

3 VEGETATION

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Field Procedures

Getting Started

1. Locate plot boundaries.
2. Assemble description forms, collection bags, and implements (e.g., a knife, small shovel).

Record and Estimate

1. Photograph the plot, if required.
2. Enter the plot number and surveyors' names.
3. Standing at one point in the plot, list all species observed in each layer.
4. Traverse the entire plot (or one quadrant at a time) in an increasing spiral or zig-zag pattern, noting each new species.
5. Collect unknown species, recording each by a temporary name and plot collection number on the form (e.g., moss 01, hairy grass 02, herb 03, etc.). Mark sample bags and pressing sheets with plot and collection numbers.
6. When the list seems complete, begin estimating percent cover. For each layer:
 - estimate total layer cover and enter at top of form;
 - estimate individual species covers for the entire layer and sub-layers, if present (i.e., first A, then A1, A2, A3);
 - add up species covers and compare to total species cover and total layer cover; reconcile any discrepancies, remembering that overlap can occur between species and layers.
7. Check that all required fields have been completed on the form.

Guidelines for Describing Vegetation

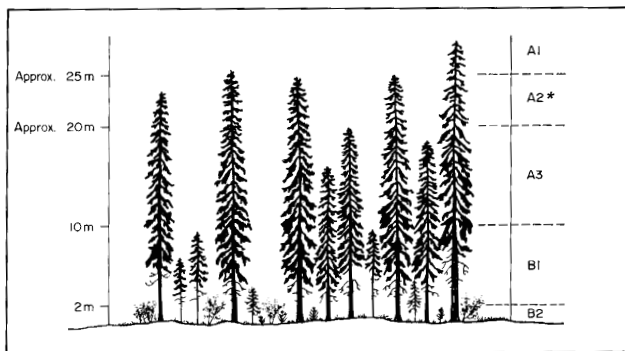
Throughout the process of describing vegetation, observe the following guidelines.

Vegetation Layers

All vegetation is assigned to one of the following layers. Criteria for A and B layers and sub-layers are depicted in Figure 3.1.

- A. The *tree layer* includes all woody plants greater than 10 m tall. Three sub-layers are recognized:
 - A1 **Dominant trees** - includes the dominant (tallest) trees of the main canopy, which may be veterans of one or more fires (previously classed as A0), or the tallest trees of the same age class as the main canopy; usually a minor portion of the stand composition.
 - A2 **Main tree canopy (codominant trees)** - the main layer of tree cover, composed of trees whose crowns form the upper layer of foliage; typically the major portion of the stand composition.
 - A3 **Sub-canopy trees** - includes trees greater than 10 m high that do not reach the main canopy; may form a distinct secondary canopy; often a mixture of trees of various heights younger than those in the main canopy or may be suppressed trees of the same age; includes “intermediate” and “overtopped” trees (terminology of MOF Resources Inventory Branch).
- B. The *shrub layer* includes all woody plants less than 10 m tall, except low (usually < 15 cm tall) woody or trailing plants which are considered part of the herb layer (see Table 3.1). Established tree regeneration more than two years of age and less than 10 m in height is considered part of the shrub layer. Two sub-layers are recognized:
 - B1 **Tall shrub layer** - includes all woody plants 2–10 m tall, including shrubs and advance tree regeneration and trees in poorly growing stands where the canopy is less than 10 m high.
 - B2 **Low shrub layer** - includes all woody plants less than 2 m high, except low (< 15 cm) woody or trailing plants (see Table 3.1); includes shrubs and established tree regeneration more than two years old and dwarfed or immature specimens of species normally considered in the shrub category (e.g., young *Vaccinium membranaceum*, or dwarf alpine forms of normally taller shrubs).
- C. The *herb layer* includes all herbaceous species, regardless of height, and some low woody plants less than 15 cm tall (see Table 3.1).

- D. The *moss, lichen, liverwort and seedling layer* includes all bryophytes, terrestrial lichens, and liverworts, and tree seedlings less than two years old.
- E. The *epiphyte layer* includes all species which grow on other living plants.



*some exceptions for very low growing stands

FIGURE 3.1. Stratification of forest stands, shrubs and trees.

Species Lists

Record the species of all vegetation by layer, either by entering the names in full, or using the 4-3-1 (genus-species-subspecies or variety) code from *British Columbia Plant Species Codes and Selected Attributes* (Meidinger et al. 1998). At a minimum, record all those species growing on the dominant substrate, which will most often be organic matter but on some sites may be rock, decaying wood, or mineral soil.

Certain projects may require only a listing of indicator plants or dominant species growing on the main substrate. In such cases, it is important to indicate that only a partial listing has been made, by checking the appropriate box (PART.) at the top of the form.

Unknown Species

Collect specimens of unknown species for verification, numbering them sequentially within each plot and recording the plot number, temporary name, and collection number on collection bags and pressing sheets. Record percent cover for unknowns on the form using the temporary name and collection number in lieu of species name (e.g., moss 03). These procedures are extremely important if several persons are collecting data, or if a significant time lag occurs between field collection and office verification and coding.

TABLE 3.1. List of low woody species and species of uncertain life form assigned to the herb layer

Latin Name	Latin Name
<i>Andromeda polifolia</i> *	<i>Kalmia microphylla</i> *
<i>Anemone multifida</i>	<i>Linnaea borealis</i> *
<i>Apocynum androsaemifolium</i>	<i>Lithospermum incisum</i>
<i>Apocynum cannabinum</i>	<i>Lithospermum ruderale</i>
<i>Apocynum medium</i>	<i>Loiseleuria procumbens</i> *
<i>Apocynum sibiricum</i>	<i>Luetkea pectinata</i> *
<i>Arctostaphylos alpina</i> *	<i>Orthilia secunda</i>
<i>Arctostaphylos uva-ursi</i> *	<i>Oxycoccus oxycoccus</i> *
<i>Aruncus dioicus</i>	<i>Penstemon davidsonii</i> *
<i>Asclepias ovalifolia</i>	<i>Penstemon ellipticus</i> *
<i>Asclepias speciosa</i>	<i>Phlox caespitosa</i>
<i>Cassiope lycopodioides</i> *	<i>Phyllodoce empetriformis</i> *
<i>Cassiope mertensiana</i> *	<i>Phyllodoce glanduliflora</i> *
<i>Cassiope stelleriana</i> *	<i>Polygonum cuspidatum</i>
<i>Cassiope tetragona</i> *	<i>Polygonum paronychia</i>
<i>Chamaerhodos erecta</i>	<i>Polygonum polystachyum</i>
<i>Chimaphila menziesii</i> *	<i>Polygonum sachalinense</i>
<i>Chimaphila umbellata</i> *	<i>Rhododendron lapponicum</i> *
<i>Cornus canadensis</i>	<i>Rubus arcticus</i>
<i>Cornus suecica</i>	<i>Rubus chamaemorus</i>
<i>Draba</i> spp.	<i>Rubus lasiococcus</i>
<i>Dryas drummondii</i> *	<i>Rubus nivalis</i> *
<i>Dryas integrifolia</i> *	<i>Rubus pedatus</i>
<i>Dryas octopetala</i> *	<i>Rubus pubescens</i>
<i>Empetrum nigrum</i> *	<i>Rubus ursinus</i> *
<i>Eriogonum androsaaceum</i>	<i>Salix arctica</i> *
<i>Eriogonum flavum</i>	<i>Salix cascadenis</i> *
<i>Eriogonum heracleoides</i>	<i>Salix polaris</i> *
<i>Eriogonum niveum</i>	<i>Salix reticulata</i> *
<i>Eriogonum ovalifolium</i>	<i>Salix stolonifera</i> *
<i>Eriogonum pauciflorum</i>	<i>Saxifraga bronchialis</i>
<i>Eriogonum umbellatum</i>	<i>Saxifraga cespitosa</i>
<i>Fragaria chiloensis</i>	<i>Saxifraga flagellaris</i>
<i>Fragaria vesca</i>	<i>Saxifraga oppositifolia</i>
<i>Fragaria virginiana</i>	<i>Saxifraga tricuspidata</i>
<i>Galium boreale</i>	<i>Sibbaldia procumbens</i>
<i>Gaultheria hispidula</i> *	<i>Vaccinium caespitosum</i> *
<i>Gaultheria humifusa</i> *	<i>Vaccinium scoparium</i> *
<i>Gaultheria ovatifolia</i> *	<i>Vaccinium vitis-idaea</i> *
<i>Geocaulon lividum</i>	<i>Vaccinium myrtillus</i> *

* low woody species

Plants Growing on Subdominant Substrates

Where the objectives of a study or the features of a particular site warrant collecting data for plants growing on substrates other than the dominant substrate, list these under "Additional Species" on the form. Identify the layer to which the plant belongs (A–E) and the type of substrate using the codes in Table 3.2. Label the top of the blank column used to record the type of substrate as "SS" (subdominant substrate).

TABLE 3.2. Codes for subdominant substrates

Code	Description
A	Aquatic; where water is the subdominant substrate
L	Cobbles, stones, or bedrock outcrops (epiliths)
O	Organic matter (e.g., plants growing on patches of organic matter on a talus slope where the dominant substrate is rock)
S	Bare soil (episols)
X	Dead wood (epixyles)

Estimating Percent Cover

In most surveys, only those species growing on the dominant substrate are included in estimates. Percent cover is estimated as the percentage of the ground surface covered when the crowns are projected vertically. Follow the outside perimeter of the projected crown. For the tree layer, distinct holes in the canopy should be subtracted from the estimate. For other layers, small gaps that are not fully covered can be ignored.

- Viewing the layer obliquely, rather than vertically, can result in an over-estimation.
- Avoid biasing estimates because of crown density.
- For species with high cover values, mentally move the plants to a corner of the plot to estimate if they represent one-quarter, one-third, or one-half, or more of the plot.
- For species that almost cover the plot, mentally move them together and estimate how much of the area is not covered by the plants.
- For species with low cover, try making estimates for subsections in each quarter of the plot.
- Equating percent cover with equivalent dimensions relative to plot area can be very helpful (Table 3.3). For several small scattered areas of coverage, think about the area covered by 1% (2 x 2 m in a 400 m² plot), or 0.1% (63 x 63 cm), and add up the total number of areas of cover that are roughly equivalent to these dimensions.

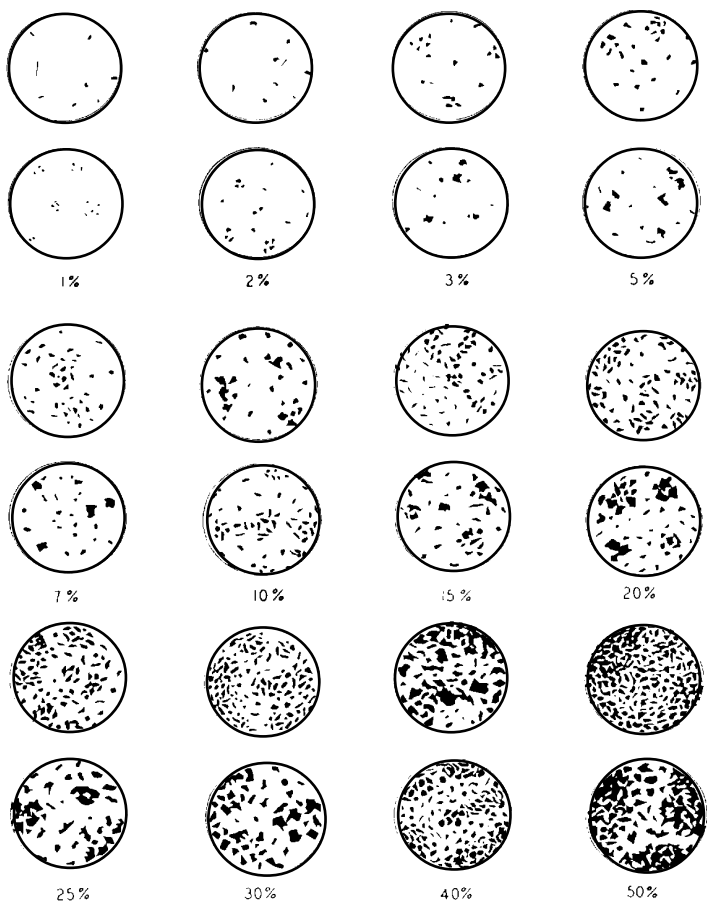


FIGURE 3.2. Comparison charts for visual estimation of foliage cover.

- Comparison charts (Figure 3.2) and the example percentage coverage diagram shown in Figure 3.3 are other useful aids.

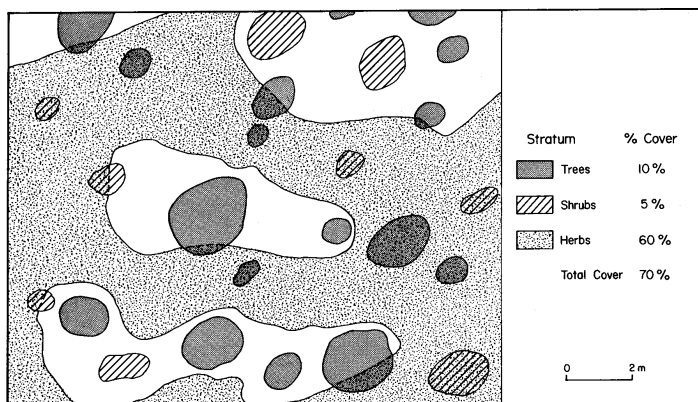


FIGURE 3.3. An example of percent coverages in a plot, viewed from above.

Recording Percent Cover

Percent cover may be entered in whole numbers (1–100), tenths of a percent (0.1–0.9), hundredths of a percent (recorded as 1H–9H), and thousandths of a percent (recorded as 1T– 9T). Table 3.3 gives examples of the relationship of dimensional area to percentage area, for a 20 x 20 m (400 m²) plot, and coding.

TABLE 3.3. Dimensions of various areas in a 400 m² plot

Dimensions	Area (m ²)	% cover	Coding
10 x 10 m	100.0	25.0	25
5 x 8 m	40.0	10.0	10
2 x 2 m	4.0	1.0	1
63 x 63 cm	0.4	0.1	0.1
20 x 20 cm	0.04	0.01	1H
6.3 x 6.3 cm	0.004	0.001	1T

Blank Columns on the Form

Within the main body of the form, immediately to the left of the columns provided for recording percent cover, two blank columns have been provided for recording additional information. Suggested items that may be recorded here include subdominant substrates (SS), distribution

codes (**DC**), plant vigour ratings (**VI**), phenology (**PV** or **PG**), utilization (**UT**), estimates of available forage (**AF**), and arboreal lichen loading (**LL**). Codes for these items are provided in Appendix 3.1. Enter a two-letter abbreviation for the type of data at the top of each column used. For types of data other than those listed here, explain under Item 11, "Notes."

Completing the Form

Numbered items below refer to circled numbers on the Vegetation Description Form shown at the beginning of this section. A recommended sequence for completing the form is described under "Field Procedure."

1. Species List

Certain projects may require a listing of dominant or indicator species only. Check the appropriate box to indicate whether an attempt has been made to record a complete listing of all species on the dominant substrate ("Comp."), or if only a partial list has been made ("Part.").

2. Percent Cover by Layer

After all species have been listed, enter the total percent cover by layer (see descriptions of layers and instructions for estimating and recording percent cover at the beginning of this section). Note that because of overlaps the sum of the percent cover values for all species within each layer may be greater than the total layer coverage.

3. Surveyor(s)

Record the first initial and last name of the person(s) who described the vegetation.

4. Plot Number

Record plot number from the Site Description Form.

5. Page ___ of ___

If more than one page is required, enter the number as a total and number each page.

6. Trees

Estimate percent cover for each tree species by sub-layer and layer (A1, A2, A3, A, B1, B2, B). If trees in A1 are veterans, record this under Item 11, "Notes." For each of the A and B layers, the total percent coverage for a species will often be less than the sum of the covers for each of the sub-layers, due to crown overlap.

7. Shrubs

Estimate percent cover for each shrub species by sub-layer (B1 and B2), and as a total for the species (B). The total percent coverage of a species will often be less than the sum of the two sub-layer values due to overlap of foliage.

8. Herb Layer

Estimate percent cover for each species in the herb (C) layer.

9. Moss, Lichen, and Seedling Layer

Estimate percent cover for each moss, lichen, and seedling species in this layer (D).

10. Additional Species

Use these lines to list species from the E layer (epiphytes), additional species from any other layer if there has been insufficient space elsewhere on the form, and species growing on subdominant substrates.

11. Notes

Use this space to record important features not described elsewhere, or for explanatory notes keyed to other entries on the vegetation form.

APPENDIX 3.1 Coding for Additional Information

Arboreal Lichen Loading (LL)

If a "Tree Attributes for Wildlife" form is not required, a general assessment of lichen loading can be recorded by tree species on the vegetation description form. Assess standing live and dead trees for lichen loading on the branches within 4.5 m of the ground or root collar. Assign an overall rating (0–5) by species by comparing with photos in *Estimating the Abundance of Aboreal Forage Lichens* (Armleder et al. 1992). A value of 0 indicates no lichens. If trees have lichens, but none are below the 4.5 m mark, rate as zero.

Available Forage (AF)

The amount of available forage may be estimated or measured in g/m² and recorded by species in one of the blank columns. If estimated for groups of species, such as palatable forbs, grasses, browse species, undesirable species, etc., record under item 11, "Notes." Also indicate whether forage was measured or estimated and note the method of determining weight (i.e., estimated green, air-dried, or oven-dried).

Distribution Codes (DC)

The spatial distribution pattern of individuals of each species is described using the following codes:

Code	Description	No. plants ^a in 400 m ²
1	Rare individual, single occurrence	1
2	A few sporadically occurring individuals	2–5
3	A single patch or clump of a species	1 patch (< 25% of plot)
4	Several sporadically occurring individuals	≥ 6
5	A few patches or clumps of a species	2–5 patches, each < 25% of plot
6	Several well-spaced patches or clumps	≥ 6 patches, each < 25% of plot
7	Continuous uniform occurrence of well-spaced individuals	many

(over)

Code	Description	No. plants^a in 400 m²
8	Continuous occurrence of a species with a few gaps in the distribution	many
9	Continuous dense occurrence of a species	many

^a guidelines for low shrubs, herbs, and mosses

Utilization Ratings (UT)

Coding for utilization (present use) of browse and forage species is as follows:

Code	% utilization	Description
0	0	Nil
1	1-15	Slight
2	16-36	Light
3	36-65	Moderate
4	66-80	Heavy
5	> 80	Extreme

Coding for Vigour (VI)

Plant vigour is described using the following codes:

Code	Description
0	Species dead
1	Vigour poor
2	Vigour fair
3	Vigour good
4	Vigour excellent

Phenology Codes: Vegetative Stages (PV)

Deciduous trees or shrubs

Code	Description
0	Closed bud
1	Buds with green tips
2	Green leaf-out, but not unfolded
3	Leaf unfolding up to 25%
4	Leaf unfolding up to 50%
5	Leaf unfolding up to 75%
6	Full leaf unfolding
7	First leaves turned yellow
8	Leaf yellowing up to 50%
9	Leaf yellowing over 50%
10	Bare

Herbs

Code	Description
0	Without shoots above ground
1	Shoots without unfolded leaves
2	First leaf unfolded
3	2 or 3 leaves unfolded
4	Several leaves unfolded
5	Almost all leaves unfolded
6	Plant fully developed
7	Stem and/or first leaves fading
8	Yellowing up to 50%
9	Yellowing over 50%
10	Dead

Conifers

Code	Description
0	Closed bud
1	Swollen bud
2	Split bud
3	Shoot capped
4	Shoot elongated
5	Shoot full length, lighter green
6	Shoot mature, equally green

Grasses

Code	Description
0	Without shoots above ground
1	Shoots without unfolded leaves
2	First leaf unfolded
3	2 or 3 leaves unfolded
4	Beginning of development of blades of grass
5	Blades partly formed
6	Plant fully developed
7	Blades and/or first leaves turning yellow
8	Yellowing up to 50%
9	Yellowing over 50%
10	Dead

Phenology Codes: Vegetative Stages (PV) (continued)

Ferns

Code	Description
0	Without shoots above ground
1	Rolled fronds above ground
2	First frond unfolded
3	2 or 3 fronds unfolded
4	Several fronds unfolded
5	Almost all fronds unfolded
6	Plant fully developed
7	First fronds fading
8	Yellowing up to 50%
9	Yellowing over 50%
10	Dead

Phenology Codes: Generative Stages (PG)

Trees, shrubs, and herbs

Code	Description
0	Without blossom buds
1	Blossom buds recognizable
2	Blossom buds strongly swollen
3	Shortly before flowering
4	Beginning flowering
5	In bloom up to 25%
6	In bloom up to 50%
7	Full bloom
8	Fading
9	Completely faded
10	Bearing green fruit
11	Bearing ripe fruit
12	Bearing overripe fruit
13	Fruit or seed dispersal

Grasses

Code	Description
0	Without recognizable inflorescence
1	Inflorescence recognizable, closed
2	Inflorescence partly visible
3	Inflorescence fully visible, not unfolded
4	Inflorescence unfolded
5	First blooms pollenizing
6	Up to 50% pollenized
7	Full bloom
8	Fading
9	Fully faded
10	Bearing fruit
11	Fruit or seed dispersal

Ferns

Code	Description
0	Sori absent
1	Sori green, forming
2	Sori mature, darker, drier
3	Sori depressing, strobili forming in lycopodium