Saskatchewan Forest Vegetation Inventory Standards

The SFVI is a multi-layered forest inventory designed to provide information on the site and current vegetation for all ecosystems found in Saskatchewan's forests. It is tied to the Provincial basemap, and tiled by 10x10km quadrangles referenced to the 6° Universal Transverse Mercator Projection and the North American Datum of 1983 (Canadian Spatial Reference System). Horizontal accuracy of registration is to be within 8m (root mean square error), or equivalently, less than 13m at a 90% confidence level. The resulting vegetation maps are suitable for plotting at a scale of 1:10,000 to 1:20,000.

Although the SFVI was originally conceived exclusively as a photo-interpreted forest inventory at a scale of 1:15,000, alternative methods of vegetation mapping are permissible provided the following specifications are met.

The basic unit of the SFVI is a polygon representing a relatively homogenous forest stand, or a non-forested area, in combination with land use or ownership. The minimum mapping unit is dependent on the land cover: water features are delineated where the banks are 15m apart, and linear features such as roads, railways, pipeline, and transmission corridors are mapped where the discernable right-of-way or surface width exceeds 15m. Anthropogenic disturbances are mapped at a minimum size of 1 ha, and natural features are mapped at a minimum size of 2ha. Polygons smaller than the 2ha minimum mapping unit are permissible, where required to ensure edge-match topological integrity at timber supply area, ownership, or quadrangle boundaries. Vegetation characteristics that allow, but do not require, a larger minimum mapping unit are described in Table 1.

Mapped polygons are described at the stand level with the attributes shown in Table 2. Attributes shown as "Required" in Table 2 are to be populated for all polygons on the landbase; conditionally required attributes are also described.

Table 1. Polygon Size Requirements.

Polygon Size	Minimum Mapping Unit Requirement
Two hectares	• Any classification within a land use clearing. • Abrupt changes in forest type, such as a wetland within a neighborhood of terrestrial stands, or a leave patch within a cutover.
Four hectares	• Any distinguishable wetland stand within a different wetland stand type, such as a bog within a larger fen complex. • A change in topography • A stand differs from the adjacent forest by two of the following: ○ Main canopy crown closure differs by 20% ○ Primary tree species crown closure differs by 20% ○ Main canopy height differs by 3m ○ Age differs by twenty years ○ Understory species composition is different ○ Soil moisture regime differs by one moisture class
Ten hectares	• A stand differs from the adjacent forest by any of the following: ○ Main canopy crown closure differs by 20% ○ Primary tree species crown closure differs by 20% ○ Main canopy height differs by 3m ○ Age differs by twenty years ○ Understory species composition is different ○ Soil moisture regime differs by one moisture class

Table 2. Stand-level Attribute Requirements.

<table>
<tr><th>Attribute Name</th><th>Attribute Definition</th></tr>
<tr><td>Polygon Identifier
(POLY_ID)

Required</td><td>A twelve digit numeric identifier for the inventory polygon. The first seven digits are reserved for the UTM mapsheet (10x10km) identifier. The remaining five digits are used to indicate a unique polygon within the mapsheet. Various numbering schemes may be used. Used as a primary key if the data are stored as normalised tables.
<u>Data Type:</u> Integer
<u>Domain:</u> [125554300001..143266500001]</td></tr>
<tr><td>UTM Mapsheet
(MAPSHEET_NUM)
Required</td><td>A seven digit 10x10km UTM mapsheet identifier.
<u>Data Type:</u> Integer
<u>Domain:</u> [1255543..1432665]</td></tr>
<tr><td>Polygon Number
(POLY_NUM)
Required</td><td>A five digit inventory polygon number, which is unique within UTM Mapsheets.
<u>Data Type:</u> Integer
<u>Domain:</u> [1..99999]</td></tr>
<tr><td>Hectares
(HECTARES)
Required</td><td>Stand area in hectares.
<u>Data Type:</u> Float
<u>Unit:</u> Hectares
<u>Precision:</u> 0.01 or better
<u>Domain:</u> [0.1…n]</td></tr>
<tr><td>Stand Type
(TYPE)

Required</td><td>A label describing the land classification for each stand.
<u>Data Type:</u> Character (3)
<u>Domain:</u>
<table>
<tr><th>Code</th><th>Label</th><th>Definition</th></tr>
<tr><td>WAT</td><td>Water</td><td>Open water, including lakes, rivers, streams, open shallow water wetlands (e.g. “ponds”, “sloughs”) and anthropogenic water features.</td></tr>
<tr><td>FOR</td><td>Upland Forest</td><td>Land that is currently growing, or capable of supporting, a treed upland forest community. Moisture regimes are dry through very moist.</td></tr>
<tr><td>TMS</td><td>Treed Muskeg</td><td>Wetlands containing at least 10% tree cover, typically greater than 2m tall in absence of recent disturbance. Includes swamps, treed bogs, and treed fens.</td></tr>
<tr><td>BSH</td><td>Brushlands</td><td>Wetlands and riparian uplands containing non-commercial</td></tr>
</table>
</td></tr>
</table>

		hardwoods and shrubs. Includes shrub swamps, and shrubby bogs and fens.
OMS	Open Muskeg	Wetlands dominated by mosses, grasses, sedges, and small herbaceous plants, and often associated with small areas of open water. Includes marshes and open or graminoid bogs and fens.
GRS	Grass	Upland areas dominated by persistent cover of grass
RCK	Rock	Barren or exposed rock containing no more than 25% tree cover
ALA	Agricultural Land	Lands which are cultivated for growing crops, including abandoned fields.
UCL	Unclassified	Anthropogenic non-forested areas, including buildings, roads, railways, mines, utility corridors, gravel pits, etc.
OTH	Other	Non-forested lands that do not fall into any other category

Tree Layer Type (LAYER_TYPE)

Required where TYPE is "FOR" or "TMS"

A description of the vertical structure of the stand.
Data Type: Character (1)
Domain:

Code	Label	Definition
N	No Canopy	A stand without a tree layer
S	Single Cohort	A stand in which a single canopy is present; heights of trees reaching into the canopy differ by no more than 3m.
C	Complex Stand	A stand with high variation in tree heights which precludes identifying discrete canopy layers. Allowable for treed wetlands, balsam fir-leading stands, open grown jack pine stands on sandy soils, and jack pine and black spruce stands on shallow soils on the Canadian Shield.
M	Multiple Cohort	A stand in which multiple canopy layers are discernable and differ by more than 3m.

Non-Vegetated Surface Layer (NVSL)

Required where exposed surface is represents >10% of the polygon area

A description of the predominant non-vegetated surface, where it exists, within a polygon.
Data Type: Character (2)
Domain:

Code	Label	Definition
UK	Unknown	An area absent of vegetation due to an undeterminable cause
CB	Cutbank	Erosion or slumping-derived absence of vegetation
RK	Rock	Exposed rocks or felsenmeer conditions,
SA	Sand	Exposed sand dunes, shorelines, or beach ridges.
MS	Mineral Soil	Exposed mineral soil, other than sand
GR	Gravel	Exposed gravel, not including gravel extraction pits
SB	Sandbar	Exposed sand completely surrounded by water
WA	Water	Open or exposed water in association with vegetation

Non-Vegetated Surface Layer Cover (NVSL_COVER)

Required where NSVL is populated

The percentage of the polygon area represented by the non-vegetated surface, to the nearest 1%.
Data Type: Integer
Unit: Percentage
Precision: Nearest 1%
Domain: [1..100]

Topographic Class (TOPO_CLASS)

Required

A class indicating the topographic relief of the site and its position within its surrounding area.
Data Type: Character (1)
Domain:

Code	Label	Definition
D	Depression	Concave or flat and lower than surrounding topography
F	Flat	Essentially level. Less than 10% of the polygon is on slopes exceeding 2%
U	Undulating	Gently sloping or undulating terrain. Slopes are generally less than 5%.
H	Hilly	Long moderate (no more than 15%) slopes. If present, opposing slopes within a polygon are more than 150m apart.
S	Steep	Long steep (greater than 15%) slopes. If present, opposing slopes within a polygon are more than 150m apart.
G	Gully	Short moderate or steep slopes in opposition. Leading edges are within 150m.

Soil Moisture Regime (SMR)

Required

A class indicating the moisture condition of the site.
Data Type: Character (2)
Domain:

Code	Label	Definition

	VD	Very Dry	Soil retains moisture for a negligible period following precipitation and water infiltration is extremely rapid. Indicates an upland stand.
	D	Dry	Soil retains moisture for brief periods following precipitation and water infiltration is very rapid. Indicates an upland stand.
	MF	Moderately Fresh	Soil retains moisture for short periods following precipitation and water infiltration is rapid. Indicates an upland stand.
	F	Fresh	Soil retains moisture for moderately short periods following precipitation and water infiltration is moderate. Indicates an upland stand.
	VF	Very Fresh	Soil retains moisture for substantial periods following precipitation or in some cases seepage. Water infiltration is somewhat slow.
	MM	Moderately Moist	Soil retains abundant moisture for most of the growing season. Water infiltration following precipitation and periodic seepage is slow. Mottling may occur below 20 cm. Indicates an upland stand.
	M	Moist	Soil is wet for a substantial part of the growing season. Seepage is common with mottling below 20 cm. Indicates an upland stand.
	VM	Very Moist	Soil is wet for most of the growing season. Permanent seepage and mottling are present and weak gleying may occur. May occur in wetland or upland stands.
	MW	Moderately Wet	Soil is wet for nearly all of the growing season. Permanent seepage and mottling is present, gleying in mineral soils, organic soils are also common. Indicates a wetland.
	W	Wet	Water table is at or near the surface (surface seepage) for most of the year. Gleying is common in mineral substrates and organic soils are also common. Indicates a wetland.
	VW	Very Wet	The water table is at or above the soil surface all year. Soils are organic or gleyed mineral. Indicates a wetland.

Aquatic Class (AQUATIC_CLASS)

Required where TYPE is "Water"

A description of the exposed water mapped as a polygon (i.e. with banks > 15m apart). Where included, polygons must be completely described by an aquatic class.

Data Type: Character (2)

Domain:

Code	Label	Definition
LA	Lake	A body of open water, including lakes and open water wetlands.
RI	River	A body of water flowing through a channel (> 15m wide) to a lake, marsh or river.
FL	Flooded Land	Areas recently covered with water, persistent due to hydrologic alteration
SF	Seasonal Floods	Areas recently covered with water, ephemeral due to seasonal precipitation
DI	Ditch	A long narrow depression created to drain water or provide irrigation.
FP	Flooded Pit	Any other anthropogenic water feature, such as dugouts, flooded borrow pits, end-pit lakes, etc.

Land Use Clearing (LUC)

Required where TYPE is "Agricultural Land" or TYPE is "Unclassified" and TRANSP_CLASS is absent

A description of anthropogenic land use, other than linear features mapped as a polygon.

Data Type: Character (3)

Domain:

Code	Label	Definition
ALA	Agriculture	Lands which are cultivated for growing crops, including abandoned fields, and areas used for pasture.
POP	Populated area	Municipal areas including hamlets, resorts, towns, and cities
REC	Recreation area	Designated recreation sites, campgrounds, and parks
PEX	Peat extraction	Peat extraction area
GPI	Gravel pit	Gravel pit
BPI	Borrow pit	Borrow pit
MIS	Mine site	Mine site
ASA	Active sawmill site	Active forest products facility (not limited to sawmills)
NSA	Non-active sawmill site	Non-active forest products facility (not limited to sawmills)
AFS	Air facility site	Any air strip, runway, and associated infrastructure
CEM	Cemetery	Cemetery
WEH	Wellhead	Wellhead associated clearing

	TOW	Tower site	Tower site
	OIS	Other industrial	Other industrial site
	OUS	Other unspecified	Other unspecified clearing

Transportation Class (TRANSP_CLASS)

Required where TYPE is "Unclassified" and LUC is absent

A description of anthropogenic land use for linear features mapped as a polygon (width exceeds 15m or is required to separate two different forest stands on either side of the feature).

Data Type: Character (3)

Domain:

Code	Label	Definition
RWC	Roadway	Road corridor including right of way
RRC	Railway	Rail line including right of way
TLC	Transmission Line	Overhead power or telephone transmission line and right of way
PLC	Pipeline	Cleared right of way for underground utilities
MPC	Multipurpose	Multipurpose corridors, including fire breaks or cut lines.

Most Recent to Historical Disturbance (DISTURBANCE_1 .. DISTURBANCE_3)

Required where disturbance is evident and occurred within 30 years.

A description of up to three anthropogenic and/or natural disturbances affecting a polygon. Distrurbances are to be identified where they affect at least 5% of the crown closure of a treed polygon, and have occurred within 30 years from the date of imagery. Order listed is from most recent to more historical.

Data Type: Character (2)

Domain:

Code	Label	Definition
CO	Cutover	Areas will be delineated as cutover where portions or all of the forest cover have been manually or mechanically harvested.
BO	Burnover	Areas will be delineated as burnover where portions or all of the forest cover have been intentionally or naturally burned.
WI	Windthrow	Areas will be delineated as windthrow where portions or all of the forest cover have been uprooted or broken by wind.
HA	Hail or Snow	Areas will be delineated as hail damaged where portions or all of the forest cover have been affected by hail or heavy snow loads.
IN	Insect	Areas will be delineated as insect damaged where insects have damaged portions or all of the forest cover. The year of infestation should reflect the year of insect damage assessment.
DI	Disease	Areas will be delineated as disease damaged where portions or all of the forest cover have been damaged by disease. The year of infection should reflect the year of disease damage assessment.
AK	Animal Kill	Areas will be delineated as animal damaged or killed where animals have damaged portions or all of the forest cover (e.g., aspen girdled or felled by beavers, grazing damage by cattle).
SL	Slump	Areas will be delineated as slumps where portions or the entire site have collapsed (usually on a slope).
SI	Silviculture	Areas will be delineated as silviculturally treated where portions or all of the area have been site prepared, planted, thinned, tended, fertilized or been subject to any other silvicultural treatment. Where further information is required on the specific type of treatment, silvicultural records should be consulted.

Note: 3 attribute fields are described here

Extent of Disturbance (DISTURBANCE_EXTENT_1 .. DISTURBANCE_EXTENT_3)

Required where disturbance is evident and occurred within 30 years.

A description of the proportion of the polygon area affected by the disturbance described in DISTURBANCE_1, DISTURBANCE_2, or DISTURBANCE_3. Order listed is from most recent to more historical.

Data Type: Integer

Domain:

Code	Label	Definition
1	Light	1 – 25% of the area has been affected
2	Moderate	26 – 50% of the area has been affected
3	Heavy	51 – 75% of the area has been affected
4	Severe	76 – 94% of the area has been affected
5	Entire	95 – 100% of the area has been affected

Note: 3 attribute fields are described here

Year of Disturbance (YOD_1 … YOD_3)

The year of disturbance. A decadal estimate may be used, wherein the recorded year represents the midpoint of the decade (e.g. 1950 decade includes 1946 to 1955). Annual origins are permissible where ancillary data are available.

Required where disturbance is evident and occurred within 30 years.	**Data Type:** Integer **Unit:** Calendar Year **Precision:** Year or Decade **Domain:** [19XX...2XXX] Note: 3 attribute fields are described here
Precision of Year of Disturbance Record (YOD_TYPE_1 … YOD_TYPE_3) Required where disturbance is evident and occurred within 30 years.	Flag indicating the Year of Disturbance is recorded as an annual or decadal estimate. **Data Type:** Character (1) **Domain:** **Code** / **Label** / **Definition** a / Annual / Recorded year represents year of origin d / Decadal / Recorded year represents the midpoint of the decade of origin
Effective Year of Inventory (INVENTORY_YEAR) Required	The effective date (calendar year) of the inventory for each polygon. By default this will be the year of photography. Other determinations may be justified on the basis of the specific inventory methods employed, provided such rationale accompanies the feature source documentation. **Data Type:** Integer **Unit:** Calendar Year **Precision:** Year **Domain:** [19XX...2XXX]

Polygons with at least 6% vegetation cover are considered forested and require a vegetation description by vertical layers. Up to three tree layers, a shrub layer, and a herb layer may be included. Multiple tree layers are required where the tree heights within a stand differ by at least three meters, and distinct cohorts are differentiable. Where cohorts are not discretely identifiable, but heights are variable throughout the stand, one tree layer is assigned, and identified as a "complex layer". For each vegetation layer, the attributes shown in Table 3 are required, unless otherwise noted. A list of eligible vegetation species is provided in Table 4.

Table 3. Vegetation Layer Attribute Requirements.

Attribute Name	Attribute Definition
Polygon Identifier (POLY_ID) Required	A twelve digit numeric identifier for the inventory polygon. The first seven digits are reserved for the UTM mapsheet (10x10km) identifier. The remaining five digits are used to indicate a unique polygon within the mapsheet. Various numbering schemes may be used. Used as a primary key if the data are stored as normalised tables. **Data Type:** Integer **Domain:** [125554300001..143266500001]
Crown Closure (CROWN_CLOSURE) Required for all vegetation layers	For tree layers, the percentage of the ground area covered by vertical projection of tree crowns to the ground. For shrub and herb layers, the ground area covered by above-ground vegetation. **Data Type:** Integer **Unit:** Percentage **Precision:** Nearest 1% **Domain:** [1..100]
Height (HEIGHT) Required for tree layers	The average height of the dominant and co-dominant trees of the leading species in a layer. For stands in which a single, complex layer is called, the median height within the range. **Data Type:** Integer **Unit:** Meters **Precision:** Nearest 1m **Domain:** [1..45]
Height Range (HEIGHT_AE) Required for polygons with LAYER_TYPE = "Complex"	The half-width of the range in height for a complex layer, such that the stand height can be described as HEIGHT ± HEIGHT_AE **Data Type:** Integer **Unit:** Meters **Precision:** Nearest 1m **Domain:** [2…15]
Canopy Pattern (HEIGHT_AE) Required for tree layers	A description of the horizontal structure (spatial arrangement) of the trees in a layer **Data Type:** Character (2) **Domain:** **Code** / **Label** / **Definition** P1 / Open, Uniform / Crown closure ≤ 50%, crowns rarely interlock, uniform spacing

<table>
<tr><td></td><td>
<table>
<tr><td>P2</td><td>Open, Clumped</td><td>Crown closure ≤ 50%, trees are consolidated into ≥ 1 patch per 2 hectares</td></tr>
<tr><td>P3</td><td>Open, Variable</td><td>Crown closure ≤ 50%, < 1 patch per 2 hectares, spacing is not uniform</td></tr>
<tr><td>P4</td><td>Closed, Clumped</td><td>Crown closure > 50%, trees are consolidated into ≥ 1 patch per 2 hectares</td></tr>
<tr><td>P5</td><td>Continuous, Variable</td><td>Crown closure > 50%, openings are common but small relative to patch size</td></tr>
<tr><td>P6</td><td>Continuous Uniform</td><td>Crown closure > 50%, spacing is uniform, openings are uncommon</td></tr>
</table>
</td></tr>
<tr><td>Year of Origin (YOO)

Required for tree layers</td><td>The year of germination for the dominant/co-dominant trees of the leading species. Generally a decadal estimate will be used, wherein the recorded year represents the midpoint of the decade (e.g. 1950 decade includes 1946 to 1955). Annual origins are permissible where ancillary data are available. Where year of origin estimates are derived from breast-height increment cores, the adjustment factors (years to breast height) must be provided. In absence of localised information, the default factors in Table 4 may be used.

Data Type: Integer
Unit: Calendar Year
Precision: Year or Decade
Domain: [1700...2XXX]</td></tr>
<tr><td>Precision of Year of Origin Record (YOO_TYPE)

Required for tree layers</td><td>Flag indicating the Year of Origin is recorded as an annual or decadal estimate.
Data Type: Character (1)
Domain:
<table>
<tr><th>Code</th><th>Label</th><th>Definition</th></tr>
<tr><td>a</td><td>Annual</td><td>Recorded year represents year of origin</td></tr>
<tr><td>d</td><td>Decadal</td><td>Recorded year represents the midpoint of the decade of origin</td></tr>
</table>
</td></tr>
<tr><td>Leading Species (SP1)
Required for all vegetation layers</td><td>The dominant or leading species in a layer.
Data Type: Character(2)
Domain: See Table 4</td></tr>
<tr><td>Leading Species Percent (SP1_COVER)
Required for all vegetation layers</td><td>The contribution of the leading species to the overall CROWN_CLOSURE within a layer.
Data Type: Integer
Unit: Classed Percent (Percent x 10)
Precision: 10 Percent
Domain: [1..10]</td></tr>
<tr><td>Second Species to Sixth Species (SP2 … SP6)
Required for all vegetation layers where multiple species are present</td><td>The identity of the second, third, fourth, fifth, and sixth species in order of descending crown closure. All species with ≥ 10% contribution to the layer's crown closure should be identified, to a maximum of six species for tree layers.
Data Type: Character(2)
Domain: See Table 4

Note: 5 attribute fields are described here</td></tr>
<tr><td>Second Species Percent to Sixth Species Percent (SP2_COVER … SP6_COVER)
Required for all vegetation layers where multiple species are present</td><td>The contribution of the second, third, fourth, fifth, and sixth species species to the overall CROWN_CLOSURE within a layer.
Data Type: Integer
Unit: Classed Percent (Percent x 10)
Precision: 10 Percent
Domain: [1..10]

Note: 5 attribute fields are described here</td></tr>
<tr><td>Seventh Species to Tenth Species (SP7 … SP10)
Permissible for shrub and herb layers where >6 species are present</td><td>The identity of the seventh, eighth, ninth, and tenth species in order of descending cover for shrubs and herbs (where present). All species with ≥ 10% contribution to the layer's crown closure should be identified, to a maximum of ten species for shrub and herb layers.
Data Type: Character(2)
Domain: See Table 4

Note: 4 attribute fields are described here</td></tr>
<tr><td>Seventh Species Percent to Tenth Species Percent (SP7_COVER … SP10_COVER)
Permissible for shrub and herb layers where >6 species are present</td><td>The contribution of the second, third, fourth, fifth, and sixth species species to the overall CROWN_CLOSURE within a layer.
Data Type: Integer
Unit: Classed Percent (Percent x 10)
Precision: 10 Percent
Domain: [1..10]

Note: 4 attribute fields are described here</td></tr>
</table>

Table 4. SFVI species list, by vegetation layer.

Code	Name	Latin Name	Summary Species Type	Default Years to Breast- Height Age Factor	Site Index Equation
Eligible Tree Layer Species					
wS	White spruce	*Picea glauca* (Moench) Voss	Softwood	15	Hu & Garcia 2010
bS	Black spruce	*Picea mariana* (Mill.) B.S.P.	Softwood	20	Huang 1997 *a*
jP	Jack pine	*Pinus banksiana* Lamb.	Softwood	8	Fang 2007
bF	Balsam fir	*Abies balsamea* (L.) Mill.	Softwood	7	Huang 1997
tL	Tamarack	*Larix laricina* (Du Roi) K. Koch	Softwood	12	Huang 2009 *b*
lP	Lodgepole pine	*Pinus contorta* Dougl. ex. Loud.	Softwood	8	Cieszewski 1993
tA	Trembling aspen	*Populus tremuloides* Michx.	Hardwood	4	Nigh 2002 *c*
bP	Balsam poplar	*Populus balsamifera* L.	Hardwood	4	Huang 2009 *d*
wB	White birch	*Betula papyrifera* Marsh.	Hardwood	5	Huang 2009 *d*
gA	Green ash	*Fraxinus pennsylvanica* Marsh.	Hardwood	7	Cieszewski 1993
mM	Manitoba maple	*Acer negundo* L.	Hardwood	4	Cieszewski 1993
wE	White elm	*Ulmus americana* L.	Hardwood	10	Cieszewski 1993
bO	Bur oak	*Quercus macrocarpa* Michx.	Hardwood	10	Cieszewski 1993
rP	Red pine	*Pinus resinosa* Ait.	Hardwood	8	Lundgren & Dolid 1970 *e*
sP	Scots pine	*Pinus sylvestris* L.	Hardwood	9	Elfving & Kiviste 1997 *f*
sL	Siberian larch	*Larix sibirica* Ledeb.	Softwood	12	Huang 2009 *b*
pC	Plains cottonwood	*Populus deltoides* var. *occidentalis* Rydb.	Hardwood	4	Huang 2009 *d*
Eligible Shrub Layer Species					
Ts	Generic Tall Shrub	Any shrub with potential to grow 2 to 5m tall	na	na	na
Al	Green/River Alder	*Alnus* species	na	na	na
Bh	Beaked hazel	*Corylus cornuta* Marsh.	na	na	na
Ma	Mountain maple	*Acer spicatum* L.	na	na	na
Sa	Saskatoon berry	*Amelanchier alnifolia* Nutt.	na	na	na
Pc	Pin/Choke cherry	*Prunus pensylvanica* L / *P. virginiana* L.	na	na	na
Cr	High-bush cranberry	*Viburnum opulus* var *americanum* Ait.	na	na	na
Wi	Willows	*Salix* species	na	na	na
Ls	Generic Low Shrub	Any shrub with potential to grow ≤ 2m tall	na	na	na
Ro	Prickly rose	*Rosa acicularis* Lindl.	na	na	na
Bi	Bog birch	*Betula glandulosa* Michx.	na	na	na
Bu	Buffaloberry	*Shepherdia canadensis* (L.) Nutt.	na	na	na
Dw	Red-osier dogwood	*Cornus sericea* ssp. *stolonifera* (Michx). Fosb.	na	na	na
Ra	Wild red raspberry	*Rubus idaeus* L.	na	na	na
Cu	Currant/Gooseberry	*Ribes* species.	na	na	na
Sn	Western snowberry	*Symphoriocarpos occidentalis* Hook.	na	na	na
Bb	Blueberry	*Vaccinium myrtilloides* Michx.	na	na	na
Ci	Shrubby cinquefoil	*Dasiphora fruticosa* (L.) Rydb.	na	na	na
Bl	Bog laurel	*Kalmia polifolia* Wang.	na	na	na
La	Labrador tea	*Ledum groenlandicum* Oeder	na	na	na
Le	Leatherleaf	*Chamaedaphne calyculata* (L.) Moench	na	na	na
Be	Bearberry	*Arctostaphylos uva-ursi* (L.) Spreng.	na	na	na
Lc	Low-bush cranberry	*Viburnum edule* (Michx.) Raf.	na	na	na
Lb	Lingonberry	*Vaccinium vitis-idea L.*	na	na	na
Eligible Herbs Layer Species					
He	Generic Forb	Any herbaceous plant not listed below	na	na	na
Fe	Fern and Allies	Ferns, horsetails, club mosses	na	na	na
Gr	Graminoids	Grasses, sedges, rushes	na	na	na
Mo	Mosses	Forest floor, seepage, and peat mosses	na	na	na
Li	Lichens	Club, shrub, and leaf lichens	na	na	na
Av	Aquatics	Emergent, floating, and submerged plants	na	na	na

Site Index Model Notes :

a Coefficients for the Central Mixedwood natural subregion are required

b Coefficients for lodgepole pine are required

c Coefficients for the Boreal Black and White Spruce biogeoclimatic zone are required

d Coefficients for trembling aspen are required

e Coefficients for the “monomolecular growth function” are required. SI is for 50y total age. Height is entered as feet, SI is to be converted to meters from feet.

f Coefficients for the Hossfield II model (equation 7) are required. A2 is to be set to 50 (years breast-height age).

Standardized Provincial Forest Types and Forest Inventory Metrics

In addition to the required stand and vegetation layer attributes, a set of standard forest inventory metrics (Table 5) are to be interpreted or calculated for the inventory. Where multiple tree layers exist, a "main canopy" is to be defined and used to populate the summary attributes populated as described in Table 5.

Table 5. Standardized Forest Inventory Metrics

Attribute Name	Attribute Definition
Main Canopy Layers (CANOPY_LAYERS) Required	A listing of the tree layers that contribute to the main canopy, or 0 if no canopy exists. **Data Type:** Integer **Unit:** Layer Designations **Precision:** 1 **Domain:** [0,1,12,123,2,23,3]
Crown Closure (CROWN_CLOSURE) Required	The sum of the crown closure for all layers identified as the main canopy. **Data Type:** Integer **Unit:** Percentage **Precision:** Nearest 1% **Domain:** [0..100]
Height (HEIGHT) Required	The crown-closure weighted average height of the layers identified as the main canopy **Data Type:** Integer **Unit:** Meters **Precision:** Nearest 1m **Domain:** [0..45]
Hardwood Percent (HWD) Required	An estimate of the proportional basal area in hardwoods, calculated as the crown-closure weighted average contribution of hardwood species to the total crown closure of the layers identified as the main canopy **Data Type:** Integer **Unit:** Percentage **Precision:** Nearest 10% **Domain:** [0..100]
Softwood Percent (SWD) Required	An estimate of the proportional basal area in softwoods, calculated as the crown-closure weighted average contribution of softwood species to the total crown closure of the layers identified as the main canopy **Data Type:** Integer **Unit:** Percentage **Precision:** Nearest 10% **Domain:** [0..100]
Leading Hardwood (LEAD_HWD) Required	The dominant or leading hardwood species in the main canopy. May be null. **Data Type:** Character(2) **Domain:** See Table 4
Secondary Hardwood (SEC_HWD) Required	The secondary hardwood species in the main canopy. May be null. **Data Type:** Character(2) **Domain:** See Table 4
Leading Softwood (LEAD_SWD) Required	The dominant or leading softwood species in the main canopy. May be null. **Data Type:** Character(2) **Domain:** See Table 4
Secondary Softwood (SEC_SWD) Required	The secondary softwood species in the main canopy. May be null. **Data Type:** Character(2) **Domain:** See Table 4
Breast-Height Age (BHAGE) Required	An estimate of the age of the main canopy trees of the leading species at 1.3m above ground **Data Type:** Integer **Unit:** Years **Precision:** Nearest 1 year **Domain:** [0..300]

Cover Species Group (CSG)
Required where TYPE is FOR

A summary metric describing the relative proportions of softwood and hardwood in potentially productive forest stands
Data Type: Character (1)
Domain:

Code	Description	Definition
S	Softwood	Softwood Percent ≥ 80
SH	Softwood-leading mixedwood	50 ≤ Softwood Percent < 80
HS	Hardwood-leading mixedwood	20 < Softwood Percent < 50
H	Hardwood	Softwood Percent ≤ 20
OP	Open Productive	Potentially productive stands with less than 6% crown closure

Provincial Forest Type (PFT)
Required where TYPE is FOR

A forest type used for sustainability assessments
Data Type: Character (3)
Domain:

Code	Description	Definition
WSF	White spruce or balsam fir dominated softwoods	CSG = S, white spruce and/or balsam fir represents at least 50% of the main canopy softwood crown closure and tamarack represents not more than 10% of the main canopy all-species crown closure.
BSU	Upland black spruce dominated softwoods	CSG = S, black spruce represents at least 50% of the main canopy softwood crown closure, pine represents less than 20% of the main canopy all-species crown closure, and SMR is no wetter than moist.
BSW	Black spruce dominated swamps and wet uplands or tamarack influenced softwoods	CSG = S and (black spruce represents at least 50% of the main canopy softwood crown closure, pine represents less than 20% of the main canopy all-species crown closure, and SMR is very moist or wetter) or tamarack represents more than 10% of the main canopy all-species crown closure.
BSL	Alternative Class: Black spruce or tamarack dominated softwoods	BSU or BSS
JLP	Jack or lodgepole pine dominated softwood stands	CSG = S and jack pine and/or lodgepole pine represents over 50% of the main canopy softwood crown closure, and white spruce and/or black spruce represents less than 20% of the main canopy all-species crown closure.
BSJ	Spruce and pine dominated mixed softwoods	CSG = S and black spruce and/ or white spruce and jack pine and/or lodgepole pine each represents at least 20% of the main canopy all-species crown closure, but white spruce and/or balsam fir represents less than 50% of the main canopy softwood crown closure and tamarack represents not more than 10% of the main canopy all-species crown closure.
PMW	Pine dominated mixedwood stands	CSG = SH and pine represent s more of the main canopy crown closure than spruce and allies
SMW	Softwood leading mixedwood with spruce and allies (wS, bS, bF, tL)	CSG = SH and spruce and allies represent the same or more of the main canopy crown closure as pine
HPM	Hardwood leading mixedwood with pine	CSG = HS and pine represents

			more of the main canopy crown closure than spruce and allies
	HSM	Hardwood leading mixedwood with spruce and allies (wS, bS, bF, tL)	CSG = HS and spruce and allies represent the same or more of the main canopy crown closure as pine
	HTA	Trembling aspen dominated hardwood stand	CSG = H, trembling aspen and/or birch represent at least 50% of the main-canopy hardwood crown closure, but birch represents less than 20% of the main canopy all-species crown closure
	HWB	Hardwood stands containing substantial amounts of white birch	CSG = H, trembling aspen and/or represent at least 50% of the main-canopy hardwood crown closure, and birch represents at least 20% of the main canopy all-species crown closure
	TAB	Alternative Class: trembling aspen or white birch dominated hardwood	HTA or HWB
	AOH	Other hardwood dominated stand (balsam poplar, ash, maple, elm)	CSG = H, a combination of balsam poplar, green ash, Manitoba maple and/or white elm represent more than 50% of the main-canopy hardwood crown closure.
	OPP	"Open productive" polygons which do not currently support trees	CSG = NT
Inventory Site Index (ISI) Optional	Inventory Site Index characterizes the historic height growth of trees that are currently dominant in an existing stand of trees. It reflects not only the potential of the site, but also conditions under which those trees have grown, which may not have always been free-growing. It is defined as the height of a site tree at 50 years of age (at breast height). A site tree is the largest diameter tree of a given species, selected from a 100 m^2 area, which expresses the height growth potential of the site in a free-growing stand condition. For ISI estimation, the average height of the leading species of the main canopy may be used to estimate site tree height. The approved site index equation for each species is shown in Table 4. **Data Type:** Float **Unit:** meters **Precision:** Nearest 0.1m **Domain:** [null,5...30]		
Post-Harvest Site Index (PHSI) Optional	Post-Harvest Site Index is used to reflect potential height growth of dominant free-growing, undamaged trees in even-aged stands following harvest. This differentiates the site index estimate from an existing, possibly older stand, from one that may better reflect the growth of trees in a post-harvest regeneration condition. SFVI information alone cannot be used to estimate PHSI: a supplemental ground sampling project is required. **Data Type:** Float **Unit:** meters **Precision:** Nearest 0.1m **Domain:** [null,5...30]		
Basal Area (BA) Optional	Basal area is an expression of site occupancy based on the cross-sectional area (m^2 at breast-height) of all stems in the main canopy on a per-hectare basis. **Data Type:** Float **Unit:** meters **Precision:** Nearest 0.1m **Domain:** [null,5...100]		
Quadratic Mean Diameter (QMD) Optional	Average diameter of trees in the main canopy, calculated using a quadratic mean or derived from basal area and stem count. **Data Type:** Float **Unit:** centimeters **Precision:** Nearest 0.1cm **Domain:** [null,0...200]		
Stems per Hectare (STEMS) Optional	Number of trees in the main canopy on a per-hectare basis **Data Type:** Float **Unit:** centimeters **Precision:** Nearest 0.1cm **Domain:** [null,0...100,000]		
Gross Biological	Gross biological volume per hectare, in the tree stem from the ground to the tip.		

Volume (VOLUME) Optional	**Data Type:** Float **Unit:** cubic meters **Precision:** Nearest $1m^3$ **Domain:** [null,0...600]
Merchantable Volume (MVOLUME) Optional	Gross merchantable volume per hectare, in the tree stem from a specified stump height to a specified top diameter, with a minimum length, and log sorting rules applied. **Data Type:** Float **Unit:** cubic meters **Precision:** Nearest $1m^3$ **Domain:** [null,0...600]
Utilization Scenario (UTILIZE) Required where MVOLUME is populated	A record of the stump height, inside-bark top diameter, minimum length, and log sorting rules applied in calculation of the Merchantable Volume. **Data Type:** Character (25) **Domain:** [formatted as height in meters / top diameter / minimum length / log length (specify) or tree length. e.g. 30/10/5.0/CTL2.6 or e.g. 30/10/5.0/TreeLength]

Ground Truth Sampling and Volume Estimation

SFVI mapping is supported by a series of ground or low-level aerial observations, established at a minimum frequency of 1 observation per 1,000 ha. These plots may be used to calibrate the attribution methods, and/or to confirm the population estimates of volume derived from the inventory. Calibration plots may be placed as required to best support attribution. If plots are used to generate population estimates of volume, plots must be located according to a valid probability sample as described in a sampling plan to be approved by the Minister. This plan must specify a sampling error target and a confidence level (percentage confidence interval or number of standard errors), as well the audit protocols to be employed for quality assurance.

Feature Source Documentation

For each mapsheet, the source of the data used to delineate polygons and populate each attribute, or set of similar attributes, for the SFVI polygon must be included. This information must be specific with respect to scale, pixel size, or footprint of imagery, and sensor name or generic spectral characteristics (for example: “1:15,000 scale black and white IR film”, or “0.5m 4 band multi-spectral [sensor name] satellite imagery”). The month and year of data collection must also be specified. Where methods differ within a mapsheet, polygon-level feature source attribution is required. Feature source documentation must be accompanied by an entry in the stand table for Effective Year of Inventory. For assessment of the currency of forest inventories, the time-since-inventory age of the SFVI for any administrative unit is determined as the current year minus the area-weighted average effective year.

Data Submission, Audit, and Acceptance Criteria

SFVI data must be submitted to the Ministry of Environment prior to its use for forest management planning. The Minister reserves the right to audit the SFVI. Such audits may include an imagery review exercise on a subset of at least 30 polygons on each of at least 5% of the mapsheets in a project area, and/or a field verification in which at least 30 polygons are visited across the project area.

The requirements and basis for assessment of each auditable attribute is shown in Table 6. All mapsheets must meet the spatial reference, appropriate tiling, digital polygon integrity, and polygon identifier requirements in order for the inventory to be accepted.

Deficiencies in any of the other attributes will require a corrective action plan to be developed and implemented to the satisfaction of the Minister.

Table 6. Inventory Audit Acceptance Criteria

Property or Attribute	Requirement	Basis for Assessment
Spatial Reference (registration)	Polygon centroids must be within 13m of their apparent position on the orthophoto base map, 9 times of out 10.	Purposively selected, clearly recognizable polygons per mapsheet
Appropriate Tiling	All stands must be separated at the 10x10km UTM mapsheet boundary as defined in the NAD83 projection.	All polygons per mapsheet
Digital Polygon Integrity (topology)	All polygons must close, must not overlap, and must not have gaps. There shall be no muti-part polygons.	All polygons per mapsheet
Polygon Identifier (POLY_ID)	Must be unique, and correctly contain the mapsheet number in the first seven digits.	All polygons per mapsheet
Polygon Delineation	The minimum mapping unit requirements must be met for 6 out of 10 polygons checked.	Randomly selected polygons
Stand Type (TYPE)	Must be correct, 9 times out of 10, based on imagery review.	Randomly selected polygons
Land Use Clearing (LUC)	Must be correct, 9 times out of 10, based on imagery review.	Randomly selected polygons
Transportation Class (TRANSP_CLASS)	Must be correct, 9 times out of 10, based on imagery review.	Randomly selected polygons
Aquatic Class (AQUATIC_CLASS)	Must be correct, 9 times out of 10, based on imagery review.	Randomly selected polygons
Topographic Class (TOPO CLASS)	± 1 class, 9 times out of 10, based on imagery review	Randomly selected polygons
Soil Moisture Regime (SMR)	± 1 class, 9 times out of 10, based on imagery review	Randomly selected polygons
Disturbance Events (DISTURBANCE_ 1.. DISTURBANCE _3)	Must be correct, 9 times out of 10, based on imagery review.	Randomly selected polygons
Disturbance Extents (DISTURBANCE_EXTENT_1.. DISTURBANCE_EXTENT_3)	± 1 class, 9 times out of 10, based on imagery review	Randomly selected polygons
Year of Disturbance (YOD_1.. YOD_3)	± 1 year or decade	Randomly selected polygons
Tree Layer Type (LAYER_TYPE)	Must be correct, 9 times out of 10, based on imagery review.	Randomly selected polygons
Tree Layers Crown Closure (CROWN_CLOSURE)	± 10%, 9 times out of 10, based on imagery review.	Randomly selected polygons
Canopy† Tree Layer Leading Species (SP1)	Must be correct, 9 times out of 10, based on imagery review	Randomly selected polygons
Canopy† Tree Layer Leading Species Percent (SP1_COVER)	± 10% (i.e. 1 unit), 9 times out of 10, based on imagery review	Randomly selected polygons
Canopy† Tree Layer Second Species (SP2)	Must be correct, 9 times out of 10, based on imagery review	Randomly selected polygons
Canopy† Tree Layer Second Species Percent (SP2_COVER)	± 10% (i.e. 1 unit), 9 times out of 10, based on imagery review	Randomly selected polygons
Canopy† Tree Layer Canopy Pattern (CANOPY_PATTERN)	± 1 class, 9 times out of 10, based on imagery review	Randomly selected polygons
Canopy† Tree Layer Height (HEIGHT)	Mean inventory height across selected polygons is within 1 standard error of the mean field sample estimate for the same polygons.	A transect/cluster of field observations within a number of sample polygons
Canopy† Tree Layer Year of Origin (YOO)	Mean year of origin for selected polygons is within the larger of : 1 standard error of the mean field sample estimate for the same polygons, or 10 years.	A transect/cluster of field observations within a number of sample polygons
Stand Volume (Gross Biological or Merchantable Volume)	Volume estimates are derived according to an approved sampling plan. This plan specifies a sampling error target and a confidence level as well the audit protocols to be employed.	

† Canopy tree layer is as defined as in Table 5.

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