



FOREST ANALYSIS AND INVENTORY BRANCH

Status of the Forest Inventory Report

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Purpose

To guide future investment in the British Columbia forest inventory program, information is required at the management unit level indicating the current status of the forest information for each unit. The purpose of this document is to provide a current and comprehensive status of each unit to assist in assessing the risks to government related to a lack of forest inventory information and to outline opportunities for future investment in the program.

Background

The first forest inventories in British Columbia were started in 1910 and were a combination of existing information where available and limited field surveys. The first inventories were incomplete in that only those areas that were deemed to be merchantable and accessible were included in this initial estimation of the timber volume.

The creation of the Forest Surveys and Inventory Division in 1951 initiated the first complete inventory coverage for the province. Aerial photographs were available for photo interpretation for the first time and, within a seven-year time period, most inventories were completed from planning to final compilation. A combination of photo estimates and ground sampling were used to create an inventory that was accurate to within +/- 10% of the total volume for major species for a specific unit (usually a TSA).

The second complete inventory or Unit Survey, at the PSYU level was completed from 1961 to 1977 with a focus on refined strata definitions, new management units and estimation of species groups, age, height, stocking and site index in class-based groupings. Pragmatic (non-random) sampling was used to calibrate the photo estimates and the target accuracy was now +/- 10% of the total volume by PSYU.

The late-1970s and most of the 1980s saw less activity in the forest inventory program. Beginning in 1977, the development of sub-unit surveys began which focussed on the need for more detailed inventory information in smaller units, such as supply blocks. During this time, Environmentally Sensitive Area (ESA) surveys were also initiated over much of the land base. In 1988, the Ministry of Forests became concerned over the lack of current information on which to make management decisions, which resulted in a revitalization of the forest inventory program. This iteration of the forest inventory included the estimation of continuous attributes (species composition identified on a percentage basis by species, specific ages and heights) for the first time instead of the class-based attributes (estimation of the age class and height class of a polygon) of the past. Also, better methods for mapping the inventory were used to provide more reliable spatial information.

The 1991 Forest Resources Commission recommended the need for a statistically valid, wider encompassing forest inventory – which initiated the development of the Vegetation Resources Inventory (VRI) in 1992. The VRI was implemented as the provincial forest inventory standard in 1996 and in addition to the traditional attributes of species

composition, age and height, now includes ecological estimates related to shrubs in the polygon and soil moisture and nutrient regime estimates.

More recently, the Inventory Program Review (IPR) was initiated in 2006 to review the program in order to examine how well it meets current and future business needs and to identify opportunities that improve the Ministry's ability to meet these needs. One component of the IPR is an assessment of the status of the current forest inventory information as a building block to guide future inventory investment.

Current Status

The Vegetation Resources Inventory (VRI) program generates three direct products: photo interpretation (Phase I); ground sampling (Phase II); and net volume adjustment factor sampling (NVAF). Related forest inventory activities include the updates that are completed to account for disturbances, the Growth and Yield program (G&Y) where permanent, purposive sampling is undertaken largely for the development of growth models, and the Ministry of Environment's Terrestrial Ecosystem Mapping (TEM) program. The current status of each of these programs has been identified as a contributing aspect in the overall understanding of the forest inventory program.

1. Photo Interpretation (Phase I)

Photo interpretation is the photo-based estimate of a variety of forest attributes including tree species composition, age, height, crown closure, basal area and other non-tree features such as the presence of shrubs and the spatial coverage of non-vegetated features such as rock, roads, water and urban centres. The quality of the photo interpretation varies depending on a number of features including the skills and abilities of the photo interpreters; the age and quality of the aerial photographs; the scale of the aerial photographs; the standards in place at the time of the photo interpretation; and, to a certain extent, the level of financial investment in the product.

Figure 1 shows the current status of photo interpretation that has been completed to VRI standards since the implementation of the program in 1996. Projects planned for completion by the end of the 2006 / 2007 fiscal year include an area within the Fort St. John TSA, a portion of the Okanagan TSA and small projects in both the Sunshine Coast TSA and the Soo TSA. Polygon delineation may occur this fiscal year in additional units such as the Fort Nelson TSA, Mackenzie TSA, Dawson Creek TSA, Quesnel TSA and portions of TFL 47.

The bulk of the completed photo interpretation has been in the northeast portion of the province, where harvesting activities are primarily being undertaken by one major licensee. In units where multiple, smaller licensees are present, the opportunity to coordinate a program to complete photo interpretation for forest inventory appears to be less common.

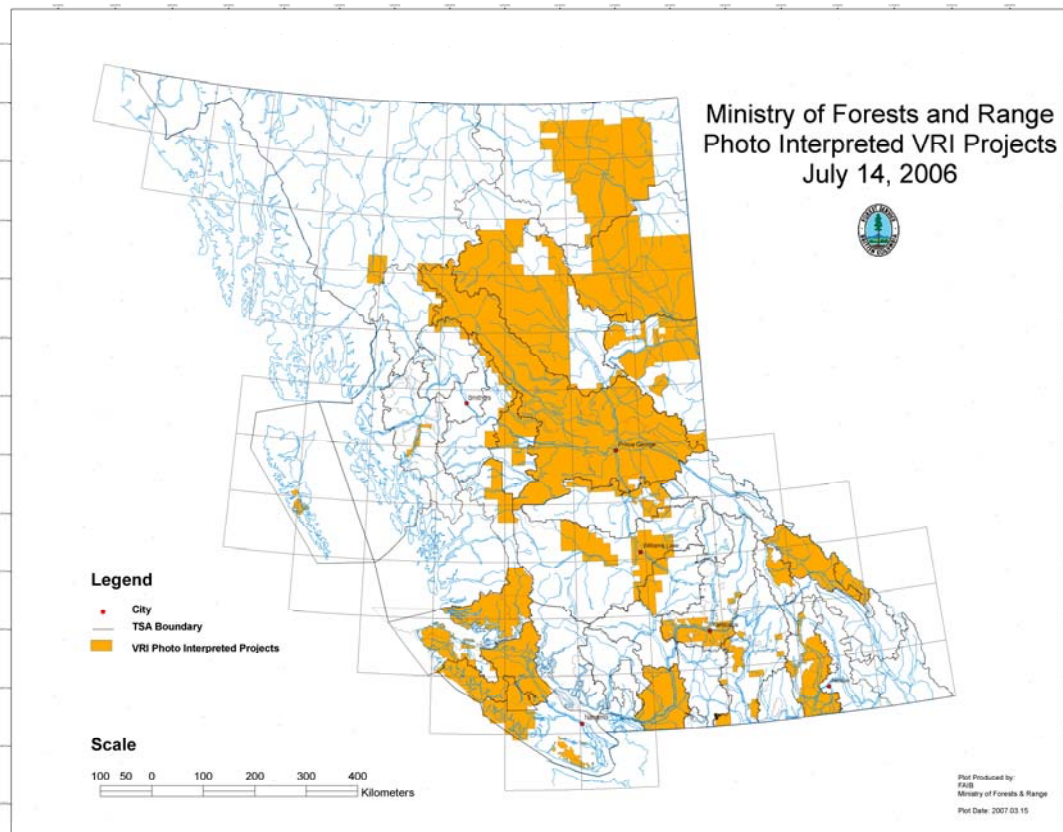


Figure 1 – Photo Interpretation Status

The completion of TFL photo interpretation information to VRI standards has been included in Figure 1 even though that information is not currently stored in or downloadable from the Land and Resource Data Warehouse (LRDW). Photo interpreted information exists for most of the parks in the Province with significant exceptions being Wells Gray Park and the Kitlope Heritage Conservancy where no forest cover information is available. The age of these inventories is a concern as the photo interpretation information was last completed in the 1970's for many parks with some units having a 1950's vintage forest inventory.

Photo acquisition of new aerial imagery was completed over an extensive area of the province in the 2006 field season using a combination of government-directed projects and contracts (through the Base Mapping and Geomatics Services section of Integrated Land Management Bureau) and contractor-directed programs. The extent of coverage in the northeast as well as any additional aerial photographs that are acquired in 2006 will significantly impact the photo interpretation program for next fiscal year with respect to available funding, priority of project areas and the availability of contract resources to complete the photo interpretation and digital mapping.

For an average unit in the province, photo interpretation accounts for about 55% of the total cost when all three direct products of the VRI program are completed.

2. Ground Sampling (Phase II)

The ground sampling phase of the VRI is the collection of field measurements of the resource (usually to generate timber volume) within a specific unit and, in coordination with the NVAF sampling, provides the basis for statistical adjustment of the photo interpreted attributes.

As shown in Figure 2, ground sampling has occurred in almost all portions of the province, to varying levels, with the exception of the northwest portion of the province where very limited inventory activity has occurred within the last ten years. Existing ground sampling projects that are planned for completion by the end of the 2006 / 2007 fiscal year include the Prince George Forest District and the Fort St. James Forest District. Additionally, a number of projects will either be initiated or ongoing this fiscal year with future work anticipated in the Lakes TSA, the Okanagan TSA, the Strathcona TSA, TFL 47 and TFL 49.

Where a TFL licensee has undertaken VRI ground sampling, this has been included in Figure 2 for completeness of information. It should be noted that areas of the province where an apparent intensification of sampling has occurred were largely completed in the FRBC-era when the Ministry of Forests was more directly involved in the planning and implementation of the VRI program. Examples of this include the Dawson Creek TSA, TFL 30 (under the active guidance of the McGregor Model Forest) and TFL 48 (Canfor).

It should also be noted that situations exist where ground sampling has been undertaken within a particular unit where photo interpretation has not been completed to VRI standards (such as the Williams Lake TSA) but the opposite is not true. All units that have been photo interpreted to VRI standards either have the VRI ground sampling completed or are in the process of implementing a ground sampling project, such as the Strathcona TSA (except for the Clayoquot Sound photo interpretation project which has no current plans for ground sampling).

3. Net Volume Adjustment Factor (NVAF) Sampling

The NVAF sampling determines the statistically valid net merchantable volume for an inventory unit and corrects the bias inherent in net tree volume estimation. The information obtained in the field component of the NVAF sampling is used to apply a ratio adjustment to the ground sample (Phase II) net volumes. The NVAF uses a

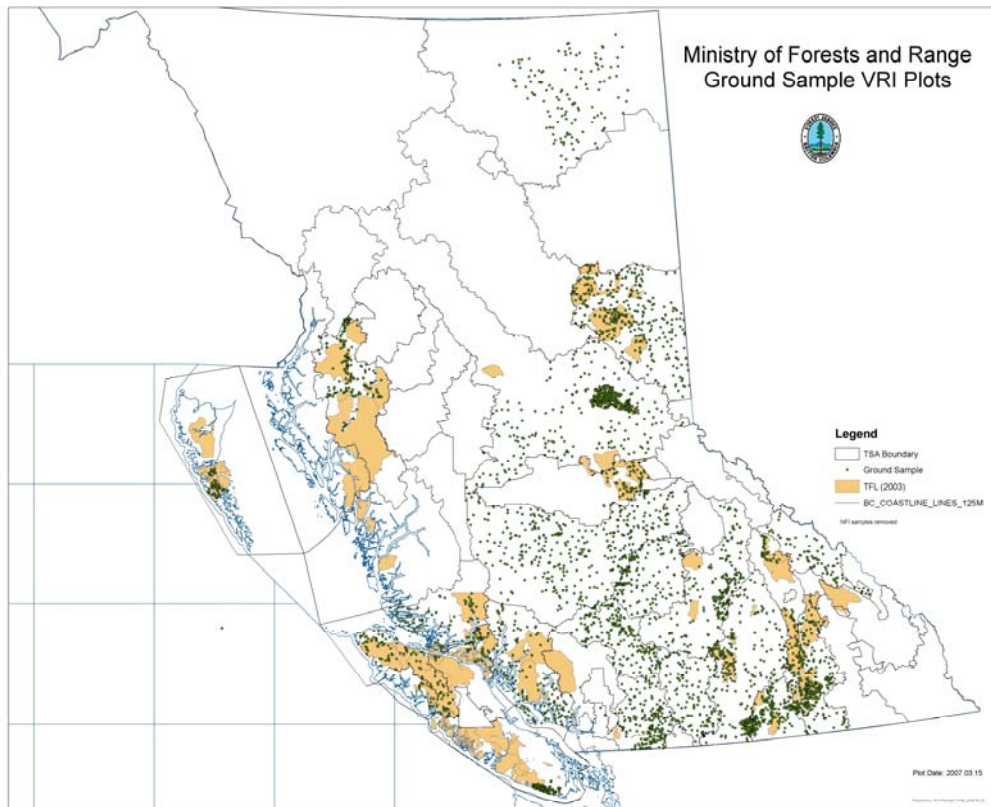


Figure 2 – VRI Ground Sampling Status

combination of visual estimates by ground sample field crews and destructive sampling of a number of individual trees to generate statistically valid results for the unit.

Information from the NVAF program can be used to correct errors in the ground sample volume estimates created from taper equation volumes, hidden decay and hidden loss indicators.

NVAF is a required component of the VRI ground sampling program – any project that completes ground sampling must also complete the NVAF sampling.

Figure 3 indicates the spatial distribution of NVAF sampling projects in the province as well as providing an assessment of the statistical quality for each unit that has been sampled. As indicated earlier, the spatial coverage of the NVAF program generally overlaps the coverage for the ground sampling in the province with a couple of noted exceptions such as the Prince George TSA where NVAF is planned and the Boundary TSA which was completed on a problem forest type population during the FRBC-era prior to the enforcement of the completion of NVAF sampling. There have been very few projects of this nature undertaken in the northwest portion of the province.

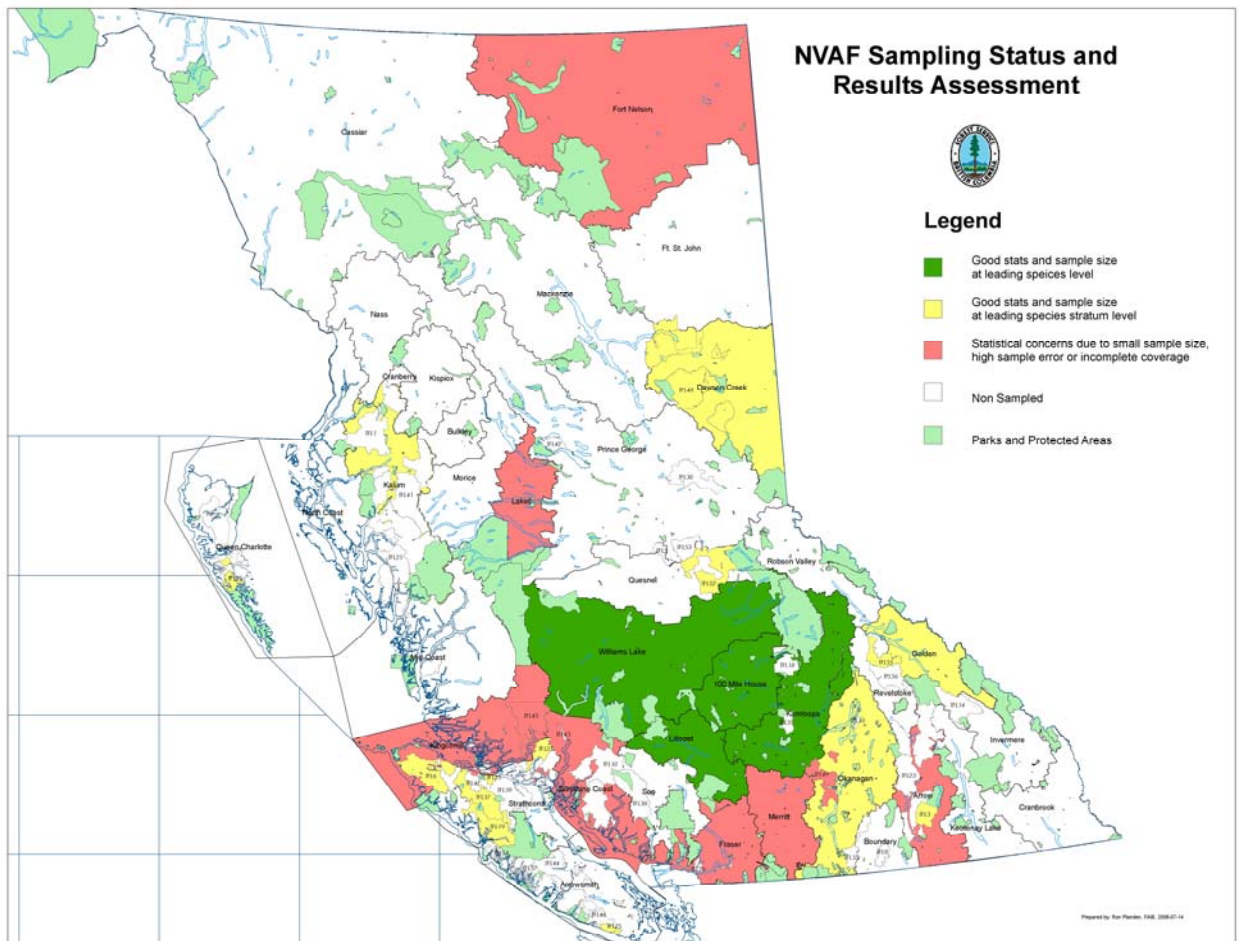


Figure 3 – NVAF Status

4. Update

Vegetation Cover Update is the process of maintaining and updating disturbances to the VRI photo interpretation information. This update process includes identifying, mapping and describing the changes that occur across the VRI. Changes to the land base as represented in the VRI may be the result of human activities such as logging, tree planting, right-of-way construction for highways and pipelines, or may be caused by natural disturbances to the forested land base such as fires, insects and windthrow.

Currency of updates by TSA range from those last completed in 2000 (three units in the northwest portion of the province) to those last completed in 2004. Ongoing disturbance updates have been temporarily stopped pending the implementation of the Vegetation Resources Inventory Management System (VRIMS). Upon implementation of the VRIMS, updates to the VRI database will be completed very efficiently.

5. Permanent Sample Plots

Permanent sample plots are long-term samples established in natural stands for the purpose of providing information on the rates of growth, mortality and changes in stand structure from stand establishment to maturity. The data is used for the development and calibration of growth and yield models such as VDYP that generate yield tables for the projection of the provincial inventory.

Permanent plots have been used for more than 80 years in British Columbia to track changes in the growth of trees across the province. Recent rejuvenation of the permanent sample plot program after a brief period of relative inactivity has necessitated the prioritization of the field data collection for this program. Further information will follow once a review of the status of the permanent sample plots has been completed.

6. Terrestrial Ecosystem Mapping and Predictive Ecosystem Mapping

Ecosystem mapping is the delineation of a landscape into map units, according to a combination of ecological features, primarily climate, physiography, surficial material, bedrock geology, soil, and vegetation. Common scales of ecological mapping are 1:20,000 to 1:50,000, though larger scales such as 1:10,000 or 1:5,000 may be used depending on project objectives.

Terrestrial Ecosystem Mapping (TEM) requires direct air photo interpretation of ecosystem attributes by an interpreter / mapper. This approach is typically used at larger mapping scales where more detailed information is required. For situations where less detail is preferred (smaller mapping scales for example), the Predictive Ecosystem Mapping (PEM) approach is used. PEM is a modelling approach to ecosystem mapping, whereby existing knowledge of ecosystem attributes and relationships are used to predict ecosystem representation in the landscape.

Both of these approaches provide a framework that integrates the biotic and abiotic ecosystem components of the landscape, from which valuable management interpretations (such as broad-scale landscape planning or site-specific interpretations) can be made. Ecosystem mapping also provides: a basis for rating values of resources or indicating sensitivities in the landscape; a historic record of ecological site conditions that can be used as a framework for monitoring ecosystem response to management; and a demonstration tool for portraying ecosystem and landscape diversity.

INVENTORY STATUS - OCTOBER 2006

ADMINISTRATIVE AREA		PHOTO INTERPRETATION			GROUND SAMPLING	
Unit	District	Photo Inventory Format	Percent of unit complete	Phase I complete (Year)	Phase II Complete (Year)	NVAF Complete (Year)
100 Mile House TSA	100 Mile House	FIP (1976)	0		2001	2001
Arrow TSA	Arrow Boundary	VRI	100	2003	2005	2005 (below minimum sample size)
Arrowsmith TSA	South Island	FIP (1986)	10% Clayoquot only			
Boundary TSA	Arrow Boundary	FIP (1989)	0		1998 (Dense pine only)	
Bulkley TSA	Skeena Stikine	FIP (1994)	0			
Cassiar TSA	Skeena Stikine	FIP (1975)	0			
Cranberry TSA	Skeena Stikine	FIP (1992)	0			
Cranbrook TSA	Rocky Mountain	FIP (1990)	0			
Dawson Creek TSA	Peace	Partial VRI (remainder 1983 and 1991)	40% complete 15% initiated in 06/07	2009 (projected)	2002	2003
Fort Nelson TSA	Fort Nelson	Partial VRI (remainder 1973)	30% complete	2001	2002 (VRI photo interpreted area only)	2002
Fort St. John TSA	Peace	Mostly VRI	50% complete 25% more to be completed in 06/07	2008 (projected)		
Fraser TSA	Chilliwack	VRI	100	1999	1999 (high sample error)	2000
Golden TSA	Columbia	VRI	100	2001	2003	2003 (high sample error)
Invermere TSA	Rocky Mountain	FIP (1993)	0			
Kalum TSA	Kalum	FIP (1989)	5%		2004	2004
Kamloops TSA	Kamloops	FIP (1985)	15%	1998	2005	2005
	Headwaters	FIP (1990)	0			
Kingcome TSA	North Island-Central Coast	VRI	100	2003	2003	2003
Kispiox TSA	Skeena Stikine	FIP (1992)	0			
Kootenay Lake TSA	Kootenay Lake	FIP (1968)	0			

Lakes TSA	Nadina	Partial VRI (remainder 1990)	40%	1999	2007 (projected)	
Lillooet TSA	Cascades	FIP (1988)	0		2002	2002
Mackenzie TSA	Mackenzie	Partial VRI (remainder 1975 and 1995)	35% complete 10% initiated in 06/07	2009 (projected)		
Merritt TSA	Cascades	FIP (1991)	0		Incomplete; needs additional samples	Incomplete; needs additional work
Mid Coast TSA	North Island-Central Coast	FIP (1989)	0			
Morice TSA	Nadina	FIP (1993)	5%	1999		
Nass TSA	Kalum	FIP (1990)	0			
North Coast TSA	North Coast	FIP (1995)	0			
Okanagan TSA	Okanagan Shuswap	Partial VRI (remainder 1975)	40% complete 40% more to be completed in 06/07	2008 (projected)	2007 (projected)	2002 (more samples needed)
Prince George TSA	Fort St. James	VRI	100	2005	2007 (projected)	2007 (projected)
	Prince George	VRI	100	2004	2007 (projected)	2007 (projected)
	Vanderhoof	VRI	100	2003	2001	2001
Queen Charlotte TSA	Queen Charlotte Islands	FIP (1967 and 1989)	0			
Quesnel TSA	Quesnel	FIP (1991)	0			
Revelstoke TSA	Columbia	VRI	100			
Robson Valley TSA	Headwaters	FIP (1991)	0			
Soo TSA	Squamish	Partial VRI (remainder 1992)	10%			
Strathcona TSA	Campbell River	VRI	100	2006	2007 (projected)	2007 (projected)
Sunshine Coast TSA	Sunshine Coast	Partial VRI (remainder 1993)	10%		1999	2000
Williams Lake TSA	Chilcotin	FIP (1966 and 1990)	0		2001	2001
	Central Cariboo	FIP (1976 and 1990)	0		2001	2001
Lignum IFPA		VRI	100	1997	1998	1998

INVENTORY STATUS - OCTOBER 2006

ADMINISTRATIVE AREA		PHOTO INTERPRETATION			GROUND SAMPLING	
Unit	Company Name	Photo Inventory Format	Percent of unit complete	Phase I Complete (Year)	Phase II Complete (Year)	NVAF Complete (Year)
TFL 1	Coast Tsimshian Resources	Unknown (1992)	0		2000	
TFL 3	Canfor	VRI	100	2000	2001	2001
TFL 5	West Fraser	VRI	100	2001		
TFL 6	Western Forest Products	VRI	100	1999	2001	2001
TFL 8	Pope and Talbot	FIP (1993)	0		1998 (Dense pine only)	
TFL 10	Interfor	Unknown (1978 and 1989)	0			
TFL 14	Tembec	FIP (1986)	0			
TFL 15	Weyerhaeuser	VRI	100	1997		
TFL 18	Canfor	FIP (1992)	0			
TFL 19	Western Forest Products	VRI	100	2002	2003	2004
TFL 23	Pope and Talbot	FIP (1990)	0		2000	
TFL 25	Western Forest Products	Partial VRI (remainder 1970)	60	2002	2003	Incomplete
TFL 26	District of Mission	FIP (1989)	0			
TFL 30	Canfor	VRI	100	2000	2000	
TFL 33	Federated Coop	FIP (1981)	0			
TFL 35	Weyerhaeuser	FIP (1978)	0			
TFL 37	Western Forest Products	VRI	100	1997	2002	2004
TFL 38	Northwest Squamish	Unknown (1981 and 1987)	0			
TFL 39	Western Forest Products	Unknown	0			
TFL 41	West Fraser	Unknown (1998)	0			
TFL 42	Tanizul Timber	VRI	100	2003		
TFL 43	Scott Paper	Unknown (1988)	0			
TFL 44	Western Forest Products	Unknown (1977)	0			
TFL 45	Interfor	VRI	100	2000	2002	2003
TFL 46	Teal Cedar Products	VRI	100	2006	2008 (projected)	2008 (projected)
TFL 47	TFL Forest	Partial VRI (remainder 1970)	85	2007 (projected)	2008 (projected)	2008 (projected)
TFL 48	Canfor	VRI	100	1997	2001	2001

TFL 49	Tolko	VRI	100	2002	1998	1998
TFL 52	West Fraser	VRI	100	2000	2002	2002
TFL 53	Dunkley	FIP (1993)	0			
TFL 54	Interfor	VRI	100	2001		
TFL 55	Louisiana Pacific	VRI	100	2002	2002	2002
TFL 56	Revelstoke Community Forest	VRI	100	2002		
TFL 57	lisaak	VRI	100	1998		