Forest Inventory Section Highlights: December 2019

Inventory Planning for 2020

Planning is underway for fiscal 20/21 with inventory staff having met in October to review the 2019 field season and to put forward plans for upcoming photo interpretation, ground sampling, and image acquisition. These plans include moving the focus of sampling from the interior to south coast areas, completing change monitoring for the province, and undertaking young stand monitoring (YSM) in the northeast.

Planning will also begin for a forest inventory in the dry belt Interior Douglas-fir (IDF) Biogeoclimatic zone south of Williams Lake using LIDAR data obtained this past summer.

Blue Ribbon Panel: BC Forest Inventory Review

The inventory program continues to draw upon recommendations from the Blue Ribbon Panel (BRP) program review report. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/panel_summary_report_final.pdf

The review provided 16 broad recommendations. Additional detailed guidance is included in the rationale for each of these.

While we have started implementing some of the recommendations immediately, others will require significantly more time.

The BRP recommendations that FAIB has begun implementing include:

- Establish an inventory innovation funding envelope within the FAIB annual budget.
- Increase communication efforts using newsletters, internet presence, and published papers to inform professionals and the public.
- Establish inventory test sites within the province upon which new, innovative methodologies can be tested.
- Assess B.C.'s stand development modelling capabilities and assess which existing models are available to fill knowledge gaps in the short term.
- Acquire additional LIDAR data using the incremental funds provided to FAIB for fiscal 2019/20, while also working toward the acquisition of provincial LIDAR data for application across the natural resource ministries.

For information contact Tim Salkeld tim.salkeld@gov.bc.ca 778-974-5612.

Inventory Database Update

The data cut for the **2018** forest cover inventory was done on March 27, 2019 with publication of the data to the LRDW (Land and Resource Data Warehouse) in early June 2019. The 2018 projection included 1.3 million hectares of areas impacted by fires in 2018, newly acquired VRI data, and updates to RESULTS data.

The data cut for the **2019** projection was made on December 8, 2019 with publication to the LRDW expected in mid-February 2020. Updates in the 2019 projection will include the addition of:

- Approximately 13 million hectares of new Landscape Vegetation Inventory (LVI) data in the Cassiar TSA.
- Incorporation of forest inventory information from Western Forest Products and Canfor for TFLs 10, 19, 25, 37, 39 and 48.
- Updated new photo interpretation for 180 map sheets, covering approximately 2,000,000 hectares.
- Updated Harvesting activities using RESULTS information for 12 of 38 TSAs.

For information contact Marc Rousseau marc.rousseau@gov.bc.ca 250 828-4426.

VRI Photo interpretation

Two major projects include:

Cranbrook TSA VRI Photo Interpretation

In 2016, digital aerial photography was acquired over the entire Cranbrook TSA. The TSA was then divided into two project areas: East and West.

In 2018, photo interpretation began over the western portion of the TSA, covering approximately 852,596 hectares. During 2018/2019, 322,580 hectares were interpreted. The remaining maps that are in progress (including 3rd party quality assurance) will be completed by March 2020 and all mapsheets of the new inventory will be integrated into the provincial database. The new VRI for the entire western portion of the TSA is expected to be available in spring 2021.

VRI for the East project area is planned for 2020/21.

Lillooet TSA VRI Photo Interpretation

In 2017, digital aerial photography was acquired over the entire Lillooet TSA. The project area covers 979,224 hectares over 62.37 full map sheet equivalents (FME's). This VRI project is being used to test a new field procedure of understory sampling in mountain pine beetle (MPB) attacked stands. The data will be used for the VDYP7 projection of understory layers in MPB impacted areas.

The project commenced in August 2019 with polygon delineation, followed by field sampling that completed in September 2019. Approximately 18 FME's (~282,600 hectares) of the new inventory are expected to be finished by March 2020. The work to complete the remaining 44.37 FME's (696,609 hectares) are planned between spring 2020 and the fall of 2021.

For information contact Cathy Taylor Cathy.Taylor@gov.bc.ca 236-478-1867.

Other VRI Photo Interpretation Projects:

Also scheduled to be completed by March 2020 are Prince George South, Prince George Nechako, and Fort St. James (central-north). A VRI project on North Vancouver Island is underway and will continue through into 2020/21.

A new VRI project is planned for the Revelstoke TSA, and FAIB is planning to acquire new digital imagery for the Kalum TSA (continuation from summer 2019 that was constrained by poor weather and visibility), the northern tip of Fort St. James TSA, the Fraser, and Sunshine TSAs.

For information contact Graham Hawkins Graham.Hawkins@gov.bc.ca 778-974-5669.

VRI ground sampling

In 2019 the FAIB inventory program established 451 ground samples and remeasured 184 previously established samples. This included the following types of samples:

Change monitoring inventory (CMI): In the Mackenzie TSA, a network of 66 CMI samples were established on a 20km x 20km grid and then supplemented with an additional 69 samples laid out on an intensified grid. Data from this project will support the dual objectives of monitoring forest change, while also providing enough information to assess (and potentially adjust) the existing spatial inventory.

Young stand monitoring (YSM): In the Prince George TSA, 98 young stand monitoring (YSM) samples originally established in 2014, were remeasured to provide growth rate data for young stands in this unit. This information will be used to verify the predicted growth rate output from yield models. YSM samples were also established in the Mackenzie TSA, and on all the Crown portion of Vancouver Island.

Permanent sample plots (PSP): 86 PSPs were remeasured in several management units across the Province.

National forest inventory (NFI): Plans for sampling in 2020 are very near finalized and the completion of 100+ more samples is anticipated!

For information contact Gary Johansen gary.johansen@gov.bc.ca 778-974-2845.

National Forest Inventory

Canada's National Forest Inventory (NFI) is a collaborative effort between the federal, provincial and territorial governments, that compiles detailed forest inventory information for each of Canada's forested ecozones.

The collaborating governments collectively monitor a network of twenty thousand sampling points across Canada on an ongoing basis to provide information on the state of Canada's forests and a continuous record of forest change. It provides data and products to forest science researchers, forest policy decision-makers, interested stakeholders and helps provide critical forest information for international reporting requirements.

British Columbia contains 268 NFI ground plots and roughly 2400 photo interpreted monitoring plots (photo plots) established on a 20 km grid as part of a network across Canada. This year Scott MacKinnon managed contracts to remeasure 32 ground plots and plans are in place to re-measure 27 in the summer of 2020, keeping pace with a planned 10 year remeasurement cycle. These ground plots are dual purpose and also form part of the provincial monitoring plan mentioned in the ground sampling update section of this newsletter.

A significant achievement this year was creating a "Crosswalk" of BC's provincial photo interpreted inventory to the NFI photo plot database. This process previously required many staff hours to compile data, and the new automated process will allow annual updates to the federal NFI database. Marc Rousseau managed the crosswalk process, completed by contract with support from Frank Eichel, Byron Smiley and staff at the Pacific Forestry Centre.

For information contact Matt Makar matt.makar@gov.bc.ca 250 371-3715
or visit https://nfi.nfis.org/en.

Predictive forest Inventory (PFI)

FAIB has designed a new hybrid forest inventory approach, titled the Predictive Forest Inventory (PFI), which incorporates methods found within the Landscape Vegetation Inventory (LVI), Lidar Enhanced Forest Inventories (LEFI) and Vegetation Resources Inventory (VRI). The new PFI will leverage the strengths of the photo interpretation techniques of the VRI, the high-resolution modelling of the LIDAR data and the semi-automated delineation and spatial imputation mapping of the LVI.

To date, the project in the Boundary TSA is nearing the model building phase of the LEFI portion, which is scheduled to be completed by March 31, 2020. The 197 fixed radius ground samples that will be used to build prediction models have been collected and are being evaluated. Currently, the photo-interpretation is in progress and will produce a sample of 8,000 segments of approximately 2 hectares in dimension. This will drive the spatial imputation and is scheduled for completion by June 2020. The final inventory product which will include a comprehensive audit process is scheduled for completion by March 2022.

For information contact Geoffrey Quinn Geoffrey.quinn@gov.bc.ca 778-974-5640

Yield Prediction and Stand Development Modelling

A review of growth models applicable for use with BC's forests stands is underway. This review will look at the models used in BC and other jurisdictions to document their strengths and weaknesses in relation to the current and future conditions expected in BC.

Work is underway to improve VDYP7 projections in Mountain Pine beetle and wildfire damaged stands. The application of the yield model in these areas is particularly challenging.

For more information contact Wenli Xu at Wenli.Xu@gov.bc.ca 778-974-5635.

The stand development modelling team is actively engaged in supporting FLNRORD response to current initiatives associated with commercial thinning and other silvicultural treatments to mitigate mid-term timber supply shortages.

Work continues with recalibration for lodgepole pine and white spruce in TASS II, Fd/Hw mixed species functionality in TASS III and the development of TASS III and TIPSY decision-support tools: PLOTSY V2, TIPSY-CBM-CFS3 linkage, FAN$IER economics features,.

For information contact Catherine Bealle Statland, catherine.BealleStatland@gov.bc.ca 778-974-5634

Inventory Section Publications:

The inventory teams have over the past year published the following:

1) Danyagri, G., Baral, S. K. and Pelletier, G. 2019. Effects of disturbance and site factors on sapling dynamics and species diversity in northern hardwood stands. Forest Ecology and Management 444:225-234.

2) Sattler, D.F., Goudie, J.W., and Reich, R.W. 2019. A module to simulate the impact of western gall rust (*Cronartium harknessii*) on merchantable volume and lumber yields for lodgepole pine (*Pinus contorta* var. *latifolia*) stands in British Columbia, Can. J. For. Res. 49:1379-1391.

3) Jang, W., Eskelson, B.N.I., de Montigny, L., Bealle Statland, C.A., Sattler, D.F., Ahmed, S. 2019. Stand growth responses after fertilization for thinned lodgepole pine, Douglas-fir, and spruce in forests of interior British Columbia, Canada. Can J. For. Res. 49:1471-1482

4) Isaac-Renton, M., Stoehr, M., Bealle Statland, C., Woods, J. 2019. Genetic gains in volume realized in Douglas-fir with minimal stem and wood quality losses. Theoretical and Applied Genetics, *Submitted.*
5) Bogdan ski, B. E.C., M. Cruickshank, C.M. Di Lucca and E. Becker. 2018. Stumping out tree root disease – An economic analysis of controlling root disease, including its effects on carbon storage in southern British Columbia. Forest Ecology and Management 409 (2018) 129–147.

6) Lalumière, A.; Heineman, J.; Goudie, J.; McClarnon, J.; Polsson, K.R.; Di Lucca, M.; and R.J. Whitehead. 2019. Shifting the focus from volume yield toward financial returns and

harvest timing. Showcasing the TASS and FAN$IER models to project volumetric growth and yield and financial returns of lodgepole pine and white spruce after site preparation at three sites in north-central British Columbia. NRCan, Can. For. Serv., Can. Wood Fibre Centre Inf. Rep. Fo4-140/2019E-PDF

Through a FAIB collaboration with the National Forest Inventory Data Task Team the following maps and publications were produced:

'A new approach for mapping forest management areas in Canada'. Published in the Forestry Chronicle. Authors include:

Graham Stinson,[a] Gurp Thandi,[a] Darren Aitkin,[b] Chris Bailey,[c] James Boyd,[d] Michelle Colley,[e] Catherine Fraser,[c] Lane Gelhorn,[f] Kathleen Groenewegen,[g] Adam Hogg,[e] Joe Kapron,[h] Antoine Leboeuf,[i] Matt Makar,[i] Mike Montigny,[k] Boyd Pittman,[l] Kirk Price,[m] Tim Salkeld,[n] Lisa Smith,[g] Antonio Viveiros,[d] Dale Wilson[o]

Links:

- Journal article: https://pubs.cif-ifc.org/doi/10.5558/tfc2019-017

For the managed forest map and the disturbance map

- https://manitoba.maps.arcgis.com/apps/MapJournal/index.html?appid=86cdd21b2cd843888bf54787f90f2b5d

- https://ca.nfis.org/forestdisturbances/index_eng.html