

**Ministry of Forests Lands and Natural Resource Operations
Forest Analysis and Inventory Branch**

**Inventory Section
2014/15 Annual Report**

For the Inventory Section of Forest Analysis and Inventory Branch (FAIB), this document provides:

1. an overview of the inventory section,
2. a reconciliation of what we accomplished in 2014/15 with what we said we'd do in the 2014/15 FAIB Business Plan, and
3. a breakdown of expenditures in 2014/15 by program area.

Inventory Section Annual Reports are posted at <http://www.for.gov.bc.ca/hts/vri/>

1 Section Overview

The inventory section:

- i) collects, manages, and makes available forest inventory information for British Columbia; and
- ii) develops and makes available stand growth and yield models.

The inventory section is the dominant provider (and in many cases the sole provider) of these tools and information in BC.

The section comprises 32 staff located in Victoria, Nanaimo, Nelson, Kamloops, and Campbell River. Our primary products are i) a province-wide forest inventory polygon data set, ii) stand growth and yield models (TASS, TIPSYP, VDYP), and iii) a variety of tree section, ground plot, and photo-plot data sets (PSP, CMI, NFI, NVAF, VRI phase 2, etc). In addition, we acquire and make available several types of imagery (mid-scale and large-scale air photos, and Landsat scenes). We produce and maintain a number of GIS spatial layers including a province-wide site index layer, PSP location layer, and year of MPB mortality layer. Also, we provide a wide variety of reports, custom data summaries, expert review and advice, analyses, model simulations, and protocols and standards.

Our data and models are used to characterize current, and forecast future, forest condition. This information is used in many settings including the analysis of timber supply, evaluation of tenure options and business opportunities, simulation of forest carbon dynamics, silviculture program design, operational planning, state of forest reporting, habitat identification, management of visual resources, wildfire risk assessment, biodiversity and watershed assessment, and much more.

A wide range of public- and private-sector clients utilize our products and services, obtaining them in many ways. Many of our products are accessed and downloaded from our branch web site or FTP site, including the stand growth models, ground sample data summaries, and published reports, protocols and maps. The provincial, forest cover polygon data is provided to users through the DataBC data distribution service. Many users access our forest inventory through software applications such as iMapBC, MapView, and HectaresBC. To service special requests, we provide custom data extracts. Imagery acquired for forest inventory is provided to GeoBC and made available through the GeoBC image distribution web site. Last, in response to user requests, inventory section staff provide expert advice and analyses related to forest inventory, monitoring, and stand growth modelling.

2 Reconciliation of Accomplishments Against Planned Activities

Each year, the FAIB Business Plan lists the projects that the inventory section plans to undertake in the fiscal year. For the period April 1, 2014 to March 31, 2015, the table below lists

- i) what we said we’d do in the 2014/15 FAIB Business Plan, and
- ii) what we actually accomplished in the fiscal year.

The table is focussed on the commitments detailed in section 3.2 of the 2014/15 FAIB Business Plan (available at <http://www.for.gov.bc.ca/hts/vri/>). Some other significant accomplishments, in areas not specified in the business plan, are not included in the table below.

What we said we’d do in the 14/15 branch business plan	What we accomplished in 14/15
<p>Air Photo and Satellite Imagery Acquisition Acquire air photos for areas on southern Vancouver Island, Williams Lake TSA, Fort St James, and Cassiar. Acquire Landsat satellite imagery for the province. Provide Forestry Canada with new photos when available for NFI photo-plot locations. Evaluate DEM and DSM obtained from air photos.</p>	<p>We acquired air photos in 4 of the 4 planned management units. In the Vancouver Island, Williams Lake, and Fort St James project areas we achieved 100% of the planned coverage over an area of 4 million hectares. In the Cassiar, due to prolonged cloud cover we achieved only 50% of the planned acquisition. We acquired and processed 80 individual Landsat 8 satellite images covering the province and produced natural and false colour balanced provincial mosaics. All imagery was provided to GeoBC for distribution. We provided Forestry Canada with new photos for some NFI photo-plot locations. We evaluated the new DEMs and DSMs derived from air photos. Additional testing is planned for 2015/16.</p>
<p>Photo-interpretation (VRI Phase 1) Initiate photo-interpretation in Quesnel and Morice TSAs and TFL 23. Continue photo-interpretation in</p>	<p>We initiated 3 of the 3 planned photo-interpretation projects. We continued 2 of the 2 projects as planned. The TFL 23 photo-interpretation project was completed as planned. We produced 2 of the 3 implementation plans (southern Vancouver Island and</p>

<p>Lakes TSA and Vanderhoof District. Prepare implementation plans for southern Vancouver Island, Williams Lake, and Fort St James.</p>	<p>Fort St James. See http://www.for.gov.bc.ca/hts/vri/planning_reports/tsa_vpip.html). Over the year, 390 full and partial mapsheets, totalling about 5 million hectares, of new VRI photo-interpretation were integrated into the provincial inventory file (see Inventory update, VRIMS maintenance, and projection).</p>
<p>Alternate Approaches to Inventory Mapping (LVI, VRI-fix, VRI-lite) Initiate LVI inventory of Cassiar TSA. Complete accuracy assessment of LVI in western Quesnel and western Williams Lake. Initiate VRI-lite photo-interpretation in northern Tweedsmuir Park. Initiate targeted improvement of existing VRI polygons in central Quesnel.</p>	<p>We initiated an LVI-based inventory in Cassiar TSA. We completed the accuracy assessment of LVI in western Quesnel and western Williams Lake (https://www.for.gov.bc.ca/hts/rs/reports.html). Where the Morice TSA photo-interpretation project extends into northern Tweedsmuir, we used eCognition for automated delineation of polygons. In central Quesnel, where field sampling had identified errors in polygon basal areas, we applied basal area prediction equations to complete a targeted improvement of existing VRI polygons.</p>
<p>VRI Ground Sampling (CMI/YSM and VRI phase 2) Co-ordinate the 14/15 ground sampling program. Complete ground sampling in Prince George, Kamloops, and 100 Mile House TSAs. Prepare project report with sample plan, implementation discussion, and data summaries. Develop ground sampling implementation plans for 2015.</p>	<p>We co-ordinated a large ground sampling program in 2014. Due to limitations in contractor capacity we did not complete all planned sampling. Most of the sampling planned for Prince George was achieved. None of the sampling planned for 100 Mile House was achieved. Part of the sampling planned for Kamloops was achieved. Late in the fiscal year, we trained and certified additional VRI ground samplers. In 2015 we intend to complete the planned 2014 sampling and sample additional areas. We did not complete a consolidated project report. Ground sample implementation plans were developed for sampling the Prince George, 100 Mile House, Kamloops, Okanagan and Lillooet TSAs in 2015.</p>
<p>Ground Sample Data Maintenance and Enhancement Load to database and compile all 2014 ground samples. Load some growth plot data from other sources (e.g., backlog PSPs, EPs, etc). Provide ground sample data on request. Produce ground sample data summaries. Continue project to modernize the ground sample data management system.</p>	<p>We loaded to the database and compiled all of the 2014 ground samples. Some PSPs previously measured but not loaded were added to our database. We provided ground sample data on request to a wide range of clients. We produced ground sample data summaries - both written summaries for YSM sampling and excel files by TSA to provide easy access to the entire sample data set (on the FTP site at ftp://ftp.for.gov.bc.ca/HTS/external/!publish/faib_ground_samples). We continued the project to modernize the ground sample data management system.</p>
<p>Coordinate Young Stand Ground Sampling Activities Document the purpose of YSM and</p>	<p>We retained a consultant to examine the issues, produce a report and make recommendations.</p>

SDM samples, their suitability for various applications, and ensure no duplication of effort.	
NVAF Sampling and Tree Volume Develop 2014/15 provincial NVAF work plan. Sample 75 NVAF trees in the Cariboo Region. Ensure knowledge transfer in NVAF sampling, compilation and analysis procedures, V&D databases, taper equation, etc.	We developed a 2014/15 provincial NVAF sampling plan and collected 62 NVAF samples in the planned management unit. A long-serving staff member retired and we worked to ensure knowledge transfer in NVAF sampling, compilation and analysis procedures, volume and decay databases, taper equations, etc. In addition, we completed a report evaluating the BEC-based loss factors.
Inventory and Monitoring Analysis Co-ordinate inventory and monitoring analyses. Complete inventory and monitoring analysis for Williams Lake, Quesnel and Merritt TSAs, and Cariboo area. Initiate inventory and monitoring analyses for Prince George, 100 Mile House, and Kamloops TSAs. Apply recent ground sample data and analyses in TSR.	We co-ordinated, and significantly enhanced, our standard inventory and monitoring data analyses. We completed analysis for 2 of the 4 planned management units that were sampled in 2013 (Williams Lake and Merritt) and posted the analysis reports at https://www.for.gov.bc.ca/hts/vri/planning_reports/tsa_analysis.html . Analyses were initiated for 2 of the 2 planned management units that were sampled in 2014 and the Kamloops TSA report was completed. The ground sample data acquired in 2014 is being applied in the Prince George and Kamloops TSRs.
Site Productivity Update the provincial site index GIS layer. Release site index layers in HectaresBC. Initiate PEM in Robson Valley TSA. Conduct SIBEC sampling in Merritt TSA and south-eastern BC. Assess accuracy of site index in the provincial site productivity layer. Develop the 2015/16 site productivity work plan.	We developed a 2015/16 site productivity work plan, updated the provincial site index GIS layer (see http://www.for.gov.bc.ca/hts/siteprod/provlayer.html), and released site index layers in HectaresBC (http://hectaresbc.ca/app/habc/HaBC.html). We initiated work in Robson Valley required for a PEM and completed all of the planned SIBEC sampling. We completed a comprehensive assessment of the accuracy of the provincial site index layer and published a research report (TR-085, https://www.for.gov.bc.ca/hfd/pubs/tr.htm).
PSP Re-measure 150 PSPs (Cranbrook, Kootenay Lake, Kamloops, Quesnel, and Bulkley TSAs). Develop 2015/16 PSP annual work plan. Test a streamlined approach to PSP contracting.	We conducted reconnaissance of 82 PSPs and re-measured 176 PSPs in the planned areas. We developed a strategic plan to guide PSP re-measurements for the next four years and obtained program review from an external expert. We prepared an annual work plan for 15/16. We tested a streamlined approach to PSP contracting and are adopted it for future contracting.
Biometrics Develop process to adjust attributes of all polygons in the inventory to account for change due to MPB.	We began developing a process to adjust attributes of all polygons in the inventory to account for change due to MPB. The process will be refined and implemented in 2015. We enhanced VDYP7 but did

<p>Enhance VDYP7 and provide VDYP7 training. Apply basal area estimation equations to several existing inventories. Continue to develop tree list estimation capability. Review or produce yield curves for use in TFL/TSA AAC determination</p>	<p>not complete training. We applied basal area estimation equations to a portion of the Quesnel TSA. We improved our ability to generate tree lists for inventory polygons. We reviewed and produced yield curves for use in TFL/TSA AAC determination.</p>
<p>Stand Development Modelling Research Release TASS III for lodgepole pine/white spruce and coastal hemlock/Douglas-fir mixtures. Remeasure and maintain key GY research installations. Enhance TIPSY, FAN\$IER and SiteTools, including complete a start-up routine and batch version that provides TIPSY yield predictions from RESULTS and other survey data. Conduct stand modelling research, including investigations on cedar biomass, crown and knot distributions; <i>Abies</i> crown biomass; Fdi for TASSIII; and bole increment modelling.</p>	<p>We developed an improved Beta test version of TASS III but it was not released by fiscal year-end. We anticipate the first public release of TASS III in 2015. In partnership with Resource Practices Branch, we re-measured and maintained 29 key long-term GY research installations. We completed the planned enhancements to TIPSY, FAN\$IER and SiteTools. We completed the planned stand modelling research, prepared and submitted several papers, and delivered presentations at workshops and meetings such as CSC, NSC, SISCO, and Western Mensurationists. We provided approximately 9000 custom TASS simulations for clients.</p>
<p>Inventory Update, VRIMS Maintenance, and Projection Integrate harvest openings and regeneration updates from RESULTS. Integrate new VRI re-inventoried mapsheets. Integrate western Williams Lake LVI and northern Vancouver Island LiDAR-based data into VRIMS. Manage the 2014 projection. Integrate all free-growing data from 10 TSAs. Provide 2014 harvest change detection for the province. Develop a province-wide Landsat-based fire map.</p>	<p>We completed 6 of the 7 planned projects. Approximately 18,000 new harvest and regeneration updates, and 10,000 free growing updates, from RESULTS were processed and brought into the provincial inventory file. This year, 390 full and partial mapsheets (5 million hectares) of new VRI inventory were integrated into the provincial inventory data set. We developed the process and prepared the data but did not complete the integration into VRIMS of western Williams Lake LVI data. We completed the integration into VRIMS of the northern Vancouver Island LiDAR-based data. The annual projection was completed ahead of schedule and the public release of the 2014 provincial inventory file (veg-comp-poly) was accomplished in December 2015 (available at: http://apps.gov.bc.ca/pub/dwds/home.so). All free-growing data from 10 TSAs was integrated into VRIMS. We completed the 2014 harvest change detection for the province. All large fires for 2007-2013 were classified for burn severity in preparation</p>

	for updating inventory polygon attributes in VRIMS in 2015.
<p>Special Analyses, Initiatives, and Products for Clients Participate in FFWG Pilot Projects and provide inventory support. Participate in 2 LiDAR projects and complete a specifications document. Initiate external expert reviews of some program areas. Develop a VRI Phase 1 certification exam and a VRI Phase 2 training course.</p>	<p>We participated in FFWG Pilot Projects and provided inventory support. We participated in 2 LiDAR projects and completed a draft specifications document. We completed external expert reviews of the inventory ground sampling and PSP programs. We developed a VRI ground sampling (Phase 2) training course, ran the course, and certified additional VRI ground samplers. We worked on, but did not complete, the development of a VRI Phase 1 certification exam. We plan to complete the development of the exam this fiscal year.</p>
<p>Administration of the Forest Inventory and GY Program Plan and manage the inventory and GY program, including program planning, budgeting, progress monitoring and reporting, and stakeholder engagement and communication.</p>	<p>We carefully planned and managed the forest inventory and GY program and the activities of the section as-a-whole. Annual work plans were developed for many program areas (e.g., site productivity and PSPs) and for all major projects. Project progress was monitored throughout the year and summarized in several year-end reports (including this one). We engaged and communicated with stakeholders at the project level, through a series of stakeholder forums, via presentations and our e-newsletter (posted at https://www.for.gov.bc.ca/hts/vri/index.html), and in many other ways.</p>

3. Expenditures in 2014/15 by Program Area

Funding for approximately 98% of the section expenditures was obtained from the Land Based Investment Program. The remainder was provided by base funding and funding from the Canadian Forest Service. The table below provides a breakdown of expenditure by program area.

Program area	Expenditure (\$)	Description
Forest inventory - photo-interpretation	\$4,320,085	Includes air photo acquisition (portions of Vancouver Island, Williams Lake, Fort St James, and Cassiar) and standard VRI photo interpretation (Morice, Lakes, Vanderhoof, Quesnel, and TFL 23).
Forest inventory – VRI ground sampling, PSPs, EPs, and analyses	\$1,467,000	Includes VRI ground sampling (phase 2 5-point clusters, CMI, NFI, and YSM) in Prince George and Kamloops TSAs, NVAF sampling, PSP and EP re-measurement, and analysis of ground sample data.
Site productivity - sampling, mapping, and analyses	\$551,000	Includes SIBEC sampling (Merritt and south-eastern BC), PEM/BEC updates (Robson Valley), and update of the provincial site index GIS layer.
Evaluation, development, and application of new inventory methods and technology	\$243,000	Includes LVI (Cassiar), VRI-lite (Tweedsmuir), VRI-fix (Quesnel), and LiDAR (northern Vancouver Island and UBC AFRF) projects.
GY model maintenance and development	\$348,000	Includes development of components of TASS III and enhancements to TIPSy, FAN\$IER, and SiteTools.
Maintenance and enhancement of inventory database and software applications	\$333,000	Includes the annual projection of the forest inventory database, VRIMS maintenance, and minor software enhancements. Does not include expenditures on the re-design of the ground sample data management system.
Program support	\$477,000	Includes travel, equipment, 3 FTEs, and miscellaneous.
Total	\$7,739,085	