Inventory Ground Sampling Field Guide

Ministry of Forests
Forest Analysis and Inventory Branch

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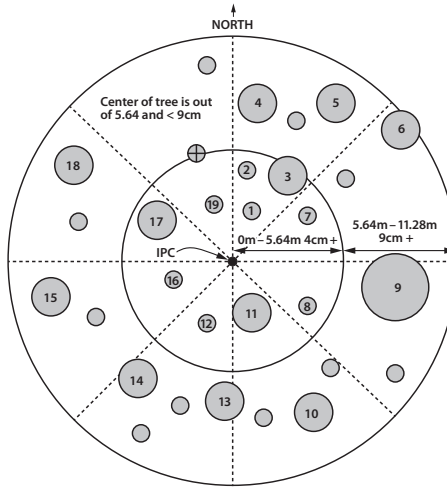
Version 1.0

CMI – 5.64M AND 11.28M FIXED RADIUS PLOT LAYOUT



TAGGING LIMITS FOR TREES			
Sample Type	**Plot**	**Plot Radius**	**DBH tag limit**
CMI	Subplot	5.64m	≥ 4.0cm
	Main plot	11.28m	≥ 9.0cm
PSP	Subplot	variable	≥ 2.0cm
	Main plot	variable	≥ 4.0cm

**All living (standing and fallen) and dead (standing only) trees are to be tagged*

TAGGING SECTORS (CMI)	
Tagging Sector	**Azimuth Range (degrees)**
1	0–44
2	45–89
3	90–134
4	135–179
5	180–224
6	225–269
7	270–314
8	315–359

CMI SMALL TREE PLOT TALLY CLASSES – 2.52M FIXED RADIUS		
Length		
10 to 29cm	30cm to 1.3m	> 1.3m but < 4.0cm* @ DBH

*NOTES: Tally each class by species; *2.0 cm for Small Tree Plots in PSPs*

SMALL TREE SPLIT PLOTS		
Small tree count > 50		
Sample #	**Half**	**Quarter**
Even	East 1/2 of plot	Northwest 1/4 of plot
Odd	West 1/2 of plot	Southwest 1/4 of plot

SPLIT PLOTS – VARIABLE RADIUS PLOTS	
Large tree count >10	
Sample #	**Half**
Even	East 1/2 of plot
Odd	West 1/2 of plot

NET FACTOR PROCEDURES FOR LOSS INDICATORS				
Rot Possibly Visible	Blind Conk	4m above top Conk 6m below bottom Conk		N.F. = 50%
	Conk (Heart Rot)	4m above top Conk 6m below bottom Conk		N.F. = 50%
	Frost Crack*	Deduction length = Total frost crack lengths x 10% *Max N.F. Deduction = 40%		Then **(A)**
	Root Rot (DRS) (rot NOT visible)	3m log (if DRS conk on stem, then log extends 3 m above highest DRS conk)		N.F. = 81%
Rot MUST be Visible	Broken Top	Deduction length = 1.0m always		Then **(A)**
	Butt Rot (Sounding)/ Catface (Conical)	Step 1: [Diameter of Decay] / [Log diameter]	Step 2: See Butt Rot Table	Then **(A)**
	Catface (Cylindrical)	Deduction length = [Diameter of decay/ Log diameter]^2 x Decay Length		Then **(A)**
	Dead Top/ Sap Rot	N.F. % = [Diameter of Sound Core/ Diameter of Sound Log]^2 x 100%		
	Fork / Crook	1.0m below N.F. = 50%; or Deduction Length = 0.5m		Then **(A)**
	Large Rotten Branch/ Knots ≥10cm)	1.0m above and below N.F. = 50%; or Deduction Length = 1.0m		Then **(A)**
	Root Rot (rot VISIBLE)	N.F.% = 100% - [19%*[Decay length/Log Length]]		
	Scar (Measurable)/ Missing Wood	N.F.% = [[Volume of Log - Volume of Decay] /Volume of Log] x 100%		
	Scar (Non-Measurable)	Deduction length = [Scar width/ (6.3* diameter log)]* Scar length		Then **(A)**
	Formula (A) N.F.% =	[Log length - Deduction length]/ Log length	x 100%	Deduction Length = % Decay * Log Length

FORMULAS FOR CALCULATING VOLUME	
Shape	**Formula**
Rectangular solid	Volume = L*W*D
Cylinder	Volume = πr^2 * L
Cone	Volume = (1/3) πr^2* L
Units must be consistent (all cm or all m)	

BUTT ROT GUIDE FOR LENGTH DEDUCTIONS		
Ratio = diameter of decay/DBH	**Length**	**Deduction Length**
1/4 Diameter	2.0m	0.2m
2/4 Diameter	4.0m	0.4m
3/4 Diameter	6.0m	1.2m
4/4 Diameter	7.0m	2.4m

NET FACTOR NOTES
Net factors will only be recorded where:
– a conk, frost crack, or blind conk is present
– decayed or missing wood is visible
– sounding of the stem indicates decay, and subsequent boring provides a relative decay ratio
– root rot is observed
Broken tops, dead tops, forks and crooks cannot have net factor deductions applied, unless there is visible rot.
SNG not necessary on trees with heart rot conks, DRS
Pinicola conks generally grow on dead wood. They are not heart rot conks. Only treated as a heart rot conk if found growing on live wood

FIXED RADIUS SAMPLE TREE SELECTION							
	Population Selection Criteria						Tree Selection Criterion
Type	*Plot*	*Species*	*B.A.*	*L/D*	*C.C.*	*Age Suit.*	*Only 1 Consideration*
T	5.64 Plot			Live	D/C		Largest DBH
L	11.28 Quad	Leading		Live	D/C	Non-Resid.	Largest DBH
S	11.28 Quad	Second	>20%	Live	D/C	Non-Resid.	Largest DBH
O	11.28 Quad	Other	>20%	Live	D/C	Non-Resid.	Largest DBH
V	11.28 Plot			Live		Residual	Representative
X							Representative

VARIABLE RADIUS SAMPLE TREE SELECTION							
	Population Selection Criteria						Tree Selection Criterion
Type	*Plot*	*Species*	*L/D*	*C.C.*	*Age Suit.*	*Ht. Suit.*	*Only 1 Consideration*
T	5.64 Plot		Live	D/C			Largest DBH
L	5.64 Plot	Leading	Live	D/C			Largest DBH
S	5.64 Plot	Second	Live	D/C			Largest DBH
O	5.64 Plot		Ideally Live	Ideally D/C	Ideally "Y"	Ideally "Y"	Subjective
X	Outside 5.64 Plot		Ideally Live	Ideally D/C	Ideally "Y"	Ideally "Y"	Subjective

AGE MEASURE CODES	
CRC	Cannot reach Center – Needs Prorate Length
NOP	Pith Missed – Needs Missed Years
OUT	Out of Plot tree
PRE	Age from Previous Measure
PTH	Pith Obtained
ROT	Rot in Center – Needs Prorate Length
WHO	Whorls above Breast Height
NOC	Core not collected

MODE DESCRIPTION		
Code	**Description**	**Attributes Required**
D	**Dropped** – A previously measured tree that is to be dropped because it was outside of the plot	Requires sector, species, DBH and stem map azimuth and distance
F	**Forest Health** – A tree in a Type-A (Early YSM - Forest Health) sample that is below the standard YSM tagging limits	Requires all attributes (may or may not have a DBH, depending on length)
H	**Harvested** – A previously measured tree that cannot be found and has obviously been harvested or cut	Only requires sector and species
M	**Missed** – A tree that was obviously missed at the previous measurement	Requires all attributes
N	**Not Found** – A previously measured tree that cannot be found	Only requires sector and species
P	**Planted, Too Small** – A planted seedling identified and tagged in a Type-A (Early YSM - Planted) sample	Requires all attributes except DBH, CC and Ht to Live Crown
Z	**Non Tally Sample Tree** – A tree that is not tallied yet is selected as a sample tree	Requires all attributes except Loss, Damage and Net Factor

CROWN CLASS CODES			
Crown Class Codes	**Relationship vs Surrounding Trees**	**Tree and Crown Size**	**Crowding**
D – Dominant	Extended above	Taller, well developed	Only somewhat
C – Co–dominant	Same level	Smaller than dominant	Crowded on sides
I – Intermediate	Below or extending into co-doms	Smaller, less developed	Quite crowded
S – Suppressed	Generally below co-dom crowns	Smallest, less developed	Overtopped

DIAMETER AT BREAST HEIGHT (DBH) RE-MEASUREMENTS	
In the case where a DBH measurement has <u>decreased</u> from the previous measurement:	
Previously Dead ⇒ Currently Dead	Use Previous DBH
Previously Live ⇒ Currently Live	Use Current DBH
Previously Dead ⇒ Currently Live	Use Current DBH
Previously Live ⇒ Currently Dead	Use Current DBH if larger than previous; if smaller, use Previous DBH

NOTE: Dead trees should never have a decrease in DBH from the last measurement

STAND DISTURBANCE CODES – CMI HEADER	
Code	**Description**
N	Non-biological/ abiotic injuries
NB	Fire
NW	Windthrow
DD	Heartrots
DF	Foliage diseases
DR	Root diseases
D	Unknown diseases
I	Unknown insects
IB	Bark beetles
ID	Insect defoliators
A	Animal
L	Logging, thinning, clearing, brushing and weeding – cut
X	Other known (add details in comments)
U	Other unknown
O	No significant damage

PHOTO DESCRIPTIONS			
Types with CWD		**Types without CWD**	
(F, O, D, E, C)		**(M, Y, L, PSP, Q, Z, T, B, N)**	
Code	**Description**	**Code**	**Description**
PP	Plot Pin	PP	Plot Pin
T1S	Transect 1 Start	N	North
T2S	Transect 2 Start	E	East
T1M	Transect 1 Mirrored	S	South
T2M	Transect 2 Mirrored	W	West
T1E	Transect 1 End	–	–
T2E	Transect 2 End	–	–
REP	Representative	REP	Representative
CAN	Canopy (Vertical)	CAN	Canopy (Vertical)
SOIL	Soil Profile*	SOIL	Soil Profile*
OTH	Other**	OTH	Other**

**Required only if a soil pit is dug*

***Optional, and multiple available to be added and named*

TREE SPECIES LIST		
Conifers		
Species Code	**Common Name**	**Scientific Name**
B	Fir (Balsam)	*Abies*
BA	Amabilis Fir	*Abies amabilis*
BG	Grand Fir	*Abies grandis*
BL	Subalpine Fir	*Abies lasiocarpa*
CW	Western Redcedar	*Thuja plicata*
FD	Douglas-Fir	*Pseudotsuga menziesii*
FDC	Coastal Douglas-Fir	*Pseudotsuga menziesii var. menziesii*
FDI	Interior Douglas-Fir	*Pseudotsuga menziesii var. glauca*
H	Hemlock	*Tsuga*
HM	Mountain Hemlock	*Tsuga mertensiana*
HW	Western Hemlock	*Tsuga heterophylla*
HXM	Mountain X Western Hemlock Hybrid	*Tsuga mertensiana x heterophylla*
JR	Rocky Mtn. Juniper	*Juniperus scopulorum*
L	Larch	*Larix*
LA	Alpine Larch	*Larix lyallii*
LT	Tamarack	*Larix laricina*
LW	Western Larch	*Larix occidentalis*
P	Pine	*Pinus*
PA	Whitebark Pine	*Pinus albicaulis*
PF	Limber Pine	*Pinus flexilis*
PJ	Jack Pine	*Pinus banksiana*
PL	Lodgepole Pine	*Pinus contorta*
PLC	Coastal Lodgepole Pine	*Pinus contorta var. contorta*
PLI	Interior Lodgepole Pine	*Pinus contorta var. latifolia*
PW	Western White Pine	*Pinus monticola*
PY	Ponderosa Pine	*Pinus ponderosa*
S	Spruce	*Picea*
SB	Black Spruce	*Picea mariana*
SE	Engelmann Spruce	*Picea engelmannii*
SS	Sitka Spruce	*Picea sitchensis*
SW	White Spruce	*Picea glauca*
SX	Spruce Hybrid	*Picea cross*
TW	Western Yew	*Taxus brevifolia*
YC	Yellow-Cedar	*Chamaecyparis nootkatensis*

DECIDUOUS		
Species Code	**Common name**	**Scientific Name**
A	Aspen, Cottonwood or Poplar	*Populus*
AC	Poplar	*Populus balsamifera*
ACB	Balsam Poplar	*Populus balsamifera ssp. Balsamifera*
ACT	Black Cottonwood	*Populus balsamifera ssp. Trichocarpa*
AT	Trembling Aspen	*Populus tremuloides*
AX	Hybrid Poplars	*Populus sp.x populus sp.*
DR	Red Alder	*Alnus rubra*
E	Birch	*Betula*
EA	Alaska Paper Birch	*Betula neoalaskana*
EP	Paper Birch	*Betula papyrifera*
EW	Water Birch	*Betula occidentalis*
GP	Pacific dogwood	*Cornus nuttallii*
KC	Cascara	*Rhamnus purshiana*
MB	Bigleaf Maple	*Acer macrophyllum*
QG	Gary Oak	*Quercus garryana*
RA	Arbutus [Aka Pacific Madrone]	*Arbutus menziesii*

UNKNOWN	
X	Unknown
XC	Unknown Conifer
XH	Unknown Hardwood

OTHERS	
Z	Other Tree Species
ZC	Other Conifer
ZH	Other Hardwood

LOSS INDICATOR CODES	
Code	**Description**
DD __	Unknown stem decay (conk)
	DDE is a known stem decay (Echinodontium tinctorium)
DR __	Unknown root decay
	DRA is a known root decay (Armillaria ostoyae)
BNK	Blind Conk
NGC	Frost Crack
SCA	Scar
FRK	Fork
CRO	Crook
LRB	Large Rotten Branch
DTP	Dead Top
SNG	Sounding
OTH	Other (cause is known, but no appropriate code)
DIR	Direct observation

LOSS INDICATOR POSITION CODES (PSPs ONLY)					
Code	**Position on Tree**				**Code**
	(tree is divided into thirds)	Lower 1/3	Middle 1/3	Upper 1/3	
1	Lower third	√			1
2	Middle third		√		2
3	Upper third			√	3
4	Lower and middle third	√	√		4
5	Middle and upper third		√	√	5
6	Lower and upper third	√		√	6
7	All thirds	√	√	√	7

DAMAGE AGENT CODES			
Field Codes			**Description**
O	NO detectable abiotic or biotic damage		
U	UNKNOWN (Damage evident but causal agent unknown)		
*		UBT	Unknown Broken Top
*		UCR	Unknown Crook
*	UF		Unknown Fork Damage
N	NON-BIOLOGICAL (ABIOTIC) INJURIES		
		NAV	Avalanche or Snow Slide
*	NB		Fire
*		NBP	Post Burn Mortality
*		NCA	Aspen (At) Decline
*		NCB	Birch (E) Decline
*		NCY	Yellow cedar (Yc) Decline
	ND		Drought
	NF		Flooding
	NG		Frost
*		NGC	Frost Crack
		NGH	Frost Heaved
		NGK	Shoot/Bud Frost Kill
	NH		Hail
	NK		Fumekill
	NL		Lightning
	NN		Road Salt
	NR		Redbelt
	NS		Slide
*	NW		Windthrow
*		NWS	Windthrow – Soil Failure
*		NWT	Windthrow – Treatment or Harvest-related
*	NX		Wind scarring or rubbing
	NY		Snow or Ice (includes snow press)
		NYB	Snow or ice breakage
		NYP	Snow press
	NZ		Sunscald

** Denotes highest priority damage agents*

DAMAGE AGENT CODES			
Field Codes			**Description**
T	TREATMENT INJURIES		
	TC		Chemical Injury
*	TH		Harvested or Cut
*	TL		Logging Wounds
	TM		Other Mechanical Damage (non-logging)
	TP		Planting (incorrectly planted)
		TPM	Planting (poor microsite)
	TR		Pruning Wound
	TT		Thinning or Spacing Wound
V	PROBLEM VEGETATION		
	VH		Herbaceous Competition
	VP		Vegetation Press
	VS		Shrub Competition
*	VT		Tree Competition
A	ANIMAL DAMAGE		
	AB		Bear
	AC		Cattle
	AD		Deer
	AE		Elk
	AH		Hare or Rabbit
*	AM		Moose
	AP		Porcupine
*	AS		Squirrel
	AV		Vole
	AX		Birds
	AZ		Beaver

** Denotes highest priority damage agents*

DAMAGE AGENT CODES				
Field Codes			Description	
D	DISEASES			
	DB		Broom Rusts	
		DBF	Fir Broom Rust	*(Melampsorella caryophyllacearum)*
		DBS	Spruce Broom Rust	*(Chrysomyxa arctostaphyli)*
	DD		Stem Decay	
*		DDB	Birch Trunk Rot	*(Fomes fomentarius)*
		DDC	Brown Cubical Rot of Birch	*(Piptoporus betulinus)*
*		DDE	Rust Red Stringy Rot	*(Echindontium tinctorium)*
*		DDF	Brown Crumbly Rot	*(Fomitopsis pinicola)*
*		DDG	Sterile Conk Trunk Rot of Birch	*(Inonotus obliquus)*
*		DDH	Hardwood Trunk Rot	*(Phellinus ignarius)*
*		DDP	Red Ring Rot	*(Phellinus pini)*
		DDQ	Quinine Conk Rot	*(Fomitopsis officinalis)*
*		DDT	Aspen Trunk Rot	*(Phellinus tremulae)*
	DF		Foliage Diseases	
		DFA	Western Pine-Aster Rust	*(Coleosporium asterum)*
		DFD	Spruce Needle Cast	*(Lirula macrospora)*
*		DFE	Elytroderma Needle Cast	*(Elytroderma deformans)*
		DFF	Marssonina Leaf Blights	*(Marssonina spp.)*
*		DFG	Cottonwood Leaf Rust	*(Melampsora occidentalis)*
*		DFH	Larch Needle Blight	*(Hypodermella laricis)*
*		DFL	Pine Needle Cast	*(Lophodermella concolor)*
*		DFM	Larch Needle Cast	*(Meria laricis)*
*		DFR	Douglas-fir needle cast	*(Rhabdocline pseudotsugae)*
*		DFS	Dothistroma Needle Blight	*(Dothistroma septosporum)*
*		DFU	Cedar Leaf Blight	*(Didymascella thujina)*
*		DFW	Swiss Needle Cast	*(Phaeocryptopus gaumanni)*
		DFX	Brown Felt Blight	(*Herpotrichia* spp.)
*		DFY	Hendersonia Needle Cast	*(Hendersonia pinicola)*

** Denotes highest priority damage agents*

DAMAGE AGENT CODES				
Field Codes			Description	
	DM		Dwarf Mistletoe	
		DMF	Douglas-fir Dwarf Mistletoe	*(Arceuthobium douglasii)*
		DMH	Hemlock Dwarf Mistletoe	*(Arceuthobium tsugense)*
		DML	Larch Dwarf Mistletoe	*(Arceuthobium laricis)*
*		DMP	Lodgepole pine Dwarf Mistletoe	*(Arceuthobium americanum)*
D	DISEASES			
	DR		Root Disease	
*		DRA	Armillaria Root Disease	*(Armillaria ostoyae)*
		DRB	Black Stain Root Disease	*(Leptographium wageneri)*
*		DRL	Laminated Root Rot (Fd form)	*(Inonotus sulphurascens)*
		DRN	Annosus Root Disease	*(Heterobasidion annosum)*
		DRR	Rhizina Root Disease	*(Rhizina undulata)*
*		DRS	Schweinitzii Butt Rot	*(Phaeolus schweinitzii)*
*		DRT	Tomentosus Root Rot	*(Inonotus tomentosus)*
	DS		Stem Diseases (Cankers and Rusts)	
*		DSA	Atropellis Canker (Lodgepole pine)	*(Atropellis piniphila)*
*		DSB	White Pine Blister Rust	*(Cronartium ribicola)*
*		DSC	Comandra Blister Rust	*(Cronartium comandrae)*
*		DSG	Western Gall Rust	*(Endocronartium harknessii)*
*		DSS	Stalactiform Blister Rust	*(Cronartium coleosporioides)*

** Denotes highest priority damage agents*

DAMAGE AGENT CODES				
Field Codes			Description	
I	INSECTS			
	IB		Bark Beetles	
		IBB	Western Balsam Bark Beetle	*(Dryocoetes confusus)*
		IBD	Douglas-fir Beetle	*(Dendroctonus pseudotsugae)*
		IBF	Fir Engraver Beetle	*(Scolytus ventralis)*
		IBI	Engraver Beetles	*(Ips* spp.*)*
*		IBM	Mountain Pine Beetle	*(Dendroctonus ponderosae)*
		IBS	Spruce Beetle	*(Dendroctonus rufipennis)*
		IBW	Western Pine Beetle	*(Dendroctonus brevicomis)*
	ID		Defoliators	
		IDA	Black Army Cutworm	*(Actebia fennica)*
		IDB	Two-year Budworm	*(Choristoneura biennis)*
		IDE	Eastern Spruce Budworm	*(Choristoneura fumiferana)*
*		IDF	Forest Tent Caterpillar	*(Malacosoma disstria)*
		IDI	Pine Needle Sheathminer	*(Zelleria haimbachi)*
*		IDK	Northern Tent Caterpillar	*(Malacosoma californicum)*
*		IDL	Western Hemlock Looper	*(Lambdina fiscellaria lugubrosa)*
		IDN	Birch Leaf Miner	*(Fenusa pusilla)*
		IDP	Larch Sawfly	*(Pristophora erichsoni)*
		IDT	Douglas-fir Tussock Moth	*(Orgyia pseudotsugata)*
*		IDW	Western Spruce Budworm	*(Choristoneura occidentalis)*
*		ID6	Aspen Leaf Miner	*(Phyllocristis populiella)*
	IS		Shoot Insects	
*		ISC	Poplar Borer	*(Saperda calcarata)*
		ISP	Pitch Nodule Moths	*(Petrova* spp.*)*
*		ISQ	Sequoia Pitch Moth	*(Vespamima sequoiae)*
	IW		Weevils	
*		IWP	Lodgepole pine Terminal Weevil	*(Pissodes terminalis)*
*		IWS	White pine Weevil (on Spruce)	*(Pissodes strobi)*
		IWW	Warren's Root Collar Weevil	*(Hylobius warreni)*

** Denotes highest priority damage agents*

DAMAGE SEVERITY AND MORTALITY CONDITION CODES AND STANDARDS		
Damage /condition or agent	**Severity code**	**Code Description**
Unknown Forks (UF) and Unknown Crooks (UCR)	M	Major fork or crook *(** see next page for key info)*
	N	Minor fork or Crook *(** see next page for key info)*
Bark Beetles	FA	Failed Attack
	GR	Current (Green) Attack
	RA	Red Attack
	GY	Grey Attack
Elytroderma Needle Cast; Dwarf Mistletoes; Broom Rusts	1, 2, 3, 4, 5, 6	Hawksworth's 6-class rating system (see page 18 for details)
Terminal Weevils	Record:	
	C	Current attack only (no previous attack)
	O	Old attack (may also be current attack)
	and: below for 'O' only. If 'C' no further code allowed	
	M	Major crook
	N	Minor crook
	F	Forking
	S	Staghead
Stem rusts and cankers (see seperate code table for YSM severities)	SC	Stem Canker(s)
	TK	Top-Kill
Root Rots	SC	Crown symptoms
	BR	Basal resinosis
	CS	Confirmatory symptoms (stain, decay, mycelia, rhizomorphs, or sporophores)

DAMAGE AGENT GROUP	SEVERITY CODE	CODE DESCRIPTION
Western Spruce Budworm	1–100	% current-year foliage defoliated, discoloured, or infected
Some Foliage Diseases (DFG, DFI, DFN, DFU, DFW)	1–100	% 2-yr-old foliage defoliated, discoloured, or infected
Western Pine Aster Rust	1–100	% 3-yr-old foliage defoliated, discoloured, or infected
All Other Foliage Diseases and Insect Defoliators	1–100	% all-years foliage defoliated, discoloured, or infected
Animals, Root Collar Weevils, Scarring, Sunscald, and some Treatment Injuries (TL, TM, TR, TT)	1–100	% circumference impacted
Drought, Hail, Fumekill, Road Salt, Redbelt, Aspen-Poplar Twig Blight	1–100	% live crown affected
Lightning	1–100	% bole length damaged
All other unlisted damage agents	*[NULL]*	No severity is allowed

** SEVERITY RATINGS FOR UF AND UCR
M (major): offset from the main stem is >= 50%
N (minor): offest from the main stem is < 50%
NOTE: Any FRK or CRO that occurs in the portion of the main stem that is < 10 cm diameter is automatically an N (minor) severity
NOTE: Select the severity that corresponds to the most severe occurrence of a UF and/or UCR
Incidences to Ignore: (Do NOT call a FRK or CRO loss indicator for the following)
Potential FRK to be *ignored:* Spike branch with no to very little diameter loss or offset (~ < 10%)
Potential CRO to be *ignored:* Very little diameter loss or offset (~ < 10%)

HAWKSWORTH SCALE FOR ELYTRODERMA, MISTLETOE INFECTION AND BROOM RUSTS

Step 1: Divide live crown into thirds according to stem length

Step 2: Rate each third separately. Give each third a rating of either as described below:

(0) No visible infection

(1) Light infection (1/2 or less of branches in the third infected)

(2) Heavy infection (more than 1/2 of branches in third infected)

Step 3: Add ratings of thirds to obtain a rating for the entire tree

Example

If this third has no visible infections, its rating is (0).

—

If this third is lightly infected, its rating is (1).

—

If this third is heavily infected, its rating is (2)

The tree in this example gets a rating of: 0+1+2=3

SEVERITY CODES FOR RUST AND CANKER MEASUREMENTS (DSC, DSS, DSG, DSA, DSB) – YSM SAMPLES ONLY (3RD DIGIT FOR TYPE-A SAMPLES ONLY)

Infection Height (1st digit)		% Encirclement (2nd digit)		'Branch' Indicator (3rd digit)	
Severity Code	Ht. Range (m)	Severity Code	% Encirclement	Severity Code	Location
0	0.0–0.5	0	1–5	B	on a branch
1	0.6–1.5	1	6 –15	<null>	on main stem
2	1.6–2.5	2	16–25		
3	2.6–3.5	3	26–35		
4	3.6–4.5	4	36–45		
5	4.6–5.5	5*	46–55		
6	5.6–6.5	6	56–65		
7	6.6–7.5	7	66–75		
8	7.6–8.5	8	76–85		
9	8.6 +	9	86–100		

** significant break point*

SEVERITY CODES FOR FIRE (NB, NBP)

Wood Fibre Damage (1st digit)		*% Foliar Scorch (2nd digit)	
Severity Code	Description	Severity Code	Description
O	No cambial or wood fibre damage	0	0% (no foliar scorch)
		1	0–15
A	Cambial damage (i.e., more than scorched bark, but less than charred wood of a significant depth)	2	16–25
		3	26–35
		4	36–45
B	Minor wood fibre damage (i.e., localized shallow charring)	5	46–55
		6	56–65
C	Major wood fibre damage (i.e., extensive shallow charring or localized or extensive deep charring)	7	66–75
		8	76–85
		9	86–100

** Foliar scorch only applies in the same year as the burn. Leave blank if visited more than a year after the fire.*

COMMON CONIFER FOREST HEALTH FACTORS BY BEC ZONE – FOR STANDS >15 YEARS											
Biogeoclimatic Zone											
BWBS		CDF		CWH		ESSF		ICH		IDF	
IB*	m	DRL	m,g	DRL	m,g	IB*	m	IB*	m	IB*	m
IDE	g	DRA	m,g	DRA	m,g	NAV	m	DRA	m,g	NB	m,g
IDB	g	NW	m	NW	m	NY	m,q	DRL	m,g	DRA	m,g
IWS	q	ND	m	DSB	m	DRA	m,g	AB	g,m	DRL	m,g
DDP	d	DSB	m	ND	m	ND	g,m	DRT	g,m	DSB	m
DB	q	DMH	g,m	DRN	g,m	DSG	m,q	IWW***	m	DSC	m
		DFU	g,m	DMH	g,m	DDP	d	DSB	m	DSS	m,g
		DFW	g	NCY	g,m	DDE	d	DSC	m,g	DSG	m,g
		DDP	d	IDH	g	IWS	q	DSS	m,g	IDW	g,m
				IWS	g	WS	g	DSG	m,q	DML	g,m
				DFW	g	DB	q	IDL	g,m	DFE	g,m,q
				DFU	g			IWS	g,q	DFL	g
				DDP	d			DFS	g,m	IDI	g
				AB	g,q			DML	g,m	DFH	g
				AE	q			DFL	g	DFM	g
								DFH	g	WS	g
								DFM	g	DDP	d
								DDE	d	DDQ	d
								DDP	d	DSA	q
								DSA	q	ISP	q
								ISP	q	DB	q
								DB	q		

COMMON CONIFER FOREST HEALTH FACTORS BY BEC ZONE – FOR STANDS >15 YEARS											
Biogeoclimatic Zone											
MH		MS		PP		SBPS		SBS		SWB	
DRL	m,g	IB*	m	IB*	m	IB*	m	IB*	m	IB*	m
DMH	g,m	NB	m,g	IBW	m	NB	m,g,q	DRA**	m,g	DSG	m,g
NCY	g,m	DRA	m,g	NB	m,g	DSC	m	DRL**	m,g	DRT	g,m
DDP	d	DRL	m,g	DRA	m,g	IWW***	m	DRT	g,m	NY	q
DB	q	DRT	g,m	DSG	m,q	DSS	m,g	NB	g,m	AP	q
NY	g,q	DSB	m	IDW	g,m	ND	m,g	IWW***	m	DB	q
		DSC	m	DDP	d	DFE	g,m,q	DSC	m	NG	q
		DSS	m,g			DSG	m,q	DSB**	m		
		DSG	m,g			DMP	g,m,q	DSS	m,g		
		DMP	g,m			DSA	q,m	DSG	m,q		
		IWS	g,q			DFL	g	DMP	g,m		
		DML	g,m			IDI	g	IDB	g		
		IDI	g			IWP	q	DFS	g		
		DFL	g			ISP	q	NY	g		
		DFH	g			DB	q	DFE	g		
		DFM	g			AS	q	IWS	g,q		
		WS	g					DFL	g		
		DSA	q					IDI	g		
		DDP	d					IWP	q		
		IWP	q					DDP	d		
		ISP	q					DSA	q		
		DB	q					ISP	q		
								DB	q		

NOTES

1) The damage agent codes are listed by BEC zone in order of typically decreasing relative importance, but the order may vary depending on forest health factor severity and prevalance.
2) The two or three letter damage agent codes are followed by lower case “impact” qualifiers/descriptors:
   m = mortality; g = growth reduction; d = decay; q = quality
   – These are listed next to each damage agent in order of their primary effect on a host.
3) IB* indicates major bark beetle species only (IBB, IBD, IBM, and IBS).
4) ** Denotes that the damage agent is restricted to the southern SBS only.
5) *** Only a mortality agent on young trees.

PRISM PLOT RADIUS FACTORS		
BAF	PRFc	PRFf
5	0.224	0.219
7	0.189	0.184
9	0.167	0.162
12	0.144	0.139
16	0.125	0.120
20	0.112	0.107
25	0.100	0.095

RELASKOP PLOT RADIUS FACTORS			
BANDS	BAF	PRFc	PRFf
2.25	5.06	0.222	0.217
2.50	6.25	0.200	0.195
3.00	9.00	0.167	0.162
3.50	12.25	0.143	0.138
4.00	16.00	0.125	0.120
4.50	20.25	0.111	0.106
5.00	25.00	0.100	0.095

BAF selection must be made prior to arriving at the reference pin

The same BAF must be used for all plots in the cluster

The final "IN" or "OUT" determination for all borderline trees will be made from the face of the tree, not the centre

To calculate the PRF_c of any BAF: **$PRF_c = 0.5/\sqrt{BAF}$**

PRF_c = Plot Radius Factor to Centre of Tree

PRF_f = Plot Radius Factor to the face of the tree

$PRF_f = PRF_c - 0.005$

PLOT AREA TO CIRCULAR FIXED RADIUS PLOT CONVERSIONS			
Plot Area (ha)	**Plot Radius (m)**	**Plot Area (ha)**	**Plot Radius (m)**
0.117	19.32	0.04	11.28
0.115	19.11	0.03	9.77
0.111	18.78	0.02	7.98
0.103	18.1	0.015	6.91
0.101	17.98	0.01	5.64
0.1	17.84	0.007	4.72
0.081	16.06	0.006	4.37
0.08	15.96	0.005	3.99
0.07	14.93	0.003	3.09
0.06	13.82	0.002	2.52
0.05	12.62	0.001	1.78

MAIN SCREENS			
F1	Form Commands/ Tools	All	Leads to other options, shows F commands available, tools menu
F2	Inactive		
F3	Copy down	Any List	Copies down the data from the row above.
F4	Next section	Trees	Move to the next section on screen
F5	Toggle tree view	Trees	Toggles between Tree List and Tree Details screen
F6	Toggle tree lists	Tree List	Toggles between tree, loss, damage and grade
F7	Inactive		
F8	Inactive		
F9	Inactive		
F10	History view (remeasure, QA)	Most Forms	Toggles to 'previous' data for that screen
F11	Inactive		
F12	Comments	Most Forms	Add a comment to the current screen
[ESC]	Escape Screen	All	Return to previous screen
[ENTER]	Enter/activate cell	All	
[TAB]	Next cell	All	
[SPACE]	Drop-down lists	Any List	Opens box drop-down lists (e.g. L/S/D/F, M/E, CC)
[ZERO]	Edit alpha cells	Any List	Allows editing in alpha cells; cursor enters cell
CTRL-F5	Sample tree	Trees	Toggles between Sample Tree and Tree screen
CTRL-A	Stem Map Only	Tree List	Locks screen for azimuth and distance only
CTRL-G	"Go to"	Tree List	Search and go to a tree or sector
CTRL-L	Delete Row/Tree	Any List	Deletes the current row you are on
CTRL-N	Insert Row/Tree	Any List	Inserts a row after the current one you are on
CTRL-S	Save	All	Saves at any time without exiting the screen
CTRL-Z	Undo	Most Forms	Deletes the most recent change to data

TREE DETAILS SCREEN			
Same as 'MAIN SCREEN' except			
F8 (SHIFT-F2)	Previous Tree	Details	Moves from current tree to previous in list
F9 (SHIFT-F3)	Next Tree	Details	Moves from current tree to next in list
F3	Add Tree	Details	Adds a tree, highest tree number +1

SMALL TREE SCREEN			
F7	10–29cm column	Sm. Tree	Goes to 10–29cm column on current row
F8	30–130cm column	Sm. Tree	Goes to 30–130cm column on current row
F9	>130cm column	Sm. Tree	Goes to >130cm column on current row
F6	Toggles add/remove	Sm. Tree	F6 changes ENTER to subtract or add by 1
[ENTER]	Add Tree to Cell	Sm. Tree	Adds tree(s) to the current cell

ACCESS SCREEN			
F2	Reset row to 0	Access	Resets current row cum. and inter. distance to 0
F3	Insert Above	Access	Adds and enters a row above current row
F4	Next Section	Access	Skips to com
F5	Insert below	Access	Adds and enters a row below current row
F6	Delete	Access	Deletes current row

TREE SHRUB HERB MOSS			
F5	Toggle Screen	Tree Shrub	Toggles between Tree/Shrub and Herb/Moss screen

TRANSECTS			
F6	Toggle Screen	Transect	Toggles between transect 1 and 2

SEEDS 1–100	RANDOM BEARING	RANDOM BEARING +90	RANDOMIZED NUMBERS 1–20 (LEFT TO RIGHT)																				RANDOMIZED NUMBERS 1–100 (TOP TO BOTTOM)
1	23	113	14	12	18	8	20	7	19	3	10	15	11	13	16	5	1	17	6	2	9	4	58
2	155	245	1	11	17	13	16	8	5	20	9	2	14	6	12	15	10	4	19	7	3	18	7
3	350	80	4	5	7	19	17	20	2	9	11	14	18	3	6	10	1	8	12	13	15	16	38
4	296	26	1	7	4	15	6	10	20	13	2	17	12	18	19	5	16	14	3	9	8	11	85
5	8	98	17	1	5	19	8	11	9	15	4	13	6	12	10	7	3	18	20	2	16	14	36
6	304	34	18	7	2	1	14	3	5	4	11	15	8	9	20	17	10	12	19	16	6	13	33
7	351	81	10	6	1	13	9	8	11	17	19	3	16	20	5	4	15	18	2	12	7	14	53
8	158	248	19	4	16	20	2	11	10	8	5	13	12	1	14	15	9	6	17	18	7	3	78
9	139	229	14	11	5	2	18	7	19	16	13	1	20	3	4	6	9	17	12	10	8	15	40
10	33	123	17	15	14	18	5	1	7	19	2	6	3	8	9	4	10	20	13	16	12	11	56
11	264	354	15	3	11	20	1	10	19	4	12	5	16	7	18	6	14	2	17	8	9	13	32
12	278	8	5	8	16	6	7	17	11	9	15	14	19	20	10	3	2	12	4	13	18	1	87
13	137	227	2	10	5	15	12	20	17	4	1	13	14	18	9	16	19	8	11	3	6	7	83
14	243	333	14	5	3	4	1	10	15	13	19	20	2	12	11	7	16	6	8	18	17	9	67
15	176	266	15	7	19	11	9	6	8	3	12	10	14	1	2	4	18	5	16	13	17	20	18
16	267	357	19	16	3	7	17	1	20	2	12	15	18	8	11	9	4	14	6	13	10	5	31

HOW TO USE THIS TABLE: The last two digits of y r sample number is the seed number used to locate the random bearings for the transects and 20 randomized numbers for random and enhanced trees. If more than 20 numbers are required, proceed down the column on the far right from the row your seed number is located on. If more than 1 random number is required, continue across and down from previous selection.

SEEDS 1–100	RANDOM BEARING	RANDOM BEARING +90	RANDOMIZED NUMBERS 1–20 (LEFT TO RIGHT) *Continued from previous page*																		RANDOMIZED NUMBERS 1–100 (TOP TO BOTTOM)
17	214	304	6	7	12	14	3	16	8	13	1	20	19	2	5	9	10	15	18	11	4	17	75
18	229	319	13	8	12	18	14	10	15	3	5	20	4	11	1	17	16	6	9	2	19	7	79
19	257	347	17	5	19	12	8	18	3	2	15	16	4	6	20	14	9	10	13	11	7	1	89
20	324	54	14	8	15	4	6	19	16	1	12	2	17	3	10	11	20	5	9	13	18	7	96
21	98	188	10	16	19	15	1	8	18	14	9	11	4	2	12	7	13	17	5	6	20	3	12
22	70	160	15	19	14	1	6	18	12	4	2	5	9	17	20	16	3	10	11	7	13	8	14
23	161	251	9	10	14	18	17	15	4	2	11	16	7	12	6	8	20	1	19	13	5	3	6
24	199	289	5	4	12	1	7	10	20	14	19	9	15	11	16	18	3	13	8	2	17	6	72
25	329	59	14	9	7	3	17	15	18	1	4	16	6	10	12	20	19	2	5	8	13	11	63
26	110	200	20	11	9	13	15	6	2	8	7	10	4	14	19	12	3	17	18	16	1	5	45
27	127	217	5	4	9	15	18	2	19	16	17	11	1	20	8	13	3	12	10	6	7	14	41
28	253	343	3	2	10	14	15	19	6	13	18	5	4	20	8	1	9	16	7	12	17	11	69
29	314	44	5	3	18	14	1	6	2	13	10	20	4	8	15	9	16	19	11	17	12	7	66
30	285	15	20	10	11	14	15	18	17	9	2	7	1	3	5	19	8	13	16	4	12	6	48
31	87	177	5	6	13	7	12	1	20	4	2	14	11	15	9	3	16	17	19	8	18	10	27
32	277	7	2	1	8	14	18	9	7	12	20	15	19	4	6	3	5	17	16	10	11	13	47
33	109	199	14	5	20	2	10	4	18	15	13	9	16	19	1	11	3	17	12	6	7	8	26
34	332	62	7	13	10	9	18	16	11	2	3	6	5	4	20	14	15	8	1	12	17	19	99
35	67	157	3	10	11	15	2	14	7	8	19	18	16	5	17	13	12	6	1	4	20	9	74
36	74	164	2	10	13	6	14	1	5	7	12	19	18	3	17	11	4	15	8	20	16	9	73
37	283	13	16	13	19	14	1	15	12	18	6	7	5	20	9	17	2	3	4	8	10	11	10
38	32	122	18	16	20	10	17	5	12	4	15	14	11	9	7	1	2	3	6	13	8	19	59

SEEDS 1–100	RANDOM BEARING	RANDOM BEARING +90	RANDOMIZED NUMBERS 1–20 (LEFT TO RIGHT) *Continued from previous page*																		RANDOMIZED NUMBERS 1–100 (TOP TO BOTTOM)
39	270	0	5	12	19	20	11	7	10	2	15	3	14	17	4	6	8	16	13	9	18	1	77
40	339	69	13	3	15	2	18	10	11	12	17	16	7	14	4	20	19	9	6	1	5	8	46
41	300	30	10	16	1	12	17	4	19	8	15	20	5	18	14	13	6	7	3	2	11	9	57
42	17	107	16	2	4	1	3	8	9	7	5	12	17	15	19	20	11	6	10	13	14	18	93
43	144	234	6	2	20	19	17	15	12	5	3	18	14	4	9	8	16	1	13	7	11	10	16
44	271	1	16	4	7	1	10	19	8	14	17	13	6	9	11	20	18	5	15	12	2	3	61
45	248	338	20	13	19	5	15	2	10	16	6	12	18	1	3	14	17	8	11	4	7	9	68
46	77	167	2	3	13	20	15	11	17	1	4	7	18	5	6	19	14	9	8	16	12	10	42
47	43	133	11	2	14	12	10	17	18	20	13	15	5	8	4	7	19	3	9	1	16	6	37
48	223	313	7	16	4	20	15	3	2	18	6	11	19	13	1	8	10	12	9	17	5	14	2
49	122	212	10	1	5	7	9	3	16	18	8	13	11	17	19	12	15	20	2	6	14	4	50
50	66	156	19	2	5	17	16	12	8	15	4	14	18	1	11	20	13	3	7	6	9	10	11
51	45	135	14	17	12	1	10	7	20	16	15	3	6	4	5	13	11	9	8	18	19	2	91
52	27	117	12	7	11	13	8	6	16	20	3	10	14	5	4	1	2	18	9	15	17	19	94
53	13	103	19	12	18	8	5	3	15	10	20	16	1	17	7	2	6	14	4	9	13	11	39
54	25	115	11	1	9	19	16	10	4	20	18	2	6	13	3	14	8	12	5	15	17	7	97
55	49	139	9	6	7	17	15	11	18	5	3	2	8	19	14	4	13	10	16	1	20	12	23
56	328	58	2	12	19	8	6	4	16	7	18	14	1	13	3	10	15	5	9	11	20	17	76
57	247	337	19	16	14	7	17	9	4	6	15	20	3	12	11	13	10	1	18	2	8	5	82
58	334	64	14	11	3	20	12	2	5	6	13	10	4	15	19	8	18	9	1	16	17	7	20
59	21	111	20	12	11	1	14	4	19	7	9	18	15	5	8	16	6	17	13	2	10	3	49
60	232	322	2	4	16	14	20	13	11	3	17	7	6	10	9	15	18	1	19	5	8	12	81

SEEDS 1–100	RANDOM BEARING	RANDOM BEARING +90	RANDOMIZED NUMBERS 1–20 (LEFT TO RIGHT) *Continued from previous page*																			RANDOMIZED NUMBERS 1–100 (TOP TO BOTTOM)
61	125	215	13	16	5	9	14	7	17	2	15	18	3	8	12	6	10	4	1	19	20	11	1
62	234	324	4	2	11	18	13	9	5	20	19	16	17	7	1	10	8	15	3	6	14	12	34
63	180	270	20	19	18	3	1	9	15	5	14	2	17	6	10	7	16	11	12	8	4	13	86
64	212	302	20	12	4	3	5	15	2	9	13	14	10	1	19	8	16	11	7	6	18	17	29
65	141	231	4	7	18	14	3	9	16	20	2	5	8	19	13	11	15	12	6	10	17	1	55
66	38	128	17	10	3	5	13	12	19	11	9	2	7	20	16	18	6	14	15	8	1	4	80
67	249	339	7	19	18	13	17	5	16	20	1	4	15	12	3	11	10	8	9	14	6	2	30
68	15	105	17	9	2	13	1	4	20	19	8	18	10	5	3	7	12	11	14	15	6	16	8
69	317	47	8	7	12	14	16	4	17	15	18	10	3	19	11	13	5	2	20	6	9	1	88
70	196	286	16	12	7	20	2	11	5	3	9	15	13	18	4	1	17	19	10	6	14	8	92
71	337	67	17	18	14	5	15	7	19	20	3	13	2	10	11	9	1	12	16	4	6	8	28
72	150	240	7	10	14	2	17	20	19	12	13	8	16	9	11	5	3	18	4	1	6	15	98
73	305	35	5	8	4	3	2	16	9	10	7	15	6	1	19	20	13	11	14	12	18	17	70
74	303	33	17	19	6	1	14	8	12	9	18	20	11	13	15	16	5	4	7	2	10	3	52
75	208	298	6	5	10	1	18	16	3	9	12	19	13	15	2	14	11	17	4	7	20	8	60
76	115	205	12	11	7	3	10	18	1	19	13	20	15	4	9	14	17	8	16	6	5	2	9
77	143	233	1	7	18	8	2	11	19	5	14	12	13	9	10	15	16	17	4	3	20	6	43
78	37	127	15	11	1	8	10	20	9	14	18	17	5	6	4	13	2	16	12	7	19	3	5
79	250	340	18	12	4	15	16	8	14	19	13	2	5	3	11	10	1	9	17	20	6	7	3
80	356	86	10	15	8	19	14	17	4	16	13	9	18	1	11	2	7	6	3	5	20	12	64
81	326	56	12	8	10	15	19	1	20	13	14	18	16	7	2	6	5	9	17	11	4	3	15
82	162	252	2	4	12	17	3	10	1	15	5	18	6	8	19	16	20	11	13	9	14	7	19

SEEDS 1–100	RANDOM BEARING	RANDOM BEARING +90	RANDOMIZED NUMBERS 1–20 (LEFT TO RIGHT) *Continued from previous page*																			RANDOMIZED NUMBERS 1–100 (TOP TO BOTTOM)
83	352	82	7	17	8	2	1	16	3	20	15	18	14	6	12	9	10	4	19	11	13	5	22
84	266	356	6	15	12	17	7	16	8	19	13	4	10	18	14	11	5	1	2	20	3	9	84
85	81	171	15	14	19	1	4	17	10	20	7	11	13	8	5	18	3	12	9	6	2	16	95
86	235	325	9	5	12	19	3	16	14	15	2	20	10	1	7	6	17	18	13	8	11	4	4
87	205	295	2	1	12	10	19	13	16	17	6	18	11	3	14	8	5	15	7	9	4	20	17
88	335	65	5	19	2	14	8	6	13	3	15	12	16	18	4	9	11	17	1	20	10	7	21
89	56	146	6	11	3	12	1	4	5	18	20	14	13	7	17	16	10	15	8	2	19	9	65
90	308	38	13	19	7	18	10	1	4	11	17	12	9	3	5	16	15	8	2	14	20	6	54
91	76	166	14	11	3	1	15	12	18	10	6	9	13	5	16	19	2	17	20	8	7	4	13
92	36	126	13	15	14	19	10	12	1	8	11	4	5	17	18	2	20	9	7	3	16	6	62
93	227	317	12	2	19	11	14	10	16	9	15	3	20	17	18	1	6	7	5	4	13	8	25
94	342	72	20	4	19	11	6	8	9	10	15	16	5	13	7	12	2	14	17	1	18	3	35
95	16	106	19	1	13	9	15	14	5	11	10	16	18	6	17	3	2	20	8	7	12	4	51
96	204	294	13	9	5	7	1	10	17	14	11	8	20	15	18	4	12	16	19	2	3	6	24
97	290	20	19	5	18	8	2	9	3	14	10	4	7	6	1	13	11	15	17	20	12	16	71
98	239	329	11	12	17	13	10	1	14	20	15	6	2	19	8	16	4	9	3	7	18	5	100
99	5	95	10	8	15	1	16	2	12	9	14	5	3	13	11	17	18	4	7	20	19	6	44
100	181	271	1	12	8	14	3	10	6	11	19	20	7	16	2	9	15	4	5	13	18	17	90