Protocol for stand level biodiversity monitoring – July 22, 2004

Required equipment:

- Site plan, silviculture prescription or post-harvest map of the site –showing retention areas, standards units and BEC information
- Prism's appropriate for local conditions – suggested range of prisms 4 BAF to 10 BAF (to bring in about 6 trees in a sweep)
- Compass
- Diameter tape
- Diameter stick (optional) – with diameter ranges marked off
- 30 metre tape
- clinometer
- calculator
- flagging tape and marking pen
- laser range finder (can be funded from Branch if necessary)
- binoculars
- densiometer (can be funded from Branch if necessary)
- GPS (optional)
- increment borer (optional)

Section references below refer to the field card FS ###

General Office Procedure:

Fill in page A of the FS ### (sections 1, 2 and 3) prior to arriving at the block.

Randomly choose plot locations and mark on map. The suggested technique is to place an appropriate scale dot grid over the site map – randomly pick one dot per WT patch less than 2 hectare (2 plots for WT patch greater than 2 hectare) and mark as plot location. Similarly locate one or two plots in the harvest areas. Harvest area plots are established to assess any dispersed retention, and assess understory vegetation and coarse woody debris. Therefore a harvest area plot should be established even if there is no dispersed retention in order to collect data on understory vegetation, and CWD.

Suggested number of plots in post-harvest plus adjacent benchmark site:

Description of retention	# of plots in cutblock	# of plots in benchmark (if suitable area available)
No trees >12.5 dbh retained in cutblock	1 in harvest area	1
Dispersed retention only	2 plots dispersed area if evenly distributed over block.	1
<2 ha patch retention	1 - 2 plots in patch retention, 1 plot in harvest area	2
>2 ha patch retention plus dispersed retention	2 - 3 plots in patch retention. 1 - 2 plots in dispersed retention if evenly distributed	2

The benchmark plot location should be finalized in the field to choose an area as similar to expected pre-harvest conditions as possible.

Section 1: Block information

Indicate if measuring a benchmark area (one of two types) or a post-harvest area. A benchmark area is unharvested and must relate to a post-harvest block

Benchmarks can be:

- measurement of the chosen block done prior to harvest, with the intent of returning post-harvest, or,
- a neighbouring area to a post-harvest site chosen as generally representative of the pre-harvest conditions – this neighbouring site should be similar ecology, slope, aspect, and timber type.

For benchmarks, the block identifier of the related post-harvest block is listed on the form. All remaining information on the form should relate to the benchmark area.

Gross area – equivalent to "total area under prescription" ie inclusive of all reserves associated with the cutblock.

Section 2: Reserve listing

This *Reserve listing* section left blank if a Benchmark measurement.
Reserve ID code: Use codes from the site map or number reserves consecutively
Reserve type:

PR	patch riparian	treed patch left within a riparian management area. Use riparian designation regardless of patch being classified as a WTP on site map.
PW	Patch wildlife	treed patch left outside of RMA for biodiversity
PO	Patch other	Treed patch left outside of RMA for other than biodiversity purpose
PT	Patch temporary	Treed patch that will likely be harvested before rotation end (e.g. indication on map that this is a temporary deferred area)
PU	Patch unidentified	No indication on map regarding patch purpose and patch not in a RMA
DR	Dispersed riparian	Dispersed trees left within a RMA. Use riparian designation regardless of other coding from map.
DW	Dispersed wildlife	Dispersed trees left outside of RMA for biodiversity
DO	Dispersed other	Dispersed trees left outside of RMA for other than biodiversity purpose
DT	Dispersed temporary	Dispersed trees that will likely be harvested before rotation end (e.g. indication on map that trees are left as part of a commercial thin or shelterwood).
DU	Dispersed unidentified	No indication on map regarding purpose of dispersed trees and they are not in a RMA.

Reserve area: Determine this from the site map. If the dispersed retention is relatively even over the entire harvested area – use the net area to be reforested as the dispersed area (should be field-checked).
Plot? Y or N: Indicate if a plot will be established in the reserve
BEC site series: If this information available on the site map
Patch location: Indicate if patch is internal to harvesting (I), on the edge but contiguous with harvesting (E), or located outside of block and not contiguous with harvesting (O)
Distance to cutblock: For outside patches – measure from the map the shortest distance between the patch and the harvest boundary.

Section 3: Landscape context

Get this information from district /local knowledge

Section 4: Stem Count

Establish 1 to 5 plots in a cutblock depending on the complexity of retention, and 1-2 plots in an adjacent benchmark area. Mark and identify plot centers on the map and in the field with flagging tape marked with plot identification (reserve ID and plot number). In this section provide information on each reserve area, benchmark area or harvest area that has a plot center established. Each plot will require one plot information card, side A and B.

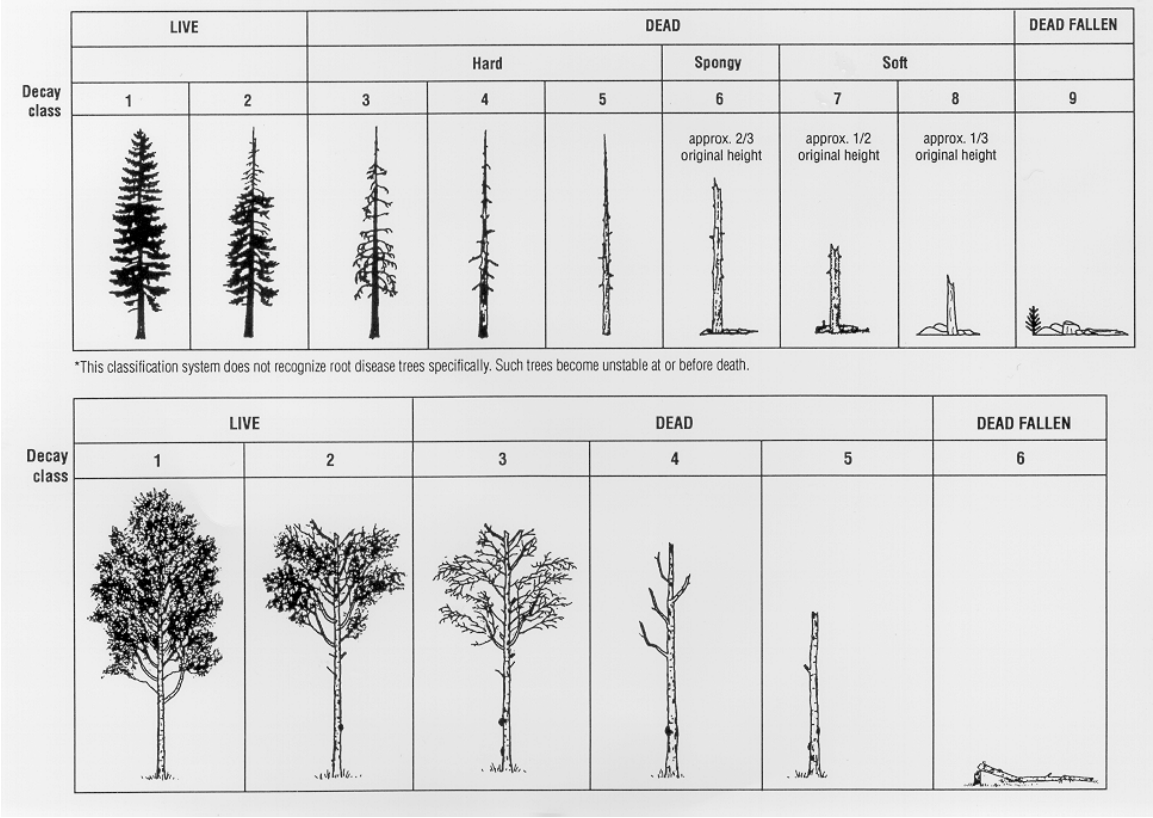
Benchmark, Harvest area, Reserve ID, Reserve type, Size: Indicate if the plot is in benchmark or harvest area (no dispersed retention), otherwise copy over the same data as from reserve listing table for the reserve ID, reserve type and size.

Stem Count: Prism sweeps should be done in patch or benchmark areas.

A variety of options exist for stem count in dispersed retention areas depending on the density of retained trees – a fixed area plot is .

- prism sweep (if several trees can be captured in a minimum BAF 4 prism sweep)
- large fixed area plot to capture scattered trees. Use laser finder – accuracy to nearest metre - to measure distance to trees to determine if they are in or out. 30 metres is the maximum plot radius.
- full count of dispersed trees in the cutblock or representative subset of cutblock e.g. if section of block that area can be readily determined from the map.

List the species in order of density. Tally stems in each table cell. Take dbh measurements as necessary to calibrate “eye” to the dbh classes. Measure or estimate a representative tree height for each table cell.



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Section 5: Cover layers:

Determine the crown cover of the tree layer > 12.5 dbh using a densiometer at plot center.
In approximate 10 m radius around plot center:

- list up to 5 species in order of abundance in advanced regen layer, shrub layer and herb layer.
- estimate ground cover of each of these layers.

In approximate 1 m radius around plot center:

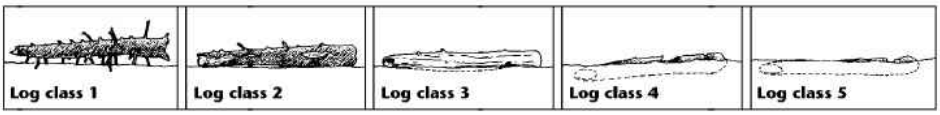
- list up to 5 species in order of abundance for the mosses lichens and liverworts layer.

Use standard species coding - tree species list provide on summary field card. For understory use four letter code based on scientific name eg. Polystichum munitum = pomu, Ceanothus sanguineus = cesa

Section 6: Coarse Woody Debris

Establish a 30 m transect from each plot centre to measure CWD. Choose a compass bearing for first 15 metres of transect – add 90 degrees to bearing and establish final 15 metres (L shaped transect).

See following website for further description of methodology:
http://srmwww.gov.bc.ca/risc/pubs/teecolo/fmdte/cwd.htm#sampling Methods

	Decay Class				
	I	II	III	IV	V
Characteristics of fallen Douglas fir[1]	 **Log class 1**	**Log class 2**	**Log class 3**	**Log class 4**	**Log class 5**
Bark	intact	intact	trace	absent	absent
Twigs	present	absent	absent	absent	absent
Texture	intact	intact to partly soft	hard, large pieces	small, soft blocky pieces	soft and powdery
Sharp	round	round	round	round to oval	oval
Color of wood	original color	original color	original color to faded	light brown to reddish brown	red brown to dark brown
Portion of tree on ground	tree elevated on support points	tree elevated on support points but sagging slightly	tree sagging near ground	all of tree on ground	all of tree on ground
Invading roots	none	none	in sapwood	in heartwood	in heartwood

[1] Characteristics of other tree species may differ. For other species use texture, shape and invading roots to determine decay class.

Section 7: Reserve Constraints, Ecological anchor

For each reserve (dispersed or patch) or benchmark area, estimate the percent of patch constrained by the various categories, and tick off the ecological features that are found in the patch. Examples of "other" ecological anchors would be a culturally modified tree, …??

For benchmark areas note presence or absence of ecological anchors/constraints in approximate 15 m radius around plot centre.

Section 8: Reserve summary

Windthrow
Distance from patch to mature timber: Estimate the shortest distance from the patch to mature timber inside or outside of the cutblock. Use laser range finder, or measure from map to the nearest ten metres.

Section 9: Comparison to surrounding forest type.

This section left blank for a harvest area with no tree retention or a benchmark area. This is a general comparison of reserved trees to surrounding forest. Change description should be quantified.

Block summary

Indicate if innovative practices have been used – for example – creating CWD clumps for small mammal habitat, redistributing CWD over block, Wildlife Tree creation techniques.

Completed plot cards

Mail all plot cards with associated site map to:
Forest Practices Branch
Attn: Nancy Densmore

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