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# Forest Plants of the Eastern Siskiyous: Their Environmental and Vegetational Distribution

The Siskiyou Mountains, extending on both sides of the California-Oregon border, are the most northern mountain range in the Klamath Geological Province (Irwin, 1966). Across the Siskiyous, from the Coast Range to the Cascades, a steep climatic gradient is exhibited. For example, precipitation decreases from over 250 cm (100 inches) in a year to less than 50 cm (20 inches). Superimposed on the climatic gradient is extreme geological diversity, unexcelled in any comparable area of the West. Because of its geographic setting, the Klamath Province is of central significance to the evolution, migration, and representation of western forest flora (Whittaker, 1961). For at least the last 100 million years, the area has escaped decimation of its flora through flooding, volcanic activity, or glaciation. These combinations of circumstances have permitted the development of a large and diverse flora, rich in endemics and relics (Chaney, *et al.*, 1944, Stebbins and Major, 1965, Whittaker, 1961).

For five years I have made intensive ecological studies in the Siskiyou Mountains in an attempt to interpret the distribution of plants as they respond to differences in the availability of water, light, essential nutrients, and varying temperature. An initial survey of 150 forest stands suggested that at least two floristic subdivisions should be recognized. Environmental measurements in 25 stands substantiated this view and provided a framework for describing distributions of individual species and vegetation.

My objectives in this paper are: (1) to distinguish two subdivisions in the Siskiyous; and (2) to examine the forest flora and vegetation in one of these subdivisions as they appear related to moisture and temperature gradients.

### The Eastern Siskiyous, a Distinct Floristic and Environmental Unit

Whittaker (1960), in his monograph on the vegetation of the Siskiyous, recognized a climatic gradient from the coast inland, but made no formal distinction between a western and eastern region. Most of his field work was conducted in the region designated as the Western Siskiyous (Figure 1), and only for that area is his vegetational treatment really appropriate.

By sampling the vegetation across the entire area more uniformly, I found that many species present in the Western Siskiyous do not extend into the eastern portion of the geological formation. The three endemics, *Picea breweriana, Quercus sadleriana,* and *Ribes marshallii,* listed by Whittaker (1961) as representative of the entire Klam-

ath Province, are notably absent. Other species occur in the western region and reappear in the Cascades. The absence of important diagnostic species common to adjacent areas (Table 1) gives the vegetation of the Eastern Siskiyous a less stratified appearance.

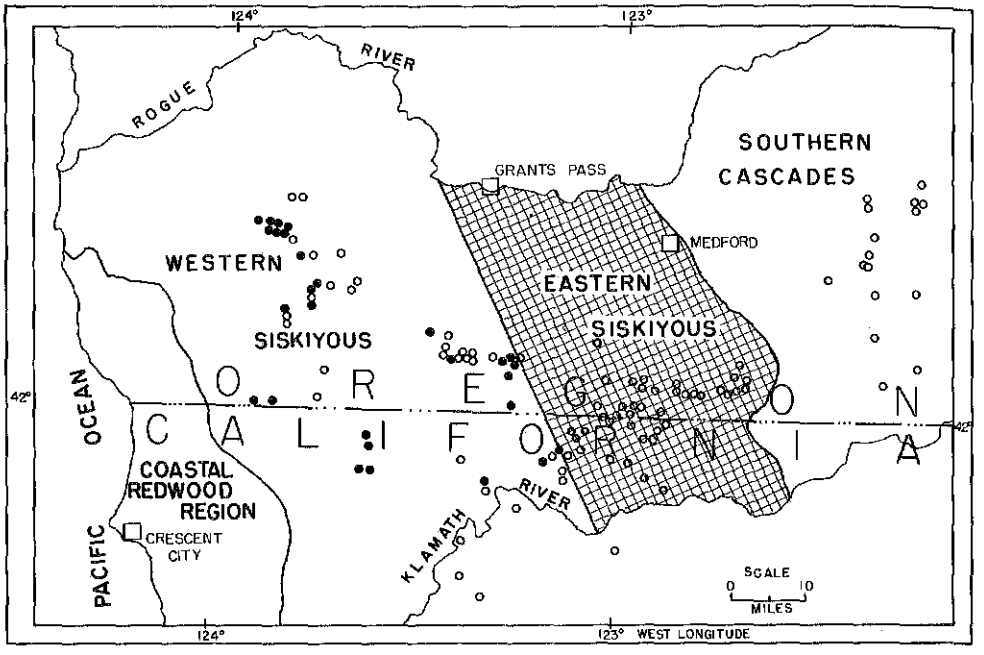


Figure 1. Map showing location of Eastern Siskiyous. Small circles indicate reconnaissance plots. Filled circles indicate where *Quercus sadleriana* was found.

Floristically, the western boundary of the Eastern Siskiyous is defined by the eastern limits of *Picea breweriana* and *Quercus sadleriana* (Figure 1). Some other diagnostic species drop out earlier in the transition from the Western to Eastern Siskiyous. The Rogue River and Cascade Mountains serve as northern and eastern boundaries, agreeing with limits set by Howell (1957), Jepson (1925), Stebbins and Major (1965), and Whittaker (1960). The Klamath River is a convenient southern boundary separating the Siskiyous from other parts of the Klamath Geological Province.

The absence of many mesophytic species in the Eastern Siskiyous suggests that it is physiologically drier than adjacent areas to the west or east. The precipitation pattern suggests this, but the full explanation is complex. Soils throughout the Siskiyous are fully charged with water during the winter, and, consequently, no water deficits exist at the start of the growing season. Summer precipitation is ineffective, coming as an occasional thunder shower.

Field temperature records indicate transpirational stress increases abruptly just inside the western boundaries of the Eastern Siskiyous. A simple comparison of daily extremes from June through mid-September shows the Eastern Siskiyous have daily temperature ranges greater than 11°C (20°F) more than 95 per cent of the time. Just over the boundary to the west, one day in three, variation averaged less than 11°C. For many species, lower transpiration rates associated with such temperature patterns favor growth by preventing development of critical water deficits in leaves.

TABLE 1. Diagnostic species of areas adjacent to the Eastern Siskiyous

| Trees | Western Siskiyous | Eastern Siskiyous | Southern Cascades |
|---|---|---|---|
| *Abies lasiocarpa* | — | * | X |
| *Chamaecyparis lawsoniana* | X | — | — |
| *Lithocarpus densiflora* | X | — | — |
| *Picea breweriana* | X | — | — |
| *Picea engelmannii* | — | * | X |
| *Pinus attenuata* | X | — | — |
| *Populus tremuloides* | — | * | X |
| Shrubs | | | |
| *Acer circinatum* | X | * | X |
| *Arctostaphylos uva-ursi* | — | — | X |
| *Gaultheria ovatifolia* | X | — | X |
| *Gaultheria shallon* | X | * | X |
| *Kalmiopsis leachiana* | X | — | — |
| *Ledum glandulosum* | X | — | X |
| *Leucothoe davisiae* | X | — | — |
| *Quercus sadleriana* | X | — | — |
| *Rhamnus californica* | X | — | — |
| *Rhododendron macrophyllum* | X | — | X |
| *Rhododendron occidentale* | X | — | — |
| *Umbellularia californica* | X | — | — |
| *Vaccinium membranaceum* | X | * | X |
| *Vaccinium ovatum* | X | — | X |
| Herbs | | | |
| *Achlys triphylla* | X | — | X |
| *Asarum hartwegii* | — | — | X |
| *Aster occidentalis* | X | — | — |
| *Boykinia elata* | X | — | X |
| *Cornus canadensis* | X | — | X |
| *Darlingtonia californica* | X | — | — |
| *Ribes marshallii* | X | — | — |
| *Sarcodes sanguinea* | X | — | — |

X Present
— Absent
* Rare, often in only a single location

**Measurements of Forest Environments and Their Interpretation**

Environment affects each plant species differently, but the kinds of stimuli are similar: moisture, chemical, temperature, light, and mechanical. The effect of each of these stimuli upon plant distribution was investigated, and moisture and temperature proved to be of leading importance. The other stimuli were significant at extremes. For example, where soils were derived from ultrabasic rocks, only plants with low nutritional requirements dominate. At higher elevations, mechanical stress from ice and snow may eliminate brittle-limbed species of trees. This paper deals mainly with plant distribution in relation to moisture and temperature gradients. If growth rates were being considered, all five physical variables would have to be considered. This is the subject of a separate paper.

The effect of moisture upon plants depends upon the supply and the demand. The supply resides in the soil and the demand is determined by transpirational stress. Where transpirational stress is consistently high, as in the Eastern Siskiyous during the growing season, plant distribution reflects the availability of soil moisture. Availability of soil moisture can be assessed by measuring the moisture stress of a plant after a full night's

recovery, and, where growing season precipitation is negligible, determination of the influence of soil moisture requires measurements only at the peak of drought. Measurements of this type often show that shallow or coarse-textured soils are depleted of water, in contrast to fine-textured soils or soils in seepage or late snow-melt sites.

During 1967, moisture stress in the Eastern Siskiyous reached a maximum in September. On September 1, *Pseudotsuga menziesii* and *Abies magnifica* var. *shastensis*, 1-2 m tall, exhibited values ranging from 5 to over 25 atm.[1] Moisture stress measurements were taken with a pressure bomb, as outlined by Waring and Cleary (1967).

Plants growing in a saturated atmosphere and with their roots in water are under no stress, but such conditions were not found in the Siskiyous during September. A tree growing beside a stream recovered to about 2 atm during the night, but trees in most forested areas exceeded 5 atm. Cambial growth appears to cease if moisture stress exceeds 18 atm at sunrise, regardless of other conditions. Above 26 atm, essentially no nightly recovery takes place, at least not on coarse-textured soils. Douglas-fir seedlings die at about 45 atm, depending upon the genetic race (Cleary, 1968).

Certain plants are confined to narrow portions of the gradient from low to high soil-moisture stress. They may be used to pin-point where a particular stand or vegetation type lies along a moisture gradient. For example, occurrence of *Lathyrus polyphyllus* and *Acer macrophyllum* (Table 2) suggests moisture is not a problem, because stresses were less than 10 atm in the reference plants. In contrast, presence of *Lonicera hispidula* and *Arctostaphylos viscida* signifies sites where the highest moisture stresses were recorded.

Let us now consider temperature. In the Siskiyous, extreme temperatures appear to have little influence upon plant distribution. In 1965 through 1967, minimum temperatures at 2,100 m (7,000 ft) did not fall below −15°C (5°F). No temperatures above 43°C (110°F) were recorded under a forest canopy. During the winter most species are dormant, and many remain protected beneath the snow. The highest temperatures occur at lower elevations during the summer, often after many species have set seed and are already dormant. The critical influence of temperature is during the growing season—that period during which new cells are laid down. This period was determined by inspecting samples from the secondary cambium.

Growing-season temperature data were obtained from instruments placed with sensing probes 20 cm above and below ground in 25 forest stands. Averages of day, night, and soil temperature were obtained by computer analysis. Day length was defined monthly as the period between sunrise and sunset at latitude 42½° N.

These data on growing-season temperatures were interpreted in light of studies of growth responses of Douglas-fir seedlings to controlled laboratory temperatures (Cleary and Waring, 1968). In the laboratory, optimum growth occurred with average day temperatures of 30°C (86°F) in the air and 20°C (68°F) in the soil. Night temperatures had little effect upon growth, but root (soil) temperatures were critical. For example, root temperatures of 10°C (50°F) reduced growth to less than 60 per cent of the maximum observed, regardless of shoot temperature.

The potential effect of temperature was estimated by summing the fractions of growth possible during a growing season in which water does not become limiting. The actual temperature effect cannot be estimated without knowledge of interactions

[1] One atmosphere is equivalent to 14.7 lbs/in$^2$ or $10^6$ ergs/cc.

between moisture and temperature. The temperature-effect index developed, expressed in units equivalent to Optimum Temperature Days (OTD), ranged from 34 to 98 in the 25 stands evaluated. At the higher elevations, from 2 to 3 days were required to yield the equivalent of 1 OTD. Where cambial growth was prematurely arrested by high moisture stress, the potential and actual temperature effects differ by at least 10 OTD.

Plant species that may be used to identify specific points along the temperature gradient are listed in Table 3.

#### Distribution of Vegetation Types

Although many species have overlapping environmental distributions (Tables 2 and 3), a generalized vegetation or community classification is possible and desirable. At least eight major types should be recognized. Identified by a component tree, they may be named accordingly: Mountain Hemlock, Shasta Red Fir, White Fir, Mixed Conifer, Ponderosa Pine, Black Oak, Yew, and Jeffrey Pine. One type may grade into another, although their approximate distribution along moisture and temperature gradients is

TABLE 2. Plant indicators of moisture stress

| Species | Plant Moisture Stress, Atm* 5-10 | 10-15 | 15-20 | 20-25 |
|---|---|---|---|---|
| *Lathyrus polyphyllus* | X | | | |
| *Lupinus andersonii* | X | | | |
| *Clintonia uniflora* | X | | | |
| *Valeriana sitchensis* | X | | | |
| *Veratrum californicum* | X | | | |
| *Tiarella unifoliata* | X | | | |
| *Whipplea modesta* | X | | | |
| *Viola glabella* | X | | | |
| *Viola sempervirens* | X | | | |
| *Phlox adsurgens* | X | | | |
| *Acer macrophyllum* | X | X | | |
| *Campanula scouleri* | X | X | | |
| *Linnaea borealis* | X | X | | |
| *Adenocaulon bicolor* | X | X | | |
| *Antennaria neglecta* | X | X | | |
| *Arnica latifolia* | X | X | | |
| *Trillium ovatum* | X | X | | |
| *Disporum hookeri* | X | X | | |
| *Goodyera oblongifolia* | X | X | | |
| *Galium triflorum* | X | X | | |
| *Pedicularis racemosa* | X | X | | |
| *Rubus parviflorus* | X | X | | |
| *Anemone deltoidea* | X | X | | |
| *Pyrola secunda* | X | X | | |
| *Ribes viscosissimum* | X | X | | |
| *Senecio triangularis* | X | X | X | |
| *Amelanchier pallida* | | X | X | |
| *Monardella odoratissima* | | X | X | |
| *Ceanothus prostratus* | | | X | |
| *Phlox diffusa* | | | X | |
| *Cordylanthus viscidus* | | | X | |
| *Rhus diversiloba* | | | X | X |
| *Agoseris retrorsa* | | | X | X |
| *Quercus kelloggii* | | | X | X |
| *Arctostaphylos viscida* | | | X | X |
| *Lonicera hispidula* | | | | X |
| *Galium aparine* | | | | X |

* Measured on 1-2 meter high Douglas-fir and Shasta red fir trees before dawn on 1 September 1967.

TABLE 3. Plant indicators of temperature effectiveness

| Species | Optimum Temperature Days* | | | | | | |
|---|---|---|---|---|---|---|---|
| | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
| *Galium bifolium* | X | | | | | | |
| *Polygonum davisiae* | X | | | | | | |
| *Valeriana sitchensis* | X | X | | | | | |
| *Polemonium californicum* | X | X | | | | | |
| *Tsuga mertensiana* | X | X | | | | | |
| *Smilacina racemosa* var. *glabra* | X | X | X | | | | |
| *Abies magnifica* var. *shastensis* | X | X | X | | | | |
| *Pyrola secunda* | X | X | X | | | | |
| *Eriogonum umbellatum* | X | X | X | X | | | |
| *Phacelia mutabilis* | X | X | X | X | | | |
| *Veratrum californicum* | X | X | X | X | | | |
| *Ribes viscosissimum* | | X | X | X | | | |
| *Anemone quinquefolia* var. *oregana* | | X | X | X | | | |
| *Paxistima myrsinites* | | X | X | X | X | | |
| *Antennaria neglecta* | | X | X | X | X | | |
| *Xerophyllum tenax* | | X | X | X | X | | |
| *Rubus parviflorus* | | | X | X | X | | |
| *Eriogonum latifolium* | | | X | X | X | | |
| *Linnaea borealis* | | | X | X | X | | |
| *Eburophyton austinae* | | | | X | X | | |
| *Whipplea modesta* | | | | X | X | X | |
| *Rubus ursinus* | | | | X | X | X | |
| *Acer macrophyllum* | | | | | X | X | |
| *Adenocaulon bicolor* | | | | | X | X | |
| *Corylus cornuta* | | | | | X | X | X |
| *Apocynum pumilum* | | | | | X | X | X |
| *Rhus diversiloba* | | | | | | X | X |
| *Agoseris retrorsa* | | | | | | X | X |
| *Quercus kelloggii* | | | | | | X | X |
| *Galium aparine* | | | | | | | X |
| *Arctostaphylos viscida* | | | | | | | X |
| *Lonicera hispidula* | | | | | | | X |

* Defined for Douglas-fir seedlings under controlled temperatures, expressed for the entire growing season by summing the effectiveness of each day as a fraction of the optimum.

defined discretely in Figure 2. The Jeffrey Pine Type is not shown in Figure 2 because its occurrence is related to particularly infertile soils, not moisture and temperature. These vegetation types serve as a reference for the distributions of other forest plants. Therefore a brief description of each is in order.

The Mountain Hemlock (*Tsuga mertensiana*) Type occurs above 2,000 m (6,600 ft) where snow creep and low temperatures discourage the establishment of most other conifers. A few Shasta red fir (*Abies magnifica* var. *shastensis*) and western white pine (*Pinus monticola*) may be present. Winter temperatures fall to about −12°C (10°F). Because (1) the growing season does not start until July, (2) soil temperatures rarely exceed 10°C (50°F), and (3) air temperatures remain below 25°C (77°F), this type is characterized by the equivalent of less than 40 OTD. The moisture regime is favorable, although no understory plants may be present. Of those few plants that do occur, *Polygonum davisiae, Valeriana sitchensis,* and *Pyrola secunda* are most common. A variant of this type occurs on very shallow soils where soil moisture stress may reach critical levels. The trees occur in patches with openings occupied by such species as *Eriogonum umbellatum, Calyptridium umbellatum, Arenaria congesta, Haplopappus suffruticosus,* and *Hieracium cynoglossoides.*

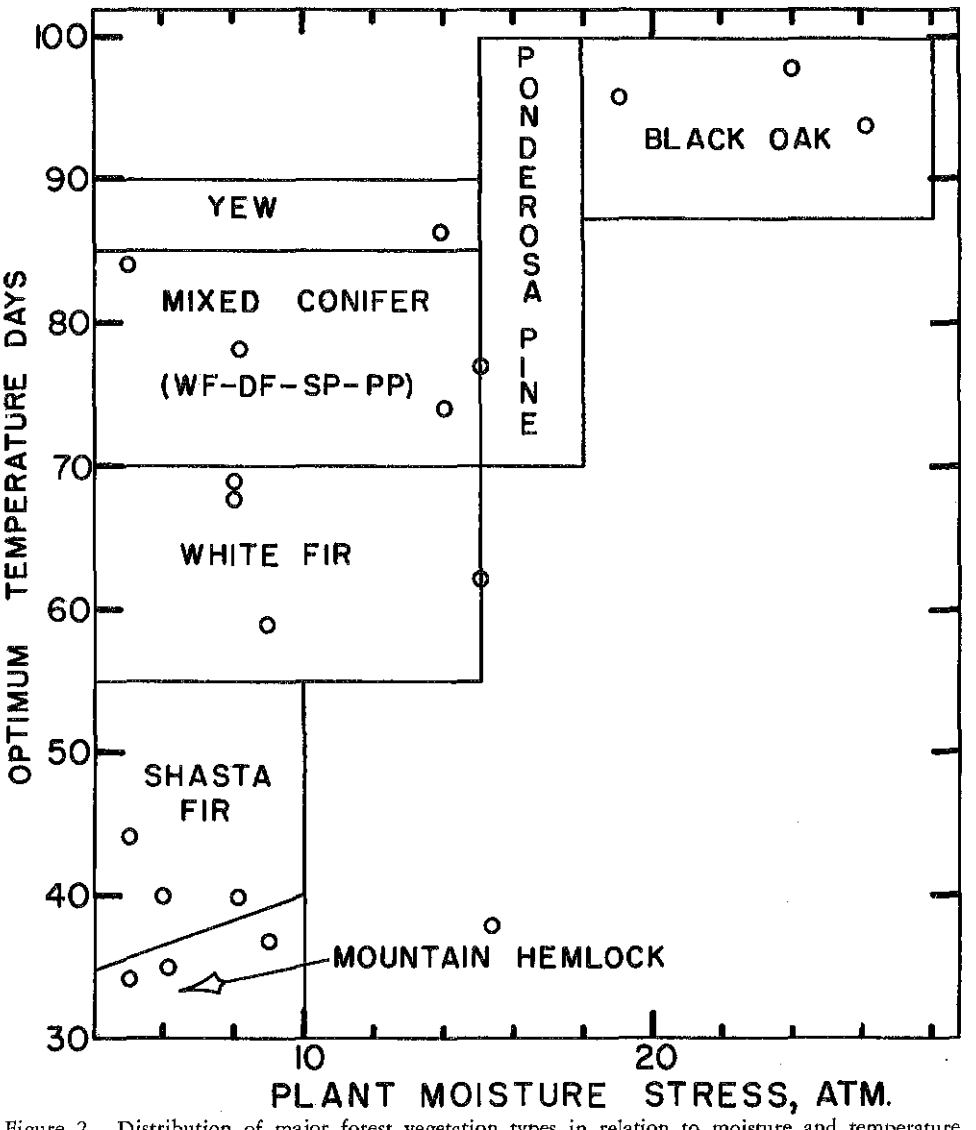


Figure 2. Distribution of major forest vegetation types in relation to moisture and temperature gradients.

The Shasta Red Fir (*Abies magnifica* var. *shastensis*)[2] Type is found at slightly lower elevations than the Mountain Hemlock Type. Snow depth may exceed 2 m, but snow creep has less importance here. The growing season usually does not start until July; soil temperatures remain below 15°C (59°F). Environments with the equivalent of 35 to 55 OTD may support this type. Moisture stress never reaches critical levels. Pure stands of fir are common, although mountain hemlock and western white pine may occasionally be found. Shrub cover is sparse and normally limited to *Ribes vis-*

[2] Although Parker (1963), from cone studies, suggested *Abies procera* is the common true fir at high elevations in the Siskiyous, recent studies of cotyledon number (Franklin and Greathouse, 1968) suggest a taxon closer to *Abies magnifica* var. *shastensis*.

*cosissimum, Arctostaphylos patula,* and *Castanopsis chrysophylla. Valeriana sitchensis, Pyrola secunda, Polemonium californicum,* and *Anemone quinquefolia* var. *oregana* are among the more common herbaceous plants.

The White Fir (*Abies concolor*) Type occurs between 1,650-1,800 m (5,400-5,900 ft). Snow creep is not a problem, but heavy, wet snowfalls place brittle-limbed species such as ponderosa pine (*Pinus ponderosa*) and madrone (*Arbutus menziesii*) at a disadvantage. Douglas-fir (*Psuedotsuga menziesii*) is usually a major component of the stand; sugar pine (*Pinus lambertiana*) and incense-cedar (*Libocedrus decurrens*) are less common. The growing season begins in early June; soil temperatures reach 16°C (60°F). Moisture stress does not exceed 15 atm and the temperature regime provides the equivalent of 55 to 70 OTD. *Acer glabrum* is the most definitive shrub species, but *Amelanchier pallida, Castanopsis chrysophylla, Holodiscus discolor, Salix scouleriana,* and *Corylus cornuta* occur in openings. Saxifragaceae, Rosaceae, and Liliaceae are families with their highest representation in this type. *Berberis nervosa, Campanula scouleri,* and *Lathyrus polyphyllus* are almost always encountered.

The Mixed Conifer Type consists of white fir, Douglas-fir, sugar pine, and ponderosa pine. Incense-cedar occurs infrequently; madrone and big-leaf maple (*Acer macrophyllum*) are normal hardwood associates. Usually, the growing season begins in late May. Soil temperatures reach 19°C (66°F) and air temperatures will rarely reach 32°C (90°F), yielding environments with 70-85 OTD. Where moisture stress remains below 10 atm, trees will reach heights of 60 m (200 ft) to 75 m (250 ft) depending on soil fertility. *Corylus cornuta, Holodiscus discolor,* and *Castanopsis chrysophylla* are shrubs usually present, but *Arctostaphylos patula, Quercus chrysolepis,* and *Salix scouleriana* occur infrequently. *Symphoricarpos mollis, Rubus ursinus, Rosa gymnocarpa,* and *Adenocaulon bicolor* are present in the White Fir Type, but exhibit their highest frequency in the Mixed Conifer Type.

The Ponderosa Pine (*Pinus ponderosa*) Type is extremely rare in the Siskiyous and may be only a variant of the Mixed Conifer Type, for white fir are occasionally found in the understory. The type is found on steep slopes of south or southwestern exposures between 1,100-1,650 m (3,500-5,400 ft). The forest canopy is open and Douglas-fir regeneration may be abundant in spots. Tree seedlings are subjected to sufficient moisture stress to force the cessation of cambial growth nearly every summer. One or more species of *Arctostaphylos* is always present. *Achillea lanulosa, Solidago canadensis, Apocynum pumilum,* and small perennial lupines are common.

The Black Oak (*Quercus kelloggii*) Type is found as high as 1,350 m (4,400 ft) on steep south and southwestern exposures, but is common from 600-900 m (2,000-3,000 ft). Douglas-fir and ponderosa pine dominate; madrone and an occasional Oregon white oak (*Quercus garryana*) may also be found. Snow cover is intermittent during the winter and soil temperatures do not fall below 4°C (40°F). The growing season may start in April; soil temperatures reach 20°C (70°F) and air temperatures exceed 38°C (100°F), which is above the optimum for Douglas-fir. The temperature environment usually exceeds 90 OTD. Critical moisture stresses are common, exceeding 25 atm at times. Productivity is low; maximum height of trees is only 30 m (100 ft). The understory is dominated by grasses, *Rhus diversiloba,* and *Lonicera hispidula.*

The Yew (*Taxus brevifolia*) Type occurs infrequently at lower elevations (with

more than 80 OTD) where adequate water is available throughout the growing season and physiographic conditions produce a sheltered situation with low transpirational stress. Here the dominant, Douglas-fir, may exceed 60 m (200 ft). *Acer circinatum, Cornus nuttallii* and *Philadelphus lewisii* are almost restricted to this type in the Eastern Siskiyous. Yew is also found along small streams at higher elevations.

The Jeffrey Pine (*Pinus jeffreyi*) Type is not shown in Figure 2 because it occurs only upon extremely infertile soils derived from peridotite or serpentinite. Such soils are very high in iron and magnesium and exceedingly low in phosphorus, potassium, nitrogen, and, usually, calcium. High concentrations of chromium and nickel may also be present. Plants adapted to these soils have low calcium requirements and a resistance to, or demand for, large amounts of magnesium. Soils are not only infertile but shallow and generally droughty. Where this type occurs at higher elevations, white fir and western white pine are stand components. Incense-cedar and Douglas-fir are generally present at all elevations; mountain hemlock and Shasta red fir are absent. On cooler, more moist sites, *Lupinus leucophyllus, Xerophyllum tenax,* and *Arctostaphylos nevadensis* are present. On drier sites, *Silene campanulata, Garrya fremontii, Onychium densum, Astragalus whitneyi, Quercus vaccinifolia, Arenaria nutallii,* and *Frasera albicaulis* occur.

Some forest vegetation types, common elsewhere, are represented only as relict populations in the Eastern Siskiyous. In this category are a small patch of *Abies lasiocarpa* and larger patches of *Populus tremuloides* on Mount Ashland, a stand of *Pinus murrayana* (*P. contorta* var. *murrayana*) along Tamarack Creek at 1,900 m (6,200 ft) (T41S., R2W., Sec. 14) and an extensive stand of *Picea engelmannii* along the east fork of Ashland Creek between 1,430-1,790 m (4,700 and 5,000 ft) (T. 40S., R. 1 E., Sec. 9).

Within the forest, certain species are found restricted to specific microsites. For example, *Astragalus whitneyi, Polystichum lonchitis, Ipomopsis congesta, Phlox diffusa,* and *Haplopappus suffruticosus* are in openings near rock outcrops; *Petasites palmatus, Athyrium filix-femina, Aralia californica, Asarum caudatum,* and *Oxalis oregana* are restricted to shaded seepage areas. Included in the checklist are a few non-forest species collected above timberline, in alpine meadows, or chaparral vegetation types.

The checklist of plants is arranged alphabetically by family. Abbreviated reference to the vegetation types just described is made when sufficient data were available. Nomenclature follows Munz (1965); Peck (1961) was used as supporting reference. An asterisk denotes species reported by Dennis (1959) from Mount Ashland and not collected in this study. Voucher specimens are on file in the Oregon State University Herbarium.

**Checklist of Forest Plants**

[Distribution of types: BO, Black Oak; JP, Jeffrey Pine; MH, Mountain Hemlock; Mixed C, Mixed Conifer; PP, Ponderosa Pine; SF, Shasta Red Fir; WF, White Fir; and, Y, Yew.]

| | Habitat |
|---|---|
| ACERACEAE | |
| *Acer circinatum* Pursh | Y |
| *Acer glabrum* Torr. var. *torreyi* (Greene) Smiley | SF, WF |
| *Acer macrophyllum* Pursh | WF, Mixed C, Y |
| ANACARDIACEAE | |
| *Rhus diversiloba* T. & G. | BO, Y |
| APOCYNACEAE | |
| *Apocynum pumilum* (Gray) Greene | Mixed C, PP, BO |

| | Habitat |
|---|---|
| ARALIACEAE | |
| *Aralia californica* Wats. | Near water |
| ARISTOLOCHIACEAE | |
| *Asarum caudatum* Lindl. | Seepage areas |
| ASCLEPIADACEAE | |
| *Asclepias cordifolia* (Benth.) Jeps. | PP |
| BERBERIDACEAE | |
| *Berberis nervosa* Pursh | SF, WF, Mixed C, BO, Y, JP |
| *Berberis piperiana* (Abrams) McMinn | Mixed C, Y |
| *Vancouveria hexandra* (Hook.) Morr. & Dec. | SF, WF, Mixed C |
| BETULACEAE | |
| *Alnus rhombifolia* Nutt. | Near water |
| *Corylus cornuta* Marsh. var. *californica* (A.DC.) Sharp | WF, Mixed C, BO, Y |
| BORAGINACEAE | |
| *Cryptantha hendersonii* (A. Nels.) Piper | PP |
| *Cryptantha simulans* Greene* | |
| *Cynoglossum occidentale* Gray | Mixed C |
| *Hackelia jessicae* (McGreg.) Brand | Above timberline |
| *Mertensia bella* Piper | |
| CAMPANULACEAE | |
| *Campanula prenanthoides* Durand | MH, WF, Mixed C, BO |
| *Campanula scouleri* Hook. | SF, WF, Mixed C |
| CAPRIFOLIACEAE | |
| *Linnaea borealis* L. ssp. *longiflora* (Torr.) Hult. | SF, WF, Mixed C |
| *Lonicera hispidula* Dougl. var. *vacillans* Gray | BO |
| *Lonicera ciliosa* (Pursh) Poir. | Mixed C |
| *Lonicera conjugialis* Kell. | MH, WF |
| *Sambucus caerulea* Raf. | |
| *Sambucus callicarpa* Greene | |
| *Symphoricarpos mollis* Nutt. in T. & G. | WF, Mixed C, PP, JP, BO |
| CARYOPHYLLACEAE | |
| *Arenaria congesta* Nutt. ex T. & G. | Timberline |
| *Arenaria douglasii* Fenzl. ex. T. & G. | PP |
| *Arenaria macrophylla* Hook. | SF, MH, Mixed C, PP, BO, JP |
| *Arenaria nutallii* Pax. ssp. *gregaria* (Heller) Maguire | JP |
| *Silene campanulata* Wats. ssp. *glandulosa* Hitchc. & Maguire | JP |
| *Silene campanulata* Wats. ssp. *greenei* (Wats.) Hitchc. & Maguire | BO |
| *Silene hookeri* Nutt. ex. T. & G. | BO |
| *Silene lemmonii* Wats. | PP |
| *Spergularia rubra* (L.) J. & C. Presl | |
| *Stellaria crispa* Cham. & Schlect. | MH |
| *Stellaria jamesiana* Torr. | |
| CELASTRACEAE | |
| *Paxistima myrsinites* (Pursh) Raf. | SF, WF, Mixed C |
| COMPOSITAE | |
| *Achillea lanulosa* Nutt. | MH, PP, BO, JP |
| *Adenocaulon bicolor* Hook. | WF, Mixed C, Y |
| *Agoseris aurantiaca* (Hook.) Greene | |
| *Agoseris elata* (Nutt.) Greene* | |
| *Agoseris glauca* (Pursh) Greene var. *monticola* (Greene) Q. Jones* | |
| *Agoseris heterophylla* (Nutt.) Greene | |
| *Agoseris retrorsa* (Benth.) Greene | PP, BO |
| *Anaphalis margaritacea* (L.) Benth. & Hook. | |
| *Antennaria argentea* Benth. | PP, JP |
| *Antennaria neglecta* Greene var. *howellii* (Greene) Cronq. | SF, WF, Mixed C |
| *Antennaria rosea* Greene | Timberline |
| *Arnica cordifolia* Hook. | SF |
| *Arnica latifolia* Bong. | MH, SF, WF, Mixed C |
| *Arnica nevadensis* Gray | SF |
| *Artemisia douglasiana* Bess. in Hook. | High elev. seepage areas |
| *Artemisia tridentata* Nutt. | Rocky areas, higher elev. |
| *Aster brickellioides* Greene | PP |
| *Aster foliaceus* Lindl. | High elev. seepage areas |
| *Aster integrifolius* Nutt. | High elev. seepage areas |
| *Aster oregonensis* (Nutt.) Cronq. | |
| *Aster radulinus* Gray | PP |

| | Habitat |
|---|---|
| *Balsamorhiza deltoidea* Nutt. | BO |
| *Brickellia greenei* Gray | JP |
| *Chaenactis douglasii* (Hook.) H. & A. | Rocky areas, high elev. |
| *Chrysopsis oregona* (Nutt.) Gray var. *rudis* (Greene) Jeps. | MH, SF, WF, Mixed C, JP |
| *Chrysothamnus nauseosus* (Pall.) Britton ssp. *albicaulis* (Nutt.) Hall & Clem. | JP |
| *Crepis pleurocarpa* Gray | JP |
| *Erigeron aliceae* Howell | MH |
| *Erigeron compositus* Pursh var. *glabratus* Macoun.* | |
| *Erigeron foliosus* Nutt. var. *hartwegii* (Greene) Jeps. | |
| *Erigon peregrinus* (Pursh) Greene ssp. *callianthemus* (Greene) Cronq.* | |
| *Eriophyllum lanatum* (Pursh) Forbes var. *lanceolatum* (Howell) Jeps. | Mixed C, PP, JP |
| *Haplopappus greenei* Gray* | |
| *Haplopappus suffruticosus* (Nutt.) Gray | Timberline |
| *Helenium bigelovii* Gray | Seepage areas |
| *Hieracium albiflorum* Hook. | MH, SF, WF, Mixed C, PP, BO |
| *Hieracium cynoglossoides* Arv.-Touv. ex Gray var. *nudicaule* Gray | Timberline |
| *Hieracium horridum* Fries | Above timberline |
| *Hieracium parryi* Zahn | PP |
| *Machaeranthera canescens* (Pursh) Gray* | |
| *Madia glomerata* Hook.* | |
| *Madia madioides* (Nutt.) Greene | WF, Mixed C, PP, BO |
| *Nothocalais alpestris* (Gray) Chamb. | MH, PP, BO |
| *Petasites palmatus* (Ait.) Gray | Seepage areas |
| *Raillardella argentea* (Gray) Gray* | |
| *Rudbeckia occidentalis* Nutt. | Seepage areas |
| *Senecio integerrimus* Nutt. var. *exaltatus* (Nutt.) Cronq. | JP |
| *Senecio triangularis* Hook. | WF, Mixed C, PP |
| *Solidago canadensis* L. | PP |
| *Taraxacum officinale* Wiggers* | |
| CORNACEAE | |
| *Cornus glabrata* Benth. | |
| *Cornus nutallii* Aud. | WF, Mixed C, Y |
| CRASSULACEAE | |
| *Sedum divergens* Wats. | Rocky areas |
| *Sedum lanceolatum* Torr. | Timberline |
| *Sedum obtusatum* Gray | JP |
| *Sedum oregonense* (Wats.) Peck* | |
| *Sedum stenopetalum* Pursh ssp. *radiatum* (Wats.) Clausen | Rocky areas |
| CRUCIFERAE | |
| *Arabis divaricarpa* A. Nels. | SF |
| *Arabis holboellii* Hornem.* | |
| *Arabis lyallii* Wats.* | |
| *Arabis oregana* Roll. | BO |
| *Arabis platysperma* Gray* | |
| *Arabis puberula* Nutt. | JP |
| *Dentaria tenella* Pursh var. *palmata* Detl. | MH, SF |
| *Descurainia pinnata* (Walt.) Britton* | |
| *Erysimum capitatum* (Dougl.) Greene | Rocky areas |
| *Erysimum perennne* (Wats. ex Cov.) Abrams* | |
| *Thlaspi glaucum* A. Nels. var. *hesperium* Pays. | JP |
| CUPRESSACEAE | |
| *Libocedrus decurrens* Torr. | WF, Mixed C, PP, JP |
| CYPERACEAE | |
| *Carex brevipes* W. Boott* | |
| *Carex festivella* Mkze.* | |
| *Carex gymnoclada* Holm.* | |
| *Carex luzulina* Olney* | |
| *Carex phaeocephala* Piper* | |
| *Carex subfusca* W. Boott* | |
| *Carex teneraeformis* Mkze.* | |
| *Scirpus microcarpus* Presl* | |
| ERICACEAE | |
| *Allotropa virgata* T. & G. ex Gray | |
| *Arbutus menziesii* Pursh | Mixed C, PP, BO, Y |

| | Habitat |
|---|---|
| *Arctostaphylos nevadensis* Gray | SF, PP, JP |
| *Arctostaphylos patula* Greene | MH, SF, Mixed C, PP, JP |
| *Arctostaphylos viscida* Parry | PP, BO |
| *Chimaphila menziesii* (R. Br. ex D. Don) Spreng. | SF, WF, Mixed C, PP |
| *Chimaphila umbellata* (L.) Barton var. *occidentalis* (Rybd.) Blake | MH, SF, WF, Mixed C, PP, JP |
| *Gaultheria shallon* Pursh | Y (rare) |
| *Monotropa hypopithys* L.* | |
| *Pterospora andromedea* Nutt. | |
| *Pleuricospora fimbriolata* Gray | BO |
| *Pyrola picta* Sm. | SF, WF, Mixed C, PP |
| *Pyrola picta* Sm. forma *aphylla* (Sm.) Camp. | WF, Mixed C, PP, Y |
| *Pyrola picta* Sm. ssp. *dentata* (Sm.) Piper | JP |
| *Pyrola secunda* L. | MH, SF, WF |
| *Vaccinium membranaceum* Dougl. | With Engelmann spruce (rare) |
| FAGACEAE | |
| *Castanopsis chrysophylla* (Dougl.) A. DC. | SF, WF, Mixed C, JP |
| *Quercus chrysolepis* Liebm. | Mixed C, BO, Y |
| *Quercus garryana* Dougl. | BO |
| *Quercus garryana* Dougl. var. *breweri* (Engelm. in Wats.) Jeps. | |
| *Quercus kelloggii* Newb. | BO |
| *Quercus vaccinifolia* Kell. | JP |
| FUMARIACEAE | |
| *Dicentra formosa* (Andr.) Walp. | |
| *Dicentra uniflora* Kell. | MH openings |
| GARRYACEAE | |
| *Garrya fremontii* Torr. | JP |
| GENTIANACEAE | |
| *Frasera albicaulis* (Griseb. in Hook.) Kuntze ssp. *nitida* (Benth.) Post | PP, JP |
| GRAMINEAE | |
| *Agropyron spicatum* (Pursh) Scribn. & Sm. | |
| *Agrostis diegoensis* Vasey* | |
| *Agrostis exarata* Trin. | |
| *Bromus carinatus* H. & A. | |
| *Bromus marginatus* Nees | |
| *Bromus rigidus* Roth | |
| *Bromus vulgaris* (Hook.) Shear | |
| *Deschampsia elongata* (Hook.) Munro ex. Benth. | |
| *Elymus glaucus* Buckl. | |
| *Festuca californica* Vasey | BO |
| *Festuca idahoensis* Elm. | |
| *Festuca megalura* Nutt. | |
| *Festuca occidentalis* Hook. | |
| *Festuca rubra* L. | |
| *Festuca subulata* Trin. in Bong. | |
| *Glyceria elata* (Nash) Hitohc.* | |
| *Hordeum jubatum* L.* | |
| *Koelaria cristata* (L.) Pers. | |
| *Melica bulbosa* Geyer ex Porter & Coult.* | |
| *Melica harfordii* Bol.* | |
| *Melica subulata* (Griseb.) Scribn. | |
| *Muhlenbergia filiformis* (Thurb.) Rydb.* | |
| *Phleum alpinum* L.* | |
| *Phleum pratense* L.* | |
| *Poa bulbosa* L.* | |
| *Poa fendleriana* (Steud.) Vasey* | |
| *Sitanion hansenii* (Scrib.) J. G. Sm.* | |
| *Sitanion hystrix* (Nutt.) J. G. Sm. | |
| *Stipa californica* Merr. & Davy* | |
| *Trisetum cernuum* Trin. | |
| HYDROPHYLLACEAE | |
| *Eriodictyon californicum* (H. & A.) Torr. | JP Lower elev. |
| *Hydrophyllum fendleri* (Gray) Heller var. *albifrons* (Hel.) Macbr. | SF |
| *Hydrophyllum occidentale* (Wats.) Gray | |
| *Nemophila parviflora* Dougl. ex. Benth. | BO |

| | Habitat |
|---|---|
| *Phacelia frigida* Greene | JP |
| *Phacelia hastata* Dougl. ex Lehm.* | |
| *Phacelia heterophylla* Pursh* | |
| *Phacelia mutabilis* Greene | MH, SF, WF, JP |
| *Phacelia procera* Gray | |
| HYPERICACEAE | |
| *Hypericum anagalloides* Cham. & Schlect.* | |
| IRIDACEAE | |
| *Iris chrysophylla* Howell | WF, Mixed C, PP, BO, Y, JP |
| *Sisyrinchium douglasii* A. Dietr. | |
| JUNCACEAE | |
| *Juncus effusus* L. var. *pacificus* Fern. & Wieg.* | |
| *Juncus mertensianus* Bong.* | |
| *Luzula comosa* E. Mey. | |
| *Luzula parviflora* (Ehrh.) Desv. | |
| *Luzula spicata* (L.) DC. | |
| *Luzula subsessilis* (Wats.) Buch. | |
| LABIATAE | |
| *Agastache urticifolia* (Benth.) Kuntze | |
| *Monardella odoratissima* Benth. | MH, WF, PP, JP |
| *Satureja douglasii* (Benth.) Briq. | |
| *Stachys rigida* Nutt. ex. Benth.* | |
| LEGUMINOSAE | |
| *Astragalus whitneyi* Gray var. *siskiyouensis* (Rydb.) Barneby | JP, rocky areas |
| *Lathyrus polyphyllus* Nutt. ex T. & G. | WF, Mixed C |
| *Lotus crassifolius* (Benth.) Greene | PP, Mixed C, in openings |
| *Lotus micranthus* Benth. | PP, BO |
| *Lotus subpinnatus* Lag. | Mixed C, PP |
| *Lupinus albicaulis* Dougl. ex Hook. | |
| *Lupinus albicaulis* Dougl. ex. Hook. var. *shastensis* (Heller) C.P. Sm. | Timberline |
| *Lupinus albifrons* Benth. | BO |
| *Lupinus albifrons* Benth. var. *flumineus* C. P. Sm. | PP |
| *Lupinus andersonii* Wats. | WF, Mixed C |
| *Lupinus leucophyllus* Dougl. ex Lindl. | JP |
| *Lupinus lyallii* Gray* | |
| *Lupinus polyphyllus* Lindl.* | |
| *Trifolium longipes* Nutt.* | |
| *Vicia californica* Greene | WF, Mixed C, PP, BO |
| *Vicia villosa* Roth | |
| LILIACEAE | |
| *Allium validum* Wats.* | |
| *Brodiaea crocea* (Wood) Wats. | |
| *Brodiaea hendersonii* Wats. | BO, JP |
| *Brodiaea multiflora* Benth. | BO |
| *Calochortus tolmiei* H. & A. | BO |
| *Clintonia uniflora* (Schult.) Kunth | MH, SF, WF, Mixed C |
| *Disporum hookeri* (Torr.) Nichols. | SF, WF, Mixed C |
| *Erythronium grandiflorum* Pursh var. *pallidum* St. John | JP |
| *Erythronium hendersonii* Wats. | Mixed C, BO |
| *Erythronium oregonum* Appleg. ssp. *leucandrum* Appleg. | Y |
| *Fritillaria adamantina* Peck* | |
| *Fritillaria atropurpurea* Nutt. | |
| *Lilium bolanderi* Wats. | |
| *Lilium pardalinum* Kell. | |
| *Smilacina racemosa* (L.) Desf. var. *amplexicaulis* (Nutt.) Wats. | WF, BO, Y |
| *Smilacina racemosa* (L.) Desf. var. *glabra* (Macbr.) St. John | MH, SF, JP |
| *Smilacina stellata* (L.) Desf. var. *sessilifolia* (Baker) Henders. | WF, Mixed C, BO |
| *Streptopus amplexifolius* (L.) DC. var. *denticulatus* Fassett | |
| *Tofieldia glutinosa* (Michx.) Pers. ssp. *occidentalis* (Wats.) C. L. Hitchc.* | |
| *Trillium ovatum* Pursh | SF, WF, Mixed C |
| *Veratrum californicum* Durand | MH, WF, moist meadows |
| *Veratrum viride* Ait.* | |

| | Habitat |
|---|---|
| *Xerophyllum tenax* (Pursh) Nutt. | SF, Mixed C, JP, PP |
| *Zigadenus micranthus* Eastw. | PP, JP |
| LINACEAE | |
| *Linum perenne* L. ssp. *lewisii* (Pursh) Hult. | |
| MALVACEAE | |
| *Sidalcea oregana* (Nutt.) Gray ssp. *spicata* (Regel) Greene* | |
| OLEACEAE | |
| *Fraxinus latifolia* Benth. | Near water |
| ONAGRACEAE | |
| *Circaea alpina* L. var. *pacifica* (Asch. & Magnus) Jones | Seepage areas |
| *Clarkia rhomboidea* Dougl. | PP, BO |
| *Epilobium angustifolium* L. | |
| *Epilobium glandulosum* Lehm.* | |
| *Epilobium lactiflorum* Hausskn.* | |
| *Epilobium minutum* Lindl. ex Hook. | |
| *Epilobium paniculatum* Nutt. ex. T. & G.* | |
| *Gayophytum nuttallii* T. & G. | MH |
| ORCHIDACEAE | |
| *Calypso bulbosa* (L.) Oakes | BO, Y |
| *Corallorhiza maculata* Raf. | MH, SF, WF, Mixed C, JP |
| *Corallorhiza mertensiana* Bong.* | |
| *Corallorhiza striata* Lindl. | WF |
| *Eburophyton austinae* (Gray) Heller | WF, Mixed C |
| *Goodyera oblongifolia* Raf. | SF, WF, Mixed C, Y, JP |
| *Habenaria dilatata* (Pursh) Hook. var. *leucostachys* (Lindl.) Ames | Seepage areas |
| *Habenaria elegans* (Lindl.) Boland | Mixed C, PP, BO |
| *Listera caurina* Piper | SF |
| *Spiranthes romanzoffiana* C. &. S. | Seepage areas |
| OROBANCHACEAE | |
| *Boschniakia strobilacea* Gray | BO |
| OXALIDACEAE | |
| *Oxalis oregana* Nutt. | Seepages and near water |
| *Oxalis trilliifolia* Hook. | |
| PINACEAE | |
| *Abies concolor* (Gord. & Glend.) Lindl. | SF, WF, Mixed C |
| *Abies lasiocarpa* (Hook.) Nutt. | Timberline (rare) |
| *Abies magnifica* A. Murr. var. *shastensis* Lemmon | MH, SF |
| *Picea engelmannii* Parry ex Engelm. | Near water (rare) |
| *Pinus albicaulis* Engelm. | Timberline (rare) |
| *Pinus jeffreyi* Grev. & Balf. in A. Murr. | JP |
| *Pinus lambertiana* Dougl. | WF, PP, Mixed C, BO |
| *Pinus monticola* Dougl. | MH, SF, JP |
| *Pinus murrayana* Grev. & Balf. in A. Murr. | Near water (rare) |
| *Pinus ponderosa* Dougl. ex P. & C. Lawson | Mixed C, PP, BO |
| *Pseudotsuga menziesii* (Mirb.) Franco | WF, Mixed C, PP, BO, Y, JP |
| *Tsuga mertensiana* (Bong.) Carr. | MH, SF |
| POLEMONIACEAE | |
| *Collomia grandiflora* Dougl. ex. Lindl. | BO |
| *Collomia heterophylla* Dougl. ex. Hook. | BO, Y |
| *Collomia tinctoria* Kell.* | |
| *Gilia capitata* Sims | BO |
| *Ipomopsis aggregata* (Pursh) V. Grant | Rocky areas |
| *Ipomopsis congesta* (Hook.) V. Grant | Timberline |
| *Microsteris gracilis* (Dougl. ex. Hook.) Greene ssp. *humilis* (Greene) V. Grant | MH |
| *Phlox adsurgens* Torr. | SF, WF, Mixed C |
| *Phlox diffusa* Benth. | JP, timberline |
| *Phlox speciosa* Pursh ssp. *occidentalis* (Durand) Wherry | |
| *Polemonium californicum* Eastw. | MH, SF |
| *Polemonium pulcherrimum* Hook.* | |
| POLYGALACEAE | |
| *Polygala californica* Nutt. | |
| POLYGONACEAE | |
| *Eriogonum compositum* Dougl. ex Benth. | |
| *Eriogonum elatum* Dougl. ex Benth. | |
| *Eriogonum latifolium* Sm. ssp. *nudum* (Dougl. ex Benth.) S. Stokes | PP, JP |

| | Habitat |
|---|---|
| *Eriogonum latifolium* Sm. ssp. *sulphureum* (Greene) S. Stokes | |
| *Eriogonum marifolium* T. & G. var. *incanum* (T. & G.) Jones* | |
| *Eriogonum umbellatum* Torr. ssp. *polyanthum* (Benth.) S. Stokes | MH, JP, timberline |
| *Polygonum bistortoides* Pursh* | |
| *Polygonum davisiae* Brew. ex Gray | MH, in openings |
| *Polygonum douglasii* Greene | MH |
| *Polygonum phytolaccaefolium* Meissn. | SF cutovers |
| *Rumex acetosella* L.* | |
| POLYPODIACEAE | |
| *Athyrium alpestre* (Hoppe) Rylands var. *americanum* Butters* | |
| *Athyrium felix-femina* (L.) Roth var. *californicum* Butters | Seepage areas |
| *Cheilanthes gracillima* D.C. Eaton in Torr. | Rocky areas (rare) |
| *Cystopteris fragilis* (L.) Berhn. | BO in shade |
| *Onychium densum* Brack. in Wilkes. | JP |
| *Pityrogramma triangularis* (Kaulf.) Maxon | Rocky areas (rare) |
| *Polystichum lemmonii* Underw. | Timberline (rare) |
| *Polystichum munitum* (Kaulf.) Presl | WF, Mixed C, Y |
| *Polystichum munitum* (Kaulf.) Presl var. *imbricans* (D. C. Eat.) Maxon | PP, BO |
| *Pteridium aquilinum* (L.) Kuhn var. *lanuginosum* (Bong.) Fern. | WF, Mixed C, PP, JP |
| PORTULACACEAE | |
| *Calyptridium umbellatum* (Torr.) Greene | MH, openings |
| *Lewisia cotyledon* (Wats.) Rob. in Gray | JP |
| *Lewisia leana* (Porter) Rob. in Gray | JP |
| *Montia cordifolia* (Wats.) Pax. & K. Hoffm.* | |
| *Montia perfoliata* (Donn.) Howell var. *depressa* (Gray) Jeps. | |
| *Montia siberica* (L.) Howell | WF |
| PRIMULACEAE | |
| *Dodecatheon alpinum* (Gray) Greene* | |
| *Dodecatheon hendersonii* Gray | PP |
| *Dodecatheon jeffreyi* Van Houtte | Near water, high elev. (rare) |
| *Trientalis latifolia* Hook. | WF, Mixed C, PP, BO, Y |
| RANUNCULACEAE | |
| *Aconitum columbianum* Nutt.* in T. & G. | |
| *Actaea rubra* (Ait.) Willd. ssp. *arguta* (Nutt.) Hult. | WF |
| *Anemone deltoidea* Hook. | SF, WF, Mixed C |
| *Anemone drummondii* Wats. | JP |
| *Anemone quinquefolia* L. var. *oregana* (Gray) Rob. | SF, WF, Mixed C |
| *Aquilegia formosa* Fisch. in DC. | |
| *Caltha howellii* (Huth.) Greene | Near water, snowmelt |
| *Delphinium decorum* F. & M.* | |
| *Delphinium glaucum* Wats. | |
| *Delphinium menziesii* DC.* | |
| *Delphinium sonnei* Greene | |
| *Ranunculus alismaefolius* Geyer ex. Benth var. *alismellus* Gray* | |
| *Ranunculus populago* Greene* | |
| RHAMNACEAE | |
| *Ceanothus cuneatus* (Hook.) Nutt. | Dry slopes at lower elev. |
| *Ceanothus integerrimus* H. &. A. var. *macrothyrsus* (Torr.) G. T. Benson | Mixed C, PP in openings |
| *Ceanothus prostratus* Benth. | PP, JP |
| *Ceanothus sanguineus* Pursh | |
| *Ceanothus velutinus* Dougl. ex Hook. | Mixed C in openings, cutovers |
| *Rhamnus purshiana* DC. | |
| ROSACEAE | |
| *Amelanchier pallida* Greene | WF, Mixed C, Y, JP |
| *Aruncus vulgaris* Raf. | Near water (rare) |
| *Cercocarpus betuloides* Nutt. ex T. & G. | Rocky areas (rare) |
| *Cercocarpus ledifolius* Nutt. | Above timberline, Dutchman's Peak |
| *Fragaria bracteata* Heller* | |
| *Fragaria californica* Cham. & Schlecht. | WF, Mixed C, PP, BO |

| | Habitat |
|---|---|
| *Geum macrophyllum* Willd.* | |
| *Holodiscus discolor* (Pursh) Maxim. | SF, WF, Mixed C, PP, BO, Y |
| *Horkelia hendersonii* Howell | Timberline |
| *Horkelia tridentata* Torr. | PP |
| *Osmaronia cerasiformis* (T. & G.) Greene | |
| *Potentilla fruticosa* L. | |
| *Potentilla glandulosa* Lindl. ssp. *ashlandica* (Greene) Keck* | |
| *Potentilla glandulosa* Lindl. ssp. *globosa* Keck | PP |
| *Prunus emarginata* (Dougl.) Walp. | MH, timberline |
| *Purshia tridentata* (Pursh) DC. | JP, rocky areas |
| *Rosa gymnocarpa* Nutt. ex T. & G. | SF, WF, Mixed C, PP, BO, Y |
| *Rubus lasiococcus* Gray* | Rare |
| *Rubus leucodermis* Dougl. ex T. & G. | |
| *Rubus parviflorus* Nutt. | SF, WF, Mixed C, Y |
| *Rubus ursinus* Cham. & Schlecht. | WF, Mixed C, Y |
| *Sorbus californica* Greene | |
| RUBIACEAE | |
| *Galium aparine* L. | BO |
| *Galium bifolium* Wats. | MH, SF, PP |
| *Galium bolanderi* Gray | PP, BO, JP |
| *Galium nuttallii* Gray | |
| *Galium triflorum* Michx. | WF, Mixed C, Y |
| *Kelloggia galioides* Torr. | |
| SALICACEAE | |
| *Populus tremuloides* Michx. | High elev. (rare) |
| *Salix commutata* Bebb* | |
| *Salix scouleriana* Barr. | WF, Mixed C, PP |
| SAXIFRAGACEAE | |
| *Boykinia major* Gray* | |
| *Heuchera micrantha* Dougl. ex Lindl. | WF, Y |
| *Lithophragma affinis* Gray | BO |
| *Mitella caulescens* Nutt. in T. & G. | Mixed C, WF |
| *Mitella diversifolia* Greene | SF, WF, Mixed C, Y |
| *Mitella pentandra* Hook.* | |
| *Mitella trifida* Grah. | SF |
| *Parnassia palustris* L. var. *californica* Gray | Seepage areas (rare) |
| *Philadelphus lewisii* Pursh ssp. *gordonianus* (Lindl.) Munz | Y |
| *Ribes binominatum* Heller | |
| *Ribes cereum* Dougl. | MH, Above timberline in openings |
| *Ribes lacustre* (Pers.) Poir. | WF |
| *Ribes lobbii* Gray | WF, Mixed C, JP |
| *Ribes sanguineum* Pursh | WF |
| *Ribes viscosissimum* Pursh | SF, WF |
| *Saxifraga oregana* Howell* | |
| *Saxifraga punctata* L. ssp. *arguta* (D. Don) Hult. | In seepages (rare) |
| *Tiarella unifoliata* Hook. | Mixed C |
| *Whipplea modesta* Torr. | WF, Mixed C |
| SCROPHULARIACEAE | |
| *Castilleja affinis* H. & A. | BO |
| *Castilleja arachnoidea* Greenm. | Timberline |
| *Castilleja brevilobata* Piper | |
| *Castilleja miniata* Dougl.* ex Hook. | |
| *Castilleja applegatei* Fern. | BO |
| *Castilleja pruinosa* Fern. | BO |
| *Collinsia grandiflora* Dougl. ex. Lindl. | BO |
| *Collinsia linearis* Gray | PP, BO |
| *Collinsia parviflora* Dougl. ex Lindl. | |
| *Collinsia torreyi* Gray var. *latifolia* Newsom* | |
| *Cordylanthus viscidus* (Howell) Pennell | PP, JP |
| *Mimulus guttatus* Fisch. ex. DC.* | |
| *Mimulus nanus* H. & A.* | |
| *Orthocarpus copelandii* Eastw. | Rocky areas, timberline |
| *Orthocarpus cuspidatus* Greene* | |
| *Pedicularis racemosa* Dougl. ex Hook. | MH, SF, WF, Mixed C |
| *Penstemon anguineus* Eastw. | SF, WF |
| *Penstemon azureus* Benth. | SF, JP |
| *Penstemon davidsonii* Greene | Above timberline |
| *Penstemon laetus* Gray ssp. *sagittatus* Keck | |

| | Habitat |
|---|---|
| *Penstemon nemorosus* (Dougl. ex. Lindl.) Trautv. | SF, WF |
| *Penstemon parvulus* (Gray) Krautter | SF |
| *Scrophularia californica* Cham. & Schlecht. | Seepage areas |
| *Synthyris reniformis* (Dougl.) Benth. var. *cordata* Gray | SF, WF, Mixed C, BO, Y |
| *Veronica serpyllifolia* L.* | |
| TAXACEAE | |
| *Taxus brevifolia* Nutt. | Y, near water |
| UMBELLIFERAE | |
| *Angelica arguta* Nutt. ex T. & G.* | |
| *Heracleum lanatum* Michx. | |
| *Ligusticum apiifolium* (Nutt.) Gray | |
| *Lomatium californicum* (Nutt.) Math. & Const.* | |
| *Osmorhiza chilensis* H. & A. | MH, SF, WF, Mixed C, PP, BO, Y |
| *Osmorhiza occidentalis* (Nutt.) Torr.* | |
| *Sanicula crassicaulis* Poepp. ex DC. | BO |
| *Sanicula graveolens* Poepp. ex DC.* | |
| *Sphenosciadium capitellatum* Gray* | |
| URTICACEAE | |
| *Urtica lyallii* Wats. | Seepage areas |
| VALERIANACEAE | |
| *Plectritis macrocera* T. & G. | BO |
| *Valeriana capitata* Pall. ex Link ssp. *californica* (Heller) F. G. Mey.* | |
| *Valeriana sitchensis* Bong. | MH, SF |
| VIOLACEAE | |
| *Viola glabella* Nutt. | MH, SF, WF, Mixed C |
| *Viola purpurea* Kell.* | |
| *Viola sempervirens* Greene | SF, WF, Mixed C |
| VITACEAE | |
| *Vitis californica* Benth. | |


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### Literature Cited


Chaney, R. W., C. Condit, and D. I. Axelrod. 1944. Pliocene floras of California and Oregon. Carnegie Inst. of Wash. Pub. 553, 407 p.

Cleary, B. D. 1968. Douglas-fir growth in relation to moisture stress. Unpublished.

Cleary, B. D., and R. H. Waring. 1968. Temperature: its analysis for the interpretation of plant growth and distribution. In press, Canadian J. Bot.

Dennis, LaRea. 1959. A taxonomic study of the vascular flora of Ashland Peak, Jackson County, Oregon. Unpub. M.S. thesis, Oreg. State Univ.

Franklin, J. F., and T. E. Greathouse. 1968. Cotyledon numbers in the noble-California red fir complex. Northwest Science, 42:32-33.

Howell, J. T. 1957. The California flora and its province. Leafl. West. Bot., 8:133-138.

Irwin, W. P. 1966. Geology of Klamath Mountains province. *In* Geology of Northern California, E. H. Bailey (editor). Calif. Div. Mines and Geol. Bull. 190:19-38.

Jepson, W. L. 1925. A manual of the flowering plants of California. Assoc. Students Store, Berkeley, Calif. 1238 p.

Munz, P. A. 1965. A California flora. Univ. Calif. Press, Berkeley, Calif. 1681 p.

Parker, E. L. 1963. The geographic overlap of noble fir and red fir. Forest Sci., 2:207-216.

Peck, M. E. 1961. A manual of the higher plants of Oregon. Binfords & Mort, Portland, Ore. 866 p.

Stebbins, G. L., and J. Major. 1965. Endemism and speciation in the California flora. Ecol. Mono., 35:1-35.

Waring, R. H., and B. D. Cleary. 1967. Plant moisture stress: evaluation by pressure bomb. Science, 155:1248-1254.

Whittaker, R. H. 1960. Vegetation of the Siskiyou Mountains, Oregon and California. Ecol. Mono., 30:279-338.

Whittaker, R. H. 1961. Vegetation history of the Pacific Coast States and the "central" significace of the Klamath Region. Madroño, 16:5-23.



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