

## What's New in Silviculture Surveys - 2022

The survey and reporting changes listed below are **recommended**, but still considered optional for the 2022 field season. They will become mandatory on **April 1<sup>st</sup>, 2023**, when the RESULTS Information Submission Specifications ([RISS](#)) documents are updated.

If placing an order for paper plot cards from [www.dcv.gov.bc.ca](http://www.dcv.gov.bc.ca), you will need to specify your preferred version (2020 or 2022). The updated 2022 cards should be ready for ordering by late April.

New videos are available on the Silviculture Surveys website and the BC Silviculture Surveys YouTube channel. There are 4 training sessions:

- What's New 2022
- 2022 FS660 Changes
- 2022 FS658 and FS659 Updates
- Rationales for the 2022 Survey and Reporting Changes

Email [taisa.brown@gov.bc.ca](mailto:taisa.brown@gov.bc.ca) if you would like to:

- join the surveyor distribution list
- provide feedback on the survey procedures, field cards, manual, videos, etc.
- learn about the silviculture surveyor accreditation program

### 1. Updates to the Silviculture Survey Procedures Manual

The changes are outlined by Section. In the manual, the changes are highlighted with red font.

#### Section 2.1.1 Regeneration Delay Survey Timing:

- Pg. 14: Introduced two best management practices (BMPs):
  - If survival is expected to be poor, licensees should avoid declaring regeneration delay met at the time of planting. This is important to capture and report the forest health factors and the surviving forest cover.
  - If the regeneration obligation is reported at the time of planting and the forest cover inventory significantly changes, it is a BMP to submit an additional forest cover submission to RESULTS.

#### Section 2.1.3 Free Growing Survey Timing:

- Pg. 15: Introduced two BMPs:
  - It is advisable to schedule stocking surveys early in the stand development. This allows for early identification of issues and the opportunity to manage the issues prior to free growing.
  - Free growing surveys should be timed to maximize identification of forest health factors. For example, if rust incidence or hazard is high, the survey should be conducted during the rust sporulation season and when rust expression is at its peak.

#### Section 3.4.3.4 Countable Conifers:

- Pg. 34: It is irrelevant to collect countable conifer data:
  - If maximum density is not listed in the stocking standards

- For areas where the number of countable conifers is well below the maximum density

#### **Section 3.5.1.1 SIBEC:**

- Pg. 38: Provided an example of calculating site index using SIBEC for a stratum with multiple site series.
- Pg. 39: SIBEC is not available for the Thompson-Okanagan and Kootenay-Boundary regions captured in the new LMH 75 and LMH 76.
- Pg. 39: If the leading inventory species is not available in the SIBEC tables or suitable for growth-intercept, then its site index should be predicted using site class conversion (M) or by converting from another species (I). Do not report a site index for a different species.

#### **Section 3.6 Basal Area Forest Cover Requirements:**

- Pg. 40: Layer 1 inventory species composition is based on basal area.

#### **Section 3.8.7 Minimum Stratum Size**

- Pg. 48: [FPPR 46.11](#) and the [Forest Cover Stratification and Milestone Declaration](#) document do not apply to woodlots.
- Pg. 48: A follow-up document to the *Forest Cover Stratification and Milestone Declaration* will be posted on the Silviculture Surveys website in Spring 2022. The new document, *Using Stratification to Achieve Non-Timber Values*, intends to:
  - Show how FPPR 46.11 can be used proactively to achieve non-timber objectives
  - Demonstrate how to strategically prescribe vegetation management
  - Provide guidance on silviculture surveying and RESULTS reporting

#### **Section 4.2 Sampling Intensity**

- Pg. 49: Sampling intensity must reflect the variability of the inventory characteristics (ie. total density, inventory species composition, basal area).
- Pg. 50: Sampling intensity is not capped at 1.5plots/ha; however, there is no expectation to establish more than 1.5plots/ha.

#### **Section 4.4 Sampling Methods**

- Pg. 53: Surveyors should be cautious using representative sampling or visual assessments for free growing surveys. Licensees have an obligation to update the forest cover inventory at free growing. The information must be reported in a form and manner that is satisfactory to the minister (FPPR 86(6)). District and provincial audits have indicated that precision standards are not being consistently met with ocular assessments or representative sampling. This is a compliance issue, and it has impacts on the program areas that rely on accurate inventory information.

#### **Section 4.4.1 Grid Sampling**

- Pg. 53: Only move plots for safety reasons or if they land in non-productive areas.
- Pg. 53: If a plot lands under the drip line of the timber edge, complete the plot.

### **Sections 4.4.3 and 4.4.4 Representative Sampling & Visual Assessments**

- Pg. 56, 57: The results need to be significantly similar to those that would result from a formal survey.
- Pg. 56, 57: To improve the quality of the forest cover inventory, the use of representative sampling and visual sampling for free growing surveys will be restricted to low-risk strata or strata with significant safety or access issues in future years. A form or matrix will be developed in 2022 for licensees to demonstrate that these conditions have been met.
- Pg. 56, 57: Representative sampling and visual sampling are most suitable when:
  - Used by skilled and knowledgeable surveyors with many years of directly related experience.
  - Used for non-declaration (i.e., stocking) surveys:
    - Ex. To map brushing or juvenile spacing treatment areas
    - Ex. To check the efficacy of brushing or juvenile spacing treatments
    - Ex. To confirm that an opening is on track and to schedule a final free growing survey
  - Used on low-risk strata:
    - Obviously free growing and
      - Recent plot survey
      - Low forest health incidence and hazard
      - Low basal area (<5m<sup>2</sup>)
      - Low species diversity
  - For visual assessments, when there are significant access or safety issues.

### **Section 7 Field Data Collection**

- Pg. 62: Printed waterproof field cards can be ordered from the Distribution Centre Victoria [website](#). For 2022, the 2020 and 2022 field cards will be available, so please clearly specify your preferred version. For 2023, all surveyors should be following the new methodologies and using the 2023 field cards.
- Stay tuned- fillable cards are coming soon!

### **Section 7.3 Precision Standards & Allowable Errors**

- Pg. 79: Table 9 now differentiates between the minimum precision standards and non-legal thresholds.

### **Section 7.4 Inventory Label Background**

- Pg. 80: This section outlines and rationalizes all the changes to the inventory label. The changes are being driven by the data needs of internal program areas that use survey information (ex. growth and yield, carbon, forest health, wildlife, wildfire, etc). There are new procedures for determining species composition, heights, ages, crown closure, and density. These changes apply to all stand structures, stocking standards, and survey methodologies (ex. even-aged, DFP, SEDRSS, multi-storey, layered).

### **Section 7.5.1 Plot Types**

- Pg. 81: Outlines the data elements and frequency for “count plots” and “full measure plots.”
- Pg. 81: Height and age measurements will sometimes happen at count plots when the target species is not present at the full measure plot.

**Section 7.5.2 FS658 Silviculture Survey Plot card, with sample data**

BRITISH COLUMBIA		MINISTRY OF FORESTS		SILVICULTURE SURVEY PLOT CARD										SURVEYOR NAME(S) & REGISTRATION NO(S): <b>Anne Simpson, A201500999</b>				SURVEY DATE <b>22 02 16</b>			PAGE OF <b>3 5</b>				
MAPSHEET-OPENING NO. <b>93B023-123</b>					LICENCE NO. <b>FLA12345</b>					CUTTING PERMIT <b>678</b>			BLOCK <b>9a</b>				STANDARDS UNIT <b>1</b>			STRATUM <b>A</b>					
PLOT NO.	STRATUM	DATA TYPE OR LAYER	COUNT CON.	COUNT HEIGHT (m)	Fdi	Sx	Cw	Bl	Pa	At	TOTALS	INV/ SILV SPP #1 AGE	INV SPP #2 AGE	INV / SILV SPP #1 HT	INV SPP #2 HT	INV CRWN CLSR	PLANTABLE	PREPARABLE	GERMINANTS NUMBER 'N'	COMPETING VEG.			FOREST HEALTH		
					p	p	p	a	u	u		% COVER	HT (m)	PEST CODE	TREE SPECIES AND # AFFECTED LIVE TREES	DEAD TREES									
1	A	T	36	1.3	29	2	15	9	-	26	81	12	11	1.7	1.6	21	1	-	6	At	23	2.0	DRA	IFdi, 1Bl	1Fdi
		W			3	1	-	1	-	-	5	-	-	-	-	-	-	-	-	Rubu par	10	1.5	AD	1Fdi	-
		F			3	1	-	Br	-	-	4	12	-	1.6	-	-	-	-	-						
2	A	T	29	0.8	21	12	2	6	-	17	58	-	-	-	-	-	1	1	0	At	50	2.2	IWW	15x	-
		W			1	1	2	-	-	-	4	-	-	-	-	-	-	-	-				DRA	-	15x
		F			1	1	2	-	-	-	4	-	-	-	-	-	-	-	-						
3	A	T	41	1.1	21	12	12	1	-	15	61	12	11	1.6	1.6	20	1	-	0	Sali spp.	15	2.0	DRA	1Fdi, 15x	1Fdi
		W			3	1	2	1	-	-	M	-	-	-	-	-	-	-	-						
		F			2 & 1Ht	1	1 & 1Ht	-	-	-	4	12	-	1.5	-	-	-	-	-						
4	A	T	38	1.5	22	11	1	5	-	16	55	-	-	-	-	-	1	-	3	At	40	2.1	DRA	1Fdi, 15x	-
		W			3	2	1	-	-	-	M	-	-	-	-	-	-	-	-				AD	1Fdi	-
		F			3	1 & 1Ht	1	-	-	-	5	-	-	-	-	-	-	-	-						
5	A	T	32	1.3	27	1	5	6	1	19	59	14	13	1.7	1.7	15	1	-	2	Sali spp.	20	2.4	DRA	1Fdi, 1Bl	1Fdi
		W			4	1	1	1	1	-	M	-	-	-	-	-	-	-	-	Rubu par	20	1.4			
		F			4	1	Br	1	-	-	M	12	-	1.5	-	-	-	-	-						

Notes: Plot 1-The well spaced are clustered to one side so there is still one plantable spot. Plot 2-no signs of repression in the conifers.  
Plot 5-Willow is being browsed. The remaining well spaced Fdi and Sx will outgrow the minor willow competition in 2 or 3 years. Pa looks good but is unacceptable species.  
A brushing treatment is not required. Moose browse on the willow.

BRITISH COLUMBIA		MINISTRY OF FORESTS		SILVICULTURE SURVEY PLOT CARD										SURVEYOR NAME(S) & REGISTRATION NO(S): <b>15</b>				SURVEY DATE <b>6</b>			PAGE OF <b>5</b>			
MAPSHEET-OPENING NO. <b>7</b>					LICENCE NO. <b>8</b>					CUTTING PERMIT <b>9</b>			BLOCK <b>10</b>				STANDARDS UNIT <b>11</b>			STRATUM <b>12</b>				
PLOT NO.	STRATUM	DATA TYPE OR LAYER	COUNT CON.	COUNT HEIGHT (m)	← ← ← ← ←					TOTALS	INV/ SILV SPP #1 AGE	INV SPP #2 AGE	INV / SILV SPP #1 HT	INV SPP #2 HT	INV CRWN CLSR	PLANTABLE	PREPARABLE	GERMINANTS NUMBER 'N'	COMPETING VEG.			FOREST HEALTH		
					93	94	95	96	97		% COVER	HT (m)	PEST CODE	TREE SPECIES AND # AFFECTED LIVE TREES	DEAD TREES									
86	87	88	91	92						98	101	103	104	106	107	108	109	111	112	113	114	115	116	117
		89								99														
		90								100	102		105											

Notes: **118**

### **Section 7.5.2 FS658 Data Entry**

- Pg. 83 (Fields 88-90- **Data Type or Layer**): In the “Data Type or Layer” column, indicate the data type for each row with a T (total trees), W (well-spaced) and F (free growing). If there are multiple layers, the rows will need to be replicated for each applicable layer. Ex. T1, T2, T3, and T4.
- Pg. 83 (Field 93- **Blank/Species**): List all the commercial tree species present within the stratum. Commercial= trees species listed in Table 6 of the FS660 or the RESULTS tree list.
- Pg. 83 (Field 94- **Blank/Acceptability**): Indicate the level of acceptability (p, a, u) for each tree species.
- Pg. 83-84 (Field 95- **Total Trees**): Tally the living, commercial trees by species in the plot. Include acceptable and unacceptable quality trees. All trees are to be tallied, except germinants.
- Pg. 84 (Field 95- **Total Trees**): If there are >50 trees in the 3.99m plot (all species combined, excluding germinants), then it is reasonable to estimate tree counts by species.
- Pg. 85 (Field 98- **Totals (Total Trees)**): Record the sum of the total tree tallies by species.
- Pg. 85, 88 (Fields 101, 104- **Inv SPP #1 Age/Height**): Select the tallest (excluding residuals), healthy tree in the 3.99m plot for the leading inventory species of the stratum. Measure and record the age and height of the selected tree.
- Pg. 85, 88 (Fields 102,105- **Silv SPP #1 Age/Height**): Select an average well-spaced or free growing tree from within the plot for the leading WS and/or FG species of the stratum. Measure and record the age and height of the selected tree.
- Pg. 85, 88 (Fields 103,106- **Inv SPP #2 Age/Height**): Select the tallest (excluding residuals), healthy tree in the 3.99m plot for the second most abundant inventory species of the stratum. Measure and record the age and height of the selected tree.
- Pg. 86: If the leading silviculture species for the stratum is unclear based on your walk-through, collect heights and ages for each of the potentially leading species. These measurements can be averaged by species and reported to RESULTS.
- Pg. 86: If the leading or second inventory species for the stratum is unclear based on your walk-through, collect inventory heights and ages for each of the potentially leading and second inventory species. These measurements can be averaged by species and reported to RESULTS.
- Pg. 86: While it is optional, there are many benefits to collecting and reporting silviculture heights and ages for the non-leading silviculture species. For example, silviculture heights and ages by species can be used to compare free growing heights for each species to the stocking standard minimum heights, to predict free growing timing, and to understand growth rates by species.
- Pg. 86 (Fields 101, 103, 104, 106- **Healthy**): The inventory heights and ages should be measured on a healthy tree. At regen delay, the sample tree must be adequately healthy to survive to free growing. At free growing, a healthy tree must meet the free growing damage criteria. Advanced regeneration must meet the advanced regeneration criteria outlined in the FS660.
- Pg. 87 (**Determining tree heights**): Measure from the point of germination to the top of the stem of the dominant leader of the selected tree. During the active growing season, include the leader growth (in-season partial growth) in the height measurement.
- Pg. 87 (**Frequency of measurements**): Measurements for silviculture and inventory heights and ages should be recorded on the first plot and every fourth plot thereafter. Ex. 1, 5, 9, 13, etc. If the target species is not present, complete the height measurement at the next plot with the species present. At minimum, 3 samples should be collected per stratum, although more samples are encouraged.

- Pg. 88 (Field 107- **Crown Closure**): If available, estimate crown closure for the stratum using recent aerial imagery. If not available, the surveyor should estimate the crown closure of the living commercial tree species within their plot.
- Pg. 88 (Field 108- **Plantable**): If the number of plantable spots meets the planting “M-value”, record the letter “M” rather than the numeric value.
- Pg. 89 (Field 110- **Germinants/Number ‘In’ Check Box**): Indicate what data is being collected in the column. Germinants is optional, though highly recommended for natural regeneration assessments or survival surveys. Number ‘In’ should be collected if basal area is specified in the stocking standards or if basal area >5m<sup>2</sup>/ha.
- Pg. 89 (Field 111- **Germinants/ Number ‘In’**): If germinants is checked in Field 110, then record the number of germinants within the plot. A germinant is a ≤ 1-year-old tree under 10cm. Planted seedlings or well-spaced trees of any size or age are counted under total trees by species (Field 95), not germinant (Field 111).  
If Number ‘In’ is checked in Field 110, record the number of Layer 1 trees ‘in’ the prism sweep.
- Pg. 89 (Field 113, 114- **Competing Vegetation**): Estimate % cover and average height of the competing vegetation within the plot.
- Pg. 89, 90 (Field 115- **Forest Health Pest Code**): Forest health information should now be reported at regeneration delay. Tally all incidences of forest health factors (max of 1 per tree). Trees with very minor damage can be excluded if they meet conditions specified on pg. 89. Trees with reportable damage can still be considered well-spaced unless the damage will prevent the tree from attaining free-growing status in the future (ex. rust on the main stem). During stocking surveys, the regeneration delay guidance should be followed if free growing data will not be collected. If free growing trees will be tallied, then the free growing guidance should be followed and the damage criteria should be applied.

**Other (FS658 deletions):**

- The POC, Bearing & Distance fields have been removed. If you are still using map and compass, record your POC, bearing and distances on the back of the field card or in unused fields.
- The Total Con field has been removed. It is not a reportable data element. If you would like to know the number of conifer trees, sum the conifer tree counts in Field 95.
- The GI Sample & Data Spp. column has been removed from the FS658. If using growth intercept, enter the data in the FS659.
- The inventory section of the FS658 has been deleted. This information is now collected at the plot in the “T” rows.



- Pg. 94 (Field 125: **Blank/Total Trees By Species**): Sum total trees by species across all plots.
- Pg. 94 (Field 126: **Total Trees**): Sum the total tree counts by species in Field 125.
- Pg. 94 (Field 127: **Total trees species composition**): Calculate species composition using the total tree value and the tree counts by species.
- Pg. 94, 95 (Fields 128, 129, 130, 131, 141, 142, 143, 144: **Inv and Silv heights and ages**): Average the silviculture height and age measurements by species. Average the inventory height and age measurements by species.
- Pg. 94 (Field 132: **Crown Closure**): If crown closure was determined using ground-based estimates, average the plot estimates.
- Pg. 94 (Field 136: **Germinants**): If germinants is recorded in Field 110, record the sum of germinants across all plots.
- Pg. 96 (Field 156: **Calculations**): Calculate the average germinants per hectare.
- Pg. 97 (Field 163: **Species & %**): The inventory label species composition is based on Field 127 and uses tree counts by species. Do not round species composition. The inventory label can host 10 species. If there are greater than 10 species, group the most minor species with the leading species.

### **Section 8.1 FS659 Silviculture Survey card, back side**

- Pg. 100 (Field 175: **Area if only part of the stratum is affected**): Warning- this field does not exist in SNAP or SAP or many licensee databases. However, it is a required reporting element for RESULTS.
- Pg. 101 (Fields 180, 181: **Treatment Recommendations and Considerations**): The RESULTS objective code field is now mandatory for drought or frost-caused replants. If applicable, indicate in the treatment recommendations to use NG (frost) or ND (drought) as the objective code.

### **Section 8.1.4 Inventory Label- Polygon**

- Pg. 113: Fully re-written to reflect the changes in procedures.

Old: Fdi40At30Sx10Bl10Cw10 -13/12-1.4/1.3-21/I-19-12700(22)

New: Fdi38At30Sx12Bl11Cw9-13/12-1.7/1.6-21/I-19-12520(22)

#### **Key Changes:**

- Record species composition to the nearest 1%
- Base species composition on tree counts by species for Layers 2, 3, and 4 for plot-based sampling methods.
- Base species composition on basal area sweeps by species for Layer 1.
- Exclude germinants from tree counts.
- Include in-season partial growth for height measurements.
- For height and age measurements, select the tallest, healthy tree (excluding residuals) within the plot for the stratum's leading and secondary species.



### **Section 8.1.5 Silviculture Label-SU**

- Pg. 114: Fully re-written to reflect the changes in procedures.

Old: FG-Fdi56Sx22Bl13Cw9-12-1.2-21/E-920(22)

New: FG-Fdi56Sx22Bl13Cw9-12-1.5-920(22)

Key changes:

- Include in-season partial growth for height measurements.
- Measure height and age on a representative WS or FG tree of the stratum's leading species.
- Site index and source is optional. It is not reported to RESULTS.

### **Section 9.2.1 Multi-Storey Survey**

- Pg. 117: Key features of a multi-storey survey listed.

#### **Section 9.2.1.6 Basal Area (BA)**

- Pg. 124: Basal area must be collected by species for layer 1 to calculate the inventory species composition and to make stand management decisions. Basal area must be reported to RESULTS when it exceeds 5m<sup>2</sup>/ha or is part of a stocking standard.

#### **Section 9.2.1.8.3 Multi-Storey Data Collection**

- Pg. 125: Count trees by species for Layers 2, 3, and 4.
- Pg. 125: Count total "Number In" by species for Layer 1.
- Pg. 127: At the full measure plots, record crown closure, silviculture heights/ages and inventory heights/ages by layer, as per Section 7.5.2.

#### **Section 9.2.2 Layered Survey**

- Pg. 128: Suggested when BA is <20m<sup>2</sup> in the Interior and <40m<sup>2</sup> on the Coast.
- Pg. 128: Key features of a layered survey listed.
- Pg. 130: Count trees by species for Layers 2, 3, and 4.
- Pg. 130: Count total "Number In" by species for Layer 1.
- Pg. 131: At the full measure plots, record crown closure, silviculture heights/ages and inventory heights/ages by layer, as per Section 7.5.2.

#### **Section 9.2.3 Deviation from Potential Survey- Interior DFP Method**

- Pg. 134: Record the total "Number In" by species.
- Pg. 134: Record total trees by species for combined understorey layer (T2/3/4).
- Pg. 134: At the full measure plots, record crown closure, silviculture heights/ages and inventory heights/ages for the overstorey (L1) and understorey (L2/3/4), as per Section 7.5.2.

#### **Section 9.2.4 SEDRSS Survey**

- Pg. 138: Appendix 3: Coastal Second Growth Douglas-fir Retention Stocking Standard linked.
- Pg. 139: SEDRSS DFP Option 1 removed from survey manual. Use tabular method.
- Pg. 139: Reporting by layer not required. Can report overstorey (Layer 1) and a combined understorey (Layers 2, 3, and 4).

- Pg. 139: Record the total and crop “Number In” by species.
- Pg. 140: Record total trees by species for the combined understorey layer (L2/3/4).
- Pg. 140: At the full measure plots, record crown closure, silviculture heights/ages and inventory heights/ages for the overstorey (L1) and understorey (L2/3/4), as per Section 7.5.2.

#### **Appendix 1: Glossary**

- Pg. 169: Some terms added, removed, or edited.

#### **Appendix 3: List of References and Hyperlinks**

- Pg. 188: All references updated with live links.

#### **Appendix 5: Forest Cover Map Legend**

- Pg. 193: A 6.2 Old Forest Cover Legend deleted.

#### **Appendix 8: Local Geographic Free Growing Competition Assessment Criteria**

- Pg. 200: “Appendix 13” will now be known as “Appendix 8”
- Pg. 201: Coastal TSAs updated

#### **Appendix: Magnetic Declination and Annual Change**

- Deleted

#### **Appendix: Ministry of Forests Field Cards and Forms**

- Deleted

#### **Appendix: Crown Closure Comparative Diagrams**

- Deleted. Refer to FS660.

#### **Appendix: FS660 Silviculture Survey Reference Card (oct. 2017)**

- Deleted. Refer to 2022 FS660 document.

#### **Appendix: Free-Growing Damage Criteria for Even-Aged (Age Class 1) Coniferous Trees (rev. 6, July 2014)**

- Deleted. Refer to 2022 FS660 document.

#### **Appendix: Broadleaf Free-Growing Damage Criteria as a supplement to the FS660 (Oct 2011)**

- Deleted. Refer to 2022 FS660 document.

## **2. Updates to FS660 Field Card with Procedures**

- Pg.1- Section 1: Consider the stratum’s ecological classification during the walk-through.
- Pg. 2- Section 5: Fixed 2 typos for 11.28m radius plots. The plot area is 400m<sup>2</sup> and the multiplier is 25.
- Pg. 3- Section 6: Fixed typo for Noble fir and updated its code to Bp.

- Pg. 10-12- Sections 18b, c, d: Included overlapping regions in brackets, though the decision keys are linked to TSAs.
- Pg. 14-17- Section 21a-d: The forest health team updated the FS747 in 2022. The FS660 includes several additional codes that are relevant for young stands.
- Pg. 35- Section 31c: Fixed typo. The 2<sup>nd</sup> row was meant to be At, not Act.
- Pg. 37- Section 33: Fully updated to reflect new methodologies and reporting requirements.
- Pg. 38- Section 34: Added boring height age correction table.