

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

Inventory Section
2013/14 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 2013/14 with what we said we'd do in the 2013/14 FAIB Business Plan, and
3. a breakdown of expenditures in 2013/14 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 31 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, TIPSY, 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 planning, management of visual resources, wildfire risk assessment, biodiversity and watershed assessment, and much more.

A wide range of public- and private-sector users utilize our products and services, obtaining them in many ways. Many of our products are accessed and downloaded from our branch web or FTP site including the stand growth models, and published reports, protocols and maps. The provincial, forest cover polygon data is provided to users through the GeoBC and DataBC data distribution portals. Many users access our forest inventory through software applications such as iMapBC and HectaresBC. To service special requests, we provide custom data extracts. Imagery acquired for forest inventory is provided to GeoBC and made available on 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, 2013 to March 31, 2014, the table below lists

- i) what we said we'd do in the 2013/14 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 2013/14 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.

What we said we'd do in the 13/14 branch business plan	What we accomplished in 13/14
Air photo and satellite imagery acquisition Acquire air photos for Morice and Quesnel TSAs through GeoBC. Acquire Landsat satellite imagery for the province. Provide Forestry Canada with new photos when available for NFI photo-plot locations.	We acquired air photos in 2 of the 2 planned management units and achieved 100% of the planned coverage over an area of 4.8 million hectares. All imagery was made publicly available through the GeoBC image distribution web site (http://geobc.gov.bc.ca/Imagery.html). We acquired Landsat 8 satellite imagery for the entire province, processed it, and provided it to GeoBC to be made available through the image distribution web site. In addition, we provided Forestry Canada with new photos for NFI photo-plot locations.
Photo-interpretation (VRI Phase 1) Initiate photo-interpretation projects in Lakes TSA and Vanderhoof district. Continue photo-interpretation projects in Kamloops TSA. Complete photo-interpretation projects in Mid Coast, 100 Mile House, and Haida Gwaii TSAs, and	We initiated 2 of the 2 planned photo-interpretation projects. We completed 5 of the 5 projects scheduled for completion. In addition, we completed the Kamloops photo-interpretation project. We produced 2 of the 2 planned implementation plans (see http://www.for.gov.bc.ca/hts/vri/planning_reports/tsa_vrip.html). 265 full and partial mapsheets, totalling about 3 million hectares, of new VRI photo-interpretation were integrated into the forest cover

TFL 35. Prepare Quesnel and Morice TSA implementation plans.	inventory file this year (see Inventory update, VRIMS maintenance, and projection).
VRI ground sampling (CMI/YSM and VRI phase 2) Co-ordinate the 13/14 ground sampling program. Complete ground sampling projects in Williams Lake, Quesnel, and Merritt TSAs. Load sample data to VGIS database. Prepare project report with sample plan, implementation discussion, and data summaries. Develop ground sampling implementation plans for 14/15.	We co-ordinated a large ground sampling program in 2013. We completed VRI ground sampling in 3 of the 3 planned management units, and completed a small additional sample in 100 Mile House TSA. 183 CMI samples were established on a 20km grid over the Quesnel, Williams Lake, 100 Mile House, and Merritt TSAs (plus an additional 57 photo-samples). 137 YSM/CMI samples were established to provide an intensified sample of young stands in the Williams Lake and Merritt TSAs. 75 VRI Phase 2 samples were established in eastern Williams Lake TSA to increase sample size in those areas where new photo-interpretation was recently completed. All ground sample data was loaded to the VGIS database. We did not complete a consolidated project report. Ground sample implementation plans were developed for sampling the Prince George and Kamloops TSAs in 2014.
NVAF sampling and tree volume Develop 2013/14 provincial NVAF work plan. Collect approx. 140 NVAF samples in 3 high priority areas (Morice, Robson Valley, and various coastal locations). Calculate new NVAFs and use them to adjust ground sample volumes. Update compiler taper equation and recompile VRI ground samples. Train successor in NVAF selection, compilation and analysis processes, V&D databases, the taper equation, etc.	We developed a 2013/14 provincial NVAF sampling plan and collected 71 NVAF samples in 1 of the 3 planned management units. Our sampling target was not achieved because no bids were received on a major NVAF tender offering. We calculated new regional NVAFs and applied them to adjust ground sample volumes. We completed the updating of the taper equation. In preparation for a key retirement, we undertook knowledge transfer in NVAF sample selection, data management, compilation and analysis processes, V&D databases, and the taper equation.
Inventory and monitoring analysis Co-ordinate inventory and monitoring analyses. Complete inventory and monitoring analysis for two management units (Kootenay Lake and Morice TSAs). Initiate inventory and monitoring analyses for Merritt, Williams Lake and Quesnel TSAs.	We co-ordinated, and significantly enhanced, our standard inventory and monitoring data analyses. We completed analysis for 2 of the 2 planned management units that were sampled in 2012 (Kootenay Lake and Morice TSAs) and posted the analysis reports at http://www.for.gov.bc.ca/hts/vri/planning_reports/planning.html# Analyses were initiated for 3 of the 3 planned management units that were sampled in 2013. These analyses (Merritt, Williams Lake and Quesnel TSAs) are scheduled for completion in 2014.
Site Productivity Develop the 2013/14 site	We developed a 2013/14 site productivity work plan and updated the provincial site index GIS layer (see

<p>productivity work plan. Update the provincial site index GIS layer. Complete or update 2 PEMs (Arrow and Merritt). Conduct SIBEC sampling in Cranbrook, Merritt, and Arrow. Initiate project to develop growth intercept and height-age models, and collect SIBEC data, for Engelmann spruce. Produce site productivity atlas.</p>	<p>http://www.for.gov.bc.ca/hts/siteprod/provlayer.html). We completed all of the planned SIBEC sampling. We completed/updated 2 of the 2 planned PEMs. We initiated a project to sample and develop models for Engelmann spruce. A report is scheduled for completion in 2014. The site productivity atlas was developed by adding site index layers to HectaresBC. The new data layers are available in the most recent HectaresBC software release (http://hectaresbc.ca/app/habc/HaBC.html).</p>
<p>Monitoring Review data and analysis reports with stakeholders. Refine data collection, compilation, analysis, and reporting.</p>	<p>We reviewed monitoring data and analysis reports with stakeholders and we refined data collection, compilation, analysis, and reporting. See updated compilation and analysis procedures at http://www.for.gov.bc.ca/hts/vri/monitoring/monitoring_g.html.</p>
<p>PSP Reconnaissance of 50 PSPs. Re-measurement of 85 PSPs. Train new PSP measurement contractors. Develop 2013/14 PSP annual work plan</p>	<p>We conducted reconnaissance of 145 PSPs and re-measured 85 PSPs. We held 2 training sessions to develop PSP measurement contractors. We drafted but did not finalize a PSP program annual work plan for 2013/14.</p>
<p>Landscape Vegetation Inventory (LVI) Complete LVI inventory of western Williams Lake TSA. Improve LVI inventory of western Quesnel. Complete LVI ground sampling in Quesnel and Williams Lake TSAs. Complete accuracy assessment of LVI in Quesnel and western Williams Lake. Modify and finalize the LVI standards and procedures.</p>	<p>We largely completed the LVI-based inventory of western Williams Lake TSA. One final set of deliverables were produced in the spring of 2014. Using an improved imputation method, we produced an improved LVI-based inventory of western Quesnel TSA. A large ground sample (173 plots) designed to provide data to assess and improve the accuracy of LVI was successfully completed in western Quesnel and Williams Lake TSAs. Accuracy assessment was completed. Procedures and standards for LVI were modified and finalized.</p>
<p>Special analyses, data provision, and products for clients Provide custom analysis to guide LBIS investments. Provide 2013 remote sensing tile for the province and harvest change detection. Provide ground sample data on request.</p>	<p>We provided custom analyses to guide LBIS investments. We downloaded Landsat 8 imagery for the province, processed it, and provided it to GeoBC to make available through the image distribution web site. We completed most but not all of the 2013 harvest change detection. This work will be completed in the summer of 2014. We provided ground sample data (PSP, CMI, YSM, VRI phase 2) on request to many clients.</p>
<p>Support the Forestry and Fibre Working Group Participate in a Fibre Based Management Unit Pilot providing</p>	<p>We provided advice and support on forest inventory issues to the Forestry and Fibre Working Group.</p>

inventory support.	
Biometrics Develop solutions for projecting attributes for MPB damaged stands. Release new version of VDYP7. Complete implementation of tree-list generation for all TSAs in BC. Implement Phase I basal area & trees per hectare estimation methodology standard across the province. Update biomass estimation equations for all BECs and species.	We explored solutions for projecting attributes for MPB damaged stands. We completed and released a new version of VDYP7 (available at http://www.for.gov.bc.ca/hts/vri/biometric/bio_softwa_re.html). We improved our ability to generate tree lists for inventory polygons, but we did not generate tree lists for all TSAs. Similarly, we improved and finalized basal area prediction models, but did not apply the method provincially. We did not update our biomass equations.
Stand development modelling research First public release of TASS III. Add western redcedar to TASS III and release a second version. Enhance Fan\$ier lumber recovery function. Enhance TIPSY RESULTS data input capability. Remeasure and maintain key GY research installations. Improve ability to use TASS and TIPSY to project growth of inventory polygons.	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 by July 2014. We enhanced Fan\$ier's lumber recovery function and TIPSY's RESULTS data input capability. In partnership with Resource Practices Branch, we re-measured and maintained 42 key long-term GY research installations. We improved the ability to use TASS and TIPSY to project the growth of inventory polygons.
Inventory update, VRIMS maintenance, and projection Integrate harvest depletion openings. Integrate new VRI re-inventoried mapsheets. Manage the 2013 projection. Produce statistics that characterize the status of the inventory and inventory update process. Undertake essential VRIMS maintenance including migration to Arc 10. Develop and execute a plan to identify and integrate missing depletions.	We completed 6 of the 6 planned projects. Approximately 40,000 new harvest and regeneration updates from RESULTS were processed and brought into the provincial inventory file. This year, 265 full and partial mapsheets (3 million hectares) of new VRI inventory were integrated into the provincial inventory data set. The annual projection was completed on time culminating in the public release of the 2013 provincial inventory file (veg-comp-poly) in January 2014 (available at: http://apps.gov.bc.ca/pub/dwds/home.so). Statistics and maps characterizing the status of the inventory were updated and are available at http://www.for.gov.bc.ca/hts/vri/planning_reports/pro_refmap.html . We completed all planned maintenance to VRIMS, including the migration to Arc 10. Also, we developed and executed a plan to identify and integrate missing depletions.
Innovation and improvement initiatives Improve components of IT	We completed 3 of the 4 planned innovation projects. We improved components of our IT infrastructure, primarily improvements to VRIMS. To build our

infrastructure. Participate in one LiDAR project. Produce ground sample data summaries. Initiate external expert reviews of some program areas.	skills with LiDAR-based inventory, we continued the project on northern Vancouver Island in partnership with BCTS, GeoBC, and WFP. In addition, we contributed to a LiDAR-project at UBC Alex Fraser Research Forest. We substantially improved our ability to deliver summaries of ground sample data and we provided the data from thousands of samples to a wide range of clients. We selected the ground sample program for external expert review, but did not initiate the review. The review is scheduled to commence in summer 2014.
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.	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 NVAF) and for all major projects. Project progress was monitored throughout the year, reported quarterly to LBIS 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, and in many other ways.

3. Expenditures in 2013/14 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	\$3,456,470	Includes air photo acquisition (Morice and Quesnel TSAs) and standard VRI photo interpretation (Mid Coast, Haida Gwaii, 100 Mile House, Kamloops, and Lakes TSAs, Vanderhoof district, and TFL 35).
Forest inventory – VRI ground sampling, PSPs, EPs, and analyses	\$1,402,453	Includes VRI ground sampling (phase 2 5-point clusters, CMI, NFI, and YSM) in Williams Lake, Quesnel, and Merritt TSAs, NVAF sampling, PSP and EP re-measurement, and analysis of ground sample data. Includes CFS funding.
Site productivity - sampling, mapping, and analyses	\$1,650,310	Includes SIBEC sampling (Cranbrook, Merritt, and Arrow), PEM (Arrow and Merritt), BEC updates, site tree stem analysis, and update of the provincial site index GIS layer.
Evaluation, development, and application of new inventory methods and technology	\$365,076	Includes LVI projects (western Williams Lake and Quesnel TSAs) and LiDAR projects (northern Vancouver Island and UBC AFRF).
GY model maintenance and development	\$381,695	Includes development of components of TASS III and enhancements to TIPSY, FAN\$IER, and SiteTools. Includes CFS funding.
Maintenance and enhancement of inventory database and software applications	\$260,000	Includes the annual projection of the forest inventory database, VRIMS maintenance, and initiating a redesign of the ground sample data management system.
Program support	\$261,496	Includes travel, equipment, 3 FTEs, and miscellaneous. Ministry base and LBIS funding.
Total	\$7,777,500	