

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

Inventory Section
2012/13 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 2012/13 with what we said we'd do in the 2012/13 FAIB Business Plan, and
3. a breakdown of expenditures in 2012/13 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, 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 fibre 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, 2012 to March 31, 2013, the table below lists

- i) what we said we'd do in the 2012/13 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 2012/13 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 12/13 branch business plan	What we accomplished in 12/13
<p>Air photo and satellite imagery acquisition Acquire air photos in two management units through GeoBC (Lakes TSA and Vanderhoof district). Acquire Landsat satellite imagery for the entire province. Acquire air photos for NFI photo-plot locations in Prince George district</p>	<p>We acquired air photos in 2 of the 2 planned management units and achieved 100% of the planned coverage over an area of 3.1 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 7 satellite imagery for the entire province and new photography for NFI photo-plot locations in Prince George and Fort St James districts. In addition, we acquired large-scale imagery at photo-sample locations across western Williams Lake TSA.</p>
<p>Photo-interpretation Initiate photo-interpretation projects in Pacific and Kamloops TSAs and TFLs 14, 23, and 35. Continue</p>	<p>We initiated 5 of the 5 planned photo-interpretation projects, however late in the fiscal year the TFL 23 project was suspended. The project will resume in 2013/14. We continued 3 of the 3 projects as planned and completed the single project that was scheduled for completion in 12/13. We produced 2 of the 2 planned implementation plans (see</p>

<p>photo-interpretation projects in 100 Mile House, Haida Gwaii, and Mid-Coast. Complete photo-interpretation projects in TFL 14. Prepare Lakes and Vanderhoof implementation plans.</p>	<p>http://www.for.gov.bc.ca/hts/vri/planning_reports/tsa_vpip.html). 370 full and partial mapsheets, totalling about 2.9 million hectares, of new VRI photo-interpretation was integrated into the forest cover inventory file this year (see Inventory update, VRIMS maintenance, and projection).</p>
<p>VRI Phase II ground sampling Conduct VRI phase 2 ground sampling in two management units (Kootenay Lake and Morice TSAs). Load sample data to VGIS database. Develop implementation plans for 13/14.</p>	<p>We completed VRI phase 2 ground sampling in 2 of the 2 planned management units, loaded the data to the VGIS database and developed ground sample implementation plans for 13/14. In addition, we conducted and reported on a ground sample of 96 VRI phase 2 samples in the Lakes TSA.</p>
<p>NVAF sampling and tree volume Develop 2012/13 provincial NVAF work plan. Collect approx. 300 NVAF samples in 4 high priority areas (Kootenay Lake, Mackenzie, and Prince George TSAs and certain coastal locations). Calculate new NVAFs and use them to adjust volume audit samples. Update compiler taper equation and recompile VRI ground samples.</p>	<p>We developed a 2012/13 provincial NVAF sampling plan. We collected 280 NVAF samples in 4 of the 4 planned management units. We calculated new regional NVAFs and applied them to adjust ground sample volumes. We did not complete the updating of the taper equation. This work is now scheduled for completion in 2013.</p>
<p>Inventory analysis Co-ordinate inventory analysis and consolidate contracting. Revise audit report format. Complete inventory analysis for six management units</p>	<p>We improved the co-ordination of inventory analyses within the section and revised the format of the analysis reports. We completed inventory analysis for 5 of the 6 planned management units (all but Revelstoke). Inventory analysis reports are posted at http://www.for.gov.bc.ca/hts/vri/planning_reports/planning.html#</p>

<p>(Mackenzie, Fort St. John, and Revelstoke TSAs, and TFLs 18, 53, and 46).</p>	
<p>Site Productivity Develop a 2013/13 site productivity work plan. Complete provincial site index GIS tile. Complete or update 4 PEMs (Kootenay Lake, Rocky Mountain, Merritt, and Okanagan drybelt). SIBEC sampling in Rocky Mountain and Arrow/Boundary. Update BEC in 3 areas (Arrow/Boundary, Kamloops, Okanagan wetbelt).</p>	<p>We developed a 2012/13 site productivity work plan. We completed and released a provincial site index GIS layer (see http://www.for.gov.bc.ca/hts/siteprod/provlayer.html). We completed all of the planned SIBEC sampling. We completed/updated 2 of the 4 PEMs (Cranbrook and Kootenay Lake). The PEM in Merritt is now planned for completion in 2013/14.</p>
<p>Monitoring Implement young stand monitoring in Kootenay Lake, Morice, and Quesnel TSAs. Develop data analysis procedures. Compile data and report. Prepare implementation plans for 13/14.</p>	<p>We established young stand monitoring plot networks in all 3 of the 3 planned areas. We developed data analysis procedures, compiled the data collected in 11/12 and initiated report preparation (see http://www.for.gov.bc.ca/hts/vri/monitoring/monitoring.html). Monitoring reports will be completed in 2013. We prepared implementation plans for 2013/14. In addition, we analyzed and reported on 58 CMI samples re-measured in 2011 in the Okanagan, 100 Mile House and Kamloops TSAs (report posted on web page listed above).</p>
<p>PSP Reconnaissance of 274 PSPs. Re-measurement of 127 PSPs. Update the MPB PSP strategy. Update the PSP Sample Tile status and location information. Develop 2013/14 PSP annual work plan.</p>	<p>We conducted reconnaissance of 636 PSPs. We re-measured 127 PSPs. We updated the PSP strategy and developed a PSP program annual work plan for 2012/13. We updated the PSP sample tile in the BCGW that provides status and location information on PSPs.</p>
<p>Landscape Vegetation Inventory (LVI) Improve/enhance LVI method. Undertake LVI inventory of western</p>	<p>We improved and enhanced the LVI method and standards. We initiated an LVI inventory of western Williams Lake TSA. Final products are scheduled for completion in the summer of 2013. Ground sampling was not completed as no bids were received for the tender. Ground sampling is scheduled for completion in 2013.</p>

<p>Williams Lake TSA. Complete ground sampling. Modify and finalize the LVI standards and procedures.</p>	
<p>Special analyses, data provision, and products for clients Provide Softwood Lumber Arbitration team with information on location and severity over time of MPB attack. Provide custom analysis to guide LBIS investments. Provide 2012 remote sensing tile for the province and harvest change detection. Provide ground sample data on request.</p>	<p>We provided BC’s Softwood Lumber Arbitration team with information to support the arbitration including the location and severity over time of MPB attack. We provided LBIS with custom analysis to guide LBIS investments, including an update to MPB-impact mapping (see http://www.for.gov.bc.ca/hts/rs/mpb_impact.html). We provided remote sensing imagery for the province, however the Landsat scenes contained data gaps due to satellite malfunction. Because of these gaps, we did not undertake 2012 harvest change detection. Landsat 8 launched successfully in February so we intend to resume harvest change detection in 2013. We provided ground sample data (PSP, CMI, VRI phase 2) on request to many clients.</p>
<p>Biometrics Improve biomass estimation. Develop capacity to generate tree lists for inventory polygons. Test accuracy of existing modifications and explore options to improve performance of VDYP in MPB-impacted stands. Develop equations and process for standardizing VRI Phase 1 basal area estimates.</p>	<p>We improved our biomass estimation and compared our biomass models to models developed by the CFS. We developed preliminary capacity to generate tree lists for inventory polygons. We tested the accuracy of existing modifications and explored options to improve performance of VDYP in MPB-impacted stands. We developed equations and a process for standardizing VRI Phase 1 basal area estimates.</p>
<p>Stand development modelling research Test, develop, and distribute an improved Beta version of TASS III. Continue</p>	<p>We developed an improved Beta test version of TASS III but it was not released by fiscal year-end. We anticipate a limited release by September 2013 followed by full public release by March 2014. We continued developing, testing, and improving various components of the SYLVER system, including releasing TIPSY 4.3 and our new software application for financial analysis, FAN\$IER,</p>

<p>development and testing of SYLVER (including enhancements to TIPSYS and FAN\$IER). Advise on monitoring protocols, yield prediction in MPB-damaged stands, PSP data compilation, and other areas of expertise. Remeasure Pothole Creek trial. Undertake data analysis of western redcedar, Abies amabilis, and sapwood distribution data sets. Update web site and publish journal paper.</p>	<p>to over 500 users (http://www.for.gov.bc.ca/hrc/software/download.htm). Research staff advised on monitoring protocols, PSP data compilation, and other areas of expertise. We remeasured the Pothole Creek trial and the UBC rectangularity trial. We analyzed western redcedar, Abies amabilis, and sapwood distribution data sets. We updated the web site. The journal paper is still in preparation. In addition, we provided 25,000 custom TASS runs to various clients across the province, individual consultations, and extension through numerous presentations and training sessions.</p>
<p>Inventory update, VRIMS maintenance, and projection Integrate harvest depletion openings. Integrate new VRI re-inventoried mapsheets. Manage the 2012 projection. Review and streamline annual projection process. Produce statistics that characterize the status of the inventory and inventory update process. Undertake essential VRIMS maintenance including changes necessary to implement layer D and LVI. Test use of high resolution satellite for fire updates.</p>	<p>We completed 5 of the 7 planned Update/VRIMS/Projection projects (all but fire update and streamlining the projection). Approximately 30,000 new, plus 30,000 older, harvest and regeneration updates from RESULTS were processed and brought into the provincial inventory file. This year, 370 full and partial mapsheets (2.9 million hectares) of new VRI inventory was integrated into the provincial inventory data set. The annual projection was completed on time culminating in the public release of the 2012 provincial inventory file (veg-comp-poly) in January 2013 (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.</p>
<p>Innovation and improvement initiatives Explore automated image processing and</p>	<p>We completed 3 of the 4 planned innovation projects. We assessed the potential for automated image processing. Evaluation of a predictive inventory was not completed. We improved components of our IT infrastructure, primarily improvements to VRIMS and the RESULTS Reader. We implemented the 2012 MPB strategy but</p>

<p>options for airborne and space digital image acquisition for inventory. Evaluate a predictive inventory method. Improve components of IT infrastructure. Implement 2012 MPB inventory strategy. Develop 2013 MPB inventory strategy. Test large scale (DCS) photos for estimating stocking in MPB-affected areas. Participate in one LiDAR project.</p>	<p>did not develop a 2013 MPB strategy. Instead, we developed the ministry’s Forest Inventory Strategic Plan (available at http://www.for.gov.bc.ca/hts/vri/index.html). We completed preliminary testing of large scale (DCS) photos for estimating stocking in MPB-affected areas. To build our skills with LiDAR-based inventory, we embarked on a two-year project on northern Vancouver Island in partnership with BCTS, GeoBC, and WFP. In addition, we participated in a project led by MacDonald Dettwiler Space and Advanced Robotics Ltd. to use high resolution satellites (RapidEye/RADARSAT) in change detection and mapping.</p>
<p>Administration of the LBIS-funded forest inventory program Plan and manage the LBIS-funded inventory program, including project and program planning, progress monitoring and reporting, and stakeholder engagement and communication.</p>	<p>We carefully planned and managed the LBIS-funded inventory program and the activities of the section as-a-whole. Annual work plans were developed for many program areas (e.g., site productivity, PSP, 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.</p>

3. Expenditures in 2012/13 by program area

Funding for approximately 94% of the section expenditures was obtained from the Land Based Investment Program. The remainder was provided by base funding, and internal and external research funding. The table below provides a breakdown of expenditure by program area.

Program area	Expenditure (\$)	Description
Forest inventory - photo-interpretation	\$3,501,103	Includes air photo acquisition (Lakes TSA and Vanderhoof district) and standard VRI photo interpretation (Mid Coast, Haida Gwaii, 100 Mile House, Kamloops, Pacific, and TFLs 14, 23, and 35).
Forest inventory - ground sampling and analyses	\$1,175,740	Includes VRI phase 2 ground sampling (Morice, Lakes, and Kootenay Lake TSAs), establishment of YSM plot networks (Quesnel, Morice, and Kootenay Lake TSAs), NVAF sampling, PSP recon and re-measurement, and analysis of ground sample data.
Site productivity - sampling, mapping, and analyses	\$915,596	Includes SIBEC sampling (Rocky Mountain and Arrow/Boundary), PEM (Cranbrook and Kootenay Lake), BEC updates, and publication of a provincial site index GIS layer.
Evaluation, development, and application of new inventory methods and technology	\$470,383	Includes the acquisition and evaluation of high resolution air-borne imagery for photo-sampling Prince George TSA, LVI project in western Williams Lake TSA, a LiDAR project on northern Vancouver Island, and statistical support.
GY model maintenance and development	\$360,000	Includes development of components of TASSIII, enhancements to TIPSYS, improvements to FAN\$IER, and re-measurement of field installations. Ministry research funding and external funding.
Inventory projection and VRIMS database maintenance	\$130,000	Includes the annual projection of the forest inventory database, and VRIMS enhancements to improve RESULTS data integration and to accommodate dead tree attributes.
Program support	\$389,069	Includes travel, equipment, auxiliaries, and miscellaneous. Ministry base and LBIS funding.
Total	\$6,941,891	