowledge the help of the State Parks and Recreation Branch of the Highway Division staff in providing basic data and information about Saddle Mountain State Park.

Paul B. Alaback
Robert E. Frenkel
October 1, 1978

SUMMARY

A 1,653 acre tract of State land lying within Saddle Mountain Sate Park in central Clatsop County, northwestern Oregon, is proposed as the Saddle Mountain Natural Area Preserve under the authority of ORS 273.562-273.597. The parcel, located in Sections 28, 29, 32, 33, and 34 of T.6 N., R. 8 W., is about ten miles from the Pacific Ocean and ranges in elevation from 380 to 3,283 feet. The surrounding land is privately owned, largely by Crown Zellerbach Corporation. This surrounding land is currently being logged intensively. The principle natural features which would be protected within the proposed preserve include:

- A rich and diverse flora for which Saddle Mountain is known. Botanists come from many areas to study the plants here, some of which are unique "Saddle Mountain endemics", some may be relict populations left after the last major advance of ice. Six of the species are on the national list of species proposed for threatened or endangered status.
- Old-growth Sitka spruce forest, near the inland limit of its range in Oregon. Saddle Mountain is close enough to the coast to be under the influence of marine air.
- Mature noble fir and western hemlock forests with trees over 100 years old. This area provides excellent examples of the forests once typical of the northern Coast Range which are now rapidly disappearing.
- Undisturbed headwaters of creeks which still have native anadromous fish runs. These, too, are becoming scarce and are very important for study.
- Grassy bald and rock garden communities found on the highest Coast Range mountains are well represented here on the three peaks of Saddle Mountain.
- Resident populations of birds, fish, mammals, amphibians dependent on the various habitats found here. Most noteworthy, perhaps, are the Roosevelt elk and the reticulate sculpin (a fish).
- Geologic formations both unique and representative of the Coast Range.

If dedicated as a Natural Area Preserve, Saddle Mountain will provide a unique opportunity for comparing long-term effects of (private) timber management on the adjacent lands with the natural conditions within the Preserve. Not only would Saddle Mountain allow comparisons of the forest communities, but the aquatic fishes, could also provide comparisons. Furthermore, the variation in elevation, slope, aspect, soils and terrestrial and aquatic biota within such a small area makes the proposed preserve well-suited for various ecological studies and educational activites.

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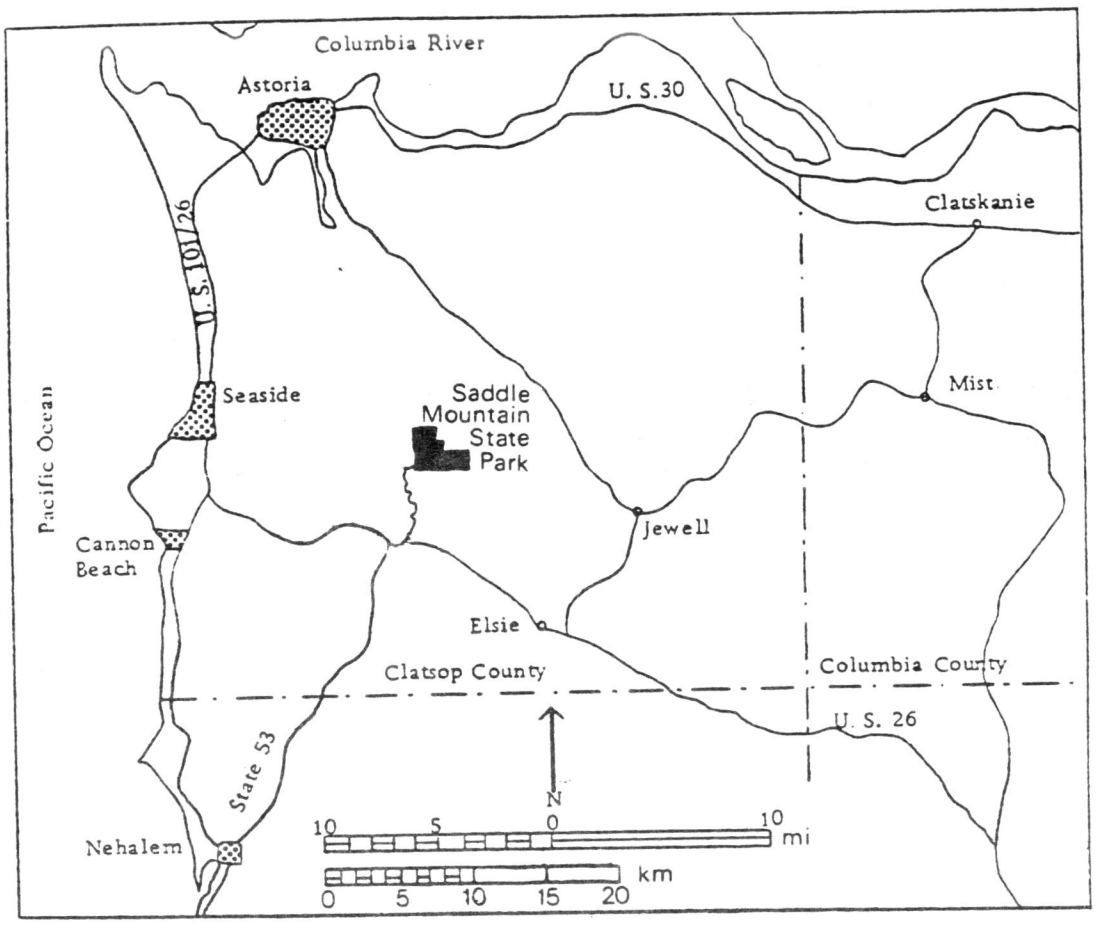

Figure 1. General location of Saddle Mountain State Park. Adapted from Penoyer, 1977.

PRESERVE ANALYSIS: SADDLE MOUNTAIN

Name of Natural Area

"Saddle Mountain Natural Area Preserve" is proposed as the name for this preserve. Located within Saddle Mountain State Park, the candidate area includes much of the prominent precipitous mountain which attains an elevation of over 900 m (3,000 ft.) (Figure 1 and 2).

Reasons for Preservation

Saddle Mountain presents an unusually diverse area, with steep topography and proximity to the ocean providing a dramatic change in climate and vegetation as the mountain is ascended or traversed.

Saddle Mountain is a refugium for various plant species from previous periods of both cooler and warmer climate giving it an unusually rich flora. (Detling, 1954). Old-growth forests, some of which contain among the largest western hemlock in the Oregon Coast Range, Sitka spruce communities, and even a reported relict silver fir stand, are found within the proposed preserve and will help fill several natural area cell needs for the Coast Range.

The area also features deeply incised perennial streams with natural debris dams, which show little disturbance by elk or man. The balds, or high elevation meadows, are of limited distribution in Oregon; they also feature unusual plant communities and plant species which are not found in other state or federal preserves in the Coast Range.

The location of these diverse elements within a relatively small area makes the proposed preserve of special value for various types of scientific research and educational activities.

Designation of the Saddle Mountain Natural Area Preserve will enhance the Oregon system of natural areas by:

1. Preserving rare, threatened or endangered plants including Cardamine pattersonii (Saddle Mountain bittercress) and

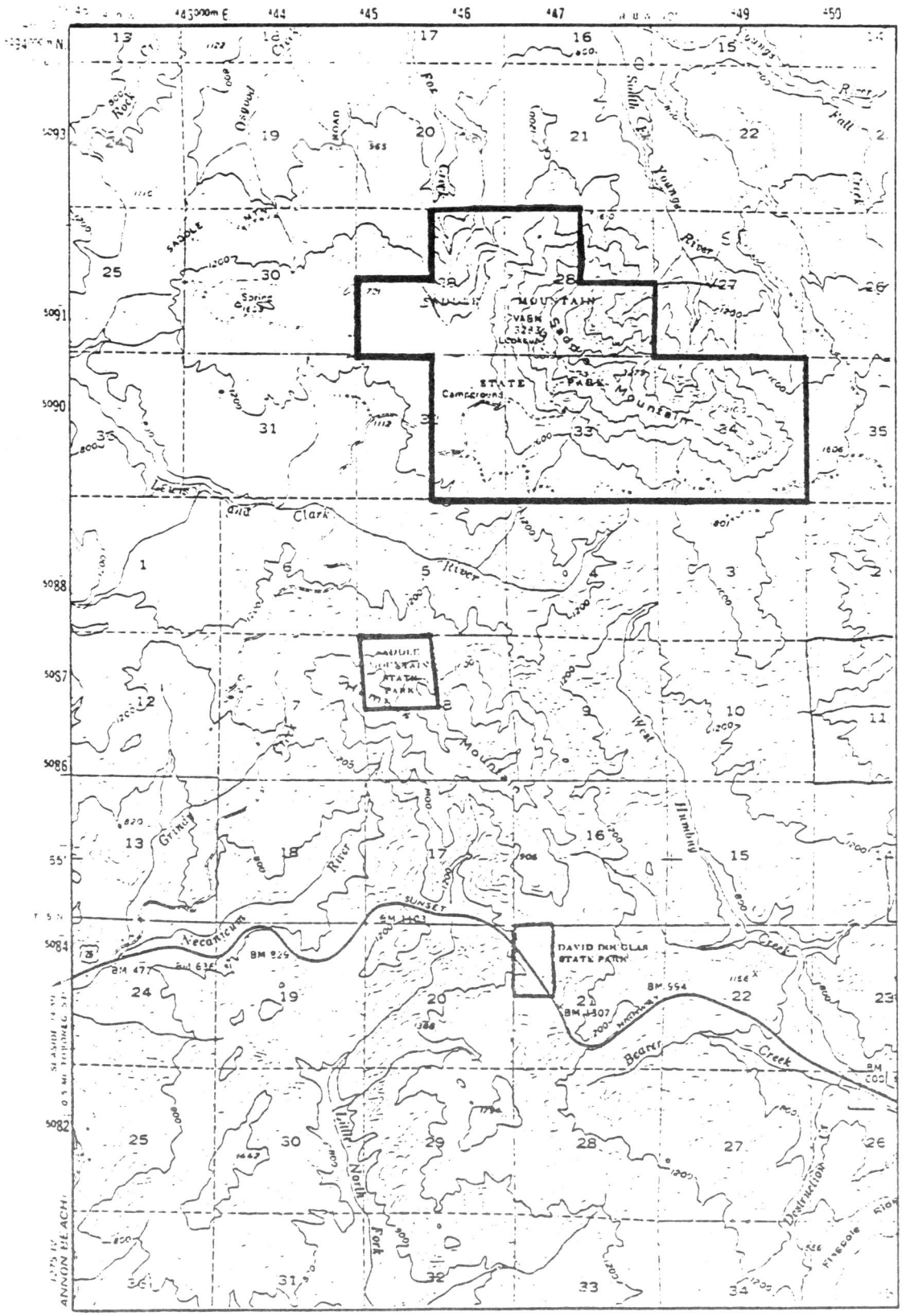

Figure 2. Location of State Park properties.

Saxifraga occidentalis v. latipetiolata (western saxifrage) among others (Table 4),

2. Encouraging further taxonomic and/or biosystematic research on endemism and plant breeding systems,

3. Filling the following research natural area cell needs not filled by any other area in the Coast Range (Dyrness et al., 1975):

   a. western hemlock/swordfern in central to northern portion of the Coast Range,

   b. old-growth Douglas-fir — western hemlock/swordfern in central to northern portion of the Coast Range,

   c. Grass bald on Coast Range mountain,

   d. "rock garden" community on Coast Range mountain,

   e. typical headwaters section of a high elevation stream with noble fir or Pacific silver fir forest,

   f. Protecting habitat of 19 plant species listed on the Oregon Provisional List (Siddall, 1977) (Appendix X and Table 4).

Ownership and Boundary Selection

Ownership

All land being considered for status as a Natual Area Preserve is now managed by the State Parks Branch of the State Highway Division of the Department of Transportation. Crown Zellerbach holds much of the adjacent land and currently is logging it. A 669 ha (1,653 acrea) section of the State Parks and Recreation Branch land is proposed as a Natural Area Preserve with boundaries as shown in Figure 3.

The park is composed of two units: Saddle Mountain and Humbug Mountain. The latter is being considered for sale or trade and is not considered in this report. The portion of the Saddle Mountain unit

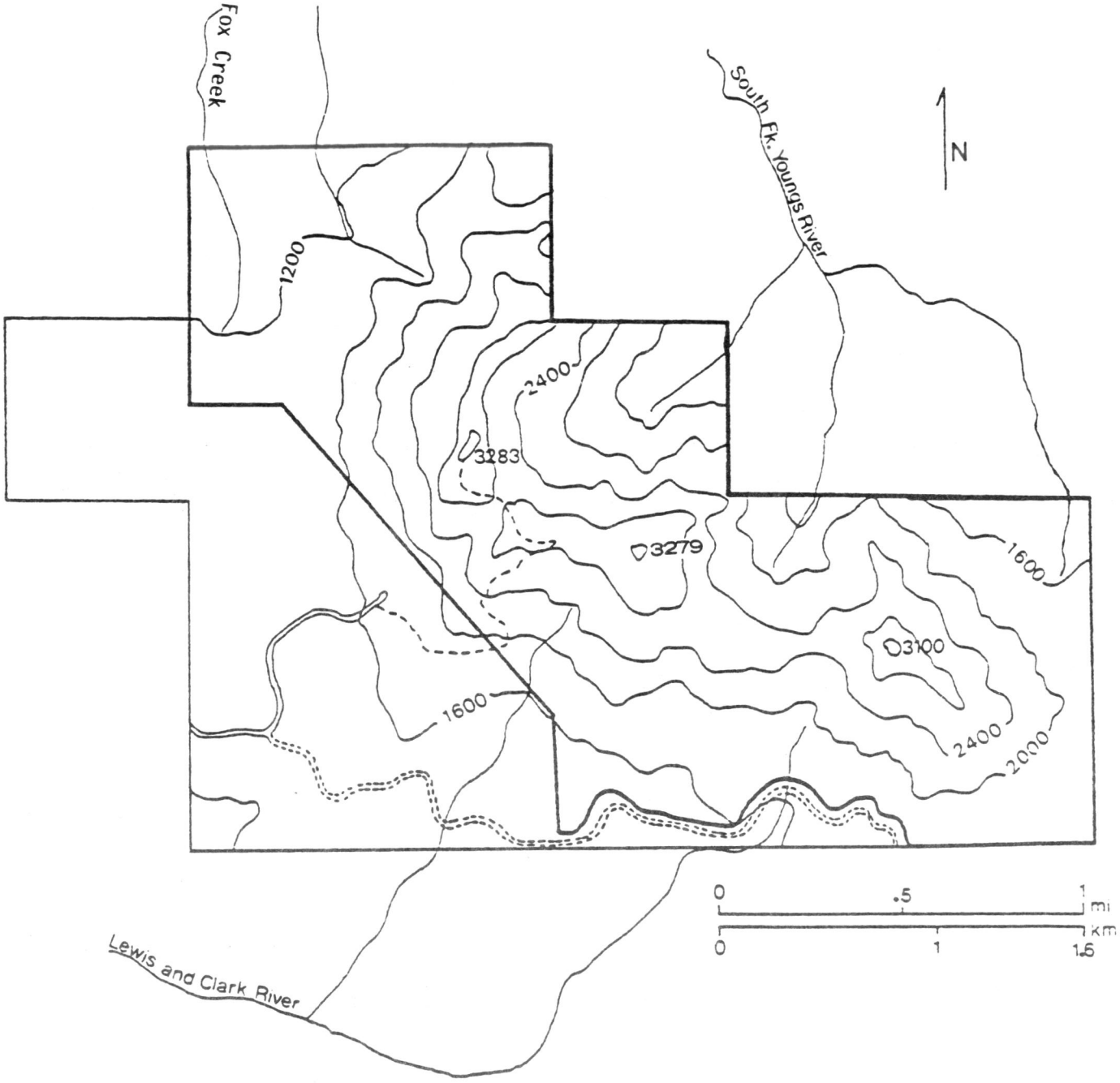

Figure 3. Saddle Mountain State Park with proposed Natural Area Preserve boundaries.

included is the proposed preserve occupies the area shown in Figure 3. This includes the NW 1/4, SW 1/4 and SE 1/4 of Section 28; the NE 1/4 and a portion of the SE 1/4 of Section 29; portions of the NW 1/4 and SW 1/4 and the entire E 1/2 of Section 33; and most of Section 34, T. 6 N., R. 8 W., Willamette Meridian (Figure 2 and 3).

Boundary Selection

Protection zones within the proposed Saddle Mountain Natural Area Preserve are shown in Figure 4. Boundaries were chosen so as to protect the most significant natural area values at Saddle Mountain, to include the greatest diversity of biotic systems, and to include areas that would be least affected by changes in the management of the surrounding land area.

The following generalized criteria were used in determining primary protection boundaries:

1. Protection of an ecosystem, representative or unique, needed as part of the State System of Natural Areas.
2. Protection of a population (or several populations) of plants or animals.
3. Assurance of the defensibility of the preserve area; i.e., the area must be able to retain and/or develop its natural character.
4. Preservation of the integrity of the preserve area, i.e., the area must substantially display its natural character.
5. Assurance that the preserve is viable, i.e., that is can perpetuate itself.

Following these five criteria, the key features have been circumscribed in Figure 4 as primary protection zones.

Surrounding the primary protection zones is a "zone of influence" which is an area that has an important relationship to the primary protection zone (Figure 4). The following criteria were considered in delineating the zone of influence:

1. Biological Influence. The zone contributes to nutrient flow or other biological aspects of the primary protection zone.

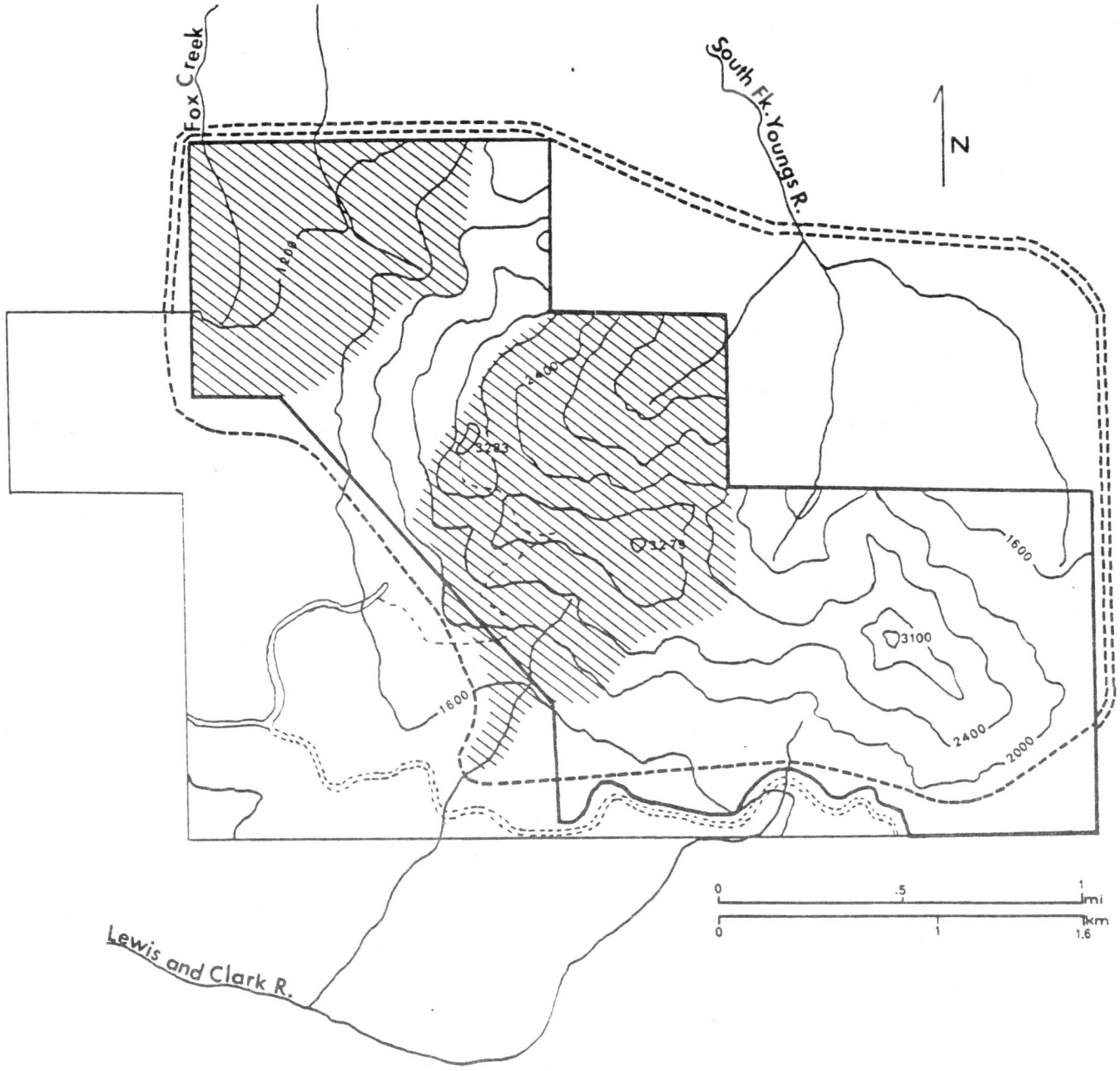

Figure 4. Proposed natural area preserve boundaries with primary protection zones and areas of influence.

2. Physical Influence. The zone constitutes a buffer between the primary protection zone and physical forces such as erosion (including landslides and slumping) or damaging winds.

3. Human Influence. The zone, by its vegetation or topography, affects access to the primary protection zone and/or presents a distance from a threat to the primary protection zone; threats might be due to the presence of damaging human activities such as eroding road cuts or intensive recreational development or use with associated trampling and soil compaction.

Sensitivity Classes

The Saddle Mountain vegetation types have been classified into three sensitivity classes (Figure 5). These units were derived primarily from the generalized vegetation patterns and topography (see Figure 9).

Sensitivity Class I (the most sensitive class) includes the high meadows and rocky slopes where many of the more unusual plant species occur, steep side slopes subject to soil erosion, and riparian vegetation along some of the river or creek banks.

Sensitivity Class II includes those areas that would normally recover reletively rapidly from disturbance and use. These areas include the brushy slopes on the north-facing part of the mountain, riparian vegetation along the major lower reaches of creeks and rivers, and some forests on steep slopes where trampling may easily damage the understory vegetation.

Sensitivity Class III includes those areas most able to withstand trampling and other human uses. The flat areas or gentle slopes with mostly vigorously growing second growth deciduous and coniferous forests comprise most of this class.

Sensitivity classification applies only to an area's ability to withstand disturbance and is not intended to imply greater or lesser natural area values. The classification could, however, be used as a rough guide to enable the location of unavoidable disturbances or developments in areas most able to withstand them.

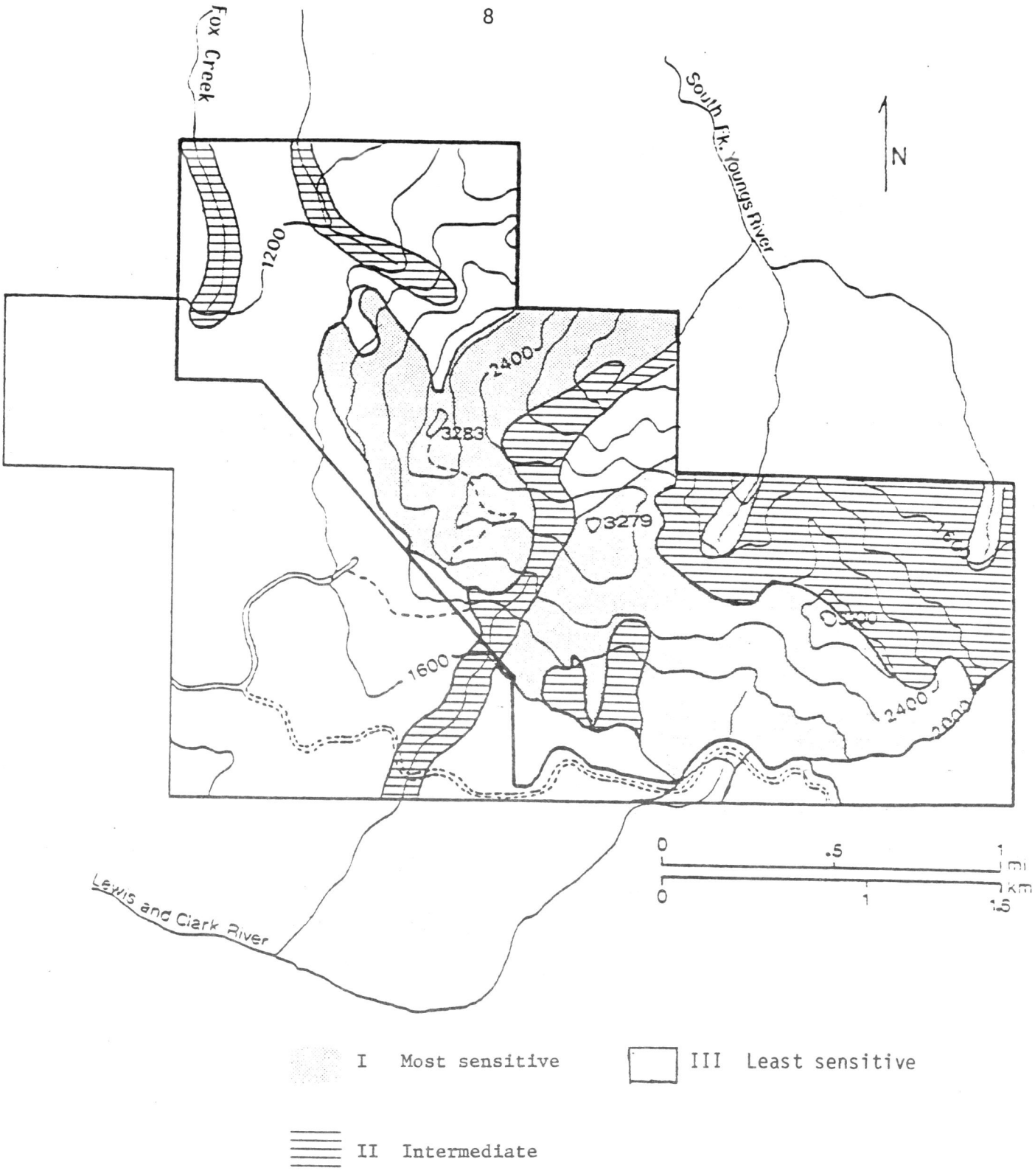

Figure 5. Proposed natural area preserve with sensitivity classes.

General Description

Setting

Saddle Mountain State Park is in the center of Clatsop County in northwestern Oregon, 16 km (10 mi.) inland from the Pacific Ocean and 11 km (7 mi.) by road north of the Sunset Highway (U.S. 26) at Necanicum Junction. The park is reached by taking the Sunset Highway to the Necanicum Junction and then driving the paved entrance road to the north (Figure 1).

The western portion of the park is relatively flat and is covered with young trees and shrubs which have become established after a long period of cutting and occasional fire. The remainder of the park consists of the steep cliffs and slopes of Saddle Mountain itself. The mountain trends in a northwest-southeast direction and is marked by three main peaks nearly 1,000 m (3,200 feet) in elevation, the tallest being the northwest peak at 1,001 m. The slopes and saddles are densely carpeted with forests and brush; sheer rock faces and meadows are present on the summits.

In the 1930's the Civilian Conservation Corps built the entrance road, other improvements, and constructed a trail to the summit of the west peak where, until recently, there was a lookout tower.

Climate

The lower elevations of Saddle Mountain enjoy a mild moist maritime climate year around (Table 1 and 2). In Astoria, to the north, growing seasons average 272 days. The summit of the mountain is covered by ice and snow for much of the winter. The more easterly portions of the mountain have greater temperature flucuations and less precipitation. Cool northwesterly winds dominate in summer; relatively mild southwesterly winds dominate in winter.

The majority of the yearly rainfall occurs between October and March. The steep v-shaped notches of the mountain massif, oriented to

the west, funnel additional moisture during these storms and provide for a lush local vegetation. Rainfall probably exceeds 300 cm (120 inches) on the upper west-facing slopes. Little rainfall occurs during the summer, but frequent fog provides moisture for many plants. Despite the heavy annual rainfall, many plants suffer from water stress during the summer when the small amount of stored soil moisture is depleted.

Table 1. Climatic data for Astoria, Oregon directly north of Saddle Mountain 30 km and near sea level.*

Month	Mean Temperature °C (°F)		Precipitation mm (inches)	
December	6	(43)	280	(12)
February	6	(43)	240	(9)
April	10	(49)	130	(5)
June	12	(58)	76	(3)
August	17	(62)	25	(1)
October	12	(54)	150	(6)
Annual	11	(51)	1,956	(77)

*Source: U.S. Department of Commerce, 1972. This is the nearest long term record to the mountain but is not representative of climate conditions on the mountain.

Table 2. Climatic data for Jewell, Oregon, elevation 491 m, to the east of Saddle Mountain where it is slightly drier and warmer during the summer.*

Month	Mean Temperature °C (°F)		Precipitation mm (inches)	
December	3	(38)	300	(12)
February	5	(41)	240	(9)
April	9	(48)	130	(5)
June	14	(58)	50	(2)
August	17	(63)	26	(1)
October	12	(53)	140	(6)
Annual	10	(50)	1,753	(69)

*Source: U.S. Department of Commerce, 1972.

Geology

Description. Saddle Mountain has been the subject of numerous geological studies over the years (Layfield, 1936; Baldwin, 1952; Cooper, 1977; Penoyer, 1977). Its prominence in the northern Coast Range and large accessible outcroppings may be contributing factors. Penoyer (1977) provided the most recent work on the descriptive and historical geology of the Saddle Mountain area and his paper appears to be the best general reference.

Saddle Mountain, like the Coast Range in general, is of Tertiary origin (Figure 6). The oldest rock units are those of the Oswald West mudstones of Oligocene and early Miocene age; they were deposited in an open marine deep water environment (as indicated by foraminifera). Turbidity currents (currents created by fluids of different density caused by suspended sediments) from a south to southeast source are believed to have caused the interbedding of sandstone and mudstone.

The Silver Point member sandstones are rythmically bedded carbonaceous and micaceous laminated sandstone and siltstone. The turbidity flows are believed to have originated from a delta 28 km to the south and east of the park.

The upper Silver Point sandstones are finer grained and have foraminifera present, indicating deeper water and lower energy deposition.

Generalized uplift and high angle faulting resulting from the convergence of the Juan de Fuca and North American Plates during the Mid-Miocene occured throughout the region (Atwater, 1970). Rapid subsidence and marine transgression followed a short erosional period as evidenced by the accumulation of greater than 600 m of Depoe Bay submarine basaltic breccias and pillow lavas throughout the study area.

Saddle Mountain and Humbug Mountain are believed to have been major volcanic vents during the middle Miocene. Saddle Mountain is considered to be primarily an erosional remnant from these gently sloping co-extensive flows. There are numerous intrusives (10 to 100 m thick) and feeder dikes within volcanic accumulation (Figure 7).

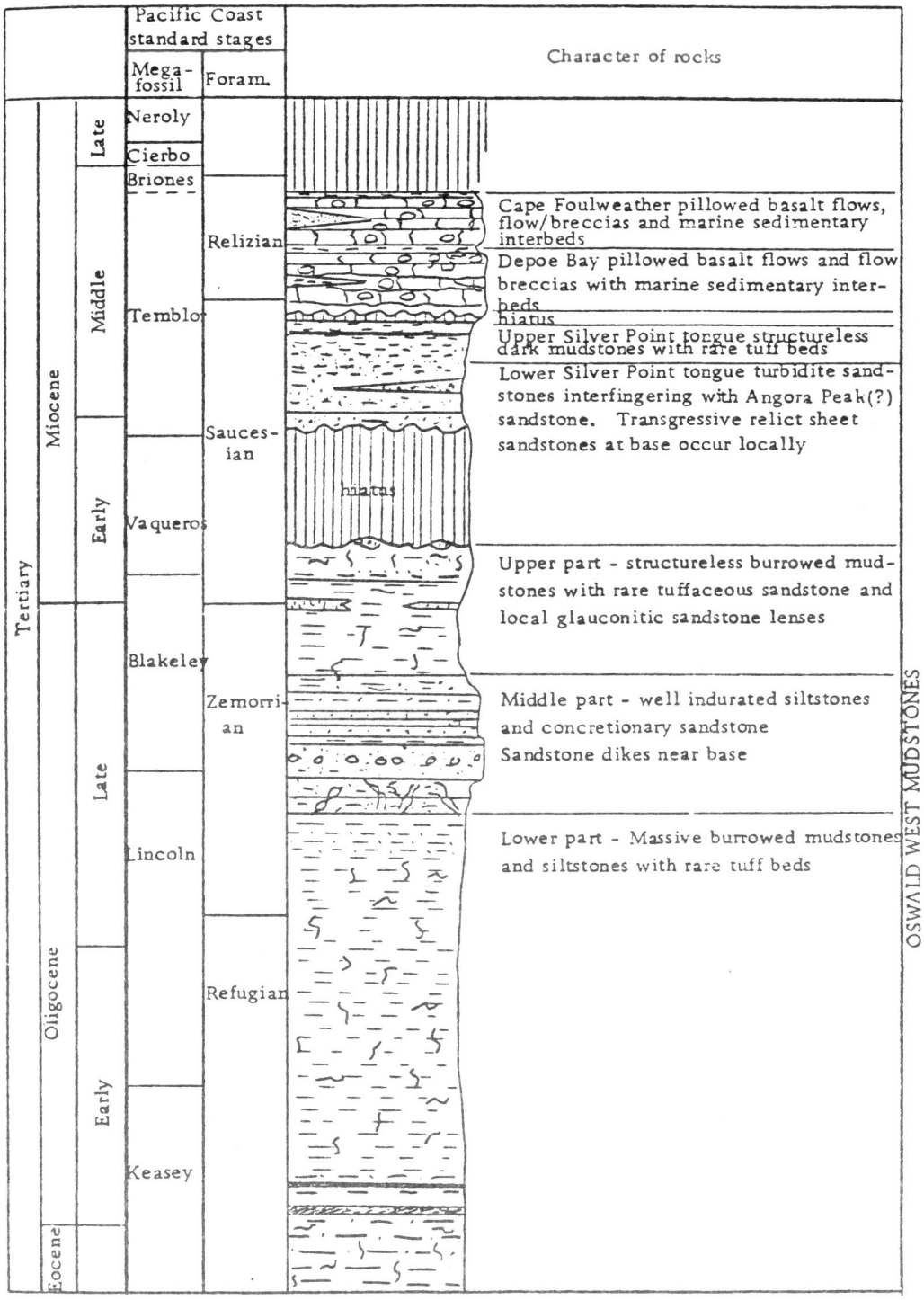

Figure 6. Generalized columnar section for the Saddle and Humbug Mountain area. Adapted from Penoyer (1977).

From high-level photography, Saddle Mountain appears to be at the intersection of two lineaments (possible faults or fractures) which may be zones of weakness along which magma may have vented to the surface (Figure 8). Most fault movement predates the mid-Miocene volcanic extrusion.

Geological hazards. Seventy percent of coastal upland areas in Clatsop and Tillamook Counties have undergone some type of downslope movement (Schlicker et al., 1972). These regions still remain in various stages of instability ranging from active movement locally to a temporarily stable condition in which slight changes in slope or drainage could reactivate movement.

The soft Tertiary rocks in the northwestern Coast Range have a low shear strength and are prone to mass wasting--the most serious geological hazard in the study area (Beaulieu, 1973). Three principle types of mass movement frequently occur at Saddle Mountain: 1) soil creep or debris slide--a slow particle by particle downslope movement of soil and rock; 2) slumping--a process by which a continuous mass of earth slips downhill along a curved basal slip plane so that the mass of earth rotates backward toward the slope; and 3) rock fall--on more vertical slopes when masses of bedrock or earth become detached and rapidly fall.

Slumps occur in sedimentary units underlying slopes greater than 25 percent. Rockslides generally occur in basalt on slopes greater than 50 percent. The lower point tongue of the Astoria Formation has been found to be the least stable (Penoyer, 1977). The interbedded sandstone allows groundwater to percolate between mudstone beds. This increases the pore pressure, saturates the expandable clays, and dissolves some ions and mineral compounds resulting in ready slippage of rock units against each other (Penoyer, 1977).

Seismic activity has been found to be relatively low in the study area. Earthquakes are not considered of great potential hazard to the area except in initiating mass movement (Penoyer, 1977). This would be of concern primarily during the wet winter months.

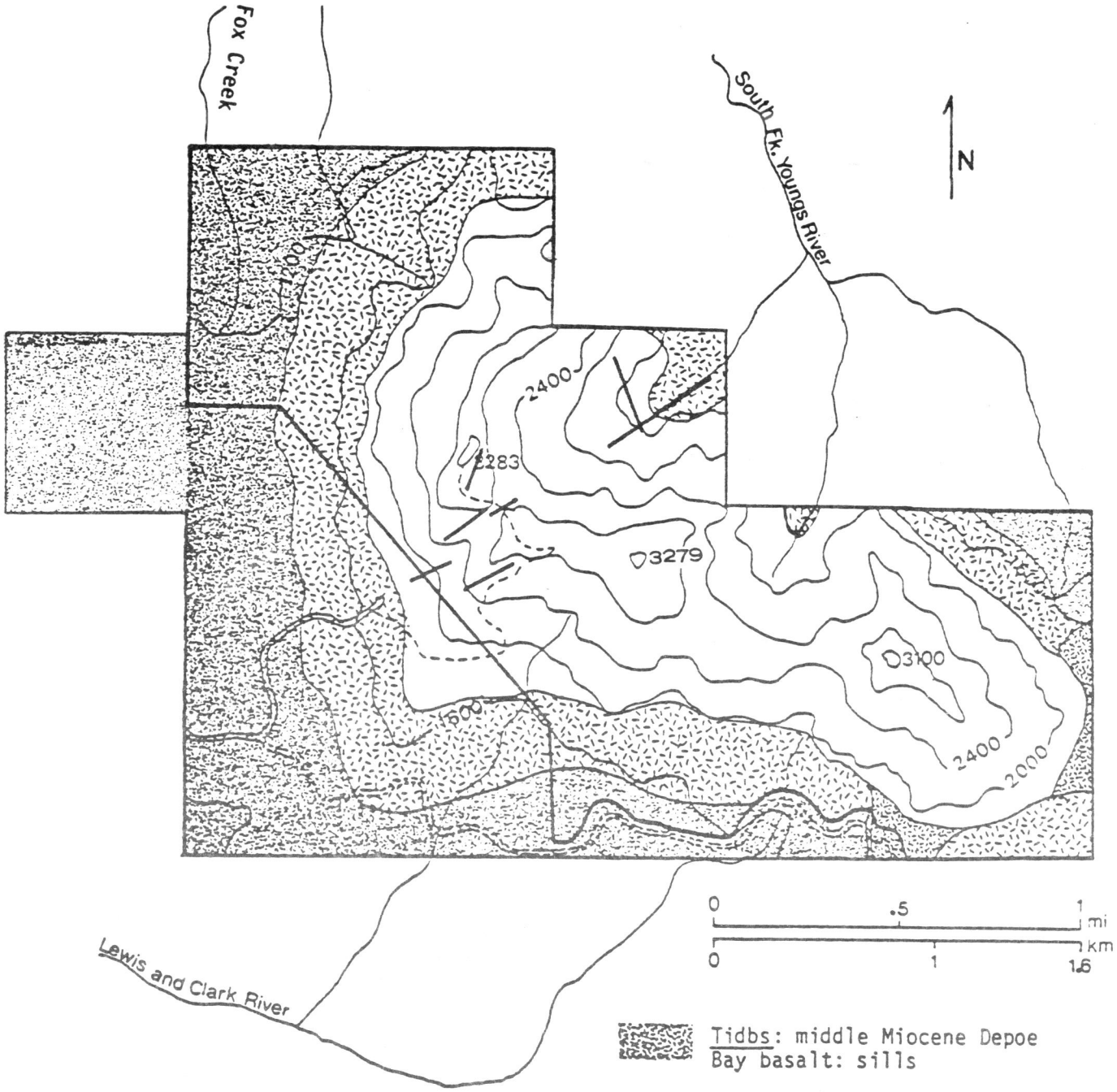

Figure 7. Geology of Saddle Mountain State Park. Adapted from Penoyer (1977).

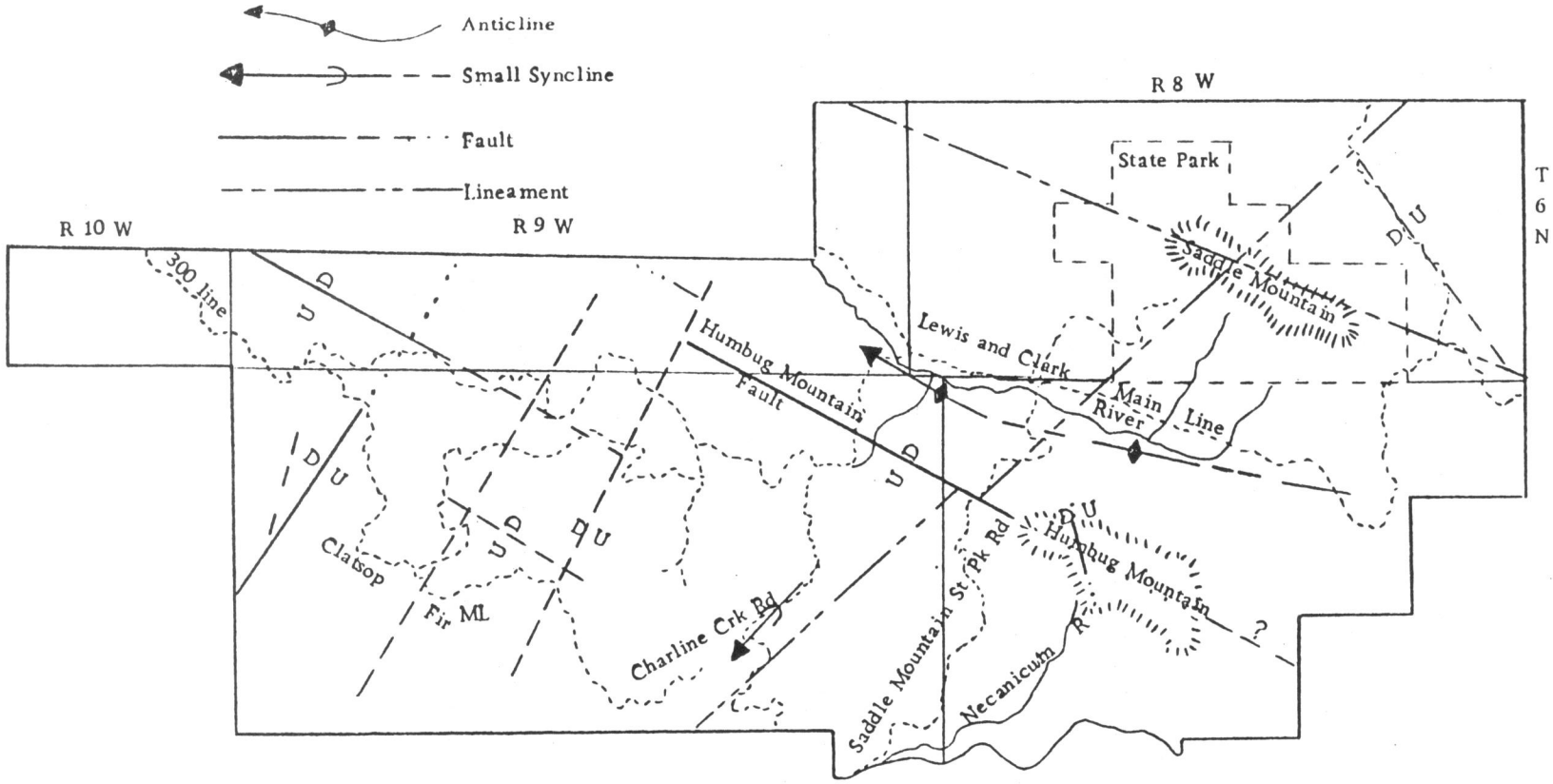

Figure 8. Structure and tectonic lineament of the Saddle and Humbug Mountain area. Lineaments from U-2 Hi-flight Infrared photography. Adapted from Penoyer (1977).

Much evidence of mass movement can be seen on the mountain. Natural slumping can be viewed on the south side of the mountain from the parking lot. On steeper slopes, where thin soil naturally creeps and erodes at a rapid rate, the down-slope movement of soil has been greatly accelerated by the summer presence of large herds of elk. Consequently, most of these slopes are heavily "terraced". These slopes are important as habitat for a fragile flora. Under conditions of saturation, the soils are subject to erosion. Large herds of elk on these upper slopes pose a potential threat to the other natural values of the summit area.

Soils

In 1949 a soil survey was published dealing with the agricultural lands in Clatsop County (Torgerson, 1949). Six soil groups were recognized for the region: 1) soils of hills and uplands (Astoria series), 2) soils of terraces (Willamette, Salem, Grande Ronde, Hebo and Cinebar series), 3) soils of flood plains (Nehalem, Wapato, Sauvie, and Clatsop series), 4) soils from wind-borne sands, 5) organic soils (peat) and 6) other soils (beach, alluvial, marsh, riverwash, and undifferentiated).

The Astoria (or Melbourne) series is the most widespread throughout the proposed preserve. This soil is a moderately compact clay-loam with iron concretions and has moderate amounts of organic matter. It is as much as one meter (three feet) deep in the more gentle or protected areas. The parent material may be permeable for as much as 3 to 7.5 m (10 - 25 ft.). Soft shale and sandstone are frequently well-weathered below the soil (Torgerson, 1949).

Moisture holding capacity of this series is only fair so that soils are usually dry by mid-summer, a factor affecting plant growth. The soil is also poor in nutrients as heavy winter rains leach much of the nutrients.

Astoria series soils were primarily developed from weathered sandstone and shale. Uniform weathering has given a mineral homogeneity to the soils. Soil differences are therefore recognized by position;

i.e., whether the soil materials are still overlying the rocks from which they have weathered, or whether they have been transported and spread out over the lower lying plain (colluvial). If the soils have been transported, soils differences were derived from differences in drainage, vegetation, and length of time of development. These colluvial soils are common below many of the cliffs and steep slopes around the base of Saddle Mountain (Torgerson, 1949).

Hydrology

Source, movement, and quantity of ground water is determined by the geology of an area. Most of the study area is underlain by fine-grained marine sedimentary rocks and associated volcanic rocks of low permeability. Most of the area also has high run off and little water storage capacity. There are several perennial streams: Fox Creek, Lewis and Clark River, and Young River (Figure 3). Winter snow pack contributes to a higher run off in the spring (Schlicker *et al.*, 1972; Torgerson, 1949).

Vegetation

Forest cover. The cool, wet maritime climate and availability of nutrients from successional species and/or rapidly weathering parent materials allows for luxuriant forest throughout the park. The only non-forest vegetation occurs on the steep rock walls on the southwesterly faces of the mountain and on top of the peaks where grassy meadows and "rock gardens" have developed (Figure 9). The mountain exhibits three major vegetation zones as defined for the Coast Range by Franklin and Dyrness (1973): Sitka Spruce (*Picea sitchensis*) Zone, Western Hemlock (*Tsuga heterophylla*) Zone, and Pacific Silver Fir (*Abies amabilis*) Zone.

The Sitka Spruce Zone generally occurs on the wettest slopes, usually west-facing and with v-shaped notches catching the incoming precipitation. Sitka spruce, western hemlock, western red cedar (*Thuja plicata*), and red alder (*Alnus rubra*) dominate the forests in this zone. Swordfern (*Polystichum munitum*), wood sorrel (*Oxalis oregana*), huckleberries (*Vaccinium ovalifolium*, *V. ovatum*, and *V. alaskaense*) and Oregon

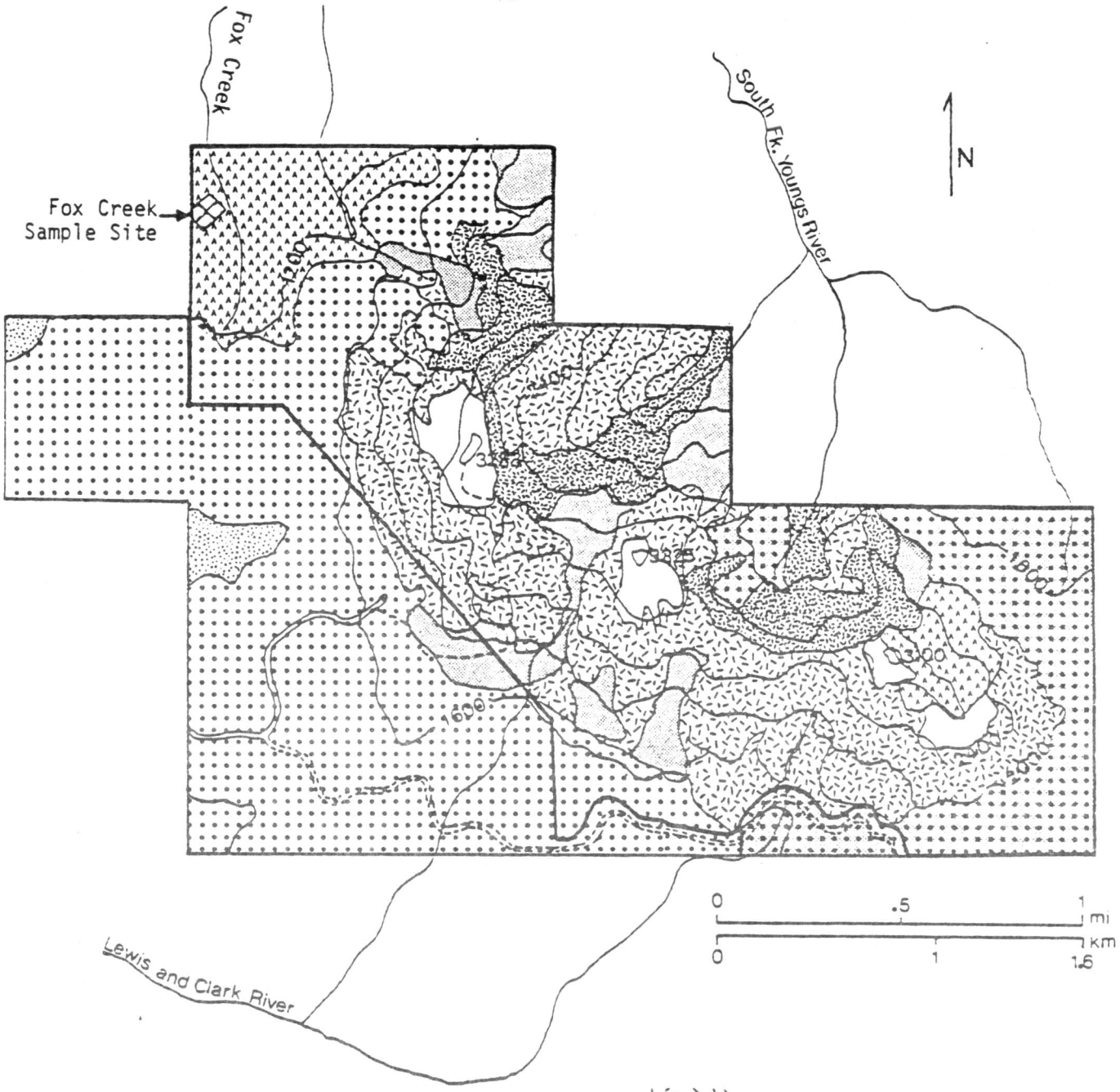

Figure 9. Vegetation of Saddle Mountain State Park.

grape (Berberis nervosa) frequently dominate the understory. Patches of vine maple (Acer circinatum) also characterize this forest.

Juday (1976) defines a western hemlock— Douglas-fir —Sitka spruce/salal/Eurynchium oreganum — Plagiothecium undulatum (Tshe-Psme-Pisi/Gash/Euor-Plun) community which is transitional in its occurrence between the Sitka Spruce Zone and the Western Hemlock Zone (Table 3). Salal and Eurynchium oreganum (a pinnately branched moss) frequently form dense patches. Juday considers salal a good indicator of the Sitka Spruce Zone even though its dominance throughout the zone is less than that of some other species (Juday, 1976).

Western red cedar (Thuja plicata) is infrequent, but seems to prefer the mineral soils along stream banks and drainage bottoms where ground water seepage keeps the soil moist throughout the year.

In the forests further east on the mountain, Douglas-fir (Pseudotsuga menziesii) becomes more common as does red alder and western hemlock. These species dominate the Western Hemlock Zone which is probably the most abundant vegetation zone in the Saddle Mountain area.

Work by Hines (1971) and others summarized by Franklin and Dyrness (1973) indicates that, of the plant associations common to the Western Hemlock Zone at Saddle Mountain, the western hemlock/Oregon grape (Tshe/Bene) community occupies the driest sites, and the western hemlock/sword fern community (Tshe/Pomu) occupies the wettest sites. The huckleberry-dominated forest types are considered intermediate in moisture conditions.

After heavy soil disturbance, these plant communities generally begin their recovery with dense red alder reproduction, often in nearly pure stands. With a better developed understory and a build-up of nitrogen and other nutrients from the leaves, this deciduous tree stage of succession appears to be important for eventual Douglas-fir — western hemlock forest development; in addition, the alder forest provides important elk (Cervus elaphus) winter range (Appendix IV).

Douglas-fir is also considered to be a seral or transitional species in the Western Hemlock Zone even though it may persist longer than generations of hemlock

Table 3. Species composition in western hemlock--Douglas-fir--Sitka spruce/ salal/ Eurynchium oreganum--Plagiothecium community (after Juday, 1976).

Stratum & Species	Av. % Cover	Av. % Const.	Stand % Cover 402	405	406	423
TREE						
Pseudotsuga menziesii	65.0	100	50	75	60	75
Tsuga heterophylla	23.8	100	25	35	30	5
Picea sitchensis	10.0	100	25	5	5	5
Thuja plicata	5.0	50	-	-	10	10
Acer circinatum	2.5	25	-	-	-	5
Acer macrophyllum	2.5	25	-	-	-	5
SHRUB						
Polystichum munitum	75.0	100	65	65	85	85
Tsuga heterophylla	8.8	75	*	15	15	5
Vaccinium parvifolium	6.3	75	-	15	5	5
Vaccinium ovatum	7.5	50	15	-	-	15
Athyrium filix-femina	2.5	50	-	5	5	-
Menziesia ferruginea	2.5	50	5	5	*	-
Rubus spectabilis	2.5	50	5	-	-	5
Vaccinium membranaceum	2.5	50	5	5	-	-
Acer circinatum	10.0	25	-	-	-	40
Gaultheria shallon	1.3	25	*	5	*	*
Rhamnus purshiana	TR	25	-	-	-	1
HERB						
Oxalis oregana	20.8	100	8.4	29.5	35.0	10.1
Eurynchium oreganum	18.6	100	10.2	20.4	28.8	14.8
Mosses	10.1	100	14.5	6.0	9.2	10.5
Polystichum munitum	5.4	100	2.7	5.5	4.7	8.6
Blechnum spicant	4.8	100	7.2	3.7	7.0	1.1
Plagiothecium undulatum	4.1	100	2.0	5.5	1.2	7.8
Gaultheria shallon	.6	100	.5	1.5	.1	.2
Trillium ovatum	1.3	75	-	2.3	2.3	.7
Maianthemum dilatatum	.9	75	2.7	.6	.1	-
Menziesia ferruginea	.5	75	.6	.6	.7	-
Vaccinium parvifolium	.3	75	-	.1	.7	.2
Montia sibirica	1.3	50	-	-	4.0	1.3
Tiarella trifoliata	.8	50	-	2.6	-	.7
Galium trifidum	.6	50	-	-	1.7	.8
Luzula parviflora	.4	50	-	-	1.1	.6
Tsuga heterophylla	.3	50	.5	.7	-	-
Vaccinium ovatum	.3	50	.7	-	-	.3
Disporum smithii	.2	50	.2	-	-	.5
Smilacina stellata	.4	25	-	1.5	-	-

On moist slopes, with significant seepage, western red cedar becomes an important component of the forest structure, as in the Sitka Spruce Zone. Alaska yellow cedar (Chamaecyparis nootkatensis) was once reported on the mountain, but it has never been confirmed (Sargent, 1922).

At higher elevations along the summits of the peaks of Saddle Mountain where winter snowpack persists, and along cold air drainages, a true fir occurs.

Non-forest vegetation. Several non-forest vegetation types also exist on the mountain. Of particular interest are the grassy balds or meadows that occur around the three peaks (Figure 9). Detling (1954) provided the first list of species to be found in these balds and Aldrich (1972) did the first plant community analysis. On the fragile soils of Saddle Mountain, Aldrich (1972) described the Lomatium martindalei association. Other important species found were Aira praecox, Arenaria rubella, Festuca rubra, and Eriophyllum lanatum. These balds are heavily grazed by elk and deer, and they maintain a short-matted physiognomy.

The cause of this non-forest type is still debated among ecologists and deserves further study. Previous fires, thin soil and heavy trampling and grazing may all be factors. Larry Morrison (OSU student in Botany) has also studied these balds on Saddle Mountain.

Four additional vegetational communities were identified by Dr. K.L. Chambers on Saddle Mountain in 1973 and the characteristic plant species for each type in addition to the meadow and forest types are listed in Appendix V. Of particular interest to botanists are the more rocky, inaccessible habitats where, with the lack of grazing and trampling pressure, and in the presence of extreme environmental conditions, many rare plant species have persisted. Of the twenty-eight rare, threatened or endangered plant species listed for the Coast Range, nineteen occur on Saddle Mountain (Table 4; also see Appendix X).

Of special interest are the moist herbaceous thickets with tall lush, herbs growing in open sunny areas and which receive adequate moisture through seepage of ground water on slopes or draws; also of interest are the rocky cliffs, crevices, ledges and dikes which support a specialized flora.

Saddle Mountain is of biogeographical interest since it seems to have been a refugium for many plant species during the last ice advance. Many isolated and/or endemic species are found here and in only a few places elsewhere (Chambers, 1973). Cardamine pattersonii and Saxifraga occidentalis var. latipetiolata, for instance, are regarded by Chambers (1973) as relicts from a more northern flora.

Saddle Mountain is also near the southern limit of many Coast Range species including: Dodecatheon pulchellum, Anemone multifida, Erigeron peregrinus subsp. peregrinus, and Prenanthes alata (Chambers, 1973). These boreal species are probably favored here by the cold stormy winters and protection from high summer temperatures through rain, fog and ground water seepage (Detling, 1954).

Table 4. Rare and endangered plants on Saddle Mountain compiled by Jean L. Siddall, August 1977.*

Allium cernuum	Lewisia columbiana var. rupicola
Allium crenulatum	Platanthera unalascensis ssp. maritima (Habenaria greenei)
Cardamine pattersonii	Poa marcida
Carex macrochaeta	Rhinanthus crista-galli
Cladothamnus pyrolaeflorus	Saxifraga bronchialis var. vespertina
Dicentra cucullaria	Saxifraga caespitosa var. subgemmifera
Douglasia laevigata var. ciliolata	Saxifraga occidentalis var. latipetiolata
Erigeron peregrinus ssp. peregrinus	Sidalcea hirtipes
Erythronium revolutum	Synthyris schizantha
Geum triflorum var. campanulatum	

* These species on the "Provisional List of Rare, Threatened and Endangered Plants in Oregon" Siddall, January 1976.

Many of the plant species which occur on Saddle Mountain are sufficiently different from the typical forms of species found elsewhere that they do not fit the species descriptions. This situation is to be expected given the isolation of the Saddle Mountain area. Some of the species have been studied, and in a few instances have been described as new species or varieties; others remain to be studied. The rare Cardamine pattersonii, for instance, has a perennial form in the moist drainages on the north side of the mountain, even though the ephemeral form, which occurs on the harsh

droughty sites on thin soil and exposed rock, is an annual. Monkey flower (Mimulus guttatus) and sandwort (Arenaria stricta) may also make this adaption (Chambers, pers. comm.).

A check list of the 301 species of vascular plants now known to occur on Saddle Mountain is presented in Appendix VI. Due to the inaccessability of many of the areas of the mountain, even more species probably will be found in the future. The study area is among the most floristically rich in the Northwest.

Old-growth forests. Old-growth forests, (i.e., forests which have greater than four dominant trees per hectare each exceeding 250 years of age) are becoming a rarity in Oregon's Coast Range. Man-caused and lightening-caused fires have destroyed much of the lower elevation drier site old-growth forests (Juday, 1976). Since the Second World War, extensive cutting of old-growth has occurred, making the preservation of intact examples of low elevation stands a high priority (Dyrness et. al., 1975).

Two intact old-growth stands occur on Saddle Mountain: 1) The Sitka spruce – western hemlock on the northwest and 2) on the southeast peak (Figure 10). The small stand of noble fir (Abies procera) occurs on the center of the southeast peak. The remaining forested areas were logged prinicipally during the period 1920-30, and subsequently burned in 1936 and 1939 (Armstrong, 1965). Plot data and analysis of the two stands of old-growth are presented in Appendix VII.

Aquatic Ecosystems

This inclusion of Saddle Mountain in the Oregon system of natural areas would fill several riparian ecosystem cell needs. The closeness of the area to the ocean for anadromous fish runs, and the protection of the headwaters of the Lewis and Clark River, Fox Creek and the South Fork of the Youngs River makes it of paramount importance that the headwaters of these streams be included in the proposed preserve. These inaccessable headwaters on the north side of the mountain insure high quality, clean water and healthy fish populations making Saddle Mountain an excellent area for studying baseline (natural) conditions along the northern Oregon coast. The

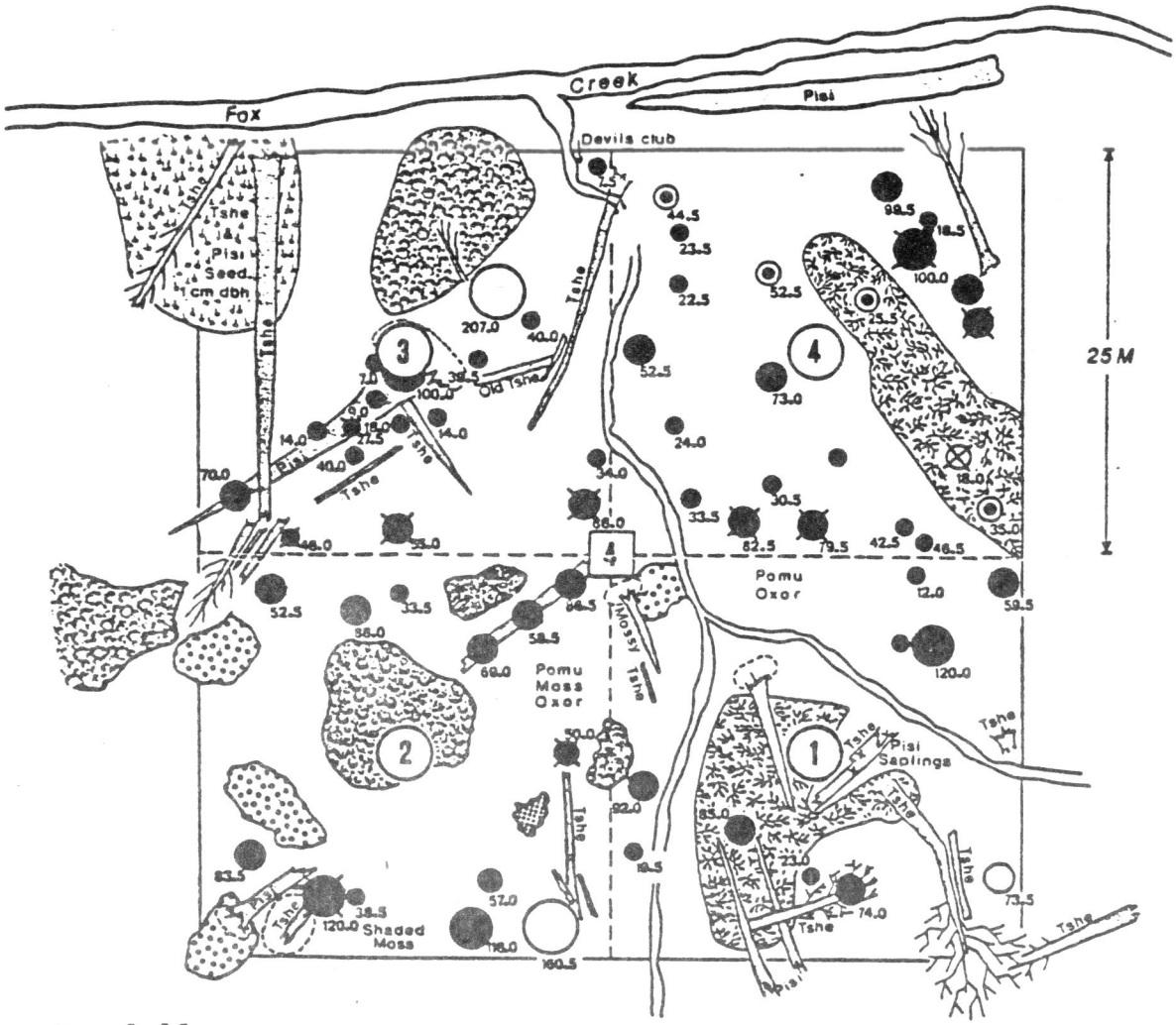

Figure 10. Northwestern 1/4 of a full hectare tally along the west edge of the NE 1/4, Section 29, T. 6 N., R. 8 W. within old-growth forest of the Sitka Spruce Zone.

(from unpublished Data by Juday)

presence of debris dams along these streams provides further opportunities for research on the nutrient inputs into the aquatic ecosystem.

All three rivers usually run throughout the year so that even more useful hydrologic information may be obtained from them. Kevin Howe discusses the structure and attributes of the aquatic ecosystems on Saddle Mountain in greater detail in Appendix VIII.

Faunal Features

The strategic position of Saddle Mountain, in being close to estuarine, riparian, and forest ecosystems with an abundance of nesting sites, makes it an important area for nesting birds and resident mammals. The variety of dead and downed material in the old-growth forests is of particular importance in providing useful habitat for rodents and other small mammals which in turn provide food for a whole host of predators. To adequately assess the population levels and the total number of birds and mammals species occurring in the area, more extensive field work in the spring would be necessary. Dr. R. M. Storm, Oregon State University, has developed tentative species lists for birds and mammals in Appendices III and IV.

The diversity of riparian and forest ecosystem types, also are important for reptile and amphibian populations. Dr. R. M. Storm has also prepared tentative species lists for these groups of animals in Appendix I and II.

Educational and Scientific Values

The diversity of ecosystem types and species present allow for extraordinary and almost unlimited opportunity for scientific research and educational use.

Studies on the change in structure and dynamics of the forests with changes in aspect, precipitation, elevation and maritime influence could do much to elucidate the reasons for growing-site differences in several areas in the northern Coast Range. Studies on sedimentation, siltation, stream runoff, nutrient flux and all their effects on fish species' pop-

Table 5. Saddle Mountain visitor use with comparative data from nearby state parks*

Day Use Expressed by Number of Cars (mult. by 4 to get no. of visitors)

Year	Saddle Mountain S. P.						Oswald West S.P.	Ecola S. P.	
	Ap-Ju	July	Aug	Sept	Summer	Total	Total	Summer	Total
1977-78	--	8,942	5,200	3,242	16,934	--	241,550	145,730	--
1976-77	7,954	6,192	8,010	1,344	15,546	29,350	213,846	144,660	335,412
1975-76	8,248	5,862	4,486	4,444	14,774	26,822	205,812	115,800	--
1974-75	9,571	5,516	6,680	4,482	16,858	29,773	235,090	122,060	182,188
1973-74	14,442	7,602	6,322	4,130	18,050	39,074	211,648	83,840	187,748
1972-73	13,332	9,016	6,802	4,908	20,734	43,086	238,290	131,896	233,412

Overnight Use Expressed by Number of Camper Nights

Year	Saddle Mountain S. P.						Oswald West S.P.	Ecola S. P.	
	Ap-Ju	July	Aug	Sept	Summer	Total	Total	Summer	Total
1977-78	345	368	230	119	717	1,062	5,322	--	--
1975-76	260	283	363	155	801	1,089	6,447	--	--
1974-75	419	307	656	230	1,193	1,727	5,857	--	--
1973-74	517	438	384	139	961	1,513	6,160	--	--
1972-73	239	407	466	189	1,062	1,318	5,949	--	--

* from data supplied by Oregon State Parks and Recreation Branch, Salem

ulation levels are important in helping to determine the population dynamics in a natural system.

Studies on the genetics and adaption of the various isolated species of plants, in particular how different physiological forms develop in such close proximity with one another, could be conducted on Saddle Mountain. Basic synecological studies of the grass balds, open herbaceous thickets, and other unusual habitats could be carried out.

Consideration of the effects of large populations of large ungulates on erosion, sedimentation, and general geomorphological processes of the steep slopes of mountains, would enable a researcher to assess values for natural rates of erosion and carrying capacity. Studies on ecosystem productivity and its relation to various animal species could do much to further refine our knowledge of generalized ecosystem functioning.

Easy access, close proximity to schools and universities, and the presence of several major ecosystem types make the Saddle Mountain area useful for biology and natural resource class fieldtrips.

Historical and Contemporary Resource Use

In August, 1916, 567 ha (1,400 acres) were set aside by the Federal Government as a gift to the state for a future park. In 1928, private donations of an additional 526 ha (1,300 acres) were made. In 1935, the Federal land was added to the private contributions to make a park.

Logging occurred over much of the land by 1930. In 1936 and 1939, fires caused extensive damage to many trees, but since then these forests have regenerated well. Since the land was put in park status, no significant amount of resources has been extracted.

During the 1930's, the entrance road and trail to the summit of Saddle Mountain were constructed by the CCC. In 1948 the state constructed a Quonset hut, a water storage reservoir, and a small overnight camp with six sites; a water source was also developed (Armstrong, 1965).

The park has since been managed without further development and has emphasized dispersed, low impact recreational use (Table 5). The park is

managed by staff headquartered at Ecola State Park, where a resident ranger is on duty during the summer season.

Leases and Easements

No leases or easements currently affect the park. Under permit Number 448, Crown Zellerbach Corporation has a road across the south part of the park. Access to other parts of the park (Youngs River, Fox Creek) is by logging roads built by Crown Zellerbach.

Economic Analysis

Most considerations of the economic impact of dedication as a natural area preserve are problematical; the area is already a state park and it is protected from resource extraction for commercial purposes.

The proposed preserve would have little impact on the recreation users. Only in the event that park attendance increases beyond the carrying capacity would use have to be restricted or controlled in order to protect the natural environment, and this is unlikely in the forseeable future. Figure 6, showing sensitivity classes, should help the planning staff in dealing with this unlikely situation. In Table 5 the past five years recreational use of Saddle Mountain and nearby Ecola and Oswald West State Parks are given. Saddle Mountain has a relatively low day- and campground-use compared to other parks in the system. It is presently being managed for dispersed low impact recreational use. Camping, however, is permitted only in designated sites near the road head. Preserve status should not affect this use. If additional facilities are needed, the flat, accessible land excluded from the proposed preserve would still be available for that purpose.

The preserve would increase the scientific and educational use substantially but this should not create management problems. Possible management problems may involve trying to limit the impact of large elk populations on the meadows and openings in the upper elevations in the park.

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APPENDIX I

Amphibians Most Likely to be Seen at Saddle Mountain
(Compiled by Dr. R. M. Storm)

Northwestern salamander (Ambystoma gracile). Probably present in limited numbers. Requires small permanent (or lasting to late summer) ponds to breed in.

Pacific giant salamander (Dicamptodon ensatus). Should occur in streams of NW part (NE¼ Sec. 29) of park as larvae. Adults in adjacent forest.

Olympic salamander (Rhyacotriton olympicus). As for 2, except adults confined to stream edges.

Rough-skinned newt (Taricha granulosa). Probably present. Needs quiet water, lasting into late summer for breeding.

Dunn's salamander (Plethodon dunni). Occurs in moist talus slopes.

Western red-backed salamander (Plethodon vehiculum, w.). Probably throughout in wooded areas. Found several in decaying wood in NE¼ of Sec. 29.

Ensatina (Ensatina eschscholtzi). Occurs in more open wooded areas. Found in NE¼ of Sec. 29.

Tailed frog (Ascaphus truei). Requires cold well-aerated streams. One found in forest, near stream, NE¼ of Sec. 29.

Pacific tree frog (Hyla regilla). Probably throughout. Breeds in small amounts of temporary water.

Red-legged frog (Rana aurora). Should be present. Adult life in moist woods. Breeds in temporary ponds.

APPENDIX II

Reptiles Most Likely to be Seen at Saddle Mountain
(Compiled by Dr. R. M. Storm)

Northern alligator lizard (Gerrhonotus coeruleus). Probably present in rocky areas as at lower elevations of Saddle Mountain.

Rubber boa (Charina bottae). Requires somewhat open wet drained areas. May occur on portions of Saddle Mountain.

Common garter snake (Thamnophis sirtalis). Near water in more open places. May be scarce in park.

Northwestern garter snake (Thamnophis ordinoides). Prefers brushy edges with open areas for sunning. Probably fairly common in area.

APPENDIX III

Birds Most Likely to be Seen at Saddle Mountain
(Compiled by Dr. R. M. Storm)

Birds listed are those most likely to be seen in Saddle Mountain area. Special emphasis is on those that may nest there. Most remarks apply to spring and summer.

Order Falconiformes--hawks, vultures, falcons

Turkey vulture (Cathartes aura). Frequently seen soaring over area. May nest in forests or on cliff faces.

Coopers hawk (Accipiter cooperii). Hunts in open woodlands. May nest.

Sharp shinned hawk (Accipiter striatus). Hunts broken woodlands or margins. May nest.

Kestrel (Falco sparverius). Possible nester in cliff crevices.

Order Galliformes--chickenlike birds

Blue grouse (Dendragapus obscurus). Permanent resident of coniferous forest.

Ruffed grouse (Bonasa umbellus). Deciduous brush and trees near streams.

Mountain quail (Oreortyx pictus). Permanent resident of brushy to partly open areas.

Order Columbiformes--pigeons and doves

Band tailed pigeon (Columba fasciata). Nests high in coniferous trees.

Mourning dove (Zenaidura macroura). Uncommon nester in deciduous trees.

Order Strigiformes--owls

Screech owl (Otus asio). Permanent resident in broken coniferous forest and in alder.

Great horned owl (Bubo virginianus). Permanent resident in coniferous forests.

Pygmy owl (Glaucidium gnoma). Mixed coniferous forests and deciduous forests. Needs woodpecker holes (flicker size) for nesting.

Spotted owl (Strix occidentalis). Nests in mature old growth coniferous forests.

Saw-whet owl (Aegolius acadicus). May occur in broken forest areas.

Order Caprimulgiformes--goatsuckers and allies

Common nighthawk (Chordeiles minor). May nest on gravelly or rocky ground.

Order Apodiformes--swifts and hummingbirds

Vaux's swift (Chaetura vauxi). Nests in hollow, burned out trees. Forages over opening in forest.

Rufous hummingbird (Selasphorus rufus). Brushland and mountain sides where suitable flowers occur.

Order Coraciiformes--kingfishers and allies

Belted kingfisher (Megaceryle alcyon). Along any streams with small fish, if not too much cover over stream.

Order Piciformes--woodpeckers

Common flicker (Colaptes auratus). Nests in forest edges adjacent to grassland.

Pileated woodpecker (Dryocopus pileatus). Resident of old forests where dead and dying trees furnish food.

Yellow-bellied sapsucker (Sphyrapicus varius). Deciduous trees seen in alder near camp.

Hairy woodpecker (Dendrocopos villosus). Mixed conifers and deciduous trees.

Downy woodpecker (Dendrocopos pubescens). Deciduous trees usually along stream courses.

Order Passeriformes--perching birds

Western flycatcher (Empidonax difficilis). Shaded coniferous or mixed forests.

Willow flycatcher (Empidonax traillii). Willow or alder thickets along streams.

Western wood pewee (Contopus sordidulus). Woodland or broken coniferous forest.

Olive-sided flycatcher (Nuttallornis borealis). Coniferous forest open or interrupted stands.

Violet-green swallow (Tachycineta thalassina). May nest in cliff crevices or in tree holes at edge of forest. Also buildings.

Tree swallow (Iridoprocne bicolor). Need water to forage over. Snags with woodpecker holes to nest in.

Barn swallow (Hirundo rustica). Nest under bridges and around buildings. Seen at dwelling at camp site.

Grey jay (Perisoreus canadensis). Coniferous forests. Not common.

Stellers jay (Cyanocitta stelleri). Coniferous forests.

Common raven (Corvus corax). Nests on cliff ledges. Forages widely over area.

Crow (Corvus brachyrhynchos). Probably only transient over area.

Black-capped chickadee (Parus atricapillus). Usually in willows and alders.

Chestnut-backed chickadee (Parus rufescens). Coniferous forests.

Bush-tit (Psaltriparus minimus). Brushy areas mixed with some trees.

White-breasted nuthatch (Sitta carolinensis). Usually in open branched deciduous trees, but occur to some extent in Douglas-fir.

Red-breasted nuthatch (Sitta canadensis). Coniferous forests.

Brown creeper (Certhia familiaris). Dense old coniferous forests.

Wrentit (Chamaea fasciata). Brushy areas.

Winter wren (Troglodytes troglodytes). Matted vegetation and root tangles in shaded forests.

Bewick's wren (Thryomanes bewickii). Brushy areas in deciduous woodlands.

Robin (Turdus migratorius). Requires moist stream sides or lawns and meadows with scattered trees for nesting.

Varied thrush (Ixoreus naevius). Nests in heavy stands of mature conifers.

Swainson's thrush (Hylocichla ustulata). Willow and alder thickets near streams, dense forest understory on moist slopes.

Golden-crowned kinglet (Regulus satrapa). Coniferous forests often high in trees.

Ruby-crowned kinglet (Regulus calendula). More open or broken coniferous forests than R. satrapa.

Cedar waxwing (Bombycilla cedrorum). Willows or alders along streams or cut over forest lands.

Starling (Sturnus vulgaris). Transient through parts of area. May nest in woodpecker holes.

Hutton's vireo (Vireo huttonii). Status uncertain, but probably nests in broken conifer situations.

Solitary vireo (Vireo solitarius). Open conifer stands.

Orange-crowned warbler (Vermivora celata). Fairly thick brush, often near streams.

Yellow warbler (Dendroica petechia). Nests in coniferous trees. Forage widely in winter.

Hermit warbler (Dendroica occidentalis). Fairly dense and shaded coniferous forests.

MacGillivray's warbler (Oporornis tolmiei). Dense plant growth near water or above shaded damp ground.

Wilson's warbler (Wilsonia pusilla). Tangles of streamside vegetation.

Brewer's blackbird (Euphagus cyanocephalus). Possible nester in trees or shrubs near meadows. Probable transient through area.

Western tanager (Piranga ludoviciana). Open coniferous forest.

Black-headed grosbeak (Pheucticus melanocephalus). Deciduous trees along streams.

Evening grosbeak (Hesperiphona vespertina). Dense mature coniferous forests.

Purple finch (Carpodacus purpureus). Probably in mixed coniferous and deciduous areas.

Pine siskin (Spinus pinus). Coniferous forests.

Red crossbill (Loxia curvirostra). Coniferous forests.

Rufous-sided towhee (Pipilo erythrophthalmus). Fairly thick brush with open ground beneath.

Savannah sparrow (Passerculus sandwichensis). Probable nester in open meadows on Saddle Mountain.

Dark-eyed junco (Junco hyemalis). Open coniferous forests with low ground cover.

White crowned sparrow (Zonotrichia leucophrys). Brushy areas on un-forested slopes.

Song sparrows (Melospiza melodia).

APPENDIX IV

Mammals Most Likely to be Seen at Saddle Mountain
(Compiled by Dr. R. M. Storm)

Most of this list is deduced on the basis of general Oregon distribution and habitats available in Saddle Mountain area.

Vagrant shrew (Sorex vagrans). Usually in more open moist areas.

Dusky shrew (Sorex obscurus). Brushy to forested areas, usually near water.

Marsh shrew (Sorex bendirii). In and near watercourses and ponds.

Trowbridge shrew (Sorex trowbridgii). Brushy areas and forests.

Shrew-mole (Neurotrichus gibbsii). Forests and wooded areas.

Coast mole (Scapanus orarius). Forests and small clearings.

Little is known of bat distribution in Oregon. The following list is a tentative one, based on probablility of occurrence in the Saddle Mountain area.

Little brown bat (Myotis lucifugus)

Yuma myotis (M. yumanensis)

Long-eared myotis (M. evotis)

Fringed myotis (M. thysanodes)

Hairy-winged myotis (M. volans)

California myotis (M. californicus)

Silver-haired bat (Lasionycteris noctivagans)

Big brown bat (Eptesicus fuscus)

Hoary bat (Lasiurus cinereus)

Western big-eared bat (Plecotus townsendii

Brush rabbit (Sylvilagus bachmani). Brushy valleys.

Snowshoe hare (Lepus americanus). Dense thickets in coniferous forests.

Mountain beaver (Aplodontia rufa). Usually in coniferous forest or advanced brushy growth near water.

Townsend chipmunk (Eutamias townsendii). Forests and dense brush.

Chickaree (Tamiasciurus douglasii). Throughout area in coniferous timber.

Northern flying squirrel (Glaucomys sabrinus). Advanced second growth and mature forests.

Mazama pocket gopher (Thomomys mazama). Probably uncommon, but should occur in meadows, if present.

Beaver (Castor canadensis). Should occur in any sizeable streams in area.

Deer mouse (Peromyscus maniculatus). Throughout in better-drained areas. Avoids wet, marshy places.

Bushy-tailed woodrat (Neotoma cinerea). Rocky areas and aroung logs in forests.

California red-backed vole (Clethrionomys californicus). Around down logs in cool parts of advanced second growth and mature forests.

White-footed vole (Arborimus albipes). Rare if present. Around dweller in dense forests.

Red tree vole (Arborimus longicaudus). Known to nest in coniferous trees, where they feed on the needles.

Long-tailed vole (Microtus longicaudus). Forested areas, near streams.

Creeping vole (M. oregoni). Most likely to occur in brushy cut-overs or small grassy clearings within the forest.

Pacific jumping mouse (Zapus trinotatus). Most often occur in meadows or near water within the forest.

Coyote (Canis latrans). Throughout area.

Black bear (Ursus americanus). Undoubtedly present in wilder timbered portions.

Raccoon (Procyon lotor). Probably throughout area, near water courses.

Marten (Martes americana). Very rare, if present. Would occur in heavy coniferous forest.

Short-tailed weasel (Mustela erminea). Brushy areas, second growth.

Long-tailed weasel (Mustela frenata). Rocky places.

Mink (Mustela vison). Along larger water courses.

Spotted skunk (Spilogale putorius). Logs and undergrowth in forests.

Mountain lion (Felis concolor). Probably moves through wilder parts of area.

Bobcat (Felis lynx). Numbers down at present. Should occur in timbered parts of area.

Roosevelt elk (Cervus elaphus roosevelti). I was asked to come up with a rather definitive statement on the status of elk in the park area. This is impossible on the basis of one weekend's visit. We walked northeastward from the campground for about one mile, at the base of the higher ridges. This is mostly grown to alder at lower elevations, with openings interspersed with conifer clumps higher up. Throughout this area, there were abundant elk sign in the way of trails and old droppings. In addition, most shrubs (huckleberries) were bruised drastically. We saw no elk, nor did we see any fresh signs. This part of the park is obviously heavily used during part of the year (winter?), and seems at the point of over-use. On the other hand, our wanderings through the northeast corner of section 29 (mature forest) showed evidence of elk use, but nowhere near as heavily. We did not feel that elk use there was excessive.

Blacktail deer (Odocoileus hemionus columbianus). We saw no deer and limited sign during the weekend. Deer prefer cut-over and brushy canyons and are probably present in average numbers throughout the area.

APPENDIX V

Characteristic Plant Species for Seven Generalized Vegetation Types at Saddle Mountain (adapted from K. L. Chamber's "A Sierra Club Wildflower Hike, Saddle Mountain State Park, June 16, 1973")

(F) - Forests of alder (Alnus rubra) and Douglas-fir (Pseudotsuga menziesii); deeply shaded, rich soil, adequate moisture for lush growth of herbaceous understory.

(MH) - Moist herbaceous thickets of tall, lush herbs, on open sunny sites, adequate moisture in the soil due to seepage on slopes or in draws.

(DH) - Dry herbaceous grassy vegetation, lower in stature, on open sunny slopes turning dry late in the season, usually thin soil and somewhat unstable.

(RC) - Rocky cliffs, crevices, ledges, dikes, etc., shaded or sunny, soil thin or absent, moisture varies from quite wet to extremely dry.

(RS) - Rocky slopes, at high elevations where soil development is just beginning, much gravel and bare spots exposed; sunny and dry.

(AT) - Alpine thickets, with dense shrubby growth, seedlings and saplings of forest trees, and low herbaceous growth around and under the thickets.

(TW) - Trailside weeds, introduced by man, mostly in open, disturbed sites.

The lists include ferns and gymnosperms, as well as flowering herbs and shrubs; common names are given, but of course these are arbitrary and not the same to all people; flower color is mentioned where this is pertinent to recognition of the species.

FORESTS (F)

Polystichum munitum - sword fern
Athyrium filix-femina - lady fern
Adiantum pedatum - maidenhair fern
Blechnum spicant - deer fern
Maianthemum dilatatum - false lily-of-the-valley (white)
Disporum smithii - fairy-bells (white)
Smilacina stellata - false Solomon's seal (white)
Smilacina racemosa - large false Solomon's seal (white)
Berberis nervosa - Oregon grape (yellow)
Achlys triphylla - vanilla leaf (white)
Vancouveria hexandra - insideout flower (white)
Montia sibirica - candy flower (pink)
Oxalis oregana - wood sorrel (white)
Boykinia elata - slender therafon (white)
Tiarella trifoliata - coolwort (white)
Tolmiea menziesii - youth-on-age (chocolate)
Dicentra formosa - bleeding heart (pink)
Viola glabella - woodland violet (yellow)
Viola sempervirens - evergreen violet (yellow)
Hydrophyllum tenuipes - waterleaf (greenish or violet)
Luzula parviflora - woodrush
Mimulus dentatus - coast monkey flower (yellow)
Oplopanax horridum - devil's club
Petasites frigidus - sweet colt's-foot (white to pink)
Adenocaulon bicolor - trail plant
Epilobium alpinum - small willow-herb (pink)

MOIST HERBACEOUS THICKETS (MH)

Pteridium aquilinum - bracken fern
Iris tenax - wild iris (blue-violet)
Lilium columbianum - tiger lily (orange)
Habenaria greenei - Greene's bog-orchid (greenish)
Habenaria unalascensis - Alaska rein-orchid (greenish)
Delphinium trolliifolium - tall larkspur (blue)
Thalictrum occidentale - western meadowrue (greenish)
Rubus parviflorus - thimbleberry (white)
Rubus spectabilis - salmonberry (red)
Osmorhiza occidentalis - sweet cicely (greenish)
Marah oregana - wild cucumber (pale yellow)
Tellima grandiflora - fringecups (yellowish)
Galium aparine - bedstraw (white)
Sidalcea hirtipes - wild hollyhock (red-violet)
Sambucus racemosa - red elderberry
Rhinanthus crista-galli - yellow rattle (yellow)
Anaphalis margaritacea - pearly everlasting (white)
Erigeron peregrinus - wandering daisy (white to violet)
Erigeron aliceae - Alice's daisy (white to violet)
Heracleum lanatum - cow parsnip (white)

DRY HERBACEOUS GRASSLAND (DH)

Pteridium aquilinum - bracken fern
Selaginella oregana - Oregon clubmoss
Fritillaria lanceolata - checkered lily (green and purple)
Cardamine pattersonii - Saddle Mountain bitter cress (red-violet)
Ranunculus occidentalis - western buttercup (yellow)
Polygonum bistortoides - bistort knotweed (white)
Delphinium menziesii - short larkspur (blue)
Trifolium spp. - clovers, of several species
Cryptantha intermedia - popcorn flower (white)
Plectritis congesta - rosy corn salad (pink)
Clarkia amoena - farewell-to-spring (deep pink)
Conioselinum pacificum - hemlock-parsley (white)
Sanicula graveolens - sanicle (yellow)
Synthyris schizantha - fringed synthyris (blue)
Achillea millefolium - yarrow (white)
Cirsium edule - Indian thistle (red)
Lomatium martindalei - desert parsley (yellow)
*Collinsia parviflora - blue-lips (blue and white)
*Lotus micranthus - small-flowered deervetch (pink)
*Epilobium minutum - small-flowered willow-herb (pink)
*Microsteris gracilis - annual phlox (pink)
*Orthocarpus pusillus - dwarf owl-clover
(*-"belly plants;" lie on the ground to find them)

ROCKY SLOPES (RS)

Selaginella oregana - Oregon clubmoss
Allium crenulatum - Olympic onion (pink)
Allium cernuum - nodding onion (pink)
Erysimum asperum - wallflower (yellow)
Lewisia columbiana - rosy lewisia (deep pink)
Arenaria rubella - sandwort (white)
Saxifraga oregana - Oregon saxifrage (white)
Saxifraga ferruginea - runty saxifrage (yellowish white)
Phlox diffusa - spreading phlox (bluish violet)
Phacelia nemoralis - woodland phacelia (pale violet)
Castilleja hispida - hairy paintbrush (red to orange)

TRAILSIDE WEEDS (TW)

Hypericum perforatum - Klamath weed (yellow)
Rumex acetosella - sheep sorrel (reddish yellow)
Plantago lanceolata - black plantain
Digitalis purpurea - fox-glove (white to lavender)
Bellis perennis - European daisy (white)
Hypochoeris radicata - false dandelion (yellow)
Sonchus asper - sow-thistle (yellow)
Taraxacum vulgare - dandelion (yellow)
Cerastium viscosum - chickweed (white)
Ranunculus repens - creeping buttercup (yellow)

ALPINE THICKETS (AT)

Abies procera - noble fir
Picea sitchensis - Sitka spruce
Tsuga heterophylla - western hemlock
Alnus sinuata - thin-leaved alder
Ribes bracteosum - stinking currant (yellowish)
Ribes lacustre - prickly currant (reddish)
Ribes sanguineum - red-flowering currant (pink to red)
Philadelphus lewisii - mock orange (white)
Holodiscus discolor - ocean spray (white)
Sorbus sitchensis - western mountain-ash
Rosa gymnocarpa - little wood rose (pink)
Acer circinatum - vine maple (reddish)
Cladothamnus pyrolaeflorus - copper-bush (bronze)
Menziesia ferruginea - fool's huckleberry (brownish)
Vaccinium ovalifolium - oval-leaved huckleberry
Vancouveria hexandra - insideout flower (white)
Conioselinum pacificum - hemlock-parsley (white)
Stachys mexicana - hedge-nettle (reddish)
Arnica latifolia - mountain arnica (yellow)
Erigeron aliceae - Alice's daisy (white to violet)

ROCKY CLIFFS (RC)

Selaginella oregana - Oregon clubmoss
Cystopteris fragilis - bladder fern
Cryptogramma crispa - parsley fern
Polypodium montense - licorice fern
Stenanthium occidentale - western stenanthium (purple)
Montia parvifolia - small-leaved montia (pink)
Aquilegia formosa - red columbina (red)
Heuchera micrantha - small-flowered heuchera (yellowish)
Saxifraga mertensiana - Merton's saxifrage (white)
Saxifraga caespitosa - tufted saxifrage (white)
Saxifraga bronchialis - matted saxifrage (yellowish)
Sedum sp. - stonecrop, two species (yellow)
Penstemon serrulatus - coast penstemon (bluish purple)
Penstemon cardwellii - Cardwell's penstemon (bright purple)
Nothochelone nemorosa - woodland beard-tongue (pink-purple)
Valeriana scouleri - northern valerian (pink)
Campanula rotundifolia - Scotch bellflower (blue)
Douglasia laevigata - smooth douglasia (violet)

APPENDIX VI

Check list of Vascular Plants for Saddle Mountain (verified by K. L. Chambers)

Aceraceae
ACER CIRCINATUM
ACER GLABRUM ssp. DOUGLASII

Araceae
LYSICHITUM AMERICANUM

Araliaceae
OPLOPANAX HORRIDUM

Aristolochiaceae
ASARUM CAUDATUM

Berberidaceae
ACHLYS TRIPHYLLA
BERBERIS NERVOSA
VANCOUVERIA HEXANDRA

Betulaceae
ALNUS RUBRA
ALNUS SINUATA

Boraginaceae
CRYPTANTHA INTERMEDIA var. GRANDIFLORA
MERTENSIA PLATYPHYLLUM

Campanulaceae
CAMPANULA ROTUNDIFOLIA
CAMPANULA SCOULERI

Caprifoliaceae
LONICERA CILIOSA
SAMBUCUS RACEMOSA ssp. PUBENS
SYMPHORICARPOS ALBUS

Caryophyllaceae
ARENARIA MACROPHYLLA
ARENARIA RUBELLA
ARENARIA STRICTA
CERASTIUM ARVENSE
CERASTIUM VISCOSUM
SILENE DOUGLASII var. DOUGLASII
STELLARIA CALYCANTHA
STELLARIA CRISPA
STELLARIA MEDIA

Compositae
ACHILLEA MILLEFOLIUM
ADENOCAULON BICOLOR
AGOSERIS AURANTIACA
AGOSERIS GRANDIFLORA
ANAPHALIS MARGARITACEA
ANTENNARIA RACEMOSA
ARNICA AMPLEXICAULIS
ARNICA LATIFOLIA
ARTEMISIA DOUGLASIANA
ASTER SUBSPICATUS
BELLIS PERENNIS
CREPIS CAPILLARIS
ERECHTITES PRENANTHOIDES
ERIGERON ALICEAE
ERIGERON PEREGRINUS ssp. PEREGRINUS
ERIOPHYLLUM LANATUM
GNAPHALIUM PURPUREUM
CIRSIUM EDULE
HIERACIUM ALBIFLORUM
HYPOCHOERIS RADICATA
MADIA MADIOIDES
PETASITES FRIGIDUS var. PALMATUS
PRENANTHES ALATA
RUDBECKIA OCCIDENTALIS
SENECIO MACOUNII
SENECIO VULGARE
SOLIDAGO CANADENSIS var. SALEBROSA
SONCHUS ASPER
TARAXACUM OFFICINALE

Crassulaceae
SEDUM OREGANUM
SEDUM SPATHULIFOLIUM

Cruciferae
ARABIS GLABRA
ARABIS HIRSUTA var. ESCHSCHOLTZIANA
CARDAMINE OLIGOSPERMA
CARDAMINE PATTERSONII
CARDAMINE PULCHERRIMA var. TENELLA
DRABA VERNA
ERYSIMUM ASPERUM

Cucurbitaceae
MARAH OREGANA

Cupressaceae
THUJA PLICATA

Cyperaceae
CAREX DEWEYANA
CAREX MACROCHAETA
CAREX MERTENSII
CAREX PACHYSTACHYA
CAREX ROSSII
SCIRPUS MICROCARPUS

Equisetaceae
EQUISETUM TELMATEIA

Ericaceae
CLADOTHAMNUS PYROLAEFLORUS
GAULTHERIA SHALLON
MENZIESIA FERRUGINEA
MONOTROPA UNIFLORA

Ericaceae (cont.)
PYROLA ASARIFOLIA
PYROLA PICTA
PYROLA UNIFLORA
VACCINIUM OVALIFOLIUM
VACCINIUM PARVIFOLIUM

Fumariaceae
CORYDALIS SCOULERI
DICENTRA CUCULLARIA
DICENTRA FORMOSA

Gramineae
AGROPYRON REPENS
AGROSTIS DIEGOENSIS
AGROSTIS TENUIS
AGROSTIS EXARATA
AIRA CARYOPHYLLEA
AIRA PRAECOX
ANTHOXANTHUM ODORATUM
BROMUS CARINATUS
BROMUS SITCHENSIS
BROMUS VULGARIS
CALAMAGROSTIS NUTKAENSIS
CINNA LATIFOLIA
DANTHONIA CALIFORNICA
DESCHAMPSIA ELONGATA
ELYMUS GLAUCUS
ELYMUS HIRSUTUS
FESTUCA BROMOIDES
FESTUCA MICROSTACHYS
FESTUCA MYUROS
FESTUCA OCCIDENTALIS
FESTUCA RUBRA
HOLCUS LANATUS
KOELARIA NITIDA
MELICA SUBULATA
POA COMPRESSA
POA GRACILLIMA
POA MARCIDA
POA SANDBERGII
PHLEUM ALPINUM
TRISETUM CANESCENS
TRISETUM CERNUUM

Hydrangeaceae
PHILADELPHUS LEWISII

Hydrophyllaceae
HYDROPHYLLUM TENUIPES
NEMOPHILA PARVIFLORA
PHACELIA NEMORALIS ssp. OREGONENSIS
ROMANZOFFIA SITCHENSIS

Hypericaceae
HYPERICUM PERFORATUM

Iridaceae
IRIS TENAX
SISYRINCHIUM ANGUSTIFOLIUM

Juncaceae
LUZULA CAMPESTRIS
LUZULA DIVARICATA
LUZULA PARVIFLORA

Labiatae
PRUNELLA VULGARIS
STACHYS MEXICANA

Leguminosae
LATHYRUS NEVADENSIS ssp. LANCEOLATUS
LOTUS MICRANTHUS
LOTUS NEVADENSIS
TRIFOLIUM LONGIPES ssp. CAURINUM
TRIFOLIUM MICROCEPHALUM
TRIFOLIUM MICRODON
TRIFOLIUM OLIGANTHUM
TRIFOLIUM PROCUMBENS
TRIFOLIUM REPENS
TRIFOLIUM TRIDENTATUM
VICIA AMERICANA var. TRUNCATA

Liliaceae
ALLIUM CERNUUM
ALLIUM CRENULATUM
CLINTONIA UNIFLORA
DISPORUM HOOKERI
DISPORUM SMITHII
ERYTHRONIUM GRANDIFLORUM var. PALLIDUM
ERYTHRONIUM REVOLUTUM
FRITILLARIA LANCEOLATA
LILIUM COLUMBIANUM
LLOYDIA SEROTINA
MAIANTHEMUM DILATATUM
SMILACINA RACEMOSA
SMILACINA STELLATA
STENANTHIUM OCCIDENTALE
STREPTOPUS AMPLEXIFOLIUS
STREPTOPUS ROSEUS
TRILLIUM OVATUM

Lycopodiaceae
LYCOPODIUM CLAVATUM

Malvaceae
SIDALCEA HIRTIPES

Onagraceae
CIRCAEA ALPINA
CLARKIA AMOENA ssp. CAURINA

Onagraceae (cont.)
EPILOBIUM ALPINUM var. LACTIFLORUM
EPILOBIUM ANGUSTIFOLIUM
EPILOBIUM GLABERRIMUM var. FASTIGIATUM
EPILOBIUM MINUTUM
EPILOBIUM WATSONII

Orchidaceae
CORALLORHIZA MERTENSIANA
GOODYERA OBLONGIFOLIA
HABENARIA GREENEI
HABENARIA UNALASCENSIS
LISTERA CAURINA
LISTERA CORDATA

Orobanchaceae
OROBANCHE UNIFLORA

Oxalidaceae
OXALIS OREGANA

Pinaceae
ABIES AMABILIS
ABIES PROCERA
PSEUDOTSUGA MENZIESII
PICEA SITCHENSIS
TSUGA HETEROPHYLLA

Plantaginaceae
PLANTAGO LANCEOLATA
PLANTAGO MAJOR

Polemoniaceae
COLLOMIA HETEROPHYLLA
MICROSTERIS GRACILIS
PHLOX DIFFUSA ssp. LONGISTYLIS

Polygonaceae
POLYGONUM BISTORTOIDES
POLYGONUM NUTTALLII
RUMEX ACETOSELLA
RUMEX OBTUSIFOLIUS

Polypodiaceae
ADIANTUM PEDATUM
ATHYRIUM FILIX-FEMINA
BLECHNUM SPICANT
CRYPTOGRAMMA CRISPA var. ACROSTICHOIDES
CYSTOPTERIS FRAGILIS
DRYOPTERIS AUSTRIACA
GYMNOCARPIUM DRYOPTERIS
POLYPODIUM GLYCYRRHIZA
POLYPODIUM MONTENSE
POLYSTICHUM MUNITUM
PTERIDIUM AQUILINUM

Portulacaceae
CLAYTONIA SIBIRICA
CLAYTONIA SPATHULATA
LEWISIA COLUMBIANA var. RUPICOLA
MONTIA FONTANA
MONTIA PARVIFOLIA

Primulaceae
DODECATHEON PULCHELLUM
DOUGLASIA LAEVIGATA var. CILIOLATA
TRIENTALIS LATIFOLIA

Ranunculaceae
ACTAEA RUBRA
ANEMONE DELTOIDEA
ANEMONE LYALLII
ANEMONE MULTIFIDA
ANEMONE OREGANA
AQUILEGIA FORMOSA
COPTIS LACINIATA
DELPHINIUM MENZIESII ssp. MENZ.
DELPHINIUM TROLLIIFOLIUM
RANUNCULUS OCCIDENTALIS
RANUNCULUS REPENS
RANUNCULUS UNCINATUS var. PARVIFLORUS
THALICTRUM OCCIDENTALE

Ribesaceae (Grossulariaceae)
RIBES BRACTEOSUM
RIBES LACUSTRE
RIBES LAXIFLORUM
RIBES SANGUINEUM

ROSACEAE
AMELANCHIER ALNIFOLIA var. SEMIINTEGRIFOLIA
ARUNCUS SYLVESTER
CRATAEGUS DOUGLASII var. SUKSDORFII
FRAGARIA VESCA
FRAGARIA VIRGINIANA
GEUM MACROPHYLLUM
GEUM TRIFLORUM var. CAMPANULATUM
HOLODISCUS DISCOLOR
PHYSOCARPUS CAPITATUS
POTENTILLA GLANDULOSA
POTENTILLA GRACILIS var. GRACILIS
PRUNUS EMARGINATA
PRUNUS VIRGINIANA var. DEMISSA
ROSA GYMNOCARPA
ROSA NUTKANA
RUBUS LACINIATUS
RUBUS PARVIFLORUS
RUBUS PEDATUS
RUBUS SPECTABILIS
RUBUS URSINUS
SORBUS SITCHENSIS

Rubiaceae
GALIUM BOREALE
GALIUM APARINE
GALIUM OREGANUM
GALIUM TRIFLORUM

Salicaceae
SALIX SCOULERIANA

Saxifragaceae
BOYKINIA ELATA
CHRYSOSPLENIUM GLECHOMAEFOLIUM
HEUCHERA MICRANTHA var. DIVERSIFOLIA
LITHOPHRAGMA PARVIFLORA
SAXIFRAGA BRONCHIALIS var. VESPERTINA
SAXIFRAGA CAESPITOSA var. SUBGEMMIFERA
SAXIFRAGA FERRUGINEA var. MACOUNII
SAXIFRAGA MERTENSIANA
SAXIFRAGA NUTTALLII
SAXIFRAGA OCCIDENTALIS var. DENTATA
SAXIFRAGA OCCIDENTALIS var. RUFIDULA
SAXIFRAGA OCCIDENTALIS var.
LATIPETIOLATA (= S. LATIPETIOLATA)
TELLIMA GRANDIFLORA
TIARELLA TRIFOLIATA
TOLMIEA MENZIESII

Scrophulariaceae
CASTILLEJA HISPIDA var. HISPIDA
CASTILLEJA MINIATA
COLLINSIA PARVIFLORA
DIGITALIS PURPUREA
MIMULUS GUTTATUS var. DEPAUPERATUS
MIMULUS GUTTATUS ssp. GUTTATUS
MIMULUS DENTATUS
MIMULUS ALSINOIDES
NOTHOCHELONE NEMOROSA
ORTHOCARPUS PUSILLUS
PENSTEMON CARDWELLII
PENSTEMON SERRULATUS
RHINANTHUS CRISTA-GALLI
SYNTHYRIS SCHIZANTHA
VERONICA AMERICANA
VERONICA ARVENSIS
VERONICA SERPYLLIFOLIA

Selaginellaceae
SELEGINELLA OREGANA
SELAGINELLA WALLACEI

Umbellifereae
CONIOSELINUM PACIFICUM
HERACLEUM LANATUM
LOMATIUM DISSECTUM var. EATONII
LOMATIUM MARTINDALEI var. FLAVUM
OENANTHE SARMENTOSA
OSMORHIZA CHILENSIS
OSMORHIZA OCCIDENTALIS
OSMORHIZA PURPUREA
PERIDERIDIA GAIRDNERI ssp. BOREALIS
SANICULA CRASSICAULIS
SANICULA GRAVEOLENS

Valerianaceae
PLECTRITIS CONGESTA ssp. CONGESTA
PLECTRITIS CONGESTA ssp. BRACHYSTEMON
VALERIANA SCOULERI

Violaceae
VIOLA ADUNCA
VIOLA GLABELLA
VIOLA SEMPERVIRENS

Plant species "reported" or "to be expected", but not verified:

AGROSTIS SCABRA
ANGELICA ARGUTA
BERBERIS AQUIFOLIUM
CHAMAECYPARIS NOOTKATENSIS
CHIMAPHILA MENZIESII
CHRYSANTHEMUM LEUCANTHEMUM
CORNUS NUTTALLII
CORNUS STOLONIFERA
EPILOBIUM GLANDULOSUM
ERYTHRONIUM MONTANUM
ERYTHRONIUM OREGONUM
FILIPENDULA OCCIDENTALIS
GLYCERIA ELATA
HABENARIA ELEGANS
HABENARIA SACCATA
HEMITOMES CONGESTA
HYPOPITYS MONOTROPA
JUNCUS spp.
MYOSOTIS MACROSPERMA
PENSTEMON OVATUS
SAXIFRAGA INTEGRIFOLIA
SCOLIOPUS HALLII
SENECIO HARFORDII
SENECIO TRIANGULARIS
STACHYS RIGIDA
TAXUS BREVIFOLIA
TRAUTVETTERIA CAROLINIENSIS
VACCINIUM ALASKENSE

APPENDIX VII

Old-Growth Forest Structure

The largest and most impressive old-growth stand in Saddle Mtn. State Park is in the Sitka Spruce Zone and is located in the northwest portion of the park (Figure 9 and 10. Some of the largest Douglas-fir and western hemlock measured in Oregon's Coast Range occur here. A one full hectare (2.47 acres) plot was carefully layed-out and mapped; stand basal area, biomass (by algorithmic equation) and other structural attributes were determined (Tables 3, 6, and 7). Considerable variation in stocking levels, biomass and understory vegetation pattern was found between the four quarter-hectare plots within the full hectare (Table 7). In fact, more variation existed in the Fox River plot than was observed elsewhere in the Coast Range, but the tree size tended to be larger in the Fox River site than for other Coast Range sites. There was a large amount of standing dead and downed material reflecting, perhaps, a slower rate of organic decomposition in this relatively cool to cold site. Several species normally found at higher elevations were found in this site, supporting the contention that conditions were abnormally cold for a Coast Range site. This was probably due to cold air drainage down the mountain slopes. Included were such species as Vaccinium ovalifolium and Listera cordata. Most of the larger trees and other aspects of the vegetation were mapped (Figure 10, page 24).

Figures 11 and 12 present the size-class frequency. The relatively high incidence of small diameter western hemlock and the "evenness" of the ascending curve indicates that the stand represents a "climax" type structure. The truncation of the smaller size-classes, for instance, would denote a slow elimination of the overstory species.

Table 6. Fox Creek old-growth forest data.

Clearcut North of Fox Creek Plot

Species*	Age (yrs)	Diameter (cm)
Pisi	242	difficult to get accurate DBH due to woody decay
Psme	279	
Psme	640	254
Psme	655	196

Height Data on Dominant Trees within Fox Creek Plot

Species*	Height (m)	Diameter (cm)
Tshe	61.9	170
Tshe	40.0	96
Tshe	52.0	116
Pisi	62.2	204
Pisi	62.8	161
Pisi	61.4	210
Pisi	43.2	127
Pisi	59.9	219

* Pisi = *Picea sitchensis* (Sitka spruce)

Psme = *Pseudotsuga menziesii* (Douglas-fir)

Tshe = *Tsuga heterophylla* (western hemlock)

Table 7. Fox Creek old-growth stand biomass and structure[a]

Species (code)	No. Stems	Stemwood kg/ha	Live Branches kg/ha	Foliage kg/ha	Leaf Area Index m^2/m^2	Percent Basal Area	Total Biomass kg/ha
QUARTER HECTARE 1							
Western hemlock (Tshe)	34	182,088	91,961	14,655	29.41	0.41	311,457
Sitka spruce (Pisi)	7	281,203	16,221	3,909	5.47	0.21	334,689
Vine maple (Acci)	64	7,504	2,499	946	1.89	0.04	13,483
QUARTER HECTARE 2							
Western hemlock (Tshe)	55	125,665	55,662	10,459	21.00	0.30	208,020
Red alder (Alru)	1	183	61	21	0.04	T	327
Western red cedar (Thpl)	1	24,690	--	995	1.76	0.06	31,832
Douglas-fir (Psme)	1	11,932	783	266	0.47	0.07	14,655
Sitka spruce (Pisi)	7	422,852	24,395	5,757	8.06	0.32	502,957
QUARTER HECTARE 3							
Western hemlock (Tshe)	60	181,386	85,823	14,842	29.78	0.42	305,099
Red alder (Alru)	9	12,292	3,810	658	1.32	0.04	22,203
Vine maple (Acci)	1	57	20	10	0.02	T	105
Sitka spruce (Pisi)	6	105,157	6,496	1,876	2.63	0.10	127,112
Western red cedar (Thpl)	1	90	--	11	0.02	T	131
QUARTER HECTARE 4							
Western hemlock (Tshe)	39	189,209	9,667	15,175	30.45	0.42	324,646
Red alder (Alru)	4	7,808	2,394	367	0.73	0.02	14,175
Vine maple (Acci)	13	768	262	126	0.25	0.01	1,394
Sitka spruce (Pisi)	3	324,791	18,546	4,248	5.95	0.23	385,471
ONE HECTARE PLOT TOTAL							
Western hemlock (Tshe)		169,587		13,784	28.81	0.59	
Red alder (Alru)		5,073		263	2.27	0.02	
Western red cedar (Thpl)		6,197		254	2.69	0.02	
Douglas-fir (Psme)		2,985		69	2.62	0.02	
Sitka spruce (Pisi)		283,502		3,949	6.53	0.34	
TOTAL						63.98[b]	649,538

[a] Stand is located in N.E. ¼, Sec. 29, T.6 N., R.8 W. Unpublished data from Glenn Juday, 1977.
[b] m^2/ha

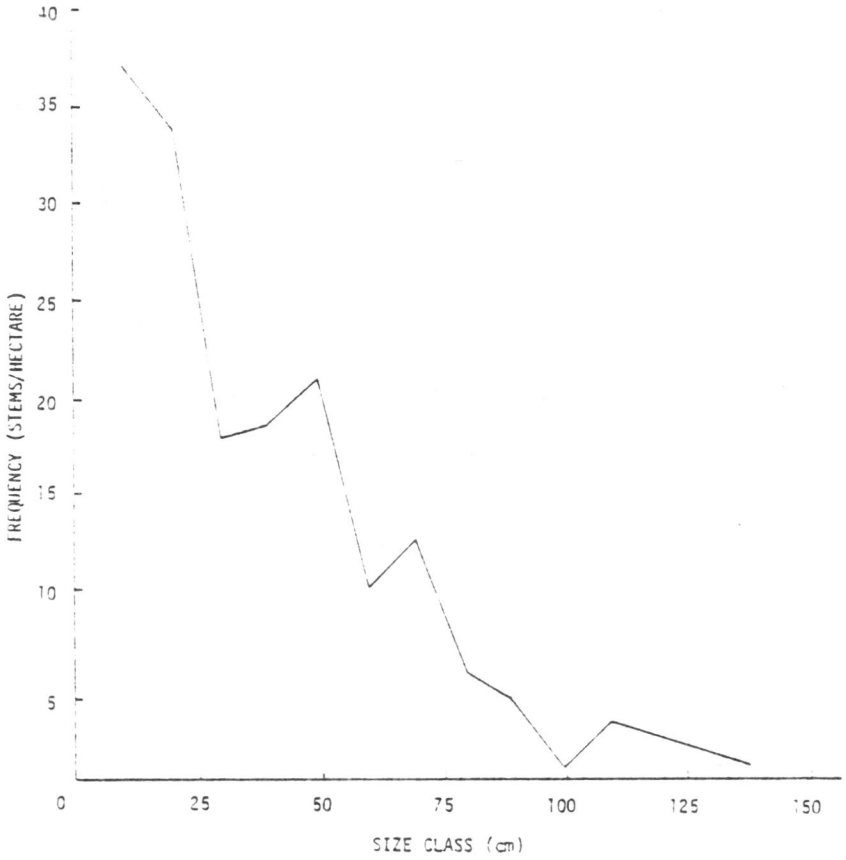


Figure 11. Class size frequency for Tsuga heterophylla (western hemlock) on Fox Creek stand.

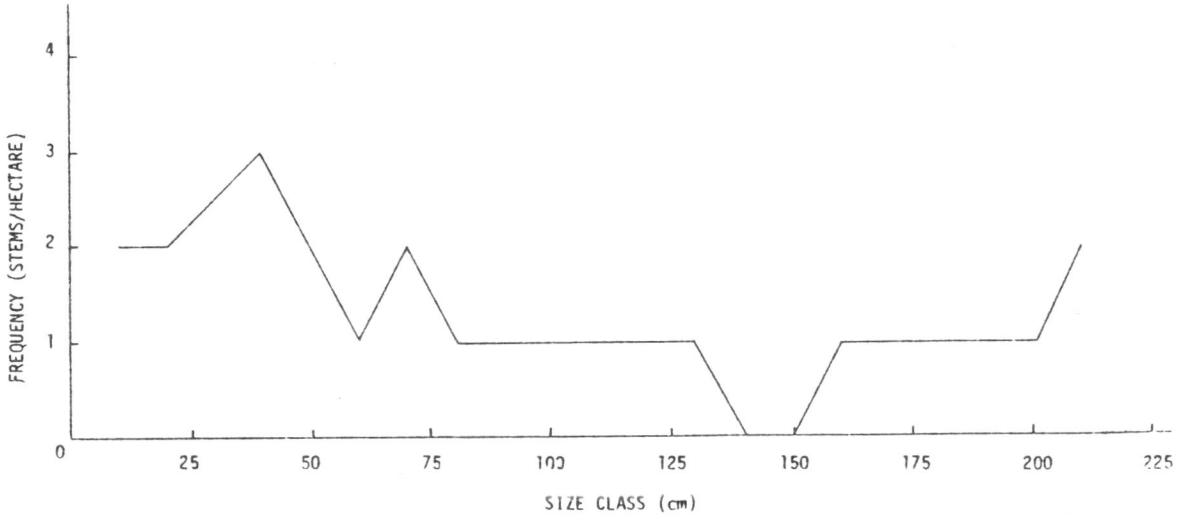


Figure 12. Size class frequency for Picea sitchensis (Sitka spruce) on Fox Creek stand.

APPENDIX VIII

Aquatic Systems of Saddle Mountain State Park, Clatsop Co., Oregon

Kevin M. Howe and Betsy B. Washington
Dept. of Fisheries and Wildlife
Oregon State University

The following report is based on observations and collections conducted 28-30 April 1977. Concentration is based upon the fishes and related factors.

The drainage on the north side of Saddle Mountain flows into the Youngs River which in turn flows into the lower Columbia River at Youngs Bay. The south side of the region drains into the Lewis and Clark River which also flows into Youngs Bay. The streams draining the south portion of the Park were not looked at in any detail because water flow was too low to support fishes.

Draining the north portion of the Mountain are tributaries to Fox Creek (itself a tributary to Youngs River) and tributaries to the South Fork of Youngs River. Observations are listed below by locality though the areas are very similar.

Fox Creek Area

There are two main branches to the creek that occur within Park boundaries. Both are similar in physical and biological factors so no attempt is made to separate them for discussion.

These streams can be considered first-order streams (ecological sense, not U.S. Forest Service classification); they are small headwater streams. They vary to about 1.5 meters (m) in width with depth averaging about 0.2 m but not exceeding 0.5 m. The streams are of high gradient with the pool to riffle ratio close to 1:1; the streams are a series of step riffles-pools. The bottom is primarily small cobble with secondary amounts of large cobble and gravel. Pool areas are primarily sand but with cobble and gravel. Very little silt is present anywhere which is probably the result of high gradient, lack of logging activities and strong winter-spring flows. Channel characteristics suggest that water level may vary as much as 0.8-1.0 m on an annual basis. Even with this variance, the stream channels do not suggest mass wasting of the banks. Almost all areas of the streams are completely shaded except in a few areas where landslides have occurred. Natural debris dams and sediment traps are present especially in the upper reaches. Water is clear and colorless and the temperature ranged between 8°C and 10°C.

Fishes present included the cutthroat trout (Salmo clarki) and the reticulate sculpin (Cottus perplexus). The sculpin is a bottom dweller, typically occurring in the pool areas. The trout are moderately abundant while the sculpins are more rare. Young of the year as well as adults of both species were found. Crayfish (Pascifastacus trowbridgi) were present but not abundant. Most common invertebrates were caddisflies (Tricoptera), mayflies (Ephemeroptera) and stoneflies (Plecoptera). These are all larval forms. Tailed frog tadpoles (Ascaphus truei) were abundant in a few places. Excepting terrestrial vegetation along the edges of the streams, little or no aquatic vegetation was present. The fishes and crayfish occur at about 3000 ft within the park. Their disappearance is related to the small size of the stream, debris dams and related factors.

Youngs River Tributaries

There are three main branches to the Youngs River that occur within the Park boundaries. As with the Fox Creek tributaries, they are similar in the physical and biological factors so no attempt is made to separate them for discussion. These streams can be considered closer to second-order streams (ecological sense). They are still small headwater streams though slightly larger than the Fox Creek tributaries. They vary in width between 1 and 2 m and average 0.3 m in depth although they reach 0.8 m in some areas. All other physical factors are the same as in the Fox Creek tributaries.

Fishes present in these streams are the same as in Fox Creek area - cutthroat trout and the reticulate sculpin. Both species are quite numerous especially in the largest tributary. In this largest branch, there are perhaps three cutthroat and nine sculpins per 3 m^2 area of pool. Crayfish, caddisflies, mayflies and stoneflies are all very abundant. The fishes extend into the park at least 1 mile.

Summary - Conclusions

Many of the headwater streams in the Coast Range of Oregon have suffered from human activities - primarily road building for the timber industry. Historically, many of these streams contained fishes but this is no longer the case. The streams within the Park boundaries are not so altered but immediately outside the boundaries, the streams have been altered by logging and road building. The most apparent difference is the amount of silt present

within the stream.

The aquatic fauna present within the Park boundaries is what we believe to be a typical Coast Range headwater assemblage that has not been greatly altered by human activities.
Of importance are the fishes - cutthroat trout and reticulate sculpin - and crayfish. It is notable that we did not find any introduced fishes or crayfish; many of our streams in Oregon harbor populations of introduced organisms but not here.

Further downstream in the Youngs River we have found young coho salmon (Oncorhynchus kisutch) and it is quite possible that coho could use at least the larger branches of the streams within the Park for spawning.

In summary, the streams within Saddle Mountain State Park appear to be in a natural condition. There are native populations of fishes and crayfish and we see no reason why this areas should not be granted the Natural Area status. Areas such as this are disappearing at an alarming rate and there is much yet to be learned about aquatic systems. Preserving some of these areas will aid us to understand and properly manage our fisheries and other aquatic resources.

APPENDIX IX

Field Notes by the State Parks and Recreation Branch, Highway Division for a Projected Land Exchange

Form 61-734-3030

OREGON STATE HIGHWAY DIVISION
INTER-OFFICE CORRESPONDENCE

FILE:

Salem, Oregon
August 10, 1976

FROM: Richard McCosh, Supervisor
Parks Master Planning

SUBJECT: Field Examination of Saddle Mountain

TO: Ray Wilson
Park Lands Supervisor

On August 5, 1976, Doug Watson, Bob True, and I made a field examination of the land areas at Saddle Mountain State Park which John Woods tentatively suggested as possible exchange areas with Crown Zellerbach Corporation for the Tillamook Head-Trails End State Park project.

Based on our observations in the field, I have the following recommendations:

1. The State should retain all of the lands and important park trees in the East 1/2 of Section 29, T.6N., R.8W., W.M. in order to maintain the significant park values and recreational interests of Saddle Mountain State Park which are noted in more detail later.

2. All of the 160 acres of the NW 1/4 of Section 8, T.5N., R.8W.,W.M. appear totally surplus to state park needs. The area is entirely isolated by private timber lands from the park; it does not offer any special park or recreation use attractions; and the lands close around it are all logging oriented. I don't feel that any of this area is feasible to continue to manage within the park.

3. All of the 160 acres of the SW 1/4 of Section 29, T.6N., R.8W., W.M. has insufficient park or recreation value to require its retention in the park if the donors would be agreeable to exchange. The north-south line in the center of Sections 29 and 32 would make a good park boundary and would block out a simple management line. The 160 acres could either be traded for the Tillamook project or for state forestry lands in the SW 1/4 of Section 27 or the privately owned mountainside area in the NE 1/4 of Section 28, both of which should be within the future boundary of Saddle Mountain State Park.

Of special concern to us are the existing park and recreation values of the NE 1/4 of Section 29. The area contains an impressive old growth climax forest situation with a compact grove of Douglas fir, redcedar, Sitka spruce, and hemlock trees up to 10 feet in diameter. This grove is of non-replaceable park value and scientific interest within the park and probably is some of the last 1 percent of such timber in a public forest in Clatsop County. Old fire scarred trees, the geology of this area, and the open attractive vegetation below near Fox Creek are also important for scientific study and are critical to other park value interests.

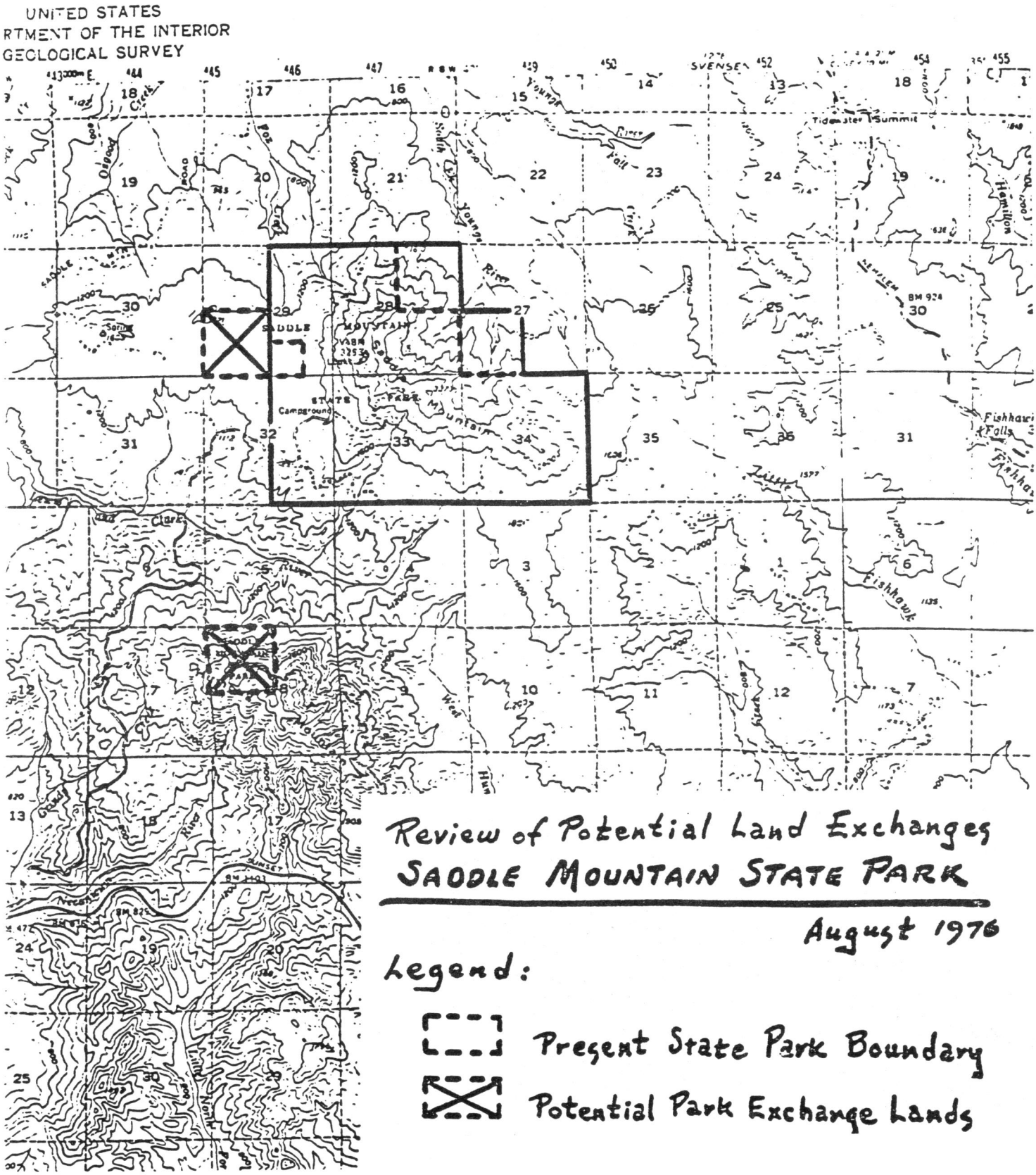
The habitat of the watering areas and vegetation along Fox Creek appear essential to the many elk using the park as well as other wildlife. A nearly level scenic trail route for all age groups could easily be provided from the present campground. It would serve forestry, botanical, and geologic study groups as well as park users and be an alternative hiking area for campers when the mountain trail is fogged in or too difficult for some to negotiate. The scenic character of the immediately adjacent lands at the foot of the mountain are readily visible from the summit. The present vegetation will be visually critical to this major scenic viewpoint now that the CZ lands just to the north have been clear cut.

Attached are some photographs of the forest grove at Fox Creek which I think the State should retain and a park boundary proposal for long range management of Saddle Mountain State Park for staff consideration.

RIM:aw

Attachments

cc: David Talbot
Warren Gaskill
Larry Jacobson
John Woods
Doug Watson
Robert True
Ray Leavitt
Darald Walker


UNITED STATES
RTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
SADDLE
MOUNTAIN
STATE
Campground
Review of Potential Land Exchanges
SADDLE MOUNTAIN STATE PARK
August 1976
Legend:
Present State Park Boundary
Potential Park Exchange Lands

APPENDIX X

Information on Rare and Endangered Plant Species which Occur on Saddle Mountain

prepared by Jean L. Siddall, August 1977, updated 1978

Of the 28 species on the "Provisional List of Rare, Threatened and Endangered Plants in Oregon" which are found in the Oregon Coast Range Province, 19 are known to occur on Saddle Mt. (see Coast Range Province listing).

The following is information regarding the distribution and status of each of the species, compiled by Jean Siddall for the Oregon Rare and Endangered Plant Project from sighting reports submitted by participating botanists, from herbarium records, from floras of Pacific Northwest plants, and from the literature.

Saxifraga occidentalis var. latipetiolata - Known from Saddle Mt., and a few high peaks to the south in Clatsop and Tillamook Counties. Its range, as presently known, is limited to a relatively small section of trail on the west peak. Due to its very limited range and small number of individuals, this plant is considered to be rare and threatened, if not endangered. It is listed on the Smithsonian Report as Threatened.

Cardamine pattersonii. Known only from Saddle Mt., Onion Peak and Sugarloaf Mt., Clatsop Co. Oregon. This species was known only from Saddle Mt. until 1972 when it was found on Onion Peak by Dr. Kenton Chambers. The type locality for this species is on the west peak of Saddle Mt. on rocks along the trail where it grows as an annual; however in May 1977, it was found growing in the gravel of Fox Creek by Jean Siddall, and on Youngs Creek by Chambers and Siddall. Here it grows as a perennial. Due to its limited range, it is considered to be rare and threatened in Oregon. It is listed on the Smithsonian Report as Endangered.

Geum triflorum var. campanulatum. Known only from Saddle Mt. in Oregon and the Olympic Mts. in Washington. With Saddle Mt. the only known locality in the state, this species is considered to be rare and endangered in Oregon.

Rhinanthus crista-galli. In Oregon, known from a few localities in Clatsop and Tillamook Cos. A specimen was collected in 1882 from "Tillamook Landing". In Washington, it is known from only a few localities. Its range outside the Pacific Northwest is circumboreal extending south to New York and Colorado, however it is apparently infrequently collected. The species is considered to be rare and endangered in Oregon.

Carex macrochaeta. The only validated location for this species in Oregon is Saddle Mt., although it was reportedly collected at Multnomah Falls in 1906 and an old (1826) collection is supposed to have come from Ft. Vancouver, Wn. The range of the species otherwise is from Vancouver Island, B.C. north along the Alaskan coast. As sedges are not the best known species, this one may eventually be found elsewhere in Oregon, but at present, its only known location is Saddle Mt.

Erigeron peregrinus ssp. peregrinus var. peregrinus. The Erigeron peregrinus which is found on Saddle Mt. is presently included in the taxon which occurs along the Alaska panhandle. The only other population in Oregon, on Onion Peak, is also included in this group. As Arthur Cronquist suggests, however, "A phase of ssp. peregrinus resembling var. peregrinus, but perhaps properly to segregated, occurs on Saddle Mt." Whatever the eventual outcome of this taxonomic question, with only two populations in Oregon, this taxon is considered to be rare.

Synthyris schizantha. Known from Saddle Mt. and Onion Peak, Clatsop Co. and near Blue Lake, Tillamook Co. in Oregon, and from the Olympic Mts. and Cascade Range near Mt. Rainier in Washington. This species is not abundant anywhere. The population on Saddle Mt. consists of a few scattered individuals.

Lewisia columbiana var. rupicola. Known from Saddle Mt., Onion Peak and Angora Peak Clatsop Co. and from near Blue Lake in Tillamook Co. in Oregon; disjunct to the Olympic Mts. and Mt. Rainier in Washington. The population on the summit of Saddle Mt. is well-known and widely sought-after by collectors as a rock garden plant, as this var. has deep pink flowers. The population here is felt to be Endangered and the taxon, in general, Threatened in Oregon.

Douglasia laevigata var. ciliolata. Known from Saddle Mt., Blue Lake area and reportedly Mt. Hood in Oregon; disjunct to Mt. Rainier and the Olympic Mts. in Washington. The presently-known population of this species on Saddle Mt. consists of three patches near the saddle between the middle and west peaks which are quite accessible. As there have been no recent sightings reported from Mt. Hood and the population on BlueLake Lookout is also limited, this species is considered to be threatened if not endangered in Oregon.

Platanthera unalascensis var. maritima (Habenaria greenei) Although the range of this species extends from "Fidalgo Islands, and probably other islands, and at numerous places along the Oregon coast, south to California", it has been reported by none of the botanists participating in the Oregon Rare and Endangered Plant Project. It is known to occur on Saddle Mountain and there are herbarium collections from Waldport, Sand Lake and Battle Rock near Port Orford.

Cladothamnus pyrolaeflorus. Until recently, this species was known only from Saddle Mt. in Oregon, disjunct to the Olympic Mts. and north. It is now known to occur on quite a few other Coast Range peaks in the immediate area of Saddle Mt., extending so. into northern Tillamook Co. and its status in Oregon is at present Undetermined.

Sidalcea hirtipes. The range of this species is limited to Tillamook and Clatsop Cos., Oregon to Lewis and Clark Cos., Washington. It has been reported recently only from Saddle Mt. and Cascade Head in Oregon, although there are several other sites near the coast named on herbarium collections. As the known population on Saddle Mt. numbers very few individuals and is easily accessible, and as there are so few other sites known, this species is considered to be threatened if not endangered in Oregon.

Erythronium revolutum. Endemic to the coast and coastal mountains , Vancouver Island to California. This species, once found in abundance along the north coast, on peaks in the northern Coast Range and along the south coast in Oregon, is now declining so rapidly it is considered to be threatened in Oregon. The populations are declining primarily because their habitat is being destroyed as the land along the coast develops and as the forests are cut for timber. As this species also has commercial value, collecting both for private and commercial purposes also takes its toll. Much of the population on Saddle Mt. is around the campground and along the trail where it is also subjected to trampling and indiscriminate picking.

Poa marcida. Known only from the coast and Coast Range, n.w. Tillamook County to Vancouver Island. In recent years this species of blue grass has been found only on Saddle Mt., Onion Peak and Cascade Head, however there is an old 1882 collection from Tillamook Head.

Dicentra cucullaria . Saddle Mt. is the westernmost site known to date for this species, and the only site west of the Columbia River Gorge. When this plant was entered on the Oregon Rare and Endangered Plant list, it was known only from the Columbia River Gorge and from "Eastern North America" , however with the information collected for the Oregon Rare and Endangered Plant Project, it is now known also from the Wallowa Mts.

Saxifraga bronchialis var. vespertina. Although this species is on the Provisional List of Rare, Threatened and Endangered Plants in Oregon, enough sites now have been reported that it is no longer considered to be rare, threatened or endangered.

Saxifraga caespitosa var. subgemmifera. Good evidence now exists that var. subgemmifera and var. emarginata should be merged. As a species, Saxifraga caespitosa will be removed from the Oregon List.

Allium cernuum. Enough sites have now been reported that this species of onion is no longer considered to be rare, threatened, or endangered.

Allium crenulatum. Enough sites have now been reported that this species of onion is no longer considered to be rare, threatened or endangered.

NATURAL AREA PRESERVES ADVISORY COMMITTEE

GOALS

1. Cooperate in developing a coordinated program of preserving representative samples of Oregon's typical and unique ecosystem types or natural features by dedicating natural area preserves on public lands.

2. Provide educational and research opportunities in Oregon through access to natural area preserves as basic resources.

3. Compile and periodically update a comprehensive list of natural area locations in Oregon, and maintain a list of natural area preserves needs.

4. Assure perpetual protection to dedicated natural area preserves and maintain preserves in as nearly a natural condition as possible.

5. Encourage the establishment of natural area preserves on qualified areas that appropriate local governments, resource agencies or citizens recommend to the State Land Board and advisory committee.

6. Recommend natural area preserves in suitable locations throughout the state, including those within and near Oregon's population centers.

7. Publish and disseminate appropriate information about natural area preserves.