Land & Forests

Trends in Silviculture in B.C. (1987-2019)

Managing and conserving the province's Crown forest and range resources provides environmental, social and economic benefits to all British Columbians. Silviculture - one of the primary tools to enhance the social and economic benefits from our forest resource - involves controlling the establishment, growth, composition, health and quality of forest vegetation at both the stand and forest scale to meet the diverse needs and values of landowners and society on a sustainable basis. This indicator investigates the trends in four measures of silviculture from 1987 to 2019.

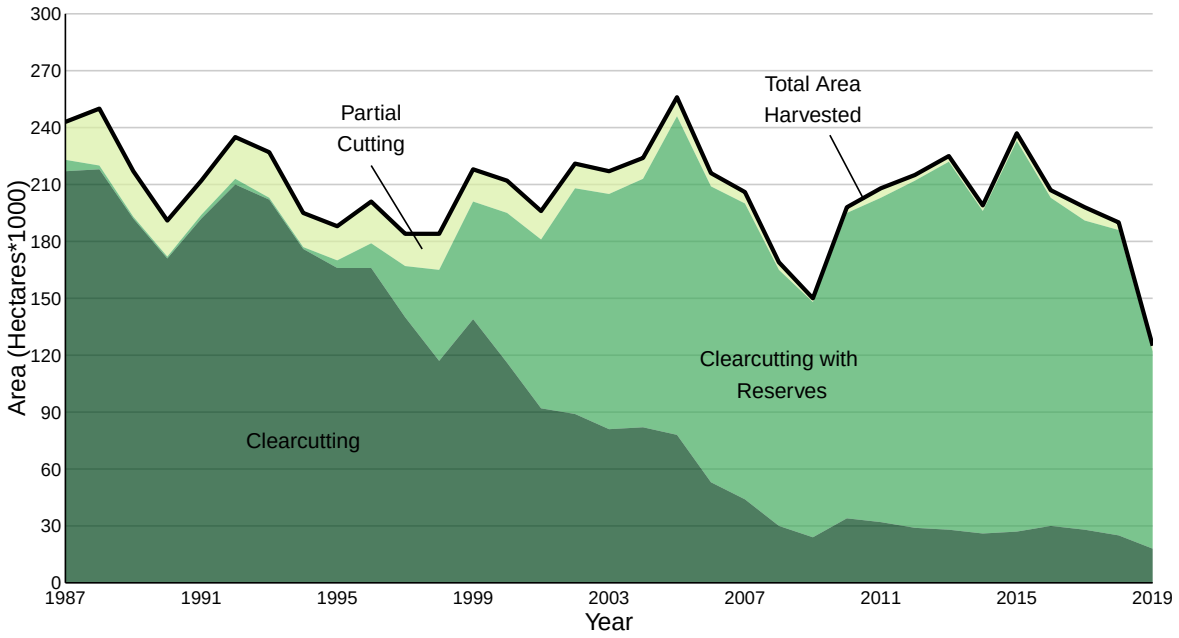
- **What silvicultural systems are used?** The three general categories of silvicultural systems used in B.C. are clearcutting, partial cutting, and clearcutting with reserves. The area of Crown forest harvested annually averages 207,000 hectares. Clearcutting with reserves was the most common silvicultural system applied over the last 15 years.
- **How much is reforested after disturbance?** The area of Crown land reforested annually is approximately the same as the area harvested two to five years earlier. Additional natural disturbance areas are reforested through government funded programs. For example, the Forests for Tomorrow program has funded 158,000 hectares of rehabilitation planting since 2005.
- **What incremental silvicultural treatments have been done?** Investments in incremental silviculture to improve the growth and quality of future crop trees included fertilizing, pruning, spacing and using select seed (usually from seed orchards) for planting. Since 1987, incremental silvicultural treatments totaled approximately 3.2 million hectares.
- **What volume gains will incremental silvicultural treatments yield?** Cumulative volume gains 65 years after making investments in incremental silviculture since 1987 are estimated at 116 million cubic metres (m^3).

What is Silviculture?

Silviculture is the art and science of controlling the establishment, growth, composition, health and quality of forest vegetation.

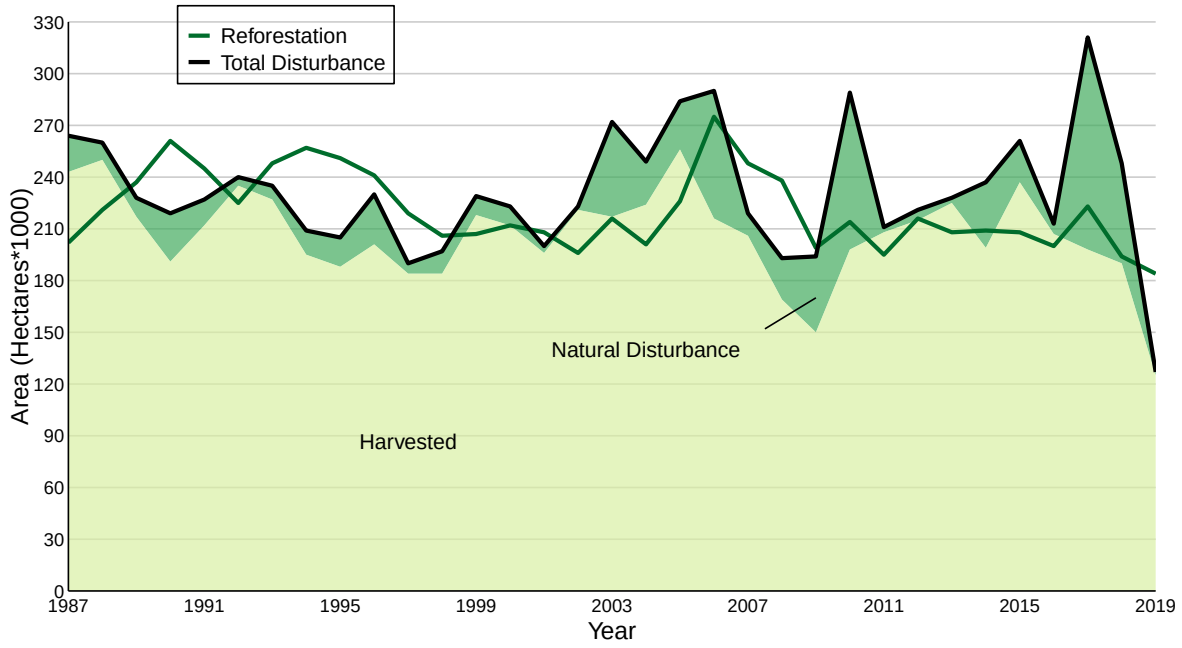
Visit the Silviculture Program Page to learn more about silviculture strategies in British Columbia.

What Silvicultural Systems Are Used?



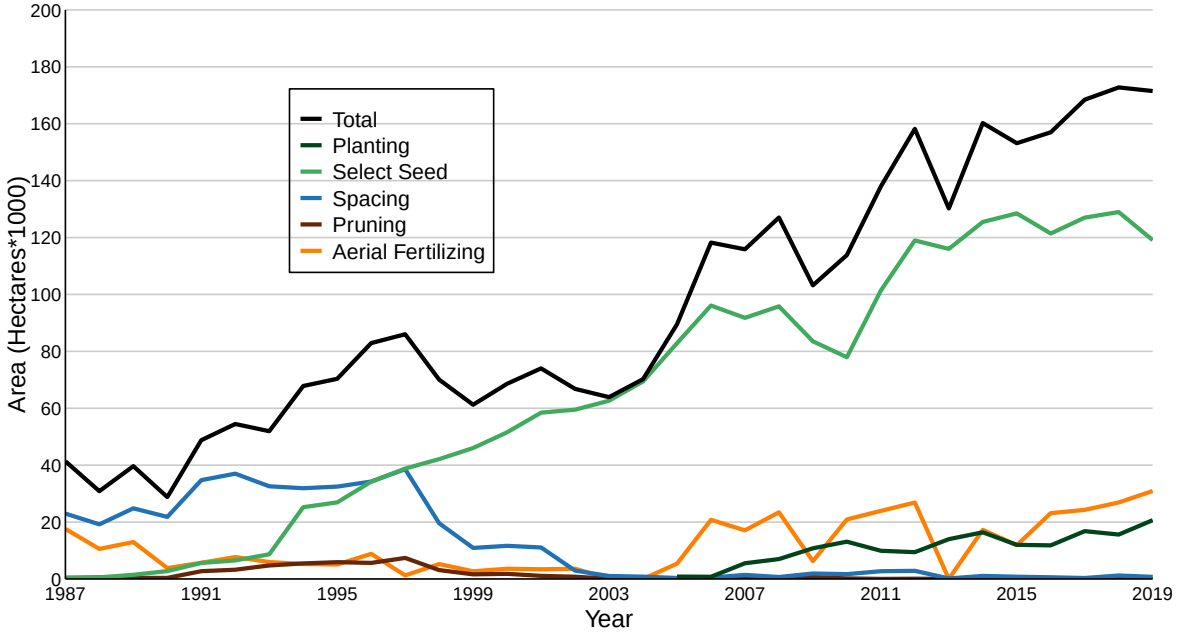
- A Silvicultural system is a planned program of treatments during the whole life of a stand designed to achieve specific stand structural objectives. The three general categories of silvicultural systems used in B.C. are clearcutting, partial cutting, and clearcutting with reserves. Selection of a silvicultural system depends on the forest stand and site characteristics (e.g., tree species, forest health, terrain), and resource management objectives (e.g., timber, visual landscapes, wildlife habitat, social).
- Since 1987, the area of Crown forest harvested annually has ranged from 125,000 hectares to 256,000 hectares, with an average of approximately 207,000 hectares.
- From 1987-1996, a clearcutting silvicultural system was applied on 88% of the area harvested. By 2012, clearcutting with reserves accounted for 85% of the area harvested on public forest land. While both systems remove the majority of the trees, clearcutting with reserves saves some trees within or outside the cutting boundary for the purpose of managing for other values such as wildlife habitat, water quality or visual landscapes.

How Much is Reforested After Disturbance?



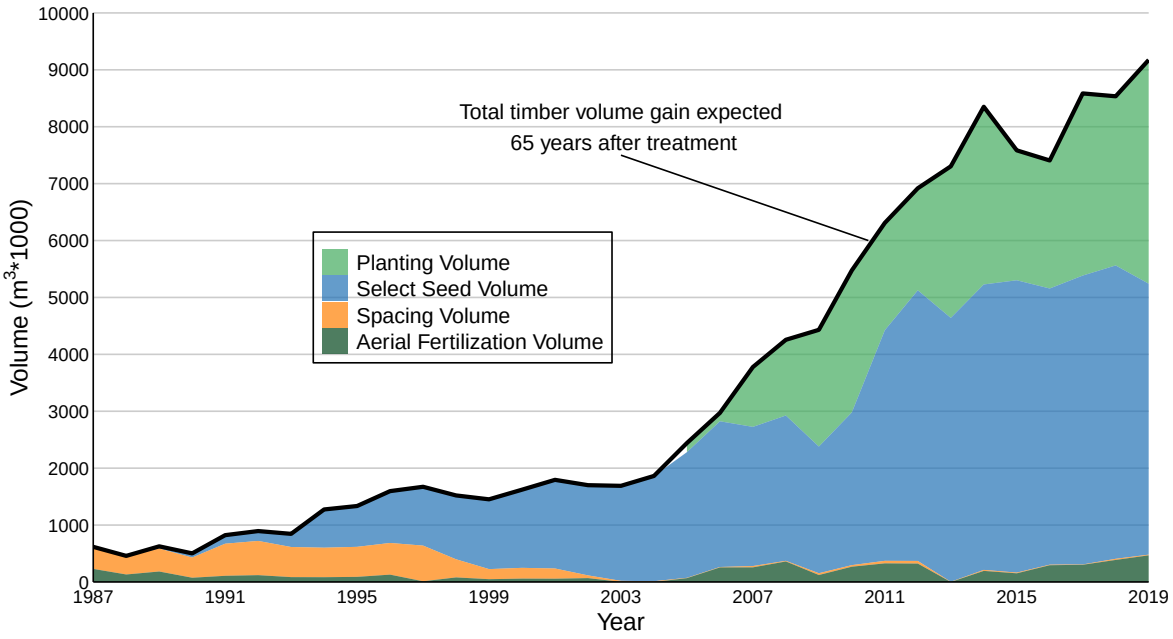
- Forests disturbed by timber harvests and other natural causes reforest naturally over time. Silviculture investments accelerate reforestation, increase timber supplies and restore ecological services sooner.
- In 1987, explicit reforestation obligations on public land were introduced requiring holders of harvesting rights to reforest the areas they harvest. This led to planting a greater proportion of harvested areas.
- In the early 1990's, increased investments in site preparation, planting, research specific to improved seed, stock type and stock handling, fertilization at the time of planting, rehabilitation planting and increased brushing has ensured prompt reforestation and improved growth of desired trees.
- Recent catastrophic wildfires and the mountain pine beetle epidemic have added large areas with below acceptable stocking. Since 2005, the Forests for Tomorrow program has funded the reforestation of mountain pine beetle and wildfire impacted land not currently under legal reforestation obligations.
- The Forest Carbon Initiative was launched in 2017 as a key element of B.C.'s commitment to take action on climate change. This initiative will help meet provincial and federal climate change targets by delivering GHG benefits through silviculture activities such as reforestation, fertilization and tree improvement.
- Forests disturbed by timber harvest can take 7 years or more to regenerate. The average is 1.9 years when planted and 5.5 years when left to reforest naturally. This is referred to as regeneration delay and accounts for a large amount of the gap between disturbance and reforestation area in the last 7 years.

What Incremental Silvicultural Treatments Have Been Done?



- Incremental silviculture is an investment in future timber production and environmental benefits from forests. Incremental silviculture only includes treatments that are not part of basic silviculture, where natural unimproved seed sources are used. Incremental silviculture can increase timber quantity and landscapes, manage forest health and fire risks, and improve specific habitats, water quality and visual landscapes. Incremental silviculture also creates employment opportunities for communities.
- Since 1987, investments in incremental silviculture to improve the growth and quality of future crop trees included aerial fertilizing (382,000 hectares), pruning (47,000 hectares), spacing (405,000 hectares) and using select seed—usually from seed orchards— for planting (2,156,000 hectares). Over this period, silvicultural treatments totaled approximately 3.15 million hectares.
- The use of select seed increases the rate of tree growth, increasing future timber volume, reducing constraints on harvesting adjacent areas and reducing the need for costly brushing treatments.
- The Forests for Tomorrow program was established to respond to catastrophic wildfires and the mountain pine beetle epidemic. Since 2005, the program has delivered over 246,000 hectares of fertilization and 158,000 hectares of planting on land not currently under legal reforestation obligations.
- The Forest Carbon Initiative was launched in just 2017 and has funded 32,300 hectares of fertilization and 6,400 hectares of planting on land not currently under legal reforestation obligations.

What Volume Gains Will Incremental Silvicultural Treatments Yield?



- Timber volume gains from incremental silviculture are the estimated volume gains—based on yield modeling predictions—in 65 years when compared to basic silviculture using natural unimproved seed sources.
- Gains from incremental silviculture include increased short- and mid-term timber supply through spacing and aerial fertilization, accelerated development of mature or old growth forest characteristics where needed for wildlife or biodiversity, higher wood quality through pruning, more pleasing visual landscapes and planting to make up the long-term timber supply.
- In general, compared with natural regeneration, planting increases harvestable volume by about 15% without the use of select seed and by about 31% with the use of select seed.
- Cumulative volume gains 65 years after making investments in incremental silviculture since 1987 are estimated at 116 million cubic metres (m^3), based on fertilization (5.3 million m^3), Spacing (6.6 million m^3), select seed (72.5 million m^3) and reforestation through the Forests for Tomorrow program (30.1 million m^3) and Forest Carbon Initiative (1.2 million m^3).

References and other useful links

- Reporting Silviculture Updates and Land Status Tracking System (RESULTS)
- Silviculture Program Page
- Seed Planning and Registry Application (SPAR)
- Forests for Tomorrow (FFT)
- Forest Carbon Initiative

Data

*By accessing these datasets, you agree to the license associated with each file, as indicated below.

- Indicator Summary Data: Change in Silviculture Systems (1987-2019) (Licence: Open Government Licence - British Columbia)
- Indicator Summary Data: Change in Disturbances and Reforestation (1987-2019) (Licence: Open Government Licence - British Columbia)
- Indicator Summary Data: Change in Silvicultural Treatments (1987-2019) (Licence: Open Government Licence - British Columbia)
- Indicator Summary Data: Change in Timber Volume Gains (1987-2019) (Licence: Open Government Licence - British Columbia)

For more information on this indicator or on Silviculture in British Columbia contact the Resource Practices Branch at Forests.ForestPracticesBranchOffice@gov.bc.ca.

Published and Available On-Line at Environmental Reporting BC (May 2018): http://www.env.gov.bc.ca/soe/indicators/land/silviculture.html

Email correspondence to: envreportbc@gov.bc.ca

Glossary

Basic silviculture Harvesting methods and silviculture operations including seed collecting, site preparation, artificial and natural regeneration, fertilization at the time of planting, brushing, spacing and stand tending and other operations as are prescribed to be required for the purpose of establishing a free growing crop of trees of a commercially valuable species.

Below acceptable stocking Productive forest land that has been denuded and has failed, partially or completely, to regenerate either naturally or by planting or seeding to the specified or desired free growing standards for the site.

Brushing A silvicultural activity done by chemical, manual, grazing, or mechanical means to control competing forest vegetation and reduce competition for space, light, moisture, and nutrients with crop trees or seedlings.

Clearcutting The process of removing all trees, large and small, in a stand in one cutting operation.

Clearcutting with reserves The removal of the majority of the trees saving some within or outside the cut boundary for other purposes such as wildlife habitat, water quality and visual landscapes.

Fertilizing The addition of fertilizer to promote tree growth on sites deficient in one or more soil nutrients. Also used to improve the vigor of crop trees following juvenile spacing or commercial thinning.

Forests for Tomorrow A silviculture program, established by the B.C. Provincial Government in March 2005 to respond to catastrophic wildfires and the mountain pine beetle epidemic.

Incremental Silviculture Silviculture other than basic silviculture.

Mid-term timber supply A term that refers to that portion of the timber inventory that would be available for harvest within the middle of the normal management cycle.

Natural regeneration A change in forest structure and composition caused by fire, insects, wind, landslides and other natural processes.

Partial cutting A variety of silvicultural system in which a stand may be cut to ensure regeneration. In a partial cutting system, only some of the trees are felled during the harvesting phase. The selection method may specify 'removal' or 'leave' trees. Some examples of selection criteria are diameter, species, volume, age, height, disease, or other damage.

Planting Establishing a forest by setting out seedlings, transplants or cuttings in an area.

Pruning The manual removal, close to or flush with the stem, of side branches, live or dead, and of multiple leaders from standing, generally plantation-grown trees. Pruning is carried out to improve the market value of the final wood product by producing knot-free wood for the improvement of the tree or its timber.

Rehabilitation planting Where planting occurs on areas disturbed by a natural event such as fire or insects which has not been salvaged in a manner that would generate a legal reforestation obligation.

Select seed Seed collected from either orchards or natural stand superior provenances. Select seed exhibits a higher level of improvement in one or more desired genetic traits (such as

growth, form, wood density, and resistance to insects and disease) than wild seed collected from an average natural stand.

Site preparation Any action, related to reforestation, to create an environment favourable for survival of suitable trees during the first growing season. It may alter the ground cover, soil or microsite conditions, using biological, mechanical, or manual clearing, prescribed burns, herbicides, or a combination of methods. Both natural regeneration and planting may be improved through site preparation.

Spacing The removal of undesirable trees within a young stand to control stocking, to maintain or improve growth, to increase wood quality and value, or to achieve other resource management objectives.

METHODS

The **R** code for creating the graphs presented on this page is available on GitHub.

Source Data

The Silviculture analysis uses data from:

1. Reporting Silviculture Updates and Land Status Tracking System (RESULTS) and
2. Seed Planning and Registry System (SPAR)

Wherever possible, the analysis used public data layers from the B.C. Geographic Warehouse[1] released under either the Open Government Licence—British Columbia or the B.C. Crown Copyright Licence:

- **Opening_VW**: WHSE_FOREST_VEGATATION_OPENING_VW (Licence: Open Government Licence - British Columbia)
- **Seedlot**: WHSE_FOREST_VEGATATION_SEED_SEEDLOT (Licence: Open Government Licence - British Columbia)
- **Veglot**: WHSE_FOREST_VEGETATION.SEED_VEG_LOT (Licence: Open Government Licence - British Columbia)
- **Activity Treatment Unit**: WHSE_FOREST_VEGATATION_RSLT_ACTIVITY_TREATMENT_UNIT (Licence: Open Government Licence - British Columbia)
- **Planting**: WHSE_FOREST_VEGATATION_RSLT_PLANTING_RSLT (Licence: Access Only)
- **Seedlot Genetic Worth**: SEEDLOT_GENETIC_WORTH (Licence: Access Only)
- **Org Unit**: Appendix I – Lookup Tables
- **CoastInteriorOrgUnit**: Appendix I – Lookup Tables
- **SILV_FUND_SRC_CODE**: Appendix I – Lookup Tables

Fiscal Year

Fiscal year will be display as follows:

- Formula used: Fiscal Yr:`IIf(Month([DATE])<4,Year([DATE])-1,Year([DATE]))`
- Example: 1987-04-01 and 1988-03-31 Fiscal Year = 1988

[1]Detailed descriptions and downloads of the source layers are available from the B.C. Data Catalogue at: http://catalogue.data.gov.bc.ca/dataset

Baseline Make Table Queries

All queries are built in Microsoft Access 2007. Make Table queries are used to create baseline data tables for increased efficiency and data auditability. Note that all data reported after April 1, 1970 is added to the baseline but the data are subset to more recent years in the final queries.

Silvicultural Systems

1a-Make Opening (outcome: 1a-Opening)

Extracts all the required attributes from the Opening_VW to create the 1a-Opening table to get a unique list of all openings.

2a-Make Raw Silv System (outcome: 2a-Raw Silv System)

Lists all completed disturbance reporting from the Activity Treatment Unit table.

Field	Criteria	Details
SILV_BASE_CODE	DN	Disturbance Reporting Only
RESULTS_IND	Y	Completed activities only

2a-Detailed Silv System and Fiscal Date

Joins the 2a-Raw Silv System with the 1a-Make Opening and creates some new calculated attributes.

Field	Criteria	Details
NewSilv	`NewSilv: IIf([DISTURBANCE_CODE] In ("L","S") And [SILV_SYSTEM_CODE] Is Null, "CLEAR", [SILV_SYSTEM_CODE])`	Identifies disturbance records with a silv system code that are Logging or Salvage and identifies them as a clearcut
Dist Start Yr	`IIf(Month([ATU_START_DATE])<4, Year([ATU_START_DATE])-1, Year([ATU_START_DATE]))`	Changes the disturbance start date to calend
Dist End Yr	`IIf(Month([ATU_COMPLETION_DATE])<4, Year([ATU_COMPLETION_DATE])-1, Year([ATU_COMPLETION_DATE]))`	Changes the disturbance end date to calend
Disturbance Type	`IIf([DISTURBANCE_CODE] In ("L","S") And [2a-Raw Silv System]![SILV_SYSTEM_CODE] Is Null Or [2a-Raw Silv System]![SILV_SYSTEM_CODE] Is Not Null, "Harvest", "Not Harvest")`	Identifies disturbance records with a Harvest or Not Harvest identifier

2b-ATU DN Detail Best Date

Joins the 2a-Detailed Silv System and Fiscal Date NewSilv with the following Silv System Code lookup table and defines the best fiscal year to report the treatments to.

SILV_SYSTEM_CODE	Silviculture System
CCRES	Clearcutting with reserves
CLEAR	Clearcutting
COPPI	Partial cutting
IMCUT	Partial cutting
PATCT	Partial cutting
RETEN	Clearcutting with reserves
SEEDT	Partial cutting
SELEC	Partial cutting
SHELT	Partial cutting

Field	Criteria	Details
Best Dist End Yr	`IIf([Dist End Yr] Is Null,[Dist Start Yr],[Dist End Yr])`	Populates missing disturbance ends years with the disturbance start year

2c-Harvest Sum of DN Area

Summarizes 2b-ATU DN Detail Best Date to calculate the disturbance area in an opening.

Field	Criteria	Details
Disturbance Type	`= "Harvest"`	Group by (Row)
OPENING_ID		Group by (Row)
LastOfBest Dist End Yr	`LAST(Best Dist End Yr)`	Group by (Row)
OPENING_GROSS_AREA		Group by (Row)
DN_Area	`TREATMENT_AMOUNT` S	um

2d-Harvest Best Area

Calculates the best harvest area using 2c-Harvest Sum of DN Area.

Field	Criteria	Details
DN Area	<0	

Field	Criteria	Details
Best Harv Area	`IIf([DN Area]<=[OPENING_GROSS_AREA],[DN Area],[OPENING_GROSS_AREA])`	Where the sum of the DN Area is greater than the opening gross area, the opening gross area is used as the disturbance area

2e-Harvest Silv System Area

Summarizes 2b-ATU DN Detail Best Date to calculate the disturbance area in an opening.

Field	Criteria	Details
Disturbance Type	`= "Harvest"`	Group by (Row)
OPENING_ID		Group by (Row)
LastOfBest Dist End Yr		Group by (Row)
SOF Silv System		Group by (Column)
TREATMENT_AMOUNT	`Sum`	Sum

2f-Make Silv System Ratio

Joins the 2e-Harvest Silv System Area with the 2d-Harvest Best Area and creates some new calculated attributes.

Field	Criteria	Details
CCRES_pct	`Round(([CCRES]/[DN Area]),2)`	
CLEAR_pct	`Round(([CLEAR]/[DN Area]),2)`	
PARTIAL_pct	`Round(([PARTIAL]/[DN Area]),2)`	

2g-Harvest Silv System Best Area

Joins the 2f-Make Silv System Ratio with the 2d-Harvest Best Area and creates some new calculated attributes.

Field	Criteria	Details
Final CCRES	`[CCRES_pct]*[Best Harv Area]`	
Final CLEAR	`[CLEAR_pct]*[Best Harv Area]`	
Final PARTIAL	`[PARTIAL_pct]*[Best Harv Area]`	

2h-Final Silv System

Summarizes 2g-Harvest Silv System Best Area to calculate the disturbance area in an opening

by silvicultural system.

Field	Criteria	Details
LastOfBest Harv End Yr	`>= 1987`	Group by (Row)
Final CCRES		Sum
Final CLEAR		Sum
Final PARTIAL		Sum

Disturbances and Reforestation

2i-Disturbance Sum of DN Area

Summarizes 2b-ATU DN Detail Best Date to calculate the natural disturbance area in an opening.

Field	Criteria	Details
Disturbance Type	`"Not Harvest"`	Group by (Row)
OPENING_ID		Group by (Row)
LastOfBest Dist End Yr	`LAST(Best Dist End Yr)`	Group by (Row)
OPENING_GROSS_AREA		Group by (Row)
DN Area	`TREATMENT_AMOUNT`	Sum

2j-Disturbance Best Area

Calculates the best harvest date and area using the 1a-Opening and 2e-Summary DN Area.

Field	Criteria	Details
Best Disturb Area	`IIf([DN Area]<= [OPENING_GROSS_AREA], [DN Area], [OPENING_GROSS_AREA])`	Where the sum of the DN Area is less than the opening gross area, the DN Area is used as the Best Disturb area, else the opening gross area is used

2k-Final Disturbance by Year

Summarises 2j-Disturbance Best Area by Year.

Field	Criteria	Details
LastOfBest Dist End Yr	`Where >= 1987`	Group by (Row)
Best Disturb Area		Sum

2l-All Denudation

Joins the 2h-Final Silv System with the 2k-Final Disturbance by Year to sum the total harvested and total natural disturbance areas by fiscal year.

Field	Criteria	Details
Total Harvested	`[Final CCRES]+[Final CLEAR]+[Final PARTIAL]`	
Total Disturbance	`[Final CCRES]+[Final CLEAR]+[Final PARTIAL]+[Not Harvest Area]`	

The reforestation number is calculated in the Trends in Genetic Resource Conservation and Management of B.C. Forests indicator analysis. Details on how the reforestation number was calculated are available in the indicators methods document (query - 3g-Assess Regen Type – Set Threshold).

Silviculture Treatments

6a-Make Fertilization (outcome: 6a-Fertilization)

Joins the Activity Treatment Unit and Opening_VW tables using the Opening_ID, joins the Activity Treatment Unit to the Org Unit using the ORG_UNIT_NO and joins the Org Unit to the CoastInteriorOrgUnit using the ORG_UNIT_CODE to get a complete list of fertilization activities.

Field	Criteria	Details
SILV_BASE_CODE	`FE`	
SILV_TECHNIQUE_CODE	`Is Null or CA`	
TREATMENT_AREA	`> 0`	

6b-Fertilization with Coast Interior

Joins 6a-Fertilization with 1a-Opening using the Opening_ID, joins 6a-Fertilization with SILV_FUND_SRCE_CODE using the SILV_FUND_SRCE_CODE, and joins the 1a-Opening with the Org Unit using the ORG_UNIT_NO. These tables are joined to summarize fertilization volume gains for the coast and interior (two different calculations) by fiscal year.

Field	Criteria	Details
Fert Yr	`IIf(Month([ATU_COMPLETION_DATE]), 4,Year([ATU_COMPLETION_DATE])-1, Year([ATU_COMPLETION_DATE]))`	
Fertilization Volume Gain	`IIf([Coast_interior]="I", [TREATMENT_AMOUNT]*0.15*65, [TREATMENT_AMOUNT]*0.3*65)`	Interior = 0.15m^3/ha/yr Coast = 0.3m^3/ha/yr

Field	Criteria	Details

6c-Fertilization with Volume Gains – BC

Summarizes 6b-Fertilization with Coast Interior Fertilization Area and Fertilization Volume Gain by Fiscal Year.

Field	Criteria	Details
Fert Yr	`Between >= 1970`	Group by (Row)
Fertilization Area	`TREATMENT_AMOUNT`	Sum
Fertilization Volume Gain		Sum
Category	`<> Legal`	Where

7a-Make Spacing (outcome: 7a-Spacing)

Joins the Activity Treatment Unit and Opening_VW tables using the Opening_ID to summarize spacing activities.

Field	Criteria	Details
SILV_BASE_CODE	`JS`	
SILV_METHOD_CODE	`< > LAYOT`	Ignore preparatory activity
TREATMENT_AREA	`> 0`	

7b-Spacing Volume Gains

Joins 7a-Spacing with 1a-Opening using the Opening_ID, joins 7a-Spacing with SILV_FUND_SRCE_CODE using the SILV_FUND_SRCE_CODE, and joins the 1a-Opening with the Org Unit using the ORG_UNIT_NO. These tables are joined to summarize spacing volume by fiscal year.

Field	Criteria	Details
Incremental		
JS Gains	`(0.25*[TREATMENT_AMOUNT])*65`	Gains = .25m^3/ha/yr
JS Yr	`JS Yr: IIf(Month([ATU_COMPLETION_DATE])<4, Year([ATU_COMPLETION_DATE])-1, Year([ATU_COMPLETION_DATE]))`	
Category	`Not in (Legal, Other)`	Excludes any legally obligated spacing activities

7c-Spacing with Volume Gains – BC

Summarizes 7b-Spacing with Volume Gains Spacing Area and Incremental JS Gains by JS Year.

Field	Criteria	Details
JS Yr	`>= 1970`	Group by (Row)
Spacing Area	`TREATMENT_AMOUNT`	Sum
Incremental JS Gains		Sum
Category	`<> Legal`	Where

8a-Make Pruning (outcome: 8a-Pruning)

Joins the Activity Treatment Unit and Opening_VW tables using the Opening_ID to summarize pruning activities.

Field	Criteria	Details
SILV_BASE_CODE	`PR`	
SILV_METHOD_CODE	`<> LAYOT`	Removes preparatory activity
TREATMENT_AREA	`> 0`	

8b-Pruning Area

Joins 8a-Pruning with 1a-Opening using the Opening_ID, joins 8a-Pruning with SILV_FUND_SRCE_CODE using the SILV_FUND_SRCE_CODE, and joins the 1a-Opening with the Org Unit using the ORG_UNIT_NO. These tables are joined to summarize pruning volume by fiscal year.

Field	Criteria	Details
PR Yr	`PR Yr: IIf(Month([ATU_COMPLETION_DATE])<4, Year([ATU_COMPLETION_DATE])-1, Year([ATU_COMPLETION_DATE\]))`	

8d-Pruning – BC

Summarizes 8b-Pruning Area Pruning Area by PR Year.

Field	Criteria	Details
PR Yr Yr	`>= 1970`	Group by (Row)
Pruning Area	`TREATMENT_AMOUNT`	Sum
Category	`<> Legal`	Where

1a-Make Opening (outcome: 1a-Opening)

Extracts the all the required attributes from the Opening_VW to create the 1a-Opening table to

get a unique list of all openings.

1b-Make Planting Activities (outcome: 1b-Planting Activities)

Joins the Activity Treatment Unit and Opening_VW tables using the Opening_ID to summarize planting activities.

Field	Criteria	Details
SILV_BASE_CODE	`PL`	
ACT_PLANTED_NO	`> 0`	Must contain planted trees

1c-Make Planted Trees (outcome: 1b-Planted Trees)

Joins the Activity Treatment Unit and Opening_VW tables using the Opening_ID and joins the Activity Treatment Unit and Planting RSLT using the ACTIVITY_TREATMENT_UNIT_ID to summarize planted trees.

Field	Criteria	Details
SILV_BASE_CODE	`PL`	
ACT_PLANTED_NO	`> 0`	Must contain planted trees

5a-Backlog Planting

Joins the 1a-Opening to the 1b-Planted Activities using the Opening_ID and joins the 1b-Planted Activities to the SILV_FUND_SRCE_CODE using the SILV_FUND_SRCE_CODE to summarize planting activities.

Field	Criteria	Details
Category	`FFT or FCI`	FFT and FCI is used to identify the post-2005 backlog planting
Backlog Planted Yr	`IIf(Month([ATU_COMPLETION_DATE])<4, Year([ATU_COMPLETION_DATE])-1, Year([ATU_COMPLETION_DATE]))`	
Backlog PL Volume Gain	`(2.93*[TREATMENT_AMOUNT])*65`	Gains = 2.93 m^3/ha/yr

5b- Backlog Planting with Volume Gains

Summarizes 8b-Pruning Area Pruning Area by PR Year.

Field	Criteria	Details
Backlog Planted Yr	>= 1970	Group by (Row)
Backlog Planting Area	TREATMENT_AMOUNT	Sum
Backlog PL Volume Gain		Sum
Category	Not In (Legal, Other)	Where

3a-Planting Details with Seedlot

Joins the 1a-Opening to the 1b-Planted Activities using the opening_ID, joins the 1b-Planted Activities to the 1c-Planted Trees using the ACTIIVTY_TREATMENT_UNIT_ID and joins the 1c-Planted Trees to the Seedlot using the SEEDLOT_NUMBER to summarize planted tree details needed to calculate genetic gains.

Field	Criteria	Details
Disturb Start Yr	IIf(Month([DISTURBANCE_START_DATE]<4, Year([DISTURBANCE_START_DATE])-1, Year([DISTUBANCE_START_DATE])) C	onverts the Distur-bance Start Date to Fiscal year
Disturb End Yr	IIf(Month([DISTURBANCE_END_DATE]<4, Year([DISTURBANCE_END_DATE])-1, Year([DISTURBANCE_END_DATE])) C	onverts the Distur-bance End Date to Fiscal year
Planted Yr	IIf(Month([ATU_COMPLETION_DATE])<4, Year([ATU_COMPLETION_DATE])-1, Year([ATU_COMPLETION_DATE])) C	onverts the Planting Date to Fiscal year
SeedClass	IIf([GENETIC_CLASS_CODE]="B" And [SUPERIOR_PRVNC_IND]="Y","B+", IIf([GENETIC_CLASS_CODE]="B" And [SUPERIOR_PRVNC_IND]="N","B", IIf([GENETIC_CLASS_CODE]="B" And [SUPERIOR_PRVNC_IND] Is Null,"B", IIf([GENETIC_CLASS_CODE]="A","A", IIf([GENETIC_CLASS_CODE] Is Null,"B"))))) A	ssign Seed Class
ProratePLArea	Round((([1c-Planted Trees]![NUMBER_PLANTED]/ [1c-Planted Trees]![ACT_PLANTED_NO])* [1c-Planted Trees]![TREATMENT_AMOUNT]),2) P	rorated species planted by planted area

4a-Calculate Genetic Worth G Gains by Opening

Summarizes 3a-Planting Details with Seedlot by Opening_ID where the GENETIC_WORTH_CODE

= "GVO" or the SeedClass = "A" OR "B+".

Field	Criteria	Details
GENETIC_WORTH_CODE	GVO	Volume Gain
SeedClass	In (A, B+)	"A"=Orchard and "B+"=Planted Natural Stand Superior

4b-Calculate Genetic Worth G Gains by Opening

Calculates the Productivity Gain for each opening in the 4a-Calculate Genetic Worth GVO Gains by Opening table.

Field	Criteria	Details
Productivity Gain	'GProductivity Gain: IIf([PlantedYr]<=2009, 0.41*[ProratePLArea]*65, IIf([PlantedYr]=2010, 0.53*[ProratePLArea]65, IIf([PlantedYr]>2010, 0.615*[ProratePLArea]*65)))"'	< = 2009: 0.41m^3/ha/yr 2010: 0.53m^3/ha/yr >2010: 0.615m^3/ha/yr

4c-Summary Genetic Gains from Planting BC

Takes 4b-Calculate Genetic Productivity G Gains by Opening and summarizes gains by area and volume.

Field	Criteria	Details
Planted Yr	>= 1970	Group by (Row)
Select Seed Area	(ProratePLArea)	Sum
Select Seed Volume	(Productivity Gain)	Sum

9a-Silvicuture Treatments BC Area

Joins the following tables to report all of the silviculture treatment area summaries in one table:

- 5b-Backlog Planting with Volume Gains BC;
- 4c-Summary Genetic Gains from Planting BC;
- 6c-Fertilization with Volume Gains – BC;
- 7c-Spacing with Volume Gains – BC; and
- 8d-Pruning – BC.

9b-Silvicuture Treatments BC Area

Joins the following tables to report all of the silviculture treatment area summaries in one table:

- 5b-Backlog Planting with Volume Gains BC;
- 4c-Summary Genetic Gains from Planting BC;
- 6c-Fertilization with Volume Gains – BC;
- 7c-Spacing with Volume Gains – BC; and
- 8d-Pruning – BC.

Appendix I – Lookup tables

Org Unit

ORG_UNIT_NO	ORG_UNIT_CODE	ROLLUP_REGION_CODE
1826	DCC	RCB
15	DCK	RSC
43	DCR	RWC
1828	DCS	RTO
42	DDC	RNO
46	DFN	RNO
1827	DHW	RSI
34	DJA	ROM
21	DKA	RTO
32	DKM	RSK
56	DMH	RCB
38	DMK	ROM
1823	DND	RSK
1832	DNI	RWC
1829	DOS	RTO
1825	DPC	RNO
18	DPG	ROM
48	DQC	RWC
50	DQU	RCB
1831	DRM	RKB
27	DSC	RSC
1902	DSE	RKB

ORG_UNIT_NO	ORG_UNIT_CODE	ROLLUP_REGION_CODE
1619	DSI	RWC
23	DSQ	RSC
1824	DSS	RSK
30	DVA	ROM

CoastInteriorOrgUnit

ROLLUP_REGION_CODE	ORG_UNIT_CODE	ORG_UNIT_NAME	Coast_Interior
RCB	DCC	Cariboo-Chilcotin	I
RCB	DMH	100 Mile House	I
RCB	DQU	Quesnel	I
RKB	DRM	Rocky Mountain	I
RKB	DSE	Selkirk	I
RNO	DFN	Fort Nelson	I
RNO	DPC	Peace	I
ROM	DJA	Fort St. James	I
ROM	DMK	Mackenzie	I
ROM	DPG	Prince George	I
ROM	DVA	Vanderhoof	I
RSC	DCK	Chilliwack	C
RSC	DSC	Sunshine Coast	C
RSC	DSQ	Sea to Sky	C
RSK	DKM	Coast Mountains	I
RSK	DND	Nadina	I
RSK	DSS	Skeena Stikine	I
RTO	DCS	Cascades	I
RTO	DKA	Thompson Rivers	I
RTO	DOS	Okanagan Shuswap	I
RWC	DCR	Campbell River	C
RWC	DNI	North Island - Central Coast	C
RWC	DQC	Haida Gwaii	C
RWC	DSI	South Island	C

SILV_FUND_SRC_CODE

SILV_FUND_SRCE_CODE	DESCRIPTION	Category
BCT	BC Timber Sales	Legal
CBI	Carbon Offset Investment	Other
CL	Catastrophic Losses	Operational
ERP	Ecosystem Restoration Program	Other
FCE	FCI under FESBC funding	FCI
FCM	FCI under Ministry funding	FCI
FES	Forest Enhancement Society BC	FES
FID	Forest Investment Account - FRPA 108	FIA
FIL	Forest Investment Account - licensee	FIA
FIM	Forest Investment Account - ministry	FIA
FIV	Forest Investment Vote	FIA
FMC	COMFOR	Other
FME	Forest Worker Development Program	Other
FMY	Youth Fund	Other
FR	FRDA I & II	FRDA
FRP	FRPA - Application For Relief	Legal
FTL	Forests for Tomorrow Lic Admin	FFT
FTM	Forests for Tomorrow MOF Admin	FFT
GA	Other Agencies or Voluntary Work	Other
GAC	Corrections	Other
GFS	Forest Stand Management Fund	Legal
GJF	Job Creation, Federal	Other
GJJ	Job Creation, Joint	Other
GJM	Job Creation, MOF	Other
IA	Industrial Appraisal	Legal
IIR	Industrial Incr., Required	Legal
IIV	Industrial Incr., Voluntary	Incremental
IO	Industry Outstanding	Backlog
IR	Industry Royalties	Backlog
JOP	Job Opportunity Program	Other
LFP	Licensee Funded Program	Other
M	Ministry	Operational

SILV_FUND_SRCE_CODE	DESCRIPTION	Category
O	Operational	Operational
RBC	Forest Renewal B.C.	FRBC
RBL	Forest Renewal B.C. - licensee administered	FRBC
RBM	Forest Renewal B.C. - ministry administered	FRBC
S	Section 88	Backlog
SBF	BC Timber Sales	Legal
SMF	South Moresby Forest Replacement Account	Legal
TSC	Tree Seed Centre	Other
VCV	Provincial Contingency Vote (Special Use Only)	Other
VFH	Forest Health	Other
VFP	Current Reforestation	Operational
VG	Ministry Outstanding	Backlog
VI	Provincial Incremental	Incremental
VOB	Ministry Vote, SBEP	Backlog
VOI	Industry Outstanding	Backlog
VRT	Afforestation	Other
XXX	No Funding Source	Other