

News from the Inventory Section, Forest Analysis and Inventory Branch, Ministry of Forests Lands and Natural Resource Operations

April 11, 2013

The 2013/14 Program

The Inventory Section plans to deliver a large program of work in 2013/14, including i) acquiring air photos in Morice and Quesnel TSAs; ii) photo-interpretation in Lakes, Mid Coast, Haida Gwaii, Pacific, 100 Mile House, and Kamloops TSAs, Vanderhoof district, and TFL 35; iii) targeted NVAF sampling in Morice and Robson Valley TSAs and coastal locations; iv) integrated audit (VRI phase 2) and monitoring (CMI/YSM) ground sampling in Quesnel, Williams Lake, and Merritt TSAs; v) reconnaissance and re-measurement of PSPs; vi) improving site productivity information; vii) finalizing an LVI inventory of western Williams Lake TSA; viii) stand modelling research and development; ix) inventory audit and monitoring analyses; x) inventory update, projection, and VRIMS maintenance; and xi) many other projects and activities. For more information on the section's 2013/14 program, contact Gary Johansen (Gary.Johansen@gov.bc.ca; 250-356-0633).

Welcome Rene de Jong

The inventory section is pleased to welcome Rene de Jong to the team. Rene's background includes working for the Canadian Forest Service, the (former) QCI Forest District, JS Thrower and Associates, and working as an independent consultant. With his strong analytical and data management skills, we feel truly fortunate to have Rene aboard. Rene can be contacted at Rene.DeJong@gov.bc.ca; 250-356-1064.

Forest Inventory Strategic Plan

At this February's annual general meeting of the Association of BC Forest Professionals, Minister Thomson released the strategic plan for the ministry's forest inventory program. The plan outlines a vision for forest inventory in British Columbia and describes the mission of the ministry's forest inventory program. The issues most pertinent to the development of a strategy for forest inventory in British Columbia are briefly reviewed. Strategies that the ministry's forest inventory program will pursue are outlined. Nine broad program goals, and specific 5- and 10-year targets for each goal, are stated. Inventory priorities in mountain pine beetle impacted areas are specified. Read the plan on our web site at <http://www.for.gov.bc.ca/hts/vri/>. For more information, contact Patrick Martin (Pat.Martin@gov.bc.ca; 250-387-3650).

Ground Sampling in 2013

This summer, we plan to establish samples across the Cariboo Forest Region and the Merritt Forest District on a 20km x 20km grid (developed by Natural Resources Canada for the National Forest Inventory (NFI) program). Thirty-two of these samples were previously established as part of the NFI, and will be re-measured this summer. At forested locations on the grid, permanent sample plots (Change Monitoring Inventory (CMI) samples) will be established. Air photo-based sampling of non-forested grid locations will complete the grid-based sample. This baseline data will provide complete and consistent, sample-based inventory information, suitable for estimating both the current state and trends in vegetation resources. The grid will serve as a base upon which additional, targeted sampling activities will occur.

In many beetle-impacted areas, mid-term timber supply depends heavily on the growth and future yield of young stands. To provide improved information on this component of the forest, we intensify the sampling of young stands. In the Williams Lake TSA this summer, in addition to the 20 km grid-based sample described above, we will establish additional samples on a finer grid to monitor young stand condition and growth.

When new photo-interpretation is completed, we assess its accuracy and gather supplemental field data. In the eastern portion of the Williams Lake TSA, the grid-based sample data will be combined with additional sampling to check the accuracy of the recently completed photo interpreted inventory. Similarly, in the western portion of the Williams Lake TSA, the grid-based sample data will be combined with additional sampling to support other inventory objectives, such as assessing the accuracy of the forthcoming LVI inventory.

In the Merritt Forest District, ground sampling will include establishing CMI sample types on the 20km x 20km grid, establishing new and re-measuring existing CMI sample types on a 4km grid in young stands, and re-measuring existing 5-point cluster VRI ground samples in mature stands. This inventory sample will provide estimates of standing inventory and rates of growth and change in both the mature and young stand components of the forest.

We will evaluate this ground sampling model this winter. If it proves successful we may employ it over the coming years across a significant portion of the MPB-impacted interior of the Province. For more information, contact Gary Johansen (Gary.Johansen@gov.bc.ca; 250-356-0633) or Chris Mulvihill (Chris.Mulvihill@gov.bc.ca; 250 354-6222).

Using the SYLVER Decision-support Tool and Long-term Site Preparation Trials to Inform B.C. Mid-term Timber Supply Planning.

In cooperation with the Natural Resource Canada Canadian Wood Fibre Centre and FLNRO Resource Practices Branch, we used the SYLVER system to project several long-term site

preparation trials to predict which treatments provide the best biological response and economic return on investment. Results suggest that on some sites “site preparation treatments show a notable positive effect on growth and yield compared to untreated control plots.” In fact, compared to untreated controls, the best treatments in these high brush hazard sites may...

- Produce up to 2 times more merchantable volume
- Reach maximum mean annual increment up to 30 years earlier
- Reach maximum site value up to 25 years earlier
- Yield up to 6% internal rate of return

These results (which will be presented in a detailed poster at the upcoming 16th International Boreal Forest Research Association Conference, co-hosted by NRCan and the University of Alberta, to be held in Edmonton from October 7-10, 2013) may have important implications for mid-term timber supply in beetle-affected TSAs and TFLs. For more information on this project, contact Jim Goudie (Jim.Goudie@gov.bc.ca; 250 387-6535).

New Data Sets, Software, and Documents Posted to the Web

Our web site(s) are loaded with inventory and GY (growth and yield) resources. New material posted to the web over the last year illustrates the wide range of our activities: i) New software downloads such as TIPS4.3 available at <http://www.for.gov.bc.ca/hre/software/download.htm>. ii) New sample plans and project implementation plans such as the Lakes TSA photo-interpretation plan available at http://www.for.gov.bc.ca/hts/vri/planning_reports/tsa_vpip.html. iii) New updates to procedures documents such as the VRI ground sampling procedures available at http://www.for.gov.bc.ca/hts/vri/standards/gs_vri.html. iv) New data files such as the 2012 provincial forest inventory coverage (the “veg-comp-poly”) available at <http://www.for.gov.bc.ca/hts/vridata/>. v) Program performance reports such as the 11/12 Inventory Section Annual Report available at <http://www.for.gov.bc.ca/hts/vri/index.html#>. iv) Information on state of the inventory such as inventory vintage and standards maps available at http://www.for.gov.bc.ca/hts/vri/planning_reports/pro_refmap.html

Landsat is Back!

Some good news on the Landsat front. The new Landsat satellite – Landsat8 - has been launched and things are looking positive for acquiring imagery this summer. In 2012, due to Landsat malfunctioning we utilized Landsat7 with its data gaps, because we felt that this was better than nothing. The resolution of the Landsat8 imagery is 15m for panchromatic and 30m for multispectral - and the imagery is free. All going well we will download and process all available scenes across the province and pass them to GeoBC for posting to the Image Warehouse. Also, we plan to run the harvest change detection processes in the fall to capture the changes from 2011 to 2013. This process captures the harvest changes that have not yet been

updated in the VRI file on the LRDW for each TSA. For more information, contact Ann Morrison (Ann.Morrison@gov.bc.ca; 250-953-3625).

Ground Sampling Species Codes

This note from our ground sampling data co-ordinator. Would all inventory ground sampling field crews please use the 2009 species code list and not the 2012 list. We have identified some inconsistencies in the 2012 species code list. If you need a copy of the 2009 list, please contact Bob Krahn (Bob.Krahn@gov.bc.ca; 250 953-3867).

Progress on Harvest Depletions

After using the 2009 provincial inventory file, the Forest Practices Board reported that a large number of harvest blocks were not captured in the provincial inventory. A backlog had developed. Since the Board's report, we have significantly reduced this backlog, developed an interim solution, and taken steps to ensure that a backlog does not develop again. We added staff to the unit responsible for integrating cutblocks into the provincial inventory. We tightened the validation checks so that incomplete data cannot get through and create a new backlog. And, we developed a separate GIS layer (the "consolidated cutblocks" layer) that can be used to identify potential gaps in harvesting updates. We are continuing our efforts in 13/14, including posting to our web site a plan that quantifies the harvest area missing from the inventory file and outlining the actions that we are taking to integrate missing areas. For more information, contact Marc Rousseau (Marc.Rousseau@gov.bc.ca; 250 828-4426).

Assessment of the Annual Adjustment to Provincial Inventory to Account for Beetle Mortality

Each year, to account for the impact of the mountain pine beetle, live volume in pine polygons in the inventory is reduced to reflect the level of tree mortality observed in the annual forest health overview survey. Over the past two years we have assessed the accuracy of this adjustment by comparing the adjusted volumes in the inventory file to volumes accurately determined at sample points. This year's accuracy assessment report (Pine Volume Adjustment for MPB Using Phase II data: Kootenay Lake, Lakes and Morice TSAs, Margaret Penner, 2013) is now posted at <http://www.for.gov.bc.ca/hts/vri/technical/trdoc.html>. Over large areas, the adjustment produces reasonable results. However, performance varies among geographic locations and with many other factors. Mortality of pine also affects stand basal area and species composition, but these attributes are not adjusted under the current procedure. For more information, contact Patrick Martin (Pat.Martin@gov.bc.ca; 250-387-3650).

LiDAR

The inventory section is involved in a partnership to produce high resolution resource information, including enhanced forest inventory, from LiDAR data on 114,000 hectares on northern Vancouver Island. LiDAR data and digital photography were acquired in 2012 and the field sampling design is underway now. In April we learned that the project had been selected as a Premier's Award finalist in the Vancouver Island Region in the award category of Partnership. GeoBC, Western Forest Products Ltd., BCTS and the inventory program are partners in this endeavor. We are very proud to be part of this innovative partnership. For more information on this project, contact Xiaoping Yuan (Xiaoping.Yuan@gov.bc.ca, 250-953-3626).

PSP field activities

Within the PSP (permanent sample plot) program, one goal for 13/14 is to increase the pool of contractors available to re-measure PSPs. To this end, two PSP re-measurement training sessions to develop new contractors will be held in the 100 Mile House and Mackenzie areas this summer. Additional PSP program goals for the year include re-measuring 85 MPB-affected PSPs and the reconnaissance of 50 PSPs in the Peace area. The data from MPB-affected PSPs re-measured in 12/13 have been compiled and are being examined by ministry stand growth modellers. For more information on PSP field activities, contact Kevin Hardy (Kevin.Hardy@gov.bc.ca; 250-751-7093).

PSP data

FAIB maintains a large data set of plot measurements from PSPs across the province, with some plots established over 80 years ago. With recent revisions to PSP data compilation methods, a set of Ministry-owned PSP data is available for general use under a data use agreement. Data summaries are provided in easy-to-access MSEXcel workbooks with canned queries, and depending on the intended use of the data, may include overall plot measurement summaries, or more detailed stand and stock tables as well as individual tree lists. To obtain PSP data, contact René de Jong (rene.dejong@gov.bc.ca; 250-356-0703).

New Version of VDYP7

Currently, we are testing a new version of the VDYP7 yield prediction model. If all goes well, we will release the new version in July which will include the following modifications: fixing known bugs, generating biomass output, producing output in CSV format, splitting stand volume into species component volumes, and stripping polygon headers from text output. For more information on VDYP7, contact Sam Otukol (Sam.Otukol@gov.bc.ca; 250 387-2659).

Stand Tables for Inventory Polygons

The inventory section is examining the use of imputation to generate stand tables for inventory polygons. The inventory would be considerably enhanced if tree size distribution was reliably estimated for individual polygons or groups of polygons. Tree lists would permit a wider variety of stand growth models to be used to estimate yield and forecast growth of stands in the inventory. In 12/13, to explore this area, we developed imputation methods and then applied them to generate tree lists to vegetated treed polygons in the Williams Lake and Fraser TSAs. For more information on this work, contact Sam Otukol (Sam.Otukol@gov.bc.ca; 250 387-2659).

Site Productivity Projects for 13/14

Site productivity, the inherent capacity of a site to grow timber, is an important work area for the inventory section. In partnership with FLNRO and MOE ecologists, and site productivity researchers, we provide site productivity maps and estimation tools for the entire province. Site productivity work planned for 13/14 includes i) loading new data and releasing an improved province-wide site index spatial layer; ii) updating the PEM, completing an accuracy assessment, and conducting SIBEC sampling in Merritt TSA; iii) completing the PEM, an accuracy assessment, and SIBEC sampling in Arrow TSA; iv) completing SIBEC sampling in Cranbrook TSA; and v) initiating a project to improve site index estimation for Engelmann spruce. For more information on the collaborative site productivity work, contact Ron Planden (Ron.Planden@gov.bc.ca; 250-387-6867).

New version of the site index GIS layer

A new version of the provincial site index GIS layer will be posted to the corporate data warehouse (BCGW) by June 30, 2013. Currently, users access this massive data set from our FTP site (via <http://www.for.gov.bc.ca/hts/siteprod/provlayer.html>). Migration to the central data distribution service will improve user access. The next version of the site layer contains substantial improvements including the addition of all available south and north coast TEM data, the addition of the Merritt, Fort St John, Invermere, and Cranbrook PEM data, updated raster datasets, and updated supporting technical documentation. For more information on the site layer, contact Graham Hawkins (Graham.Hawkins@gov.bc.ca; 250-387-8893).

Landscape Vegetation Inventory (LVI)

LVI is a cheaper, faster, lower resolution inventory that is produced from a photo-interpretation sample, wall-to-wall satellite data (Landsat), and other ancillary data sets. The production of an LVI-based inventory for the western portion (about 1.7 million hectares) of Williams Lake TSA is in the final phase. The photo sampling is complete, statistics of the area have been compiled,

and a preliminary report is available. The final phase involves generating maps for the area, in which spatial extrapolation of the photo sample data is conducted using a rigorous statistical process called k-nearest neighbor classification. This final phase is expected to be completed by June. An independent ground sample with a total of about 250 plots will be collected this summer over western Williams Lake and Quesnel TSAs. The ground sample will be used to audit the LVI results for both western Quesnel and western Williams Lake TSAs. All of the LVI components will be assessed for accuracy and/or precision. A second objective is to assess the improvement and effectiveness of including ground samples in the LVI process. The tender package for ground plot measurements has been posted and the work is expected to be completed by the end of the 2013 summer. For more information on this project, contact Xiaoping Yuan (Xiaoping.Yuan@gov.bc.ca; 250-953-3626).

Haida Gwaii

The re-inventory of Haida Gwaii is proceeding on schedule. The contractor is preparing for the final field calibration campaign in May. This field calibration will cover the Gwaii Haanas National Park Reserve and several map sheets in the central area of Moresby Island. This will complete the remaining 25% of the Haida Gwaii VRI project. The project is on schedule to be fully completed in February, 2014. The new VRI inventory will be available in the annual release of the provincial inventory file in January, 2015. For more information on this project, contact Roman Bilek (Roman.Bilek@gov.bc.ca; 250-387-6043).

100 Mile House and Kamloops Photo-interpretation

The 100 Mile House and Kamloops VRI photo-interpretation projects are progressing towards completion. Polygon descriptions (attribution) will continue over the summer in 100 Mile, with final delivery to the Ministry by the fall of 2013. In Kamloops, contractors will be undertaking additional fieldwork, delineating polygons, and describing attributes over the summer with final delivery to the Ministry by the end of this fiscal year. For more information on this project, contact Matt Makar (Matt.Makar@gov.bc.ca; 250-828-4427).

Software Maintenance

Components of the inventory program's IT infrastructure are dated need to be replaced. While we work with central agencies on a proposal for a major IT upgrade, we are continuing to maintain our existing software and implement small changes that enhance data validity and streamline production. The software used to collect field data for VRI, CMI and YSM sampling (TIMVEG) is undergoing its yearly maintenance to correct bugs and incorporate additional attribute checks. Similarly, the software used by contractors and the ministry to load and validate new photo-interpretation (VEGCAP) has received some basic maintenance, is now

undergoing beta testing, and a new version will be released soon. For more information, contact Matt Makar (Matt.Makar@gov.bc.ca; 250-828-4427) on TIMVEG and Marc Rousseau (Marc.Rousseau@gov.bc.ca; 250-828-4426) on VEGCAP.

TASS II and III Development.

Work continues on the development and eagerly-awaited release of the complex stand version of TASS (III). In conjunction with FLNRO Wildfire Management Branch (who are keenly interested in simulated fire-proofing of stands by thinning), we are testing crown recession algorithms in both TASS II and TASS III against all available PSP data that have height-to-crown measurement. Early results for lodgepole pine show that, while TASS II crown lift is reasonable, TASS III crown lift compares even better against PSP data across the range of initial stand densities. Crown lift in TASS II is governed by simulations of the physical interaction of simulated crowns while in TASS III, it is determined by predicted light environment in the simulation space. As part of this effort, we coordinated and funded the re-measurement of the long term Douglas-fir/western hemlock rectangularity trials on the UBC Research Forest at Haney. The data analysis is underway. Stay tuned! For more information on this project, contact Jim Goudie (Jim.Goudie@gov.bc.ca; 250 387-6535).

SYLVER development

As part of our cooperative project with the Canadian Wood Fibre Centre at Natural Resources Canada, we initiated a project to ensure that the lumber output from our sawmill simulator (SAWSIM) provided realistic distribution of board sizes and grades. Contractors and FLNRO staff visited four sawmills (two interior, two coastal) to:

- 1) view the physical operations of impressively efficient modern sawmills, and
- 2) discuss log and lumber sorting with mill managers.

One interior mill was producing the equivalent of lumber for 150 houses per day! The first prediction equations are complete and will be incorporated with the release of TASS III. For more information on this project, contact Jim Goudie (Jim.Goudie@gov.bc.ca; 250 387-6535).

Growth and Yield and Forest Inventory at SISCO

Growth and yield (GY) and forest inventory were on the agenda at the winter workshop of the Southern Interior Silviculture Committee (SISCO). The inventory section provides many forest inventory and GY products that are valuable to silviculturists, planners, and other natural resource managers. A PowerPoint slide deck that provides a high level overview of our suite of inventory and GY products is posted on our web site at <http://www.for.gov.bc.ca/hts/vri/>.

Timber Resources in the Lakes TSA

In the fall of 2012, the inventory program implemented a ground sample of Lakes TSA. The sample is intended to provide a current characterization of the timber resource in the area, to serve until a new photo-interpretation inventory is completed in 2015. This winter, the sample data were analyzed by Gord Nigh. Live and dead volume in various timber types and geographic zones were estimated. Ground-measured volumes were compared to the volumes in the current inventory file. Distributions of trees by size and quality classes were prepared. For more information on this work, contact Gord Nigh (Gordon.Nigh@gov.bc.ca; 250 387-3093).

Lakes TSA Photo-Interpretation Project

We anticipate that work will commence this spring on the photo-interpretation of the Lakes TSA. This is a significant 2.5 year project that will provide a new VRI phase 1 inventory for the entire TSA (exclusive of protected areas). The November, 2012 *VRI Lakes TSA Project Implementation Plan for Photo Interpretation* provides additional information on this project and can be downloaded from http://www.for.gov.bc.ca/hts/vri/planning_reports/tsa_vpip.html. For further information on the Lakes photo interpretation project, please contact Roman Bilek (Roman.Bilek@gov.bc.ca; 250-387-6043).

Inventory Analyses

Inventory analyses have been completed and reports are now available on-line for the Morice, MacKenzie and Fort St John TSAs, and for TFLs 18, 46 and 53. The role of the inventory analysis is to evaluate the accuracy of the Phase I photo-interpreted inventory, using the Phase II ground sample as the basis for the comparison. A supplementary analysis of MPB killed pine volume, for units where MPB attack is significant, and an assessment of model and attribute bias, is also provided in these reports. To download copies of the TSA or TFL inventory analysis reports, please follow these links:

http://www.for.gov.bc.ca/hts/vri/planning_reports/tsa_analysis.html

http://www.for.gov.bc.ca/hts/vri/planning_reports/tsa_analysis.html#

Analyses will be initiated in the fall for data collected in 2013 (Merritt, Williams Lake, and Quesnel TSAs), with reports available by March 2014. For more information on inventory analyses, please contact Graham Hawkins (Graham.Hawkins@gov.bc.ca; 250-387-8893).