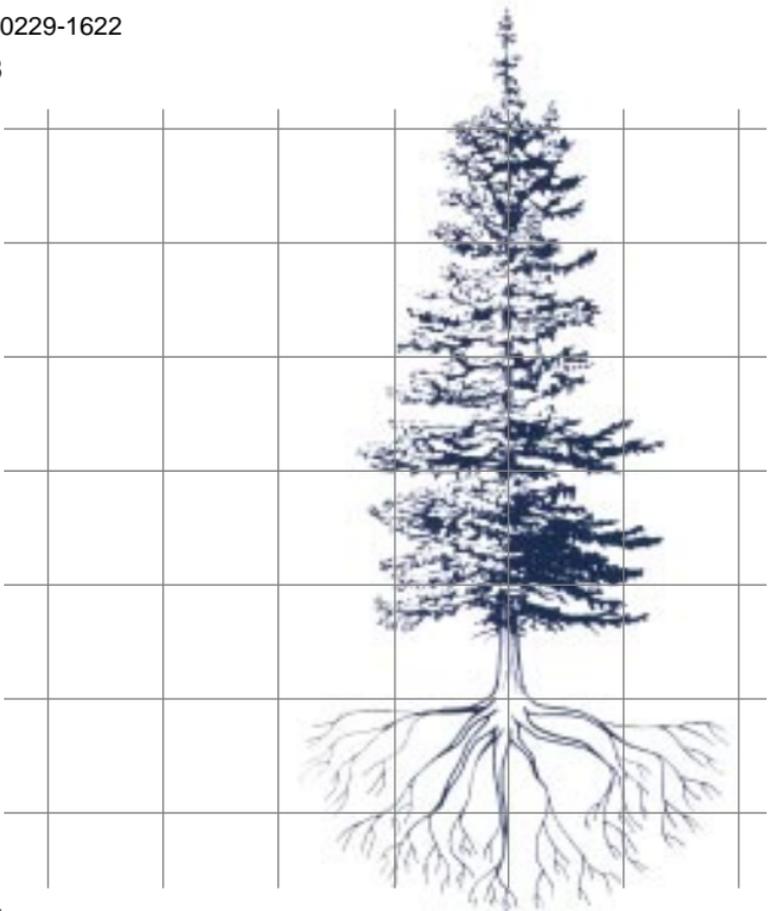


Field Manual for Describing Terrestrial Ecosystems

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6 TREE ATTRIBUTES FOR WILDLIFE

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TREE ATTRIBUTES FOR WILDLIFE												Project id.	1	Plot size (m ²)	6	Plot no.	4	Minimum DBH (cm)	7	Surveyor	3	Date	Y	m	d	Comments		
Tree No.	Species	Stand/Fall	DBH (cm)	M or I	Rem. Bark (%)	Length			Estimated length (m)	Cr. Class	Height to live crown (m)	Wildlife Codes																
						Top (%)	Bot (%)	Slope Distance (m)				Appear	Crown	Bark	Wood	Lichen	Wildlife use											
0 1																												
0 2	8	9	10	11	12			13	14	15	16																	
0 3																												
0 4																												
0 5																												
0 6																												
0 7																												
0 8																												
0 9																												
1 0																												
1 1																												
1 2																												
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1 6																												
1 7																												
1 8																												
1 9																												
2 0																												

Field Procedure

Getting Started

1. Identify sample trees based on a prism sweep, or if using a fixed-area plot, establish plot boundaries. Be aware of the minimum DBH for the project.
2. If desired, tag or flag numbers on each tree including all live and dead, standing and fallen trees.

Measure and Record

1. Enter the header information.
2. For each sample tree, record the species and classify as standing or fallen.
3. Determine DBH and percentage of bark remaining at breast height.
4. Record data required to calculate the length of each sample tree, or estimate length.
5. For each standing live tree, assign a crown class and determine height to live crown.
6. For each sample tree, assess appearance, crown condition, bark retention, wood condition, lichen loading, and wildlife use.
7. Check that all the required information has been collected and noted on the form. Strike through any fields that were not assessed.

Selecting the Sampling Method

Either a fixed-area or variable-radius plot may be used. Variable-radius plots will be used most commonly, but if the project area is dominated by stands with the following characteristics, a fixed-area plot may be preferable:

- very open stands with widely spaced trees or clumps of trees
- very dense stands where not all trees in a plot would be easily visible

Once selected, the same plot-type should be used consistently throughout the project.

Selecting the Minimum Diameter

The minimum diameter at breast height (DBH) is determined by the wildlife species of concern in the project—the goal is to sample a reasonable number of trees of an appropriate minimum size for the species. For example, for Bald Eagle interpretations, trees less than 20 cm DBH are not of value and may be ignored. For most projects, the minimum DBH will be 15 cm or greater. Trees less than the minimum DBH are ignored

Selecting a Basal Area Factor Prism

The basal area factor (BAF) prism size should be based on previous experience. A prism size that will provide 7-11 sample trees (greater than or equal to the minimum DBH) per plot is ideal. A minimum of 5 and maximum of 16 trees is required. Generally, the larger the trees, the larger the BAF; the denser the stand, the smaller the BAF required. It may be necessary to have several prisms available throughout a project. When traversing the stand, but before determining the plot location, the prism size should be selected.

Selecting the Plot Size and Shape

For fixed-area plot sampling, a plot size is selected that will provide ten or more sample trees greater than or equal to the minimum DBH. The plot size is determined for a project and is only reduced or increased in exceptional circumstances. The decision of whether to increase or decrease, e.g., double or halve, the plot size is done when entering the stand, before the plot is marked, so as to minimize bias.

Plot shape can be circular, square, or rectangular, but should be determined at the start of a project.

Completing the Form

Numbered items below refer to circled numbers on the Tree Attributes for Wildlife Form shown at the beginning of this section. A recommended sequence for completing the form is described under “Field Procedure.”

1. Project Identification

Identify the project (Proj id.) as in Item 3, Site Description Form.

2. Date

Enter the 2-digit codes for year, month, and day.

3. Surveyor

Enter the first initial and last name of person(s) collecting tree attribute data.

4. Plot no.

Record the plot number from the Site Description Form.

5. Basal Area Factor

Enter the standard metric (m^2/ha) Basal Area Factor (BAF) prism used, if applicable.

6. Plot size

Enter the area of the plot, if applicable.

7. Minimum Diameter

Enter the minimum diameter (DBH) being used.

8. Species

Identify tree species using the codes given in Appendix 6.1.

9. Standing / Fallen

Classify the tree as standing or fallen using the following codes and criteria:

S Standing Trees or portions of trees with the root attached and self-supporting (i.e., the tree would remain standing if all supporting materials were removed).

F Fallen Trees or portions of trees with the root attached and not self-supporting, greater than 1.3 m in length.

10. Diameter at Breast Height

Measure the diameter at breast height (DBH), i.e., 1.3 m, of all live, dead, standing, and fallen sample trees.

- On slopes, breast height is measured from the high side of the tree.
- Measure diameter to the nearest 0.1 cm.
- Hold the diameter tape tight, making no allowance for missing bark.
- If it is not possible to measure DBH accurately because of an obstruction or unsafe conditions, enter an estimate.

11. Measured or Estimated

If it was necessary to estimate DBH, enter **E**; otherwise, enter **M**.

12. Remaining Bark

Record, to the nearest percent, the percentage of bark remaining at breast height. Use the diameter tape to measure the total circumference and the portion of the circumference with bark remaining. The ratio of the two numbers multiplied by 100 equals the percent remaining bark. For example, if a tree with a 60 cm circumference has bark remaining on 15 cm, the percent remaining is $15 \div 60 \times 100 = 25\%$. Note the following coding convention:

- Record 100% bark remaining as “--”. When the data is entered into a database, e.g., VENUS, substitute 100 for “--”.
- If no bark is present, record as “00”.

13. Length

Determine the total length of all trees greater than 1.3 m high by collecting all the information required to complete the fields on the form. Measure length from the ground surface on the high side of the stem, along the stem, to the top.

- If the tree is broken, record the length of the stem to the point of breakage.
- On fallen trees, measure from the root collar to the top of the last attached portion of the stem.
- Length may be estimated if it is not possible to measure accurately because of obstructions, unsafe conditions, or if project objectives do not require measured accuracy on all trees.

Slope to top of tree (Top):

Enter the percent slope to the top of the tree; the sign must be shown (usually '+'). The maximum acceptable reading is 99%. If a reading greater than 99 is obtained, move further from the tree, or up slope.

Slope to DBH or bottom of tree (Bot):

Enter the percent reading to DBH, or the base of the tree, or to the lowest visible point; the sign must be shown ('+' or '-'). The maximum allowed reading is 99%.

Bottom position (Bot pos):

Enter, to the nearest 0.1 m, the height at which the **Bot** % reading was taken.

Slope distance (SD):

Enter the distance, to nearest 0.1 m, from the observers eye to the centre of the tree trunk at **Bot pos**.

The above information is used by the data entry program, VENUS, to calculate the length of each tree. The equation used is: $\text{Height} = \text{Bot pos} + (\text{Top} - \text{Bot})/100 \times (\text{SD} \times \cos(\arctan(\text{abs}(\text{Bot}/100))))$.

14. Estimated Length

If estimating length, enter to the nearest metre. Project objectives may allow for some lengths to be estimated in order to speed-up the field work. Use conventions as in Item 13. Note: If measuring length, the data entry program, VENUS, will calculate the length from the information in Item 13.

15. Crown Class

Assign a crown class designation to all standing live trees as follows:

- D Dominant** Trees with crown extending above the general level of the layer; somewhat taller than the codominant trees, and have well developed crowns, which may be somewhat crowded on the sides.
- C Codominant** Trees with crowns forming the general level of the crown canopy; crown is generally smaller than those of the dominant trees and usually more crowded on the sides.
- I Intermediate** Trees with crowns below, but extending into the general level of the crown canopy; crowns usually small and quite crowded on the sides.
- S Suppressed** Trees with crowns entirely below the general level of the crown canopy.

16. Height to Live Crown

For each live tree, measure height to live crown (effective portion of the live crown for growth) in metres. This is normally the height on the stem at which live branches occupy about three-quarters of the stem circumference. Enter negative one (-1) for trees with no "effective" crown (e.g., only a few green branches).

17. Wildlife Codes

Each tree sampled is classified according to the following criteria and the appropriate code is entered on the field form.

Appearance (Appear):

For each tree, enter a code (1-9) for the illustration in Figure 6.1 that best represents the appearance of the tree, using the shape of the tree stem as the dominant characteristic.

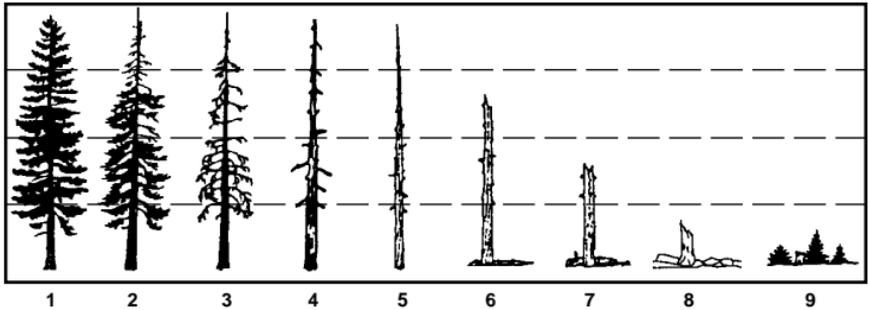


FIGURE 6.1. Visual appearance codes for wildlife trees.

Crown condition (Crown):

Using one of the classes in Table 6.1, rate the condition of the crown in relation to a normal live crown. Note: lower crown loss due to self-pruning is not counted as foliage or branch loss.

TABLE 6.1. Crown condition codes

Code	Description
1	All foliage, twigs, and branches present
2	Some or all foliage lost; possibly some twigs lost; all branches usually present; possible broken top
3	No foliage present; up to 50% of twigs lost; most branches present; possible broken top
4	No foliage or twigs present; up to 50% of branches lost; top usually broken
5	Most branches gone; some sound branch stubs remain; top broken
6	No branches present; some sound and rotting branch stubs, top broken

Bark retention (Bark):

Indicate the proportion of bark remaining on each tree, using the codes in Table 6.2.

TABLE 6.2. Bark retention codes

Code	Description
1	All bark present
2	Bark lost on damaged areas only (< 5% lost)
3	Most bark present; bare patches; some bark may be loose (5–25% lost)
4	Bare sections; firm and loose bark remains (26–50% lost)
5	Most bark gone; firm and loose bark remains (51–75% lost)
6	Trace of bark remains (76–99% lost)
7	No bark (100% lost)

Wood condition (Wood):

Classify the texture (soundness) of the wood for each tree, using the codes in Table 6.3.

TABLE 6.3 Wood condition codes

Code	Description
1	No decay
2	Probable limited internal decay and/or deformities
3	Wood essentially hard; limited decay
4	Wood mostly hard, but decay spreading; soft wood present
5	Balance of hard and soft wood; spongy sections
6	More soft and spongy wood than hard wood
7	No more hard wood; all soft or spongy; powdery sections
8	Hollow shell; outer wood mostly hard or firm

Lichen loading (Lichen):

Assess all standing live or dead trees for lichen loading on branches that are within 4.5 m of the ground or root collar. Assign a rating (0–5) based on comparison with photos in *Estimating the Abundance of Arboreal Forage Lichens* (Armleder et al. 1992). A value of 0 indicates no lichens, whether it is a live tree with branches and foliage or a dead tree. If a tree has lichens but none are below the 4.5 m mark, rate as zero.

Wildlife use:

If wildlife are observed using sample trees or if there is evidence of use, record a code for the type of use (activity) in the first column and the user in the second column (e.g., a feeding bird [FB], nesting amphibian [NA], denning mammal [DM]). If only the activity can be determined, leave the second column blank. If no evidence of wildlife use is observed, indicate with dashes (--).

Activity:

- C Cavity nest** May be difficult to detect, but locations are somewhat predictable, and in season, the begging calls of nestlings are easy to detect; test a tree with a cavity nest by carefully striking it to determine if the nest is occupied; if possible, note species in the *Comments* section using the specific species code (see section “User” below).
- Many woodpeckers prefer nesting in live hardwoods, often underneath branches.
 - Nuthatches and chickadees nest in broken-off standing dead trees, or in broken branch holes, often directly below the breakage point where stem rots have entered the tree and softened the heartwood.
 - Cavity nesters have perfectly round or oval nest holes.
 - The Pileated Woodpecker and the Common Flicker have oval nest holes.
 - Downy Woodpeckers, Chickadees, and Nuthatches have small round nest holes.
 - Brown Creepers have hammock nests under the loose bark.
 - Some ducks, owls, and squirrels nest in abandoned woodpecker holes.
- O Open nest** Nests of eagles, hawks, owls, and herons are usually situated in the upper part or crown of live and dead trees; raptors and herons build large platform-style stick nests.
- D Denning/resting** May be used by bears, squirrels, bats, marten, fisher, weasels, skunks, and raccoons.
- Bears often hibernate in the hollow trunks of large standing trees, especially western redcedars.
 - Entrances to tree dens can be basal or arboreal.
- F Feeding** Some examples of indicators are:
- Pileated Woodpeckers excavate large rectangular feeding holes.
 - Red-breasted and Yellow-bellied Sapsuckers drill horizontal patterns of sap wells.
 - Three-toed and Black-backed Woodpeckers scale off bark to feed on insects.
 - Porcupines gnaw on large sections of bark (diagonal tooth marks are often apparent).

- Rabbits, hares, and squirrels feed on the base of young trees (squarish “windows” or girdling at the base).
- Squirrels cache cones or leave basal accumulations of cone bracts.

M Mark tree Trees used mostly for communication of territorial boundaries and during courtship; examples of indicators include claw marks by grizzly or black bears, and antler rubbing by deer or elk.

P Perching/roosting Some examples of indicators are:

- Perch trees of aerial foraging and hawking birds are typically tall, with prominent dead branches which provide a good view of the surrounding area; especially common near riparian edges.
- Plucking spots where raptors feed are identified by “whitewash” and remains of prey in the vicinity.
- Roost trees are often in sheltered locations with natural or excavated cavities; roosting sites include cavities, hollows, beneath bark, and in foliage.

S Squirrel cache

User:

If possible, enter a code identifying the user, as follows:

- M** = mammal
B = bird
R = reptile
A = amphibian

If a wildlife species using a sample tree can be positively identified, record the species code on the Wildlife Habitat Assessment form or record it in the NOTES section of the Site Description Form. Use the six-character codes found in Appendix 5.1. The first letter identifies the species as mammal (**M**), bird (**B**), reptile (**R**) or amphibian (**A**); the remaining 4 letters are from the first two letters each of the genus and species names, or of the common names (mostly in the case of birds).

APPENDIX 6.1 Tree Species Codes¹

Conifers

Common name	Species	Code
Cedar	<i>Thuja</i>	
western redcedar	<i>T. plicata</i>	Cw
Cypress	<i>Chamaecyparis</i>	
yellow-cedar	<i>C. nootkatensis</i>	Yc
Douglas-fir	<i>Pseudotsuga</i>	
Douglas-fir	<i>P. menziesii</i>	Fd
interior Douglas-fir	<i>P. menziesii</i> var. <i>glauca</i>	Fdi
coast Douglas-fir	<i>P. menziesii</i> var. <i>menziesii</i>	Fdc
Fir (Balsam)	<i>Abies</i>	
amabilis fir	<i>A. amabilis</i>	Ba
grand fir	<i>A. grandis</i>	Bg
subalpine fir	<i>A. lasiocarpa</i>	Bl
Hemlock	<i>Tsuga</i>	
mountain hemlock	<i>T. mertensiana</i>	Hm
western hemlock	<i>T. heterophylla</i>	Hw
mountain x western hemlock hybrid	<i>T. mertensiana</i> x <i>heterophylla</i>	Hxm
Juniper	<i>Juniperus</i>	
Rocky Mountain juniper	<i>J. scopulorum</i>	Jr
Larch	<i>Larix</i>	
alpine larch	<i>L. lyallii</i>	La
tamarack	<i>L. laricina</i>	Lt
western larch	<i>L. occidentalis</i>	Lw
Pine	<i>Pinus</i>	
whitebark pine	<i>P. albicaulis</i>	Pa
limber pine	<i>P. flexilis</i>	Pf
jack pine	<i>P. banksiana</i>	Pj
lodgepole pine	<i>P. contorta</i>	Pl
lodgepole x jack pine hybrid	<i>P. x murraybanksiana</i>	Pxj
shore pine	<i>P. contorta</i> var. <i>contorta</i>	Plc
lodgepole pine	<i>P. contorta</i> var. <i>latifolia</i>	Pli
western white pine	<i>P. monticola</i>	Pw
ponderosa pine	<i>P. ponderosa</i>	Py
Spruce	<i>Picea</i>	
black spruce	<i>P. mariana</i>	Sb
Engelmann spruce	<i>P. engelmannii</i>	Se
white spruce	<i>P. glauca</i>	Sw
Sitka spruce	<i>P. sitchensis</i>	Ss
spruce hybrid	<i>Picea</i> cross	Sx

Conifers

Common name	Species	Code
Engelmann x white	<i>P. engelmanniix glauca</i>	Sxw
Sitka x white	<i>P. x lutzii</i>	Sxl
Sitka x unknown	<i>P. sitchensis</i> x ?	Sxs
Yew	<i>Taxus</i>	
western yew	<i>T. brevifolia</i>	Tw

Hardwoods

Common name	Species	Code
Alder	<i>Alnus</i>	
red alder	<i>A. rubra</i>	Dr
Apple	<i>Malus</i>	
Pacific crab apple	<i>Malus fusca</i>	Up
Aspen, Cottonwood, Poplar	<i>Populus</i>	
poplar	<i>P. balsamifera</i>	Ac
balsam poplar	<i>P. b. ssp. balsamifera</i>	Acb
cottonwood	<i>P. b. ssp. trichocarpa</i>	Act
hybrid poplar	<i>P. spp.</i>	Ax
trembling aspen	<i>P. tremuloides</i>	At
Arbutus	<i>Arbutus</i>	
arbutus	<i>A. menziesii</i>	Ra
Birch	<i>Betula</i>	
Alaska paper birch	<i>B. neoalaskana</i>	Ea
Alaska x paper birch hybrid	<i>B. x winteri</i>	Exp
paper birch	<i>B. papyrifera</i>	Ep
water birch	<i>B. occidentalis</i>	Ew
Cascara	<i>Rhamnus</i>	
cascara	<i>R. purshiana</i>	Kc
Cherry	<i>Prunus</i>	
bitter cherry	<i>P. emarginata</i>	Vb
pin cherry	<i>P. pensylvanica</i>	Vp
choke cherry	<i>P. virginiana</i>	Vv
Dogwood	<i>Cornus</i>	
western flowering dogwood	<i>C. nuttallii</i>	Gp
Maple	<i>Acer</i>	
bigleaf maple	<i>A. macrophyllum</i>	Mb
vine maple	<i>A. circinatum</i>	Mv
Oak	<i>Quercus</i>	
Garry oak	<i>Q. garryana</i>	Qg

Hardwoods

Common name	Species	Code
Willow	<i>Salix</i>	
peach-leaf willow	<i>S. amygdaloides</i>	Wa
Bebb's willow	<i>S. bebbiana</i>	Wb
pussy willow	<i>S. discolor</i>	Wd
Pacific willow	<i>S. lucida</i>	Wp
Scouler's willow	<i>S. scouleriana</i>	Ws
Sitka willow	<i>S. sitchensis</i>	Wt

Others

Common name	Species	Code
Unknown		
Unknown conifer		Xc
Unknown hardwood		Xh
Other tree, not on list		
Other conifer		Zc
Other hardwood		Zh

¹ Additional codes for exotic tree species available from B.C. Ministry of Forests, Research Branch. Also noted in Appendix 4.1