

INTERNAL REPORT 49  
VEGETATION AND SOILS OF WATERSHEDS 2 AND 3,  
H. J. ANDREWS EXPERIMENTAL FOREST

Glenn Hawk and C. T. Dyrness  
USDA Forest Service

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## ABSTRACT

Early in the planning of the Coniferous Biome program it was recognized that experimental watersheds 2 and 3 in the H. J. Andrews Experimental Forest might provide ideal study sites for certain phases of the Biome program. A study was funded during year 1 (1970) to provide necessary background ecological information about these watersheds, which would then be available before intensive studies were undertaken. This report contains a summary of the information obtained as a result of an inventory of vegetation and soils present on the watersheds. It contains the vegetation mapping legend, vegetation maps, descriptions of mapped vegetation units, detailed soil maps, and a brief description of soils present. In addition to small maps included with this report, large-scale vegetation maps (scale 2 inches or 5 centimeters equals 100 meters) are also available.

### GENERAL DESCRIPTION OF THE AREA

Experimental watersheds 2 and 3 are located in the southwestern corner of the H. J. Andrews Experimental Forest. Elevations range from 526 m to 1067 m in watershed 2 and from 480 to 1082 m in watershed 3. The two watersheds drain in a northwesterly direction from Lookout Ridge which constitutes the southern boundary of the experimental forest.

The combined area of the two watersheds is 161.5 ha--60.3 ha in watershed 2 and 101.2 ha in watershed 3. Three small clearcut units in watershed 3 (L 221, L 222, and L 141), totaling 24.7 ha, were not included in the mapped area. Dyrness (1965, 1969a) has been studying plant succession following clearcut logging on these units since 1962. Watershed slopes are steep, with considerable area of shallow soils and occasional rock outcrops, especially in the upper portions. Mean slope percentages are 61 for watershed 2 and 53 for watershed 3 (Rothacher et al. 1967).

The vegetation of the watersheds is typical of the *Tsuga heterophylla* zone as defined by Franklin and Dyrness (1969). The timber stands in these watersheds are primarily of Douglas-fir in the 125-year age class (second-growth), 450-year age class (old-growth), or a combination of the two age classes. Both age classes occur commonly, with the most prominent type being old-growth stands mixed with varying amounts of second-growth. The species composition of tree regeneration within the two watersheds indicates that the climax species over most of the area is western hemlock (*Tsuga heterophylla*). Other tree species commonly present as understory regeneration are western redcedar (*Thuja plicata*), Pacific yew (*Taxus brevifolia*), and Douglas-fir (*Pseudotsuga menziesii*).

These stands, in contrast to the previously reported stands in the Hi-15 watersheds (Dyrness and Hawk 1972), include western hemlock as a major constituent of both overstory and understory layers. The only exception are stands typical of the Douglas-fir/ocean spray association

where Douglas-fir is the only major tree species in both overstory and tree regeneration layers. In most cases tree regeneration is dominated by western hemlock. In some areas, however, large amounts of western redcedar regeneration are also present. Yew (*Taxus brevifolia*) is the third most abundant tree species in the understory as measured by total cover.

### PLANT COMMUNITIES OF WATERSHEDS 2 AND 3

Vegetation in watersheds 2 and 3 was classified into ten basic plant groupings for purposes of mapping. These ten groupings include seven climax or near-climax associations, two seral communities, and one phase of an association. These units, listed in approximate order of increasing effective moisture are as follows:

- Pseudotsuga menziesii/Holodiscus discolor* (OS)
- Tsuga heterophylla/Castanopsis chrysophylla* (CRS)
- Tsuga heterophylla/Rhododendron macrophyllum/Gaultheria shallon* (RS)
- Pseudotsuga menziesii/Acer circinatum/Gaultheria shallon* (VM-S)
- Tsuga heterophylla/Rhododendron macrophyllum/Berberis nervosa* (R-OG)
- Tsuga heterophylla/Rhododendron macrophyllum/Berberis nervosa--  
Xerophyllum tenax* phase (R-OG [B])
- Pseudotsuga menziesii/Acer circinatum/Berberis nervosa* (VM-OG)
- Tsuga heterophylla/Acer circinatum/Polystichum munitum* (VM-SF)
- Tsuga heterophylla/Polystichum munitum* (SF)
- Tsuga heterophylla/Polystichum munitum--Oxalis oregana* (SF-0x)

#### *Pseudotsuga menziesii/Holodiscus discolor* (OS) Association

The *Pseudotsuga/Holodiscus* (OS) association occupies only a small area within watersheds 2 and 3, generally on steep to moderately steep slopes. There are only two locales where it occurs in mappable quantities--one is a small area near the southeast boundary between watersheds 1 and 2, and the other is located in watershed 3 above clearcut unit L 141. Total mapped area of this association is 3.9 ha (Table 1). The *Pseudotsuga/Holodiscus* association is found on shallow, stony soils and is indicative of the warmest and driest sites within the watersheds. Its position with respect to the other communities of the H. J. Andrews Experimental Forest is shown diagrammatically in Figure 1.

The *Pseudotsuga/Holodiscus* association is restricted to second-growth with scattered old-growth Douglas-fir stands in these watersheds (Table 2). Three reconnaissance plots were established within this map unit. Vegetation data collected on these plots are summarized in Table 3. The overstory tree layer consists solely of Douglas-fir. Douglas-fir also dominates the small tree--tall shrub layer with an average of only 1.66%, emphasizing the fact that Douglas-fir is the climax tree species on these warm, dry sites.

The tall shrub layer in the *Pseudotsuga/Holodiscus* association is dominated by *Holodiscus discolor*. Other commonly occurring species include *Rhododendron macrophyllum*, *Castanopsis chrysophylla*, and *Amelanchier alnifolia*. There are ten additional tree and shrub species that occur in the tall shrub layer (Table 3).

The low shrub layer is made up of moderately low amounts of *Berberis nervosa* and *Gaultheria shallon* as well as three other species in smaller amounts. *Rosa gymnocarpa* and *Rubus ursinus* occur in over half the sampled stands.

The herb layer within this association has a total cover value of 47%. This is misleading because of the occurrence of two species in large amounts in localized areas. *Pedicularis racemosa* contributed 35% cover on one plot and *Heuchera micrantha* averaged 30% cover on another. Probably herb layer coverage for the association as a whole would be lower than that encountered on the reconnaissance.

#### *Tsuga heterophylla/Castanopsis chrysophylla* (CRS) Association

The *Tsuga/Castanopsis* association is a fairly extensive vegetation unit on western aspects of both watersheds 2 and 3. It is found on upper slopes and ridgetops ranging from 2% to 99% in gradient. It is characterized by a moderately open tree overstory and an unusually dense small tree--tall shrub layer.

This association occupies approximately 19 ha of the mapped area in the two watersheds; the largest area is in watershed 3 (Table 1). The *Tsuga/Castanopsis* is generally associated with stands of old-growth Douglas-fir mixed with scattered second-growth Douglas-fir and western hemlock (Table 2). Based on species composition of tree regeneration, western hemlock is apparently the climax tree species. Nine reconnaissance plots were sampled in this community, and vegetation data collected are summarized in Table 4.

Overstory tree layer coverage of the *Tsuga/Castanopsis* community averages 44%, or 11% lower than the average for this layer in all communities in the two watersheds (Table 5). The tree canopy is dominated by old-growth Douglas-fir; the next most common species is western hemlock. Other species present include the ubiquitous western redcedar and the rarer sugar pine.

The tree regeneration portion of the tall shrub layer is low in total cover value but is dominated by western hemlock. The most abundant tall shrubs are *Rhododendron* and *Castanopsis*, which together account for over half the total cover in this layer. Moderate amounts of *Acer circinatum* are also present in most stands, and *Vaccinium parvifolium* is present in more than half the stands though it has a low total cover value.

The low shrub layer of the *Tsuga/Castanopsis* association is extremely well developed with a total average cover of 41%, higher than any other mapped community (Table 5). *Gaultheria shallon* accounts for this high cover value in the low shrub layer since its average alone is 36%, ranging from 10% to 80% (Table 4).

The herb layer, on the other hand, is very poorly developed with only 12% cover divided among 15 species. *Linnaea borealis*, *Xerophyllum tenax*, and *Chimaphila umbellata* are the only species to occur in over half the sample stands, and they account for 90% of the herbaceous cover.

*Tsuga heterophylla/Rhododendron macrophyllum/Gaultheria shallon*

(R-S) Association

The *Tsuga/Rhododendron/Gaultheria* association occupies a relatively large amount of the mapped area in watersheds 2 and 3. Total area is approximately 27.9 ha, most of which is located in watershed 3 (Table 1). The association has been sampled in 11 reconnaissance plots (Table 6) occurring primarily on west to northwest aspects in the upper portions of watershed 2 and northwest aspects in the upper portion of watershed 3. Slopes are moderate to steep, ranging from 20% to 72%. Soils supporting this unit are deeper and less stony than those found in either the *Pseudotsuga/Holodiscus* or the *Tsuga/Castanopsis* association.

The overstory tree layer of the *Tsuga/Rhododendron/Gaultheria* association is composed primarily of Douglas-fir and western hemlock. About half were classed as old-growth stands and the other half were second-growth. Total overstory tree cover averages 53% in this association. *Tsuga heterophylla* of the younger age class is abundant in all stands. Tree species other than Douglas-fir and western hemlock play a minor role in this association, each averaging less than 0.5% cover per stand.

The small tree--tall shrub layer is dominated by western hemlock and *Rhododendron*. Other species include *Acer circinatum*, *Taxus brevifolia*, and *Vaccinium parvifolium*, which occur in over half the stands. Six additional species occur but contribute little total cover to this association (Table 6).

The low shrub layer is well developed in the *Tsuga/Rhododendron/Gaultheria* association with well above average cover as compared with other vegetation units (Table 5). The total cover ranges from 10% to 64% with an average value of 38%. *Gaultheria shallon* is the dominant species, and moderately large amounts of *Berberis nervosa* occur commonly as well. *Rubus ursinus* is the only other low shrub that occurs in more than 50% of the sampled stands.

The herb layer of the *Tsuga/Rhododendron/Gaultheria* association is composed of nineteen species. Coverage is low, totaling only half the average herb layer cover value for all of watersheds 2 and 3 (Table 5). Species that occur in over half the stands are *Linnaea borealis*, *Polystichum munitum*, *Chimaphila umbellata*, *Goodyera oblongifolia*, and *Trientalis latifolia*. *Linnaea borealis* and *Polystichum munitum* are generally dominant species.

*Pseudotsuga menziesii/Acer circinatum/Gaultheria shallon (VM-S)*

Community

The *Pseudotsuga/Acer/Gaultheria* community occupies only a minor portion of the mapped area (5.3 ha). It occurs in small parcels scattered throughout watershed 2 and two small areas in watershed 3. This community, as seen in Figure 1, is a seral grouping and as such can be expected to occur in small units in this area dominated by old-growth forest. This community is found

in areas of second-growth Douglas-fir with only scattered old-growth trees. In all cases this community abuts stands classified as *Tsuga/Rhododendron/Gaultheria* or *Tsuga/Rhododendron/Berberis* or as small units next to the other seral community, *Pseudotsuga/Acer/Berberis*.

Stands mapped as *Pseudotsuga/Acer/Gaultheria* occur on steep (60%) slopes with a variety of aspects. The overstory tree layer is dominated by second-growth western hemlock. Bigleaf maple and western redcedar also occur, but in very low amounts.

The small tree and tall shrub layer is dominated by western hemlock and by *Acer circinatum* (Table 7). Total coverage of this layer is 56%, which is approximately the combined average for all communities (Table 5). *Acer circinatum* accounts for 28% cover. Other shrubs occurring on more than half of the sampled stands are *Rhododendron*, *Castanopsis*, *Corylus*, and *Vaccinium parvifolium*. Nine other species compose the balance of the coverage in this layer.

The low shrub layer is well developed and is represented by six species. *Gaultheria* makes up more than half the total cover in this layer. Other important species include *Berberis nervosa* and *Rubus ursinus*.

The herb layer in the *Pseudotsuga/Acer/Gaultheria* community, although highly diversified (27 species), is relatively poorly developed in terms of cover value. Total cover in this layer is only 21% (Table 7). Only eight species occur with greater than 50% constancy. These are the dominant *Polystichum maritimum*, followed by *Linnaea borealis*, *Whipplea modesta*, *Galium triflorum*, *Viola sempervirens*, *Trientalis latifolia*, *Achlys triphylla*, and *Anemone deltoidea*.

#### *Tsuga heterophylla/Rhododendron macrophyllum/Berberis nervosa*

##### (R-OG) Association

The *Tsuga/Rhododendron/Berberis* association is the most commonly encountered unit in the two watersheds with a total mapped area of 40.9 ha (Table 1). It occurs on sites having all aspects and on slopes that range from 7% to 120% gradient. A total of 24 reconnaissance plots were included in this association (Table 8). Tree overstory coverage averages about 50%, consisting primarily of old-growth Douglas-fir mixed with varying amounts of second-growth Douglas-fir and western hemlock. In a few areas, however, second-growth Douglas-fir predominates. Western redcedar and bigleaf maple also contribute low amounts of cover.

The small tree--tall shrub layer is dominated by western hemlock, *Acer circinatum*, and *Rhododendron macrophyllum* (Table 8). These three species account for over 80% of the total cover of this layer. *Taxus brevifolia* and *Vaccinium parvifolium* are the only other species that occur on more than half the stands.

The low shrub layer of the *Tsuga/Rhododendron/Berberis* association is only moderately developed. *Berberis nervosa* is the dominant species,

accounting for more than half the total cover. Six species were encountered in this layer but only *Berberis*, *Gaultheria*, and *Rubus ursinus* occurred with any degree of regularity.

That this association is probably the climatic climax for the *Tsuga heterophylla* zone is hinted by the rich diversity of the herb layer. Over 40 species were identified here for an average total cover of 40%. This layer is dominated by *Polystichum maritimum*, followed by *Linnaea borealis*, *Coptis laciniata*, and *Whipplea modesta*.

*Tsuga heterophylla*/*Rhododendron macrophyllum*/*Berberis nervosa*--  
*Xerophyllum tenax* (R-OG[R]) Phase

The *Tsuga/Rhododendron/Berberis*--*Xerophyllum* phase is a plant grouping found in very small amounts in association with the *Tsuga/Rhododendron/Berberis* association and is separated from that unit on the map by a dashed line. Only four plots of this type were sampled; all occurred on steep slopes (67%) with west aspects. The *Xerophyllum* phase occurs under a canopy of primarily second-growth Douglas-fir. The total area of this map unit is 1 ha, all situated in watershed 2 (Table 1).

The overstory tree layer is dominated by second-growth Douglas-fir and hemlock mixed with scattered old-growth Douglas-fir. Total coverage is 62.57% (Table 9).

The understory tree--tall shrub layer is dominated by western hemlock and *Rhododendron* with moderate amounts of vine maple and western redcedar for a total coverage of 48%.

The low shrub layer is very poorly developed with only 13% total cover contributed by five species (Table 9). *Berberis nervosa* makes up more than half of this total; *Gaultheria* and *Rubus ursinus* are the only other species that occur in over 50% of the stands.

The herbaceous layer of the *Xerophyllum* phase is also poorly developed with only seven species contributing greater than trace amounts of cover. *Xerophyllum* is by far the dominant, followed by *Polystichum maritimum* and *Linnaea borealis*.

The soil supporting the *Xerophyllum* phase of the *Tsuga/Rhododendron/Berberis* association is shallow and stony and of low productivity. This is in marked contrast to the soil supporting the typical rhododendron/Oregon grape community, which tends to be deep and of relatively low stone content.

*Pseudotsuga menziesii*/*Acer circinatum*/*Berberis nervosa* (VM-OG)

Community

This community, like the *Pseudotsuga/Acer/Gaultheria*, is designated in Figure 1 as a seral community. Its location in watersheds 2 and 3 supports the contention that it is indeed a seral grouping. That is, it occurs,

as did the *Acer/Gaultheria* unit, in confined small areas of dominantly second-growth Douglas-fir in zones where the predominant vegetation was classed as the *Tsuga/Rhododendron/Berberis* association.

The *Acer-Berberis* community was sampled on five plots situated on moderately steep slopes (58%) with west or northwest aspects. The average total cover for this association is 181%, which is virtually equal to the average cover value for all plant groupings (Table 5).

The overstory tree layer is composed of both second- and old-growth Douglas-fir (31%) and second-growth western hemlock (28%). Other tree species are widely distributed western redcedar and bigleaf maple, but both occur in less than 50% of the stands (Table 10).

The understory tree--tall shrub layer is dominated by western hemlock and vine maple; *Taxus brevifolia*, *Rhododendron*, and *Vaccinium parvifolium* also occur in more than half the sampled stands. The total cover for the small tree--tall shrub layer is 57%, very near the combined average for all communities mapped (Table 5).

The low shrub layer is dominated by *Berberis nervosa* (20%), followed by much smaller amounts of *Gaultheria shallon* (7%) and two additional species (Table 10).

The herbaceous layer is well developed in terms of both species diversity and abundance. The layer is made up of 25 species dominated by *Linnaea borealis* and *Polystichum monitum*, with average coverages of 10% and 8%, respectively. Of the remaining 23 species, only *Coptis laciniata* and *Achlys triphylla* occur with greater than 50% constancy.

*Tsuga heterophylla/Acer circinatum/Polystichum monitum*

(VM-SF) Association

The *Tsuga/Acer/Polystichum* association occupies a small portion of the mapped area in watershed 2 (2.4 ha or 4.1% of the area) and 3 (1.6 ha or 1.6% of the area). This association is a climax community type that occurs on sites that are more moist than those characteristic of all other mapped units with the exception of the *Tsuga/Polystichum* and the *Tsuga/Polystichum--Oxalis*. In the mapped area the *Tsuga/Acer/Polystichum* community is associated with stands of old-growth Douglas-fir, generally mixed with considerable amounts of hemlock in younger age classes. This association is found only in small tracts on the watersheds mapped and occurs primarily on gently to moderately sloping terrain with generally northerly aspects. Slopes range from 18% to 40% in gradient and all plots lie near main drainage channels.

The *Tsuga/Acer/Polystichum* community was sampled in three stands within the mapped watersheds (Table 1). The total overstory coverage ranged from 53% and 70% with an average of 61%. The overstory canopy is composed primarily of Douglas-fir (40%) and western hemlock (18%). Other trees in this layer include *Thuja plicata* and *Acer macrophyllum*. The predominant tree regeneration is *Tsuga heterophylla* (average cover of 25%) making up almost half of the total coverage of the small tree--



tall shrub layer. Other important components of this layer include *Acer circinatum* (average cover of 22%), *Rhododendron macrophyllum*, *Vaccinium parvifolium*, and *Taxus brevifolia*, all occurring with greater than 50% constancy.

The low shrub layer of the *Tsuga/Acer/Polystichum* association is relatively sparse and is composed of only three species with a combined total cover of 18% (Table 11). *Berberis nervosa* (average cover 13%) is dominant, followed in importance by *Gaultheria shallon* and *Rubus ursinus*.

The herb layer of this community consists of 13 species for a combined average cover of 52%, with a range of 36%-81%. The dominant species is *Polystichum munitum* with 23% cover, followed by *Linnaea borealis*. Other common species in this layer include *Coptis laciniata*, *Adiantum pedatum*, *Vancouveria hexandra*, and *Trientalis latifolia*.

#### *Tsuga heterophylla/Polystichum munitum* (SF) Association

The *Tsuga/Polystichum* association is a moderately extensive community in watersheds 2 and 3, occupying a total area of 15.8 ha (Table 1). It occurs near major drainage channels in the central portions of the watersheds or in the lower sections where soil water levels are apparently higher. This association occupies relatively moist and cool portions of the *Tsuga heterophylla* zone (Figure 1) and its position in watersheds 2 and 3 once again supports this ordination of communities.

The *Tsuga/Polystichum* association was sampled by 11 reconnaissance plots which were situated on north-, northwest-, and northeast-facing slopes. Slope gradient ranged from 18% to 74% with an average of 48%. The tree canopy in this association is composed primarily of old-growth Douglas-fir with scattered second-growth Douglas-fir and western hemlock. Western redcedar plays a slightly more important role in this moist community type with a total percentage in the overstory of nearly 5%, and about the same in the understory (Table 12).

It appears that successional status of this association is slightly more advanced than other associations mapped in these two watersheds. For example, tree layer dominance has shifted from Douglas-fir to western hemlock. In addition, the *Tsuga/Polystichum* association shows diversity in both the small tree--tall shrub layer and the herb layer.

The small tree--tall shrub layer is dominated by western hemlock and relatively small amounts of *Acer circinatum*, *Rhododendron*, *Thuja plicata*, *Taxus brevifolia*, and *Vaccinium parvifolium* (Table 12). Five other species occur with less than 50% constancy.

The low shrub layer is very poorly developed and is, in fact, the most depauperate of any of the low shrub layers seen in the two watersheds (Table 5). Total coverage for this layer is only 10%, most of which is contributed by *Berberis nervosa*.

The herb layer is composed of 35 species for a total of 44% coverage. The dominant species is *Polystichum* with an average coverage of 27%. Also occurring commonly are *Linnaea borealis*, *Viola sempervirens*, *Coptis laciniata*, *Galium triflorum*, *Hieracium albiflorum*, *Whipplea modesta*, *Achlys triphylla*, *Trillium ovatum*, *Tiarella unifoliata*, and *Smilacina stellata*.

*Tsuga heterophylla/Polystichum muritum--Oxalis oregana*  
(SF-0x) Association

The *Tsuga/Polystichum--Oxalis* association occupies the wet-cool end of the spectrum as shown in Figure 1. Its distribution in the watersheds is extremely limited, totaling less than 0.4 ha, and only one reconnaissance plot was located within the association (Table 13). The only mappable unit of this community is found at the base of watershed 3 on gently sloping and hummocky bench next to the main stream. The soils here are much deeper and less stony than those found in most other associations in the watersheds.

The outstanding characteristic of the *Tsuga/Polystichum--Oxalis* association is its luxuriant herb layer, which in the sampled stand totalled 149% cover. Almost half of this coverage was contributed by *Oxalis oregana* (Table 13).

## Map Legend for Vegetation Maps of Watersheds 2 and 3

H.J. Andrews Experimental Forest

Map symbols on the vegetation maps of watersheds 2 and 3 use fractional notation with the numerator referring to overstory characteristics and the denominator indicating understory features. The symbols are made up of the following components:

Age class of  
overstory trees

Cover class of  
overstory trees

Cover class of  
understory trees

Important tree  
species other than  
western hemlock

Plant  
community

### NUMERATOR

#### Age class of overstory trees

<u>SYMBOL</u>	<u>Explanation</u>
2nd	Stand is composed of virtually all second-growth Douglas-fir and western hemlock (125-year age class) with less than 5% of the Douglas-fir canopy coverage represented by old-growth trees (450-year age class).
2nd/OG	Stand is made up of second-growth Douglas-fir and western hemlock with 5%-40% of the Douglas-fir canopy coverage composed of old-growth Douglas-fir.
OG	Stand is composed of old-growth Douglas-fir and second-growth western hemlock. More than 50% of the Douglas-fir canopy coverage is made up of old-growth Douglas-fir. One exception is the Douglas-fir/ocean spray association where there are no western hemlock trees in either the overstory or the understory layers in other than trace amounts.

#### Cover class of overstory trees

<u>SYMBOL</u>	<u>Explanation</u>
1	<20% canopy coverage
3	20%-40% canopy coverage
5	40%-60% canopy coverage
7	60%-80% canopy coverage
9	>80% canopy coverage

## DENOMINATOR

This portion of the symbol indicates the total coverage of the following species of trees in the understory: western hemlock, Douglas-fir, Pacific yew, golden chinquapin, and western redcedar. In most cases the dominating species is western hemlock with smaller amounts of the other species common to most sites.

<u>SYMBOL</u>	<u>Explanation</u>
10	<20% total understory tree cover
30	20%-40% understory tree coverage
50	40%-60% understory tree coverage
70	60%-80% understory tree coverage
90	>80% understory tree coverage

## Important Tree Species Other than Western Hemlock in the Understory

This category in the symbol will explain any large deviations from the immediately preceding category. Variations in understory tree species occur primarily in two associations mapped on the two watersheds.

<u>SYMBOL</u>	<u>Explanation</u>
(DF)	Understory tree species composed of Douglas-fir with only token amounts of other species.
(Ch)	Understory tree layer is modified with a high percentage of golden chinquapin and moderate amounts of other species mentioned above.

## Plant Communities

The principal stratification shown on the map is based on the following plant communities. For this reason, the solid lines within the borders of the watersheds separate areas of different plant communities. For detailed descriptions of these communities, see the following sections of this report.

<u>SYMBOL</u>	<u>Explanation</u>
OS	Douglas-fir/ocean spray community <i>Pseudotsuga menziesii/Holodiscus discolor</i>
CRS	Western hemlock/chinquapin community <i>Tsuga heterophylla/Castanopsis chrysophylla</i>
RS	Western hemlock/rhododendron/salal community <i>Tsuga heterophylla/Rhododendron macrophyllum/ Gaultheria shallon</i>

<u>SYMBOL</u>	<u>Explanation</u>
VM-S	Vine maple/salal community <i>Pseudotsuga menziesii/Acer circinatum/ Gaultheria shallon</i>
R-OG	Rhododendron/Oregon grape community <i>Tsuga heterophylla/Rhododendron macrophyllum/ Berberis nervosa-Xerophyllum tenax</i> phase
R-OG(B)	Beargrass phase of the rhododendron/Oregon grape community <i>Tsuga heterophylla/Rhododendron macrophyllum/ Berberis nervosa-Xerophyllum tenax</i> phase
VM-OG	Vine maple/Oregon grape community <i>Pseudotsuga menziesii/Acer circinatum/ Berberis nervosa</i>
VM-SF	Vine maple/sword fern community <i>Tsuga heterophylla/Acer circinatum/ Polystichum monitum</i>
SF	Sword fern community <i>Tsuga heterophylla/Polystichum monitum</i>
SF-0x	Sword fern--Oxalis community <i>Tsuga heterophylla/Polystichum monitum/ Oxalis oregana</i>

#### Example of Map Symbol Interpretation

Symbol:	<u>2nd/OG 7</u> 30 (Ch) CRS
Numerator:	This stand is composed of primarily second-growth Douglas-fir and western hemlock trees with 5%-40% of the Douglas-fir coverage resulting from old-growth Douglas-fir trees (2nd OG). The total crown canopy coverage is between 60% and 80% (7).
Denominator:	Understory tree regeneration totals 20%-40% coverage (30). The understory tree coverage is modified by a high cover value for golden chinquapin with moderate amounts of western hemlock, Douglas-fir, and perhaps other tree species (Ch). The mapped area is classified within the <i>Tsuga heterophylla/Castanopsis chrysophylla</i> habitat type (CRS).

## Reconnaissance plots

During the course of the survey, 79 reconnaissance plots were established and sampled in the area of watersheds 2 and 3. At each plot site cover of all plant species was estimated and recorded. Terrain information regarding slope and aspects was also recorded. The approximate location of each of these plots is indicated on the map. Vegetation data for each plot are included in this report (Tables 3-13).

### SOILS OF WATERSHEDS 2 AND 3

H. J. ANDREWS EXPERIMENTAL FOREST

#### Soil Map Legend

Symbols on the soil maps are composed of three components. The upper portion of the symbol, consisting of one to several letters, designates the soil series. (The soil series on the Andrews Forest are tentative and are not yet correlated.) The middle portion of the symbol is a two digit number that denotes slope phase. The lower portion, consisting of a single letter, indicates the landform. In addition, rock outcrop areas are indicated on the maps by check marks.

Forty-six soil profiles have been described and sampled on the two watersheds. These are shown on the maps by crosses accompanied by profile number. Profile descriptions and considerable basic analytical data for these soils are on file at the Forestry Sciences Laboratory, Corvallis. Some characteristic and properties of soils on watersheds 2 and 3 have been discussed by Rothacher et al. (1967) and Dyrness (1969b).

#### 1. Soil series (upper portion of the symbol)

- L - Limberlost loam containing 35%-50% stone fragments (>2 mm dia)
- Lv - Fine-loamy variant of the Limberlost containing less than 35% stones (>2 mm)
- L(St) - Stony phase of the Limberlost containing 50%-75% stones (by volume)
- F - Frissell loam or clay loam containing 35%-50% stone fragments
- Fv - Fine-loamy variant of the Frissell containing less than 35% stones
- F(St) - Stony phase of the Frissell containing 50%-75% stones
- Ac - Loam soil from andesite colluvium containing 35%-50% stone fragments
- Ac(St) - Stony phase of soil from andesite colluvium containing 50%-75% stones (>2 mm dia)
- Ac(Frag) - Fragmental soil from andesite colluvium containing over 75% stones by volume
- B - Budworm loam or silt loam
- S - Slipout loam to clay loam
- Fl - Flunky gravelly loam
- A - McKenzie River shotty loam to clay loam
- BR - Blue River gravelly loam
- Mc - Clay loam soil from mixed colluvium
- Ds - Deep, red silty soil

2. Slope phase (middle portion of the symbol)

<u>Symbol</u>	<u>Class</u>
10	0%-20% slope
30	20%-40% slope
50	40%-60% slope
70	70%-80% slope
80+	>80% slope

3. Landform (lower portion of the symbol)

<u>Symbol</u>	<u>Class</u>
X	Bench
R	Ridge
M	Smooth slope
U	Uneven slope

Description of Soils Occurring in Watersheds 2 and 3

1. *Limberlost*. The Limberlost is a widely distributed regosolic soil derived from greenish tuffs and breccias. The dark brown to very dark brown A1 horizon ranges from 5 to 18 cm in thickness and is made up of medium and fine granular loam. This surface horizon is often gravelly and may contain up to 30% by volume of gravels. The AC horizon is dark brown to very dark grayish brown in color and ranges from 18 to 36 cm in thickness. The texture of the AC is generally loam with a fine and medium subangular blocky structure. The lower boundary of the AC horizon is generally clear and also is marked by an abrupt decrease in root density. The C horizon is made up of thoroughly decomposed greenish tuff-breccias and is olive brown in color. This horizon is most often structureless (massive), containing occasional tree roots. Fresh, unweathered bedrock is encountered at depths of greater than 1.2 m.

The Limberlost soil in watersheds 2 and 3 exhibits a wide range in stone content (generally andesite). The typical Limberlost (L) is a loamy-skeletal soil containing 35%-50% stones. Profiles with over 50% stones are also encountered [L(St)], however, as well as the fine-loamy variant (Lv) containing less than 35% by volume of stones.

2. *Frissell*. The Frissell is a widely distributed regosolic soil derived from reddish tuffs and breccias. Like the Limberlost, the Frissell generally lacks a B horizon and exhibits an A-AC-C horizon sequence. The A1 horizon ranges from 5 to 13 cm in thickness and consists of gravelly loam to clay loam with medium and fine granular structure. The AC varies from 15 to 46 cm in thickness. Textures range from loam to clay loam and the structure is weak to moderate granular and/or fine subangular blocky. The C horizon is generally composed of massive stony clay loam that grades into weathered breccia parent material at a depth of 0.9-1.2 m.

Stone content of the Frissell is generally greatest on steep south-facing slopes where it often totals over 50% [F(St)]. More frequently the Frissell is classed as a loamy-skeletal soil containing 35%-50% stones by volume (F). A fine-loamy variant of the Frissell (Fv) with less than 35% stones occurs in the vicinity of cutting unit L 141 in watershed 3.

3. *Soil from andesite colluvium.* A soil derived from andesite colluvium occupies most of the upper portions of both watersheds 2 and 3. The surface horizon, averaging 15 cm in thickness and ranging from 5 to 25 cm, is dark brown to very dark brown in color and loam or sandy loam textured. The structure is most often fine and medium granular and substantial amounts of shotty concretions and andesite stones are also generally present. The B horizon is generally lacking. The AC is differentiated from the A horizon largely on the basis of lighter colors due to the incorporation of smaller amounts of organic matter. The AC horizon (15 to 51 cm thick) most often consists of dark brown stony loam having either granular or fine subangular blocky structure. The solum is underlain at depths of 0.5-0.6 m by very deep deposits of andesite colluvium. These layers, generally interpreted as C horizons, are composed of massive stony loams, silt loams, or clay loams containing 25%-80% andesite gravels and cobbles. In many locations abundant pumice flecks were noted in these layers.

In virtually all cases soils from andesite colluvium contained an average of at least 35% stones. Two loamy-skeletal phases were recognized and mapped (35%-50% and 50%-75% stones) and one fragmental phase (over 75% stones).

4. *Budworm.* The Budworm soil is scattered throughout the watersheds, but occupies only a limited area. It is a deep, relatively stone-free soil derived from a greenish tuff and breccia parent material. Owing to its occurrence on gently sloping terrain, the profile is usually fairly well developed. A textural B horizon is generally not present, however. The surface soil is characteristically very dark brown shotty loam or silt loam. This is underlain at 30-51 cm by a B2 horizon consisting of dark brown clay loam or silty clay loam having medium and fine subangular blocky structure. Profiles are generally deep; the C horizon occurs at depths of 0.9-1.2 m. Profile stoniness seldom surpasses 30% and is generally considerably less.

5. *Slipout.* The Slipout is a deep, well-developed, imperfectly drained soil derived from greenish tuffs and breccias. It is generally found on uneven slopes and benches in areas where mass soil movements are common. The Slipout soil is restricted in occurrence to two delineations in the northeastern portion of watershed 3. The surface soil is generally composed of very dark grayish brown clay loam of fine and very fine subangular blocky structure. A distinct brown or olive brown B2 horizon is encountered at depths of 0.3-0.6 m. This horizon is silty clay loam or silty clay textured and usually exhibits marked mottling. Stone content of the Slipout is variable, but generally averages less than 20%.

6. *Flunky.* The Flunky is a shallow, stony Lithosol derived from basalt. In watersheds 2 and 3 its occurrences is confined to ridgetop positions. Depth to fractured basalt bedrock is 51 cm or less, and stone content averages 60%-80%. The surface 13-25 cm is the only layer to show appreciable evidence of soil development. The soil material in this layer is composed of dark brown to brown cobbly very gravelly loam having weak granular structure.



7. *McKenzie River*. The McKenzie River is a moderately deep, well-developed soil derived from reddish tuffs and breccias. It is restricted in occurrence to moderately sloping terrain near the mouth of watershed 3. The 10- to 15-cm A1 horizon is made up of dark brown, granular, shotty clay loam. A well-developed textural B horizon is encountered at depths of 0.3-0.6 m. This horizon is generally composed of brown to reddish brown silty clay having subangular blocky structure. Total effective rooting depth is most often at least 0.9-1.2 m and stone content is usually low (maximum of 10%-20%).

8. *Blue River*. The Blue River series consists of Brown Podzolic soils formed in residuum and colluvium from andesite bedrock. In the mapped area, it occurs only on the highest ridges in watershed 3. The Blue River soil is somewhat shallow and stony, and exhibits only indistinct horizoning. The surface soil is dark brown gravelly loam of weak granular structure. The only marked changes in subsoil layers involve increased stone content and a shift from granular to subangular blocky structure.

9. *Soil from mixed colluvium*. This soil is restricted to a small area near the mouth of watershed 3. It is a weakly developed soil forming in very deep deposits of fine textured colluvium. The surface horizon consists of dark brown, granular clay loam. A weakly developed B2 horizon is usually encountered at depths of about 30 cm and characteristically contains brown silty clay loam of weak subangular blocky structure. The B2 horizon is underlain by brown, massive silty clay loam extending to depths of 3 m or greater. Stone content of the soil ranges from about 10% to 30%.

10. *Deep, red, silty soil*. This is a deep, reddish brown, stone-free soil that apparently is derived from volcanic ash, tuffaceous materials, or both. Its occurrence is restricted to one gently sloping area in the northeastern portion of watershed 2. The surface horizon is composed of dark brown shotty loam of medium and coarse granular structure. A B2 horizon extending from 30 to 61 cm in depth is made up of reddish brown clay loam of weak subangular blocky structure. This grades into a massive silty clay loam C horizon which is at least 2.4 m deep.

## REFERENCES

- DYRNESS, C. T. 1965. Effect of logging and slash burning on understory vegetation in the H. J. Andrews Experimental Forest. USDA For. Serv. Res. Note PNW-31. 13 p.
- DYRNESS, C. T. 1969a. Early plant succession following logging and slash burning in *Pseudotsuga* forests in Oregon. (Abstr.) Abstracts of papers presented at the XI International Botanical Congress, 24 Aug. to 2 Sep. 1969, p. 50.
- DYRNESS, C. T. 1969b. Hydrologic properties of soils on three small watersheds in the western Cascades of Oregon. USDA For. Serv. Res. Note PNW-111. 17 p.
- DYRNESS, C. T., and G. HAWK. 1972. Vegetation and soils of the Hi-15 watersheds, H. J. Andrews Experimental Forest. IBP/Coniferous For. Biome Intern. Rep. 43. 28 p.
- FRANKLIN, J. F., and C. T. DYRNESS. 1969. Vegetation of Oregon and Washington. USDA For. Serv. Res. Pap. PNW-80. 216 p.
- ROTHACHER, J., C. T. DYRNESS, and R. L. FREDRIKSEN. 1967. Hydrologic and related characteristics of three small watersheds in the Oregon Cascades. USDA For. Serv. Pac. Northwest For. Range Exp. Stn. Misc. Publ. 54 p.

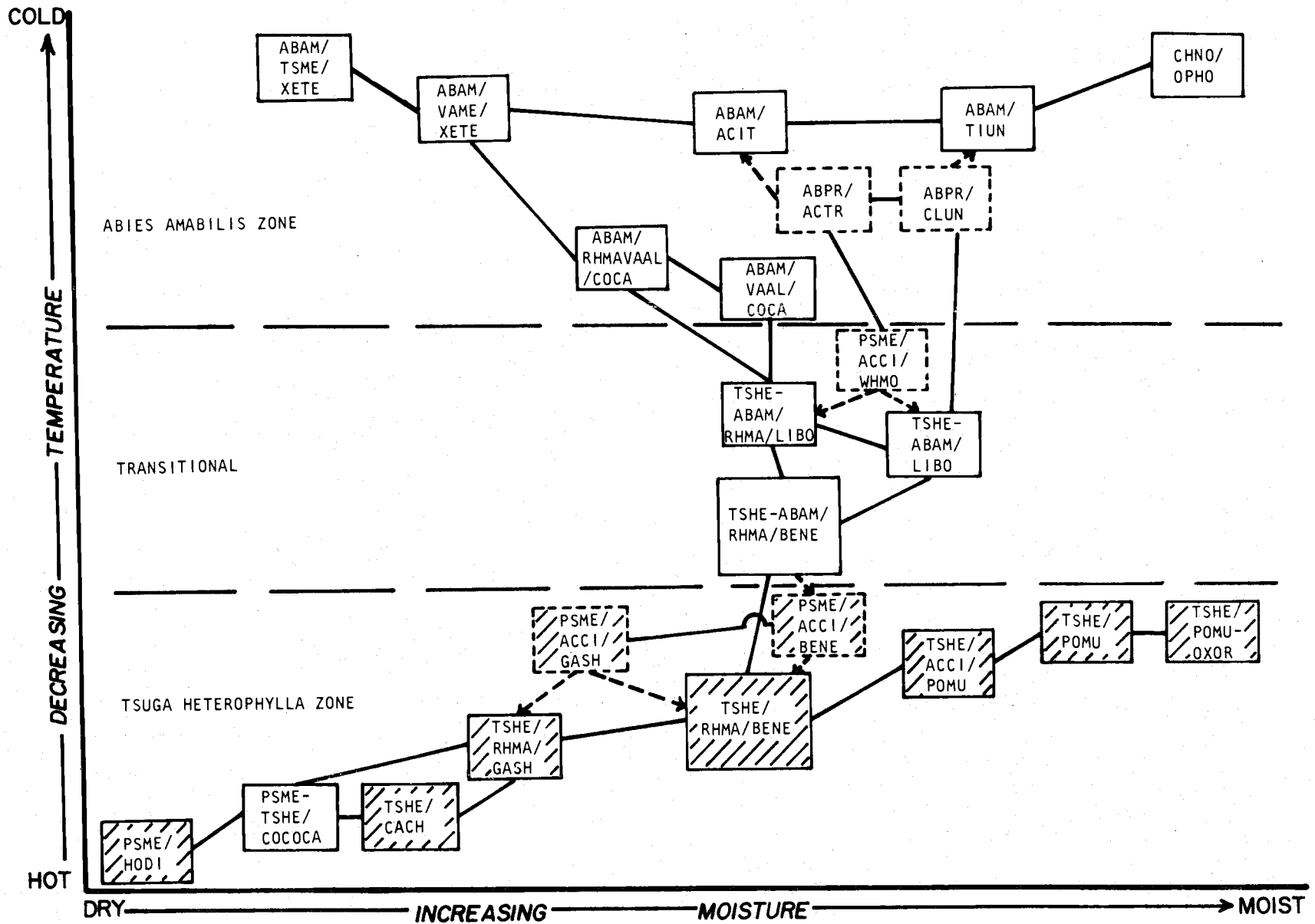


Figure 1. Forest communities of the H. J. Andrews Experimental Forest. Shaded boxes represent those communities occurring on watersheds 2 and 3.

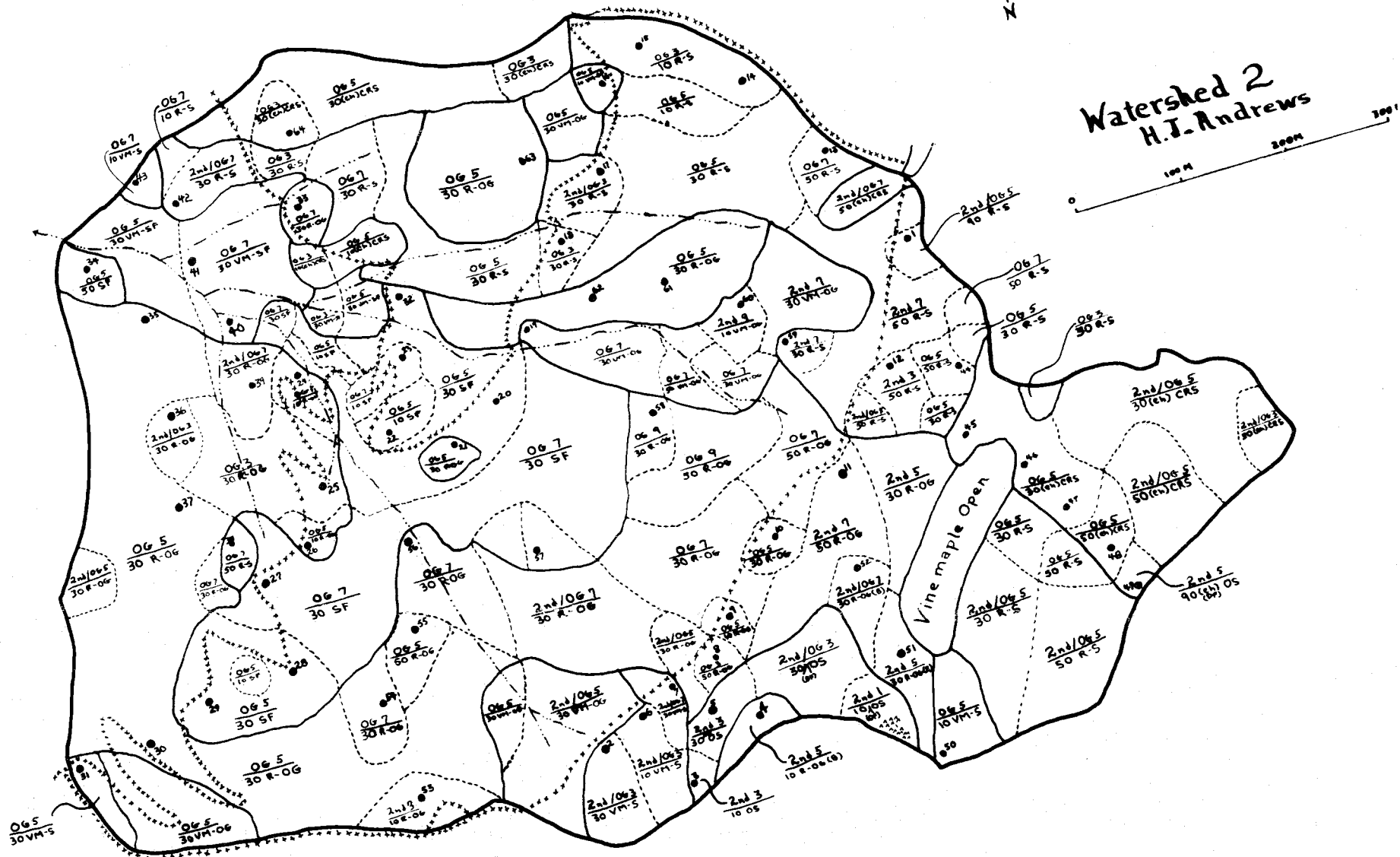


Figure 2. Vegetation map of watershed 2, H. J. Andrews Experimental Forest, Oregon.



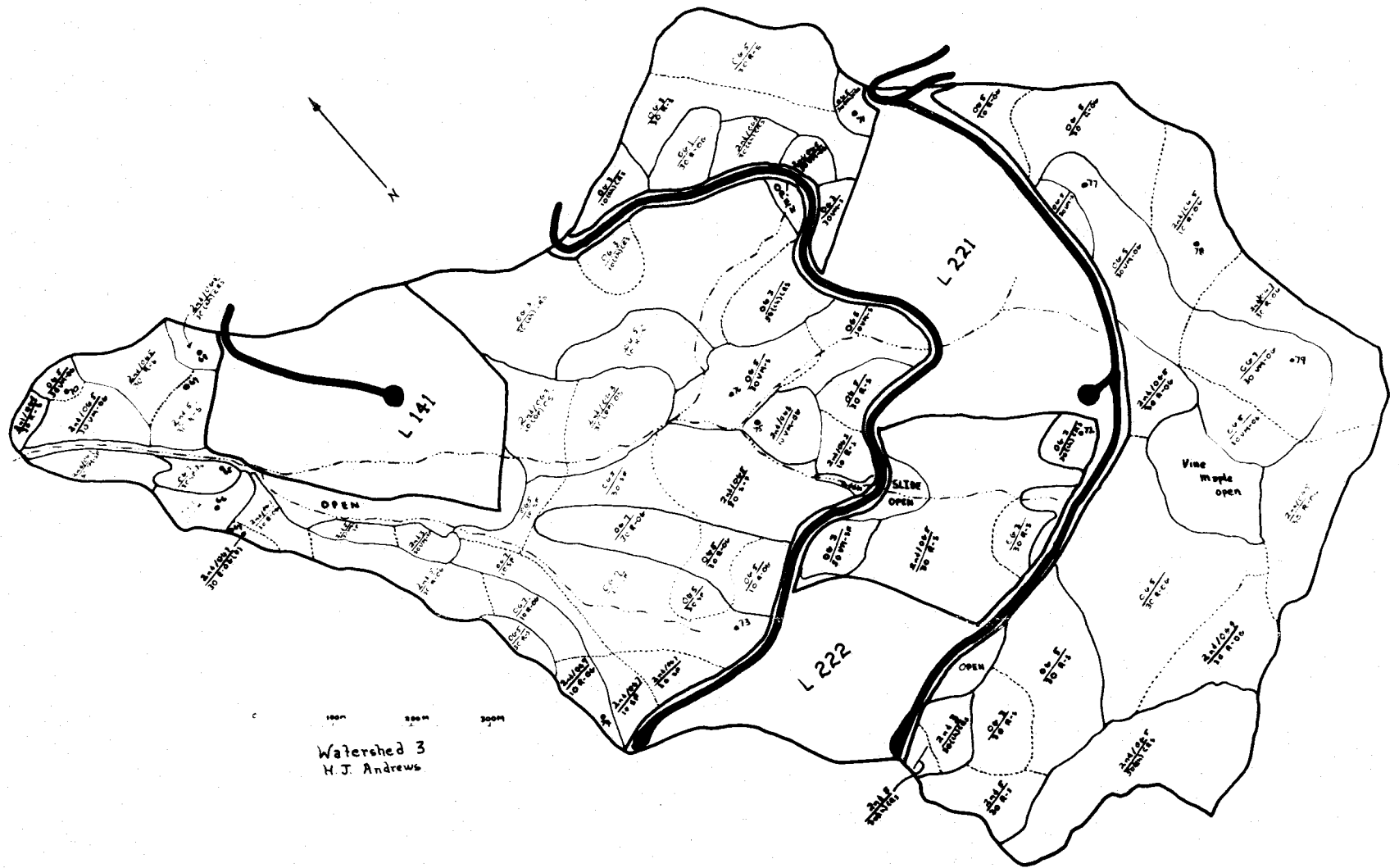


Figure 4. Vegetation map of watershed 3, H. J. Andrews Experimental Forest, Oregon.

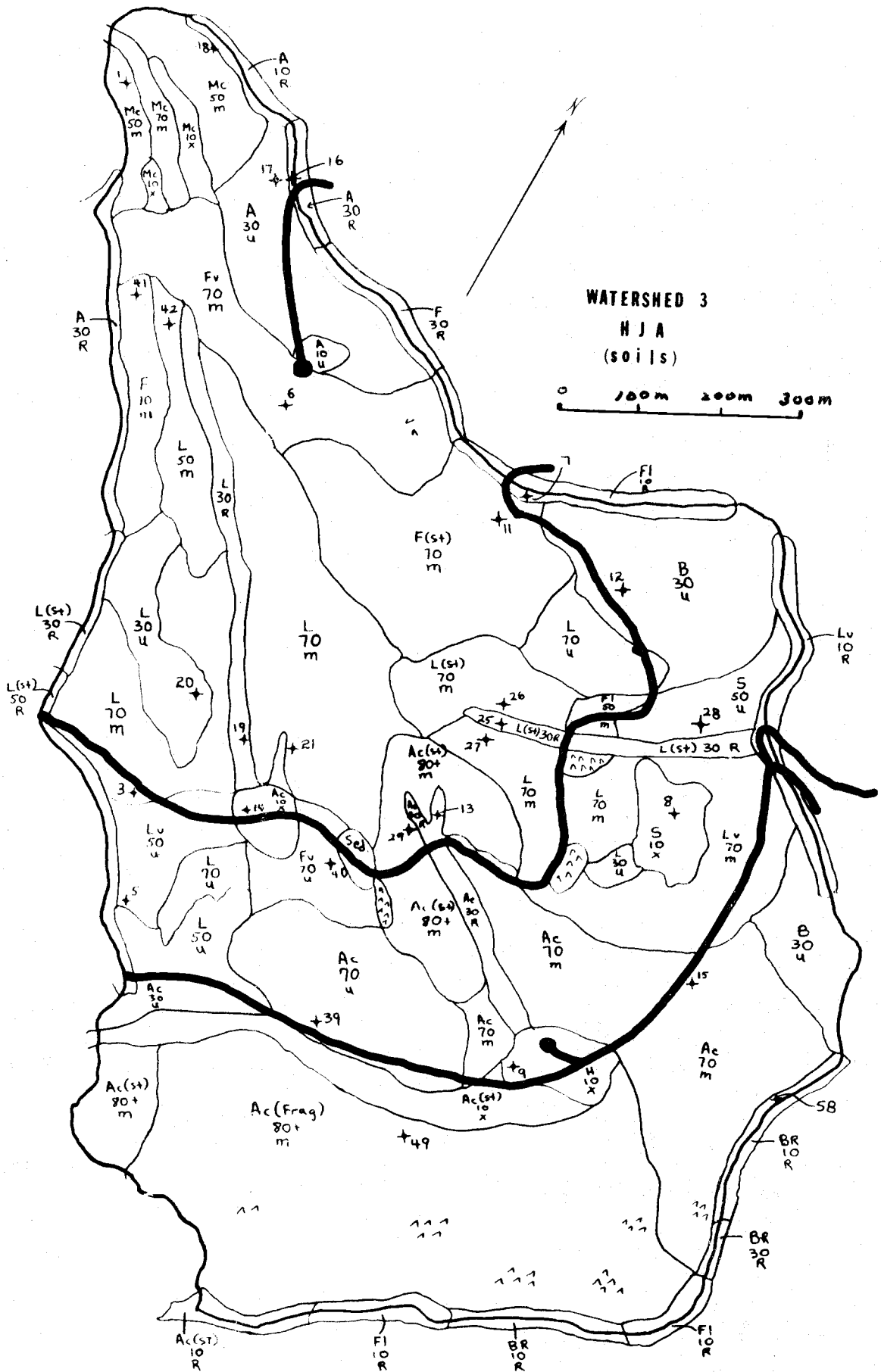


Figure 5. Soil map of watershed 3, H. J. Andrews Experimental Forest, Oregon.

Table 1. Area occupied by plant communities, overstory tree age classes, overstory cover classes, and understory tree cover classes in watersheds 2 and 3, H. J. Andrews Experimental Forest.

Classification	Watershed 2		Watershed 3		Total mapped area	
	(ha)	(%)	(ha)	(%)	(ha)	(%)
<b>PLANT COMMUNITY</b>						
OS	1.42	2.3	2.47	3.5	3.89	2.9
CRS	6.47	10.7	12.55	17.6	19.02	14.4
RS	11.78	19.5	16.11	22.6	27.89	21.2
VM-S	2.02	3.3	3.24	4.5	5.26	4.0
R-OG	21.81	36.1	19.02	26.7	40.83	31.0
R-OB(B)	1.01	1.7			1.01	0.8
VM-OG	4.73	7.8	6.23	8.8	10.96	8.3
VM-SF	2.47	4.1	1.62	2.3	4.09	3.1
SF	7.73	12.8	8.01	11.2	15.74	12.0
SF-0x			0.36	0.5	0.36	0.3
Vine maple--Talus	1.05	1.7	1.62	2.3	2.67	2.0
<b>Total</b>	<b>60.49</b>	<b>100.0</b>	<b>71.22</b>	<b>100.0<sup>a</sup></b>	<b>131.72</b>	<b>100.0</b>
<b>AGE CLASS OF OVERSTORY TREES</b>						
2nd	6.47	10.7	3.88	5.5	10.35	7.9
2nd/OG	12.22	20.2	26.02	36.5	38.24	29.0
OG	40.67	67.2	39.70	55.7	80.37	61.0
<b>Total</b>	<b>59.36</b>	<b>98.1</b>	<b>69.60</b>	<b>97.7</b>	<b>128.96</b>	<b>97.9</b>
<b>OVERSTORY COVER CLASS</b>						
1 (<20%)	1.74	2.9	2.27	3.2	4.01	3.0
3 (20%-40%)	7.41	12.2	15.70	22.0	23.11	17.5
5 (40%-60%)	32.54	53.8	40.31	56.6	72.85	55.3
7 (60%-80%)	16.92	28.0	12.50	17.6	29.42	22.3
9 (>80%)	1.90	3.1	0.45	0.6	2.35	1.8
<b>Total</b>	<b>60.51</b>	<b>100.0</b>	<b>71.23</b>	<b>100.0</b>	<b>131.74</b>	<b>100.0</b>
<b>COVER CLASS OF UNDERSTORY TREES</b>						
10 (<20%)	7.00	11.6	12.83	18.0	19.83	15.0
30 (20%-40%)	43.95	72.6	53.70	75.4	97.65	74.1
50 (40%-60%)	9.23	15.3	4.69	6.6	13.92	10.6
90 (>80%)	0.32	0.5			0.32	0.2
<b>Total</b>	<b>60.50</b>	<b>100.0</b>	<b>71.22</b>	<b>100.0</b>	<b>131.72</b>	<b>100.0</b>

<sup>a</sup>The remainder of watershed 3 area (29.95 ha) is in road right-of-way and other open areas (5.67 ha) and three clearcut units totaling 24.28 ha.



Table 2. Percentage of total area within each forest community in 15 tree overstory age and cover classes mapped in watersheds 2 and 3, H. J. Andrews Experimental Forest.

COVER CLASS OF OVERSTORY TREES

AGE CLASS

	2nd	2nd/OG	OG	2nd	2nd/OG	OG	2nd	2nd/OG	OG	2nd	2nd/OG	OG	2nd	2nd/OG	OG
1	8.4														2.3
3	9.8	81.8		2.6	1.5	43.1	1.1	3.7	15.3		17.0	6.9	1.1	0.6	3.3
5				1.6	33.9	15.8	5.6	26.6	36.6			69.4	4.4	10.4	45.1
7					1.4		5.4	1.4	4.2		4.1	2.5	2.3	13.5	12.5
9														1.1	3.4
	OS			CRS			RS			VM-S			R-OG		

AGE CLASS

	2nd	2nd/OG	OG	2nd	2nd/OG	OG	2nd	2nd/OG	OG	2nd	2nd/OG	OG	2nd	2nd/OG	OG
1															
3					6.6			6.6			14.9				
5	68.7				23.0	35.2	6.8		28.3		13.5	33.1			
7		31.3		7.3		25.5		14.5	28.9		7.1	44.7			100.0
9				2.3							1.6				
	R-OG (B)			VM-OG			VM-SF			SF			SF-0x		

Table 3. *Pseudotsuga menziesii*/*Holodiscus discolor* (OS) association on watersheds 2 and 3.

Species	Cover (%) on plot no:			Average cover (%)	Constancy (%)
	3	5	49		
<b>OVERSTORY TREE LAYER</b>					
<i>Pseudotsuga menziesii</i>	35	35	45	38	100
<b>SMALL TREE--TALL SHRUB LAYER</b>					
<i>Tsuga heterophylla</i>			5	2	33
<i>Pseudotsuga menziesii</i>	5	15	60	27	100
<i>Thuja plicata</i>		3		1	33
<i>Acer circinatum</i>			5	2	33
<i>Rhododendron macrophyllum</i>		3	15	6	66
<i>Castanopsis chrysophylla</i>		2	15	6	66
<i>Corylus cornuta</i> var. <i>californica</i>			1	tr.	33
<i>Holodiscus discolor</i>	45	15	17	26	100
<i>Vaccinium parvifolium</i>			2	1	33
<i>Vaccinium membranaceum</i>		5		2	33
<i>Acer glabrum</i> var. <i>douglasii</i>		8		3	33
<i>Alnus alnifolia</i>	tr.	5		2	66
<i>Pachistima myrsinites</i>	1			tr.	33
<i>Arctostaphylos columbiana</i>			5	2	33
<i>Arbutus menziesii</i>	—	tr.	—	tr.	33
<b>Total</b>	<b>51</b>	<b>56</b>	<b>125</b>	<b>80</b>	
<b>LOW SHRUB LAYER</b>					
<i>Berberis nervosa</i>	5	5	15	8	100
<i>Gaultheria shallon</i>		15	10	8	66
<i>Rosa gymnocarpa</i>	2	5		2	66
<i>Rubus ursinus</i>	3	2		2	66
<i>Symphoricarpos mollis</i>	—	5	—	2	33
<b>Total</b>	<b>10</b>	<b>32</b>	<b>25</b>	<b>22</b>	
<b>HERB LAYER</b>					
<i>Linnaea borealis</i>			5	2	33
<i>Polystichum muritum</i>	1	5		2	66
<i>Hieracium albiflorum</i>	2	1		1	66
<i>Whipplea modesta</i>		10	5	5	66
<i>Xerophyllum tenax</i>			15	5	33
<i>Goodyera oblongifolia</i>	tr.	2	3	2	100
<b>Grass</b>		1		tr.	33
<i>Smilacina racemosa</i>		2		1	33
<i>Fragaria</i> sp.	2	1		1	66
<i>Pedicularis racemosa</i>			35	12	33
<i>Arenaria macrophyllum</i>	tr.			0	33
<i>Heuchera micrantha</i>	30	15		15	66
<i>Sedum spathulifolium</i>	5			2	33
<i>Lilium washingtonianum</i>	—	tr.	—	0	33
<b>Total</b>	<b>40</b>	<b>37</b>	<b>63</b>	<b>48</b>	
<b>Total understory</b>	<b>101</b>	<b>131</b>	<b>213</b>	<b>150</b>	
<b>Total all layers</b>	<b>136</b>	<b>166</b>	<b>258</b>	<b>188</b>	

Table 4. *Tsuga heterophylla*/*Castanopsis chrysophylla* (CRS) association on watersheds 2 and 3.

Species	Cover (%) on plot no:										Average cover(%)	Constancy
	44	45	46	47	48	64	68	71	72			
<b>OVERSTORY TREE LAYER</b>												
<i>Tsuga heterophylla</i>	25	15	10	10	5	10	20	10	12		13	100
<i>Pseudotsuga menziesii</i>	30	30	35	40	35	20	20	35	25		30	100
<i>Thuja plicata</i>					tr.						0	11
<i>Pinus lambertiana</i>							5				1	11
<b>Total</b>	<b>55</b>	<b>45</b>	<b>45</b>	<b>50</b>	<b>40</b>	<b>30</b>	<b>45</b>	<b>45</b>	<b>37</b>		<b>44</b>	
<b>SMALL TREE--TALL SHRUB LAYER</b>												
<i>Tsuga heterophylla</i>	5	15	10	8	15	5	10	5	15		9	100
<i>Pseudotsuga menziesii</i>	5			tr.		5					1	33
<i>Thuja plicata</i>				2	5						1	22
<i>Acer circinatum</i>	10	30	5	5	5	20	10	20	5		12	100
<i>Rhododendron macrophyllum</i>	35	25	5	35	75	45	45	5	75		38	100
<i>Castanopsis chrysophylla</i>	35	20	20	10	30	20	18	45	15		24	100
<i>Taxus brevifolia</i>		tr.					tr.	10	20	10	4	55
<i>Cornus nuttallii</i>				5		3			tr.		1	33
<i>Vaccinium parvifolium</i>	5	5	3	5	tr.	tr.					2	66
<b>Total</b>	<b>95</b>	<b>95</b>	<b>43</b>	<b>70</b>	<b>130</b>	<b>98</b>	<b>93</b>	<b>95</b>	<b>120</b>		<b>92</b>	
<b>LOW SHRUB LAYER</b>												
<i>Berberis nervosa</i>	5		5	1	5	5	10	2	2		4	88
<i>Gaultheria shallon</i>	45	55	10	20	15	35	45	80	15		36	100
<i>Rubus ursinus</i>	1	tr.	3			5					1	44
<b>Total</b>	<b>51</b>	<b>55</b>	<b>18</b>	<b>21</b>	<b>20</b>	<b>45</b>	<b>55</b>	<b>82</b>	<b>17</b>		<b>41</b>	
<b>HERB LAYER</b>												
<i>Limnaea borealis</i>	8			3	tr.	5	10	5	tr.		3	77
<i>Polystichum munitum</i>						2	2				tr.	22
<i>Trientalis latifolia</i>						tr.			tr.		0	22
<i>Galium triflorum</i>			1			3					tr.	22
<i>Whipplea modesta</i>				5	tr.	tr.					1	33
<i>Achlys triphylla</i>					tr.	5		1			1	33
<i>Chimaphila umbellata</i>	tr.		tr.	1	tr.	3	10	2			2	77
<i>Chimaphila menziesii</i>									tr.		0	11
<i>Trillium ovatum</i>			tr.								0	11
<i>Anemone lyallii</i>				tr.							0	11
<i>Xerophyllum tenax</i>	10		5	15	5	5	3				5	66
<i>Goo yera oblongifolia</i>		tr.	tr.		tr.		1				tr.	44
<i>Pyrola picta</i>	tr.								tr.		0	22
<i>Epilobium angustifolium</i>						tr.					0	11
<i>Anaphalis margaritaceae</i>						tr.					0	11
<b>Total</b>	<b>18</b>	<b>0</b>	<b>6</b>	<b>24</b>	<b>5</b>	<b>23</b>	<b>25</b>	<b>8</b>	<b>0</b>		<b>12</b>	
<b>Total understory</b>	<b>164</b>	<b>150</b>	<b>71</b>	<b>115</b>	<b>155</b>	<b>166</b>	<b>174</b>	<b>185</b>	<b>137</b>		<b>145</b>	
<b>Total all layers</b>	<b>219</b>	<b>195</b>	<b>116</b>	<b>165</b>	<b>195</b>	<b>196</b>	<b>219</b>	<b>230</b>	<b>174</b>		<b>189</b>	

Table 5. Characteristics of 10 forest communities mapped on watersheds 2 and 3, H. J. Andrews Experimental Forest, Based on data collected on 79 reconnaissance plots established during mapping.

Species	<i>Pseudotsuga/Holodiscus</i>		<i>Tsuga/Castanopsis</i>		<i>Tsuga/Rhododendron/Gaultheria</i>		<i>Pseudotsuga/Acer/Gaultheria</i>		<i>Tsuga/Rhododendron/Berberis</i>	
	Cover (%)	Const. <sup>a</sup> (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)
<b>OVERSTORY TREE LAYER</b>										
<i>Tsuga heterophylla</i>			15	100	21	100	17	100	28	100
<i>Pseudotsuga menziesii</i>	38	100	30	100	31	100	33	100	24	100
<i>Thuja plicata</i>			tr. <sup>b</sup>	11	tr.	9	tr.	14	2	29
<i>Pinus lambertiana</i>			1	11						
<i>Acer macrophyllum</i>					tr.	9	1	28	1	33
Total	38		46		52		51		51	
<b>SMALL TREE--TALL SHRUB LAYER</b>										
<i>Tsuga heterophylla</i>	2	33	9	100	27	100	15	100	19	100
<i>Pseudotsuga menziesii</i>	27	100	1	33	1	9	1	14	tr.	16
<i>Thuja plicata</i>	1	33	1	22	2	36	2	57	4	37
<i>Abies grandis</i>							tr.	14		
<i>Acer macrophyllum</i>									1	20
<i>Arbutus menziesii</i>	tr.	33								
<i>Acer circinatum</i>	2	33	12	100	10	100	28	100	10	100
<i>Rhododendron macrophyllum</i>	6	66	38	100	16	100	3	71	14	100
<i>Castanopsis chrysophylla</i>	6	66	24	100	2	63	1	57	tr.	25
<i>Taxus brevifolia</i>			4	55	3	72	4	42	4	70
<i>Cornus nuttallii</i>	tr.	33	1	33	2	45	tr.	28	1	50
<i>Corylus cornuta</i> var. <i>calif.</i>					1	18	1	57	tr.	10
<i>Holodiscus discolor</i>	26						tr.	28		
<i>Vaccinium parvifolium</i>	1	33	2	66	1	63	2	85	2	91
<i>Vaccinium membranaceum</i>	2	33					tr.	14	tr.	4
<i>Rhamnus purshiana</i>									tr.	8
<i>Acer glabrum</i> var. <i>doug.</i>	3	33							tr.	12
<i>Rubus parviflorus</i>					tr.	9	tr.	28	tr.	20
<i>Rubus spectabilis</i>									tr.	4
<i>Amelanchier alnifolia</i>	23	66					tr.	14		

Table 5. (cont.) page 2

Species	<i>Tsuga/Rhododendron/Berberis-Xerophyllum</i> phase		<i>Pseudotsuga/Acer/Berberis</i>		<i>Tsuga/Acer/Polystichum</i>		<i>Tsuga/Polystichum</i>		<i>Tsuga/Polystichum/Oxalis</i>	Avg. for watersheds 2 and 3
	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	
<b>OVERSTORY TREE LAYER</b>										
<i>Tsuga heterophylla</i>	27	75	27	100	18	100	33	100	25	
<i>Pseudotsuga menziesii</i>	34	100	31	100	40	100	24	100	30	
<i>Thuja plicata</i>	2	50	3	40	1	33	5	54	5	
<i>Pinus lambertiana</i>										
<i>Acer macrophyllum</i>			1	20	2	66	2	45		
<b>Total</b>	<b>63</b>		<b>63</b>		<b>61</b>		<b>64</b>		<b>60</b>	<b>55</b>
<b>SMALL TREE--TALL SHRUB LAYER</b>										
<i>Tsuga heterophylla</i>	14	100	17	100	25	100	20	100	17	
<i>Pseudotsuga menziesii</i>	2	25								
<i>Thuja plicata</i>	2	50	2	40	1	33	4	72		
<i>Abies grandis</i>										
<i>Acer macrophyllum</i>			1	20	tr.	33	1	27		
<i>Arbutus menziesii</i>										
<i>Acer circinatum</i>	7	75	26	100	22	100	4	81	15	
<i>Rhododendron macrophyllum</i>	13	100	3	100	3	66	5	90	2	
<i>Castanopsis chrysophylla</i>	1	50	tr.	20			tr.	18		
<i>Taxus brevifolia</i>	4	50	5	100	2	66	3	72	6	
<i>Cornus nuttallii</i>			1	40			tr.	36	tr.	
<i>Corylus cornuta</i> var. <i>calif.</i>			tr.	20						
<i>Holodiscus discolor</i>	1	25								
<i>Vaccinium parvifolium</i>	1	100	1	80	2	66	2	72	12	
<i>Vaccinium membranaceum</i>	tr.	25	tr.	20			tr.	9		
<i>Rhamnus purshiana</i>										
<i>Acer glabrum</i> var. <i>daug.</i>										
<i>Rubus parviflorus</i>							tr.	9		
<i>Rubus spectabilis</i>										
<i>Amelanchier alnifolia</i>										

Species	<i>Pseudotsuga/</i> <i>Holodiscus</i>		<i>Tsuga/</i> <i>Castanopsis</i>		<i>Tsuga/</i> <i>Rhododendron/</i> <i>Gaultheria</i>		<i>Pseudotsuga/</i> <i>Acer/</i> <i>Gaultheria</i>		<i>Tsuga/</i> <i>Rhododendron/</i> <i>Berberis</i>	
	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)
<i>Pachystima myrsinites</i>	tr.	33								
<i>Arctostaphylos columbiana</i>	2	33								
<i>Alnus rubra</i>										
<i>Rubus procerus</i>									tr.	4
<b>Total</b>	<b>80</b>		<b>92</b>		<b>65</b>		<b>57</b>		<b>55</b>	
<b>LOW SHRUB LAYER</b>										
<i>Berberis nervosa</i>	8	100	4	88	13	100	11	100	16	100
<i>Gaultheria shallon</i>	8	66	36	100	23	100	22	100	7	80
<i>Rosa gymnocarpa</i>	2	66			tr.	18			tr.	20
<i>Rubus ursinus</i>	2	66	1	44	1	72	3	85	1	54
<i>Rubus nivalis</i>					1	27	tr.	14	1	25
<i>Symphoricarpos mollis</i>	2	33					tr.	14		
<i>Rubus leucodermis</i>							tr.	14		
<b>Total</b>	<b>22</b>		<b>41</b>		<b>38</b>		<b>36</b>		<b>25</b>	
<b>HERB LAYER</b>										
<i>Linnaea borealis</i>	2	33	3	77	8	90	6	100	9	91
<i>Polystichum maritum</i>	2	66	tr.	22	6	81	6	85	12	100
<i>Viola sempervirens</i>					tr.	27	1	71	2	70
<i>Trientalis latifolia</i>			tr.	22	tr.	54	1	85	1	66
<i>Coptis laciniata</i>					2	45	tr.	28	4	83
<i>Galium triflorum</i>			tr.	22	tr.	36	2	57	1	37
<i>Hieracium albiflorum</i>	1	66			tr.	9	1	28	tr.	50
<i>Whipplea modesta</i>	5	66	1	33	2	45	2	71	5	70
<i>Synthyris reniformis</i>							tr.	14	tr.	8
<i>Achlys triphylla</i>			1	33	1	36	1	71	tr.	50
<i>Chimaphila umbellata</i>			2	77	3	81	1	28	tr.	16
<i>Chimaphila menziesii</i>			tr.	11	tr.	36	tr.	14	tr.	29
<i>Trillium ovatum</i>			tr.	11	tr.	54	tr.	42	tr.	50
<i>Anemone deltoidea</i>					tr.	18	tr.	57	tr.	25
<i>Anemone lyallii</i>			tr.	11	tr.	9				
<i>Xerophyllum tenax</i>	5	33	5	66	1	45	tr.	28	tr.	25
<i>Adenocaulon bicolor</i>							tr.	14	tr.	8

Table 5. (cont.) page 4

Species	<i>Tsuga/Rhododendron/Berberis-Xerophylla</i> phase		<i>Pseudotsuga/Acer/Berberis</i>		<i>Tsuga/Acer/Polystichum</i>		<i>Tsuga/Polystichum</i>		<i>Tsuga/Polystichum/Oxalis</i>		Avg. for watersheds 2 and 3
	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)		
<i>Pachystima myrsinites</i>											
<i>Arctostaphylos columbiana</i>											
<i>Alnus rubra</i>					tr.	33					
<i>Rubus procerus</i>											
Total	49		56		55		39		52		60
LOW SHRUB LAYER											
<i>Berberis nervosa</i>	10	100	20	100	13	66	7	100	4		
<i>Gaultheria shallon</i>	3	75	7	100	2	33	2	63	7		
<i>Rosa gymnocarpa</i>											
<i>Rubus ursinus</i>	tr.	75	tr.	40	3	66	1	63	7		
<i>Rubus nivalis</i>	tr.	25	3	40			1	18	10		
<i>Symphoricarpos mollis</i>	tr.	25									
<i>Rubus leucodermis</i>											
Total	13		30		18		11		28		26
HERB LAYER											
<i>Linnaea borealis</i>	2	50	10	100	8	100	4	54	30		
<i>Polystichum muritum</i>	3	75	8	80	23	100	27	100	15		
<i>Viola sempervirens</i>	tr.	50	tr.	40			1	63	5		
<i>Trientalis latifolia</i>			1	40	tr.	66	1	45	3		
<i>Coptis laciniata</i>	1	25	5	80	5	66	3	100	2		
<i>Galium triflorum</i>			tr.	20			1	63	tr.		
<i>Hieracium albiflorum</i>	tr.	25	tr.	20	tr.	33	tr.	54			
<i>Whipplea modesta</i>	tr.	25	2	20	3	33	2	63			
<i>Synthyris reniformis</i>							tr.	9			
<i>Achlys triphylla</i>			2	80	1	66	1	63	3		
<i>Chimaphila umbellata</i>	tr.	50	1	20			tr.	18	10		
<i>Chimaphila menziesii</i>	tr.	50	tr.	20			tr.	27			
<i>Trillium ovatum</i>	tr.	25	tr.	40	tr.	33	tr.	63	1		
<i>Anemone deltoidea</i>			tr.	20			tr.	27	1		
<i>Anemone lyallii</i>	tr.	25									
<i>Xerophyllum tenax</i>	10	100	tr.	20							

Species	<i>Pseudotsuga/</i> <i>Holodiscus</i>		<i>Tsuga/</i> <i>Castanopsis</i>		<i>Tsuga/</i> <i>Rhododendron/</i> <i>Gaultheria</i>		<i>Pseudotsuga/</i> <i>Acer/</i> <i>Gaultheria</i>		<i>Tsuga/</i> <i>Rhododendron/</i> <i>Berberis</i>	
	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)
<i>Goodyera oblongifolia</i>	2	100	tr.	44	tr.	81	tr.	42	tr.	33
<i>Pyrola picta</i>			tr.	22	tr.	18	tr.	28		
<i>Pyrola asarifolia</i>										
<i>Tiarella unifoliata</i>					tr.	9			tr.	33
<i>Vancouveria hexandra</i>					tr.	18	tr.	42	1	20
<i>Bromus</i> sp.										
Grass	tr.	33					tr.	28	tr.	25
<i>Pteridium aquilinum</i>									tr.	4
<i>Oxalis oregana</i>										
<i>Smilacina racemosa</i>	1	33					tr.	28	tr.	24
<i>Smilacina stellata</i>							tr.	14	tr.	12
<i>Asarum caudatum</i>										
<i>Athyrium filix-femina</i>									tr.	16
<i>Blechnum spicant</i>									1	16
<i>Disporum hookeri</i>							tr.	14	tr.	4
<i>Galium oreganum</i>									tr.	4
<i>Dicentra formosa</i>							tr.	14	tr.	4
<i>Cornus canadensis</i>										
<i>Campanula scouleri</i>							tr.	14	tr.	4
<i>Corallorhiza maculata</i>									tr.	4
<i>Fragaria vesca</i>	1	66								
<i>Mitella</i> sp.										
<i>Pedicularis racemosa</i>	12	33								
<i>Arenaria macrophylla</i>	tr.	33							tr.	4
<i>Actaea arguta</i>							tr.	14	tr.	4
<i>Polypodium glycyrrhiza</i>							tr.	14	tr.	4
<i>Epilobium watsonii</i>									tr.	4
<i>Epilobium angustifolium</i>			tr.	11					tr.	8
<i>Aralia californica</i>									tr.	12



Table 5. (cont.) page 6

Species	<i>Tsuga/ Rhododendron/ Berberis-Xero- phyllum</i> phase		<i>Pseudotsuga/ Acer/ Berberis</i>		<i>Tsuga/ Acer/ Polystichum</i>		<i>Tsuga/ Polystichum</i>		<i>Tsuga/ Polystichum/ Oxalis</i>		Avg. for watersheds 2 and 3
	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)		
<i>Goodyera oblongifolia</i>	1	75	tr.	40				tr.	18		
<i>Pyrola picta</i>			tr.	40				tr.	18		
<i>Pyrola asarifolia</i>			tr.	20				tr.	9		
<i>Tiarella unifoliata</i>			1	20	1	33	tr.	63	10		
<i>Vancouveria hexandra</i>			2	20	3	66	1	45	4		
<i>Bromus</i> sp.							tr.	9			
Grass							tr.	27			
<i>Pteridium aquilinum</i>	tr.										
<i>Oxalis oregana</i>									65		
<i>Smilacina racemosa</i>			tr.	20							
<i>Smilacina stellata</i>							tr.	54	tr.		
<i>Asarum caudatum</i>			tr.	20			tr.	9			
<i>Athyrium filix-femina</i>							tr.	9			
<i>Blechnum spicant</i>			tr.	20	1	33	tr.	18			
<i>Disporum hookeri</i>			tr.	40							
<i>Galium oregonum</i>											
<i>Dicentra formosa</i>							tr.	9			
<i>Cornus canadensis</i>							tr.	9			
<i>Campanula scouleri</i>	tr.	25					tr.	18			
<i>Corallorhiza maculata</i>											
<i>Fragaria vesca</i>											
<i>Mitella</i> sp.	tr.	25					tr.	9			
<i>Pedicularis racemosa</i>	tr.	25									
<i>Arenaria macrophylla</i>											
<i>Actaea arguta</i>							tr.	9			
<i>Polypodium glycyrrhiza</i>											
<i>Epilobium watsonii</i>							tr.	9			
<i>Epilobium angustifolium</i>											
<i>Aralia californica</i>					2	33	tr.	18			

Table 5. (cont.) page 7

Species	<i>Pseudotsuga/</i> <i>Holodiscus</i>		<i>Tsuga/</i> <i>Castanopsis</i>		<i>Tsuga/</i> <i>Rhododendron/</i> <i>Gaultheria</i>		<i>Pseudotsuga/</i> <i>Acer/</i> <i>Gaultheria</i>		<i>Tsuga/</i> <i>Rhododendron/</i> <i>Berberis</i>	
	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)
<i>Anaphalis margaritacea</i>			tr.	11					tr.	4
<i>Adiantum pedatum</i>									tr.	8
<i>Heuchera micrantha</i>	15	66							1	8
<i>Monotropa uniflora</i>									tr.	4
<i>Sedum spathulifolium</i>	2	33								
<i>Lilium washingtonianum</i>	tr.	33								
<i>Penstemon</i> sp.	—		—		—		—		—	
Total	48		12		23		21		37	
Total understory	150		145		126		114		117	
Total all layers	188		191		178		165		172	

Table 5. (cont.) page 8

Species	<i>Tsuga/ Rhododendron/ Berberis-Xero- phyllum</i> phase		<i>Pseudotsuga/ Acer/ Berberis</i>		<i>Tsuga/ Acer/ Polystichum</i>		<i>Tsuga/ Polystichum</i>		<i>Tsuga/ Polystichum/ Oxalis</i>	Avg. for watersheds 2 and 3
	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	Const. (%)	Cover (%)	
<i>Anaphalis margaritacea</i>										
<i>Adiantum pedatum</i>			tr.	20	4	66	3	36		
<i>Heuchera micrantha</i>	1	25								
<i>Monotropa uniflora</i>										
<i>Sedum spathulifolium</i>										
<i>Lilium washingtonianum</i>										
<i>Penstemon</i> sp.							tr.	9		
Total	18		32		51		44		149	43
Total understory	80		118		124		94		229	129
Total all layers	143		181		185		158		289	184

<sup>a</sup>Percent constancy or percentage of total plot in which species occurred.

<sup>b</sup>Occurred in trace amounts (less than 0.5 percent cover).

Table 6. *Tsuga heterophylla*/*Rhododendron macrophyllum*/*Gaultheria shallon* (RS) association in watersheds 2 and 3.

Species	Cover (%) on plot no:											Average cover (%)	Constancy (%)
	1	12	13	14	15	17	18	38	42	59	69		
<b>OVERSTORY TREE LAYER</b>													
<i>Tsuga heterophylla</i>	20	20	45	10	15	20	15	20	20	25	25	21	100
<i>Pseudotsuga menziesii</i>	35	20	25	30	20	20	25	45	45	45	30	31	100
<i>Thuja plicata</i>					5							tr.	9
<i>Acer macrophyllum</i>									5			tr.	9
<b>Total</b>	<b>55</b>	<b>40</b>	<b>70</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>65</b>	<b>70</b>	<b>70</b>	<b>55</b>	<b>52</b>	
<b>UNDERSTORY TREE AND TALL SHRUB LAYER</b>													
<i>Tsuga heterophylla</i>	65	35	50	10	10	30	30	25	5	25	12	27	100
<i>Pseudotsuga menziesii</i>				2								tr.	9
<i>Thuja plicata</i>	15	tr.			2					3		2	36
<i>Acer circinatum</i>	5	6	5	10	10	10	10	8	20	10	15	10	100
<i>Rhododendron macrophyllum</i>	20	15	7	15	12	10	12	35	15	25	15	16	100
<i>Castanopsis chrysophylla</i>	1	5		3	2				5	5	4	2	63
<i>Taxus brevifolia</i>		tr.	3		5	5	10	tr.	5		8	3	72
<i>Cornus nuttallii</i>			3					3	5	3	3	2	45
<i>Corylus cornuta</i> var. <i>calif.</i>			1						5			1	18
<i>Vaccinium parvifolium</i>	tr.	5				1	1	tr.		tr.	3	1	63
<i>Rubus parviflorus</i>												tr.	9
<b>Total</b>	<b>106</b>	<b>66</b>	<b>69</b>	<b>40</b>	<b>41</b>	<b>56</b>	<b>63</b>	<b>72</b>	<b>60</b>	<b>71</b>	<b>60</b>	<b>64</b>	
<b>LOW SHRUB LAYER</b>													
<i>Berberis nervosa</i>	tr.	15	15	5	7	8	20	10	15	15	25	13	100
<i>Gaultheria shallon</i>	10	20	20	35	10	10	10	48	25	35	35	23	100
<i>Rosa gymnocarpa</i>			tr.	1								tr.	18
<i>Rubus ursinus</i>	tr.	2	3			tr.	2	3	1	1		1	72
<i>Rubus nivalis</i>					5	tr.		3				1	27
<b>Total</b>	<b>10</b>	<b>37</b>	<b>38</b>	<b>41</b>	<b>22</b>	<b>18</b>	<b>32</b>	<b>64</b>	<b>41</b>	<b>51</b>	<b>60</b>	<b>38</b>	

Table 6. (cont.)

Species	Cover (%) on plot no:											Average	
	1	12	13	14	15	17	18	38	42	59	69	cover (%)	Constancy (%)
<b>HERB LAYER</b>													
<i>Limnaea borealis</i>		8	tr.	5	3	10	8	8	10	3	30	8	90
<i>Polystichum monitum</i>		5	5	3		8	5	10	15	2	8	6	81
<i>Viola sempervirens</i>			tr.	3				2				tr.	27
<i>Trientalis larifolia</i>	tr.		tr.	tr.	tr.				1		tr.	tr.	54
<i>Coptis laciniata</i>	3			tr.	3			3		8		2	45
<i>Galium triflorum</i>					tr.		1	tr.	2			tr.	36
<i>Hieraceum albiflorum</i>											tr.	0	9
<i>Whipplea modesta</i>				5	5		8	2			3	2	45
<i>Achlys triphylla</i>		tr.		3		1			3			1	36
<i>Chimaphila umbellata</i>	tr.			2	1	5	3	tr.	tr.	10	12	3	81
<i>Chimaphila menziesii</i>				tr.	tr.	3			tr.			tr.	36
<i>Trillium ovatum</i>		tr.	1				tr.		1	1	2	tr.	54
<i>Anemone deltoidea</i>			1					tr.				tr.	18
<i>Anemone lyallii</i>											1	tr.	9
<i>Xerophyllum tenax</i>	2		tr.	tr.						2	3	1	45
<i>Goodyera oblongifolia</i>	tr.	tr.	1	tr.	tr.	tr.	1			1	1	tr.	81
<i>Pyrola picta</i>		tr.				tr.						0	18
<i>Tiarella unifoliata</i>								tr.				0	9
<i>Vancouveria hexandra</i>					tr.				5			tr.	18
<b>Total</b>	<b>5</b>	<b>13</b>	<b>8</b>	<b>21</b>	<b>12</b>	<b>27</b>	<b>26</b>	<b>25</b>	<b>37</b>	<b>27</b>	<b>60</b>	<b>23</b>	
<b>Total understory</b>	<b>121</b>	<b>116</b>	<b>115</b>	<b>102</b>	<b>75</b>	<b>101</b>	<b>121</b>	<b>161</b>	<b>138</b>	<b>148</b>	<b>180</b>	<b>125</b>	
<b>Total all layers</b>	<b>176</b>	<b>156</b>	<b>185</b>	<b>142</b>	<b>115</b>	<b>141</b>	<b>161</b>	<b>226</b>	<b>208</b>	<b>218</b>	<b>235</b>	<b>177</b>	

Table 7. *Pseudotsuga menziesii*/*Acer circinatum*/*Gaultheria shallon* (VM-S) community in watersheds 2 and 3.

Species	Cover (%) on plot no:							Average cover (%)	Constancy (%)
	2	6	7	31	43	50	76		
<b>OVERSTORY TREE LAYER</b>									
<i>Tsuga heterophylla</i>	10	20	30	25	20	10	5	17	100
<i>Pseudotsuga menziesii</i>	20	20	40	20	50	45	35	33	100
<i>Thuja plicata</i>	tr.								14
<i>Acer macrophyllum</i>				3	5			1	28
Total	30	40	70	48	75	55	40	51	
<b>SMALL TREE--TALL SHRUB LAYER</b>									
<i>Tsuga heterophylla</i>	15	7	30	30	5	10	5	15	100
<i>Pseudotsuga menziesii</i>	5							1	14
<i>Thuja plicata</i>	5	2	5		2			2	57
<i>Abies grandis</i>							tr.		14
<i>Acer circinatum</i>	30	30	15	25	30	25	20	28	100
<i>Rhododendron macrophyllum</i>			5	5	5	5	tr.	3	71
<i>Castanopsis chrysophylla</i>	tr.		3			3	2	1	57
<i>Taxus brevifolia</i>		tr.	tr.				25	4	42
<i>Cornus nuttallii</i>			1				2	tr.	28
<i>Corylus cornuta</i> var. <i>calif.</i>		2	1	3				1	57
<i>Holodiscus discolor</i>				tr.				tr.	28
<i>Vaccinium parvifolium</i>		3	2	1	tr.	3	3	2	85
<i>Vaccinium membranaceum</i>						tr.			14
<i>Rubus parviflorus</i>		2	tr.					tr.	28
<i>Amalanchier alnifolia</i>		3						tr.	14
Total	55	49	62	64	42	46	57	57	
<b>LOW SHRUB LAYER</b>									
<i>Berberis nervosa</i>	15	7	10	15	15	2	10	11	100
<i>Gaultheria shallon</i>	15	10	7	20	25	15	60	22	100
<i>Rubus ursinus</i>	2	5	1	3	5	2		3	85
<i>Rubus nivalis</i>		tr.							14
<i>Symphoricarpos mollis</i>							tr.		14
<i>Rubus leucodermis</i>				1					14
Total	32	33	18	39	45	19	70	35	
<b>HERB LAYER</b>									
<i>Linnaea borealis</i>	3	3	3	10	5	10	5	6	100
<i>Polystichum maritum</i>	10	10	5		10	5	3	6	85
<i>Viola sempervirens</i>	2	3	2		tr.		tr.	1	71
<i>Trientalis latifolia</i>	1	1	1	3	tr.		tr.	1	85
<i>Coptis laciniata</i>					tr.		2	tr.	28
<i>Galium triflorum</i>	2	2	2	5				2	57
<i>Hieracium albiflorum</i>		1		5				1	28
<i>Whipplea modesta</i>	2	3	5		tr.		3	2	71
<i>Synthyris reniformis</i>						2		tr.	14
<i>Achlys triphylla</i>	tr.		3		2	tr.	tr.	1	71
<i>Chimaphila umbellata</i>					1		3	1	28
<i>Chimaphila menziesii</i>					tr.				14
<i>Trillium ovatum</i>		1		tr.	tr.			tr.	42

Table 7. (cont.)

Species	Cover (%) on plot no:							Average cover (%)	Constancy (%)
	2	6	7	31	43	50	76		
<i>Anemone deltoidea</i>	2	tr.	tr.	1				tr.	57
<i>Xerophyllum tenax</i>					1	1		tr.	28
<i>Adenocaulon bicolor</i>							tr.		14
<i>Goodyera oblongifolia</i>	tr.				1		tr.	tr.	42
<i>Pyrola picta</i>	tr.			tr.					28
<i>Vancouveria hexandra</i>		1			tr.	tr.		tr.	42
Grass		2		1				tr.	28
<i>Smilacina racemosa</i>			tr.				tr.		28
<i>Smilacina stellata</i>				tr.					14
<i>Disporum hookeri</i>			tr.						14
<i>Dicentra formosa</i>		tr.							14
<i>Campanula scouleri</i>	1							tr.	14
<i>Actaea arguta</i>		1						tr.	14
<i>Polypodium glycyrrhiza</i>			1					tr.	14
Total	23	28	22	24	21	18	16	21	
Total understory	110	101	102	127	108	83	143	113	
Total all layers	140	139	172	175	183	138	183	164	

Table 8. *Tsuga heterophylla*/*Rhododendron macrophyllum*/*Berberis nervosa* (R-OG) association in watersheds 2 and 3.

Species	Cover (%) on plot no:																								Average	
	8	9	10	11	21	24	25	26	30	33	35	36	37	39	53	54	55	56	58	61	62	63	74	78	cover(%)	Constancy
<b>OVERSTORY TREE LAYER</b>																										
<i>Tsuga heterophylla</i>	10	40	35	30	30	10	20	25	20	45	30	30	30	50	5	20	20	20	55	25	10	25	40	35	28	100
<i>Pseudotsuga menziesii</i>	25	25	25	30	10	10	15	20	15	20	15	10	20	10	35	40	25	45	25	35	30	35	30	15	2	100
<i>Thuja plicata</i>									5	5					2	6		5		5		8		2	29	
<i>Acer macrophyllum</i>					1		2		3	2						2		5			3		5		1	33
<b>Total</b>	35	65	60	60	41	20	37	45	43	67	50	40	50	60	40	64	51	70	85	60	48	60	83	50	55	
<b>SMALL TREE--TALL SHRUB LAYER</b>																										
<i>Tsuga heterophylla</i>	30	10	18	45	15	15	30	5	25	10	15	30	30	35	5	15	25	7	5	35	25	20	3	5	19	100
<i>Pseudotsuga menziesii</i>	1			tr.		1									5										tr.	16
<i>Thuja plicata</i>	10			12					5		5					10	25		15		tr.		5	4	37	
<i>Acer macrophyllum</i>						3			1	10			5				2			15		tr.			1	20
<i>Acer circinatum</i>	8	3	10	10	10	5	5	5	15	10	8	5	10	10	15	10	15	10	10	15	20	15	15	2	10	100
<i>Rhododendron macrophyllum</i>	10	15	10	10	7	10	5	15	10	25	10	25	10	15	10	10	10	10	15	10	15	10	20	37	14	100
<i>Castanopsis chrysophylla</i>	tr.										tr.	tr.	1										2	tr.	25	
<i>Taxus brevifolia</i>		5	3	tr.	6			1	2	8	5	5	5				2	15	5		5	5	1	12	4	70
<i>Cornus nuttallii</i>				3		1	5	tr.			3	tr.		2	5		2	2			3			1	1	50
<i>Corylus cornuta</i> var. <i>oalif.</i>	2		3																					3	tr.	10
<i>Vaccinium parvifolium</i>	2	1	5	2	3	5	5	3	tr.		5	tr.	5	3		1	8	2	tr.	2	3	tr.	2	tr.	2	91
<i>Vaccinium membranaceum</i>																								tr.	tr.	4
<i>Rhamnus purshiana</i>	tr.																						5		tr.	8
<i>Acer glabrum</i> var. <i>douglasii</i>	tr.	tr.													3										tr.	12
<i>Rubus parviflorus</i>	1			1	tr.	1									tr.										tr.	20
<i>Rubus spectabilis</i>											3														tr.	4
<b>Total</b>	64	34	46	86	41	41	50	29	58	63	54	65	66	65	43	46	89	46	50	62	71	50	56	57	55	
<b>LOW SHRUB LAYER</b>																										
<i>Berberis nervosa</i>	7	15	25	25	10	12	20	25	15	25	15	20	10	20	8	15	15	20	8	20	15	15	8	10	16	100
<i>Gaultheria shallon</i>	15	10	tr.	15		7	10	3	10	3	3	10	25	5	5		5	3	tr.	10		5	9	7	7	80
<i>Rosa gymnocarpa</i>	tr.		tr.			2	tr.													tr.					tr.	20
<i>Rubus ursinus</i>		1		3	2	5						3	3				1		tr.	2	5	tr.	1	5	1	54
<i>Rubus nivalis</i>								3			tr.	4	3			3			2						1	25
<i>Rubus procerus</i>															3										tr.	4
<b>Total</b>	22	26	25	43	12	26	30	31	25	28	18	37	41	25	16	18	21	23	10	32	20	20	18	22	25	



Table 8. (cont.)

Species	Cover (%) on plot no:																								Average		
	8	9	10	11	21	24	25	26	30	33	35	36	37	39	53	54	55	56	58	61	62	63	74	78	cover(%)	Constancy(%)	
HERB LAYER																											
<i>Limnaea borealis</i>	10	1	1	10	15	5		12	5	5	10	15	15	5	30	6	20	15	7	5	15		1	3	9	91	
<i>Polystichum muritum</i>	15	8	5	8	10	20	15	5	10	10	10	25	10	10	5	25	15	20	10	20	25	5	4	2	12	100	
<i>Viola sempervirens</i>	tr.	3		2	3	3		3	1		4	5	2	1	tr.	5	5			tr.	tr.			tr.	2	70	
<i>Trientalis latifolia</i>	3	tr.		2	1	4	1	3	5	tr.	2	2		2	2						2			2	1	66	
<i>Coptis laciniata</i>		tr.		5	5	5	3	5	7	2	5	10	5	8		5	5	5	2	8	8		2	7	4	83	
<i>Galium triflorum</i>				3	1	2	2		2		2	4				3							tr.		1	37	
<i>Hieracium albiflorum</i>	2				2	1	tr.	2	tr.		tr.	tr.			2	tr.							tr.	2	tr.	50	
<i>Whipplea modesta</i>	10	5		10	10	3	3	8	10	tr.	5	10	10	10		tr.	3				10			7	5	70	
<i>Synthyris reiformis</i>	3														3										tr.	8!	
<i>Achlys triphylla</i>	tr.	tr.		2	1		3	tr.		1	2									tr.	tr.			tr.	tr.	tr.	50
<i>Chimaphila umbellata</i>								tr.				1						1							2	tr.	16
<i>Chimaphila menziesii</i>										1					2				1	tr.		tr.	tr.	tr.	tr.	tr.	29
<i>Trillium ovatum</i>	tr.	tr.		tr.	tr.			tr.	1	tr.	tr.					tr.	2			tr.			tr.		tr.	tr.	50
<i>Anemone deltoidea</i>		tr.		1		tr.					tr.						tr.	2							tr.	tr.	25
<i>Xerophyllum tenax</i>	2	3	tr.																	tr.		tr.			tr.	tr.	25
<i>Adenocaulon bicolor</i>								1	1																tr.	tr.	8
<i>Goodyera oblongifolia</i>				tr.								7			1			tr.	tr.		tr.		1	tr.	tr.	tr.	33
<i>Tiarella unifoliata</i>					2	tr.		1			tr.	tr.				1	1	1							tr.	tr.	33
<i>Vancouveria hexandra</i>		4			5						tr.	tr.					7								1	tr.	20
Grass	2				1	1		1							5							tr.			tr.	tr.	25
<i>Smilacina stellata</i>	tr.										1					1									tr.	tr.	12
<i>Athyrium filix-femina</i>						1		tr.					1	1											tr.	tr.	16
<i>Blechnum spicant</i>				tr.	7			1					4												1	tr.	16
<i>Disporum hookeri</i>	tr.														tr.											tr.	4
<i>Galium oregonum</i>																										tr.	4
<i>Dicentra formosa</i>	1																									tr.	4
<i>Campamula scouleri</i>											tr.															tr.	4
<i>Corallorhiza maculata</i>																								tr.		tr.	4
<i>Arenaria macrophylla</i>						tr.																				tr.	4
<i>Actaea arguta</i>																1										tr.	4
<i>Polypodium glycyrrhiza</i>	1																								tr.	tr.	4
<i>Epilobium watsonii</i>						1																			tr.	tr.	4
<i>Epilobium angustifolium</i>						1																	3		tr.	tr.	8
<i>Aralia californica</i>				tr.		2																			tr.	tr.	12
<i>Anaphalis margaritacea</i>				tr.						3																tr.	4
<i>Adiantum pedatum</i>								tr.								1									tr.	tr.	8

Table 8. (cont.)

Species	Cover (%) on plot no:																				Average					
	8	9	10	11	21	24	25	26	30	33	35	56	37	39	53	54	55	56	58	61	62	63	74	78	cover(%)	Constancy
<i>Monotropa uniflora</i>					tr.																					4
<i>Heuchera micrantha</i>															5							15			1	8
<i>Pteridium aquilinum</i>													1												tr.	4
<i>Smilacina racemosa</i>																										4
Total	49	24	6	44	49	62	28	40	44	22	41	79	48	37	55	48	53	52	19	33	60	5	23	28	37	
Total understory	135	84	77	173	102	129	108	100	127	113	113	181	155	127	114	112	163	121	79	127	151	75	97	107	117	
Total all layers	170	149	137	233	143	149	145	145	170	180	163	221	205	187	154	152	214	191	164	187	199	135	180	157	172	

Table 9. *Tsuga heterophylla*/*Rhododendron macrophyllum*/*Berberis nervosa*-*Xerophyllum* phase [R-OG(B)] on watersheds 2 and 3.

Species	Cover (%) on plot no:				Average cover (%)	Constancy (%)
	4	51	52	67		
<b>OVERSTORY TREE LAYER</b>						
<i>Tsuga heterophylla</i>		5	55	43	27	75
<i>Pseudotsuga menziesii</i>	45	45	10	35	34	100
<i>Thuja plicata</i>	—	5	3	—	2	50
<b>Total</b>	45	55	68	78	63	
<b>SMALL TREE--TALL SHRUB LAYER</b>						
<i>Tsuga heterophylla</i>	7	10	20	20	14	100
<i>Pseudotsuga menziesii</i>	7				2	25
<i>Thuja plicata</i>		20	5		6	50
<i>Acer circinatum</i>		10	5	12	7	75
<i>Rhododendron macrophyllum</i>	20	10	5	18	13	100
<i>Castanopsis chrysophylla</i>	2	tr.			1	50
<i>Taxus brevifolia</i>			tr.	17	4	50
<i>Holodiscus discolor</i>	2				1	25
<i>Vaccinium parvifolium</i>	2	tr.	tr.	tr.	1	100
<i>Vaccinium membranaceum</i>	—	tr.	—	—	—	25
<b>Total</b>	40	50	35	67	49	
<b>LOW SHRUB LAYER</b>						
<i>Berberis nervosa</i>	5	3	15	15	10	100
<i>Gaultheria shallon</i>	5		3	3	3	75
<i>Rubus ursinus</i>		tr.	tr.	tr.		75
<i>Rubus nivalis</i>			1		tr.	25
<i>Symphoricarpos mollis</i>	1	—	—	—	tr.	25
<b>Total</b>	11	3	19	18	13	
<b>HERB LAYER</b>						
<i>Linnaea borealis</i>	5		1		2	50
<i>Polystichum munitum</i>		3	5	3	3	75
<i>Viola sempervirens</i>		tr.	tr.			50
<i>Coptis laciniata</i>				3	1	25
<i>Hieracium albiflorum</i>	tr.					25
<i>Whipplea modesta</i>		1			tr.	25
<i>Chimaphila umbellata</i>	1			tr.	tr.	50
<i>Chimaphila menziesii</i>		tr.		tr.		50
<i>Trillium ovatum</i>			tr.			25
<i>Anemone lyallii</i>		tr.				25
<i>Xerophyllum tenax</i>	20	10	5	5	10	100
<i>Goodyera oblongifolia</i>	1	1		tr.	1	75
<i>Pteridium aquilinum</i>			tr.			25
<i>Campanula scouleri</i>			tr.			25
<i>Pedicularis racemosa</i>	tr.					25
<i>Heuchera micrantha</i>	2	—	—	—	1	25
<b>Total</b>	29	15	11	11	17	
<b>Total understory</b>	80	68	65	96	79	
<b>Total all layers</b>	125	123	133	174	142	

Table 10. *Pseudotsuga menziesii*/*Acer circinatum*/*Berberis nervosa* (VM-0G) community on watersheds 2 and 3.

Species	Cover (%) on plot no:					Average	
	60	70	75	77	79	cover (%)	Constancy (%)
<b>OVERSTORY TREE LAYER</b>							
<i>Tsuga heterophylla</i>	65	15	20	20	20	28	100
<i>Pseudotsuga menziesii</i>	30	35	10	35	45	31	100
<i>Thuja plicata</i>				3	10	3	40
<i>Acer macrophyllum</i>			5			1	20
<b>Total</b>	<b>95</b>	<b>50</b>	<b>35</b>	<b>58</b>	<b>75</b>	<b>63</b>	
<b>SMALL TREE--TALL SHRUB LAYER</b>							
<i>Tsuga heterophylla</i>	10	20	15	25	15	17	100
<i>Thuja plicata</i>				2	10	2	40
<i>Acer macrophyllum</i>			3			1	20
<i>Acer circinatum</i>	25	25	30	15	35	26	100
<i>Rhododendron macrophyllum</i>	3	5	tr.	2	5	3	100
<i>Castanopsis chrysophylla</i>				2		tr.	20
<i>Taxus brevifolia</i>	tr.	8	3	10	5	5	100
<i>Cornus nuttallii</i>		3	3			1	40
<i>Corylus cornuta</i> var. <i>calif.</i>			tr.				20
<i>Vaccinium parvifolium</i>		3	1	2	tr.	1	80
<i>Vaccinium membranaceum</i>					tr.		20
<b>Total</b>	<b>38</b>	<b>64</b>	<b>55</b>	<b>58</b>	<b>70</b>	<b>56</b>	
<b>LOW SHRUB LAYER</b>							
<i>Berberis nervosa</i>	12	25	25	28	10	20	100
<i>Gaultheria shallon</i>	tr.	10	15	5	5	7	100
<i>Rubus ursinus</i>		1	1			tr.	40
<i>Rubus nivalis</i>				10	3	3	40
<b>Total</b>	<b>12</b>	<b>36</b>	<b>41</b>	<b>43</b>	<b>18</b>	<b>30</b>	
<b>HERB LAYER</b>							
<i>Linnaea borealis</i>	1	1	10	35	4	10	100
<i>Polystichum maritimum</i>		8	15	5	10	8	80
<i>Viola sempervirens</i>		tr.	1			tr.	40
<i>Trientalis latifolia</i>			tr.	6		1	40
<i>Coptis laciniata</i>	1		10	7	7	5	80
<i>Galium triflorum</i>			1			tr.	20
<i>Hieracium albidiflorum</i>				tr.			20
<i>Whipplea modesta</i>				10		2	20
<i>Achlys triphylla</i>		2	4	3	tr.	2	80
<i>Chimaphila umbellata</i>		5				1	20
<i>Chimaphila menziesii</i>				tr.			20
<i>Trillium ovatum</i>		tr.	tr.				40
<i>Anemone deltoidea</i>			1			tr.	20
<i>Xerophyllum tenax</i>	2					tr.	20
<i>Adenocaulon bicolor</i>			1			tr.	20
<i>Goodyera oblongifolia</i>		tr.			1	tr.	40
<i>Pyrola picta</i>	tr.				tr.		40
<i>Pyrola asarifolia</i>			tr.				20

Table 10. (cont.)

Species	Cover (%) on plot no:					Average cover (%)	Constancy (%)
	60	70	75	77	79		
<i>Tiarella unifoliata</i>				3		1	20
<i>Vancouveria hexandra</i>			8			2	20
<i>Smilacina racemosa</i>		1				tr.	20
<i>Asarum caudatum</i>			1			tr.	20
<i>Blechnum spicant</i>			tr.				20
<i>Disporum hookeri</i>		tr.	tr.				40
<i>Adiantum pedatum</i>			tr.				20
<b>Total</b>	<u>4</u>	<u>17</u>	<u>52</u>	<u>69</u>	<u>22</u>	<u>32</u>	
<b>Total understory</b>	54	117	148	170	110	118	
<b>Total all layers</b>	149	167	183	228	185	181	

Table 11. *Tsuga heterophylla*/*Acer circinatum*/*Polystichum munitum* (VM-SF) community on watersheds 2 and 3.

Species	Cover (%) on plot no:			Average	
	16	40	41	cover (%)	Constancy (%)
<b>OVERSTORY TREE LAYER</b>					
<i>Tsuga heterophylla</i>	10	30	15	18	100
<i>Pseudotsuga menziesii</i>	40	25	55	40	100
<i>Thuja plicata</i>	3			1	33
<i>Acer macrophyllum</i>	—	5	tr.	2	66
Total	53	60	70	61	
<b>SMALL TREE--TALL SHRUB LAYER</b>					
<i>Tsuga heterophylla</i>	15	35	25	25	100
<i>Thuja plicata</i>	3			1	33
<i>Acer macrophyllum</i>			tr.		33
<i>Acer circinatum</i>	20	20	25	22	100
<i>Rhododendron macrophyllum</i>	5		3	3	66
<i>Taxus brevifolia</i>	tr.		5	2	66
<i>Vaccinium parvifolium</i>	2	5	5	2	66
<i>Alnus rubra</i>	—	—	tr.	—	33
Total	45	55	63	55	
<b>LOW SHRUB LAYER</b>					
<i>Berberis nervosa</i>		25	15	13	66
<i>Gaultheria shallon</i>	5			2	33
<i>Rubus ursinus</i>	7	3	—	3	66
Total	12	28	15	18	
<b>HERB LAYER</b>					
<i>Linnaea borealis</i>	10	8	7	8	100
<i>Polystichum munitum</i>	15	45	10	23	100
<i>Trientalis latifolia</i>	tr.		1	tr.	66
<i>Coptis laciniata</i>		5	10	5	66
<i>Hieracium albiflorum</i>			tr.		33
<i>Whipplea modesta</i>	10			3	33
<i>Achlys triphylla</i>	1	3		1	66
<i>Trillium ovatum</i>	tr.				33
<i>Tiarella unifoliata</i>			3	1	33
<i>Vancouveria hexandra</i>		8	1	3	66
<i>Blechnum spicant</i>		2		1	33
<i>Aralia californica</i>			5	2	33
<i>Adiantum pedatum</i>	—	10	3	4	66
Total	36	81	40	51	
Total understory	93	164	118	124	
Total all layers	146	224	188	185	

Table 12. *Tsuga heterophylla*/*Polystichum munitum* (SF) association on watersheds 2 and 3.

Species	Cover (%) on plot no:											Average cover (%)	Constancy (%)
	20	22	23	27	28	29	32	34	57	66	73		
<b>OVERSTORY TREE LAYER</b>													
<i>Tsuga heterophylla</i>	20	35	35	40	30	35	25	15	75	15	35	33	100
<i>Pseudotsuga menziesii</i>	35	20	22	25	15	20	15	15	15	40	38	24	100
<i>Thuja plicata</i>					5	1	5	15	5	20		5	54
<i>Acer macrophyllum</i>	2	1	5					5			5	2	45
<b>Total</b>	<b>57</b>	<b>56</b>	<b>62</b>	<b>65</b>	<b>50</b>	<b>56</b>	<b>45</b>	<b>50</b>	<b>95</b>	<b>75</b>	<b>78</b>	<b>64</b>	
<b>SMALL TREE--TALL SHRUB LAYER</b>													
<i>Tsuga heterophylla</i>	15	15	10	30	25	30	10	50	20	5	10	20	100
<i>Thuja plicata</i>	10		3		3	5	10	5	5	2		4	72
<i>Acer macrophyllum</i>	1	1	5									1	27
<i>Acer circinatum</i>	4	5		3	3	2	5	2	15	4		4	81
<i>Rhododendron macrophyllum</i>	2		1	5	8	10	5	5	5	10	tr.	5	90
<i>Castanopsis chrysophylla</i>				1	tr.							tr.	18
<i>Taxus brevifolia</i>	3	5	1	3			5	1		5	15	3	72
<i>Cornus nuttallii</i>	tr.		1					1	2			tr.	36
<i>Vaccinium membranaceum</i>									tr.				9
<i>Vaccinium parvifolium</i>		2	5	tr.	3		3	3	3	tr.	2	2	72
<i>Rubus parviflorus</i>			1									tr.	9
<b>Total</b>	<b>35</b>	<b>28</b>	<b>28</b>	<b>41</b>	<b>42</b>	<b>47</b>	<b>38</b>	<b>68</b>	<b>47</b>	<b>28</b>	<b>25</b>	<b>39</b>	
<b>LOW SHRUB LAYER</b>													
<i>Berberis nervosa</i>	5	8	15	10	15	5	5	tr.	3	10	5	7	100
<i>Gaultheria shallon</i>	2		10	3			1	tr.	1	2		2	63
<i>Rubus ursinus</i>		1	3	1			1	2	tr.	1	1	1	63
<i>Rubus nivalis</i>				2	5							1	18
<b>Total</b>	<b>7</b>	<b>9</b>	<b>28</b>	<b>16</b>	<b>20</b>	<b>5</b>	<b>7</b>	<b>2</b>	<b>4</b>	<b>13</b>	<b>6</b>	<b>11</b>	
<b>HERB LAYER</b>													
<i>Linnaea borealis</i>	5	8			2		5	15		5		4	54
<i>Polystichum munitum</i>	20	35	25	25	25	15	10	45	15	20	65	27	100
<i>Viola sempervirens</i>		2	1	2	tr.	1				2	1	1	63
<i>Trientalis latifolia</i>		3	2				7	tr.		tr.		1	45
<i>Coptis laciniata</i>	tr.	5	tr.	1	2	tr.	10	2	5	3	tr.	3	100
<i>Galium triflorum</i>		3	1	1	tr.			tr.		tr.	1	1	63

Species	Cover (%) on plot no:											Average	
	20	22	23	27	28	29	32	34	57	66	73	cover (%)	Constancy (%)
<i>Hieracium albiflorum</i>	tr.	tr.			tr.	2				tr.	1	tr.	54
<i>Whipplea modesta</i>	1	8	5	3	2		tr.			1		2	63
<i>Synthyris reniformis</i>		tr.											9
<i>Achlys triphylla</i>	tr.		5	tr.			2		tr.	1	tr.	1	63
<i>Chimaphila umbellata</i>			tr.							1		tr.	18
<i>Chimaphila menziesii</i>	tr.					tr.				tr.			27
<i>Trillium ovatum</i>	tr.	tr.	2				tr.		tr.	tr.	1	tr.	63
<i>Anemone deltoidea</i>		tr.	1								tr.	tr.	27
<i>Adenocaulon bicolor</i>		tr.									1	tr.	18
<i>Goodyera oblongifolia</i>	tr.										tr.		18
<i>Pyrola picta</i>						tr.				tr.			18
<i>Pyrola asarifolia</i>	tr.												9
<i>Tiarella unifoliata</i>	tr.	1	tr.	1	1	tr.					tr.	tr.	63
<i>Vancouveria hexandra</i>		3	1				2	5		tr.		1	45
<i>Bromus</i> sp.											tr.		9
Grass			1	3	1							tr.	27
<i>Smilacina stellata</i>		1	1	tr.				tr.	tr.	tr.	tr.	tr.	54
<i>Asarum caudatum</i>												tr.	9
<i>Athyrium filix-femina</i>		tr.											9
<i>Blechnum spicant</i>		tr.		3								tr.	18
<i>Dicentra formosa</i>		tr.											9
<i>Cornus canadensis</i>								tr.					9
<i>Campanula scouleri</i>				1		tr.						tr.	18
<i>Mittella</i> sp.											2	tr.	9
<i>Actaea arguta</i>								tr.					9
<i>Epilobium watsonii</i>		tr.											9
<i>Aralia californica</i>		1									1	tr.	18
<i>Adiantum pedatum</i>		2		1				30			3	3	36
<i>Penstemon</i> sp.				tr.									9
Total	26	72	45	41	33	16	38	97	20	33	76	44	
Total understory	68	109	101	98	95	68	83	167	71	74	107	94	
Total all layers	125	165	163	163	145	124	128	217	166	149	185	158	



Table 13. *Tsuga heterophylla*/*Polystichum munitum*--*Oxalis oregana* (SF-0x) association on watersheds 2 and 3.

Species	Cover (%) on plot no: 65
<b>OVERSTORY TREE LAYER</b>	
<i>Tsuga heterophylla</i>	25
<i>Pseudotsuga menziesii</i>	30
<i>Thuja plicata</i>	<u>5</u>
<b>Total</b>	<b>60</b>
<b>SMALL TREE--TALL SHRUB LAYER</b>	
<i>Tsuga heterophylla</i>	17
<i>Acer circinatum</i>	15
<i>Rhododendron macrophyllum</i>	2
<i>Taxus brevifolia</i>	6
<i>Cornus nuttallii</i>	tr.
<i>Vaccinium parvifolium</i>	<u>12</u>
<b>Total</b>	<b>52</b>
<b>LOW SHRUB LAYER</b>	
<i>Berberis nervosa</i>	4
<i>Gaultheria shallon</i>	7
<i>Rubus ursinus</i>	7
<i>Rubus nivalis</i>	<u>10</u>
<b>Total</b>	<b>28</b>
<b>HERB LAYER</b>	
<i>Linnaea borealis</i>	30
<i>Polystichum munitum</i>	15
<i>Viola sempervirens</i>	5
<i>Trientalis latifolia</i>	3
<i>Coptis laciniata</i>	2
<i>Galium triflorum</i>	tr.
<i>Achlys triphylla</i>	3
<i>Chimaphila umbellata</i>	10
<i>Trillium ovatum</i>	1
<i>Anemone deltoidea</i>	1
<i>Tiarella unifoliata</i>	10
<i>Vancouveria hexandra</i>	4
<i>Oxalis oregana</i>	65
<i>Smilacina stellata</i>	<u>tr.</u>
<b>Total</b>	<b>149</b>
<b>Total understory</b>	<b>229</b>
<b>Total all layers</b>	<b>289</b>