May 2003
Summary No. 24

Morice & Lakes Innovative Forest Practices Agreement

Project Summary

Morice & Lakes IFPA projects are exploring ways to enhance forest productivity through a better understanding of factors affecting productivity, through intensive silviculture treatments, by increasing the area of productive forest land, and by improving site productivity estimates.

Ecosystem Management
Forest Productivity
Public Involvement
Adaptive Management

Analysis of Low Site Polygons

Introduction

The Morice and Lakes Innovative Forest Practices Agreement (M&L IFPA) technical committee identified the need to evaluate low site polygons as it was suspected that current inventory and productivity information for these areas was inadequate. The IFPA considered conducting a Vegetation Resources Inventory (VRI) as one method by which the existing inventory could be updated and improved. However, prior to committing to implementing a VRI, it was determined that the need and suitability of conducting such an extensive project be assessed. Preliminary field verification checks were recommended as a means to assess both the accuracy of the current inventory and the suitability of conducting a VRI. In addition, the IFPA requested that based upon the results of the project, a brief summary of alternatives to conducting a VRI be presented.

The results of the preliminary field verification plots indicated that there are significant discrepancies within the current inventories with respect to low site forest types. The discrepancies range from incorrect leading species identification to the substantial underestimation of site index and volume. Several options exist for updating the inventory and/or improving growth projection models. These include conducting a full VRI of the low site polygons including photo interpretation, conducting a VRI using the current polygon delineation or retrofitted VRI information, updating the inventory by using Ian Moss' *Stand Structure Protocol*, or applying other Growth and Yield methodologies.

Objectives

The objectives of the preliminary field verification project were twofold. The first objective is to determine if the problem forest types (PFTs) and low site polygons in the Lakes and Morice TSAs require a more accurate assessment of inventory characteristics. The second objective is to briefly summarize options that are available to the IFPA technical committee to address any inaccuracies in the inventory, including assessing the suitability of conducting a VRI.

Methods

Target Population

The target population of this project was low site and identified PFT polygons that comprise approximately 100,377 ha in the Morice TSA and 14,583 ha in the Lakes TSA. The majority of the low site polygons were located in the Morice TSA (87%) because many polygons in the Lakes TSA had already been assessed by a PFT project conducted previously under Babine Forest Products' Enhanced Forest Management Pilot Project. These previously sampled areas were excluded from the population. Other areas also excluded from the target population were those within private land boundaries, parks (or other non-contributing land areas), inoperable areas, the Burns Lake Community Forest Pilot Agreement area, LRMP proposed protected areas, non-productive areas, woodlot areas, and the Burnie and Nanika landscape

Babine Forest Products
D.L.F.P.
L & M Lumber Ltd.
Fraser Lake Sawmills
CANFOR

units (excluded from the Timber Harvesting Land base [THLB] in the previous Timber Supply Review). All polygons labelled as Environmentally Sensitive Areas (ESA) were included in the population.

Sample Selection

Thirty plots were distributed proportionally (based upon stratum area) between three strata: balsam, spruce, and pine/Douglas fir. As a result sixteen balsam forest cover polygons, four spruce polygons, and ten pine/Douglas fir polygons were selected to be sampled with one plot established in each.

Plot Establishment and Measurement

Field visits to each polygon consisted of a walkthrough to assess the characteristics representative of the polygon and the establishment of one cruise plot. The cruise plot was strategically located to best characterize the polygon. In addition to the standard cruise plot measurements, the best available site index tree (of the leading species) in the plot was aged in order to determine a site index for the polygon. Also, based on the walkthrough, an estimate was made of the species composition of the entire stand. This was done in full recognition that in highly variable stands, one cruise plot may not accurately represent this stand characteristic.

Data Analysis

In order to assess the accuracy of the current inventory information, six stand attributes were chosen to be assessed: species composition, net volume, average diameter at breast height (DBH), average height, average age, and site index. In order to obtain net volume and average DBH of the plot, the cruise plots were compiled using a standard cruise compilation program. Site index was determined using *Site Tools Version 3.2m*. The average height and age of each plot was calculated manually.

Tables and charts were developed in order to visually compare the plot results to the inventory information. A statistical analysis of the results was beyond the scope of this project. The sample size of 30 was considered to be sufficient to view a substantial cross-section of the target population, recognize trends, and to provide a professional opinion. The resulting sample sizes were not large enough to provide confidence for further statistical analysis.

Results

In general, the results of the plots indicate that the current inventory does not accurately reflect the characteristics of low site polygons in the Morice and Lakes TSAs. In most cases, leading species composition, site index, net volume, age and height attributes measured in the field differed substantially from the forest cover inventory.

Species Composition

The accuracy of the forest cover inventory information with respect to species composition is variable. The species composition of the balsam polygons was predicted with reasonably close accuracy as all the balsam stands were found to be balsam leading in the field. With the spruce stratum, of the four spruce polygons sampled only one polygon was spruce leading. The other three polygons were found to be balsam leading. The majority of the pine polygons were typed reasonably accurate in terms of species composition with the exception of two of the ten polygons, which were found to be balsam leading.

Site index

The site indices in the forest cover inventory appear to be generally underestimated across all species. The site indices of all spruce polygons were underestimated. All but one of the ten pine polygon site indices were underestimated and of the sixteen balsam polygons, thirteen site indices were underestimated by the inventory.

Of the measured site indices, many were found to be above the site index cut-off used to classify low site polygons. The site indices of all four spruce polygons were greater than 8.0m (the low site cut-off for spruce) and 8.3m (the low site cut-off for balsam). The indices of seven of the ten pine polygons were above the 12.0m pine cut-off. Finally, of the sixteen balsam polygons visited, ten of the site indices were found to be above the 8.3m cut-off.

Net Volume

The forest cover inventory underestimates the net volume of timber on most of the low site polygons sampled. In fact, the volumes of three of the four spruce polygons, nine of the ten pine polygons, and fourteen of the sixteen balsam polygons were underestimated by the forest cover inventory information.

Age and Height

The ability of the forest cover inventory to accurately identify age and height appears to vary significantly between species. The heights and ages of the majority of the balsam and spruce polygons are consistently overestimated. However, on average the forest cover ages and heights of the pine polygons are relatively correct.

Diameter at Breast Height

The accuracy of the forest inventory information with respect to DBH was found to be generally acceptable.

Recommendations

It is readily apparent from the results of the preliminary field verification plots that the current forest cover inventory does not accurately reflect the low site polygons assessed. Significant discrepancies between the inventory data and the measured characteristics were evident.

Because volume and site index appear in many cases to be underestimated by the current inventory information, the principal recommendation of this report is that the current inventory be updated. Improving the current inventory may increase the current THLB as many of the identified low site polygons are not low site in nature but rather are misclassified. One must keep in mind the focus of the project when viewing the results. Polygons with significantly higher site indices than illustrated on the forest cover may still have operability concerns (i.e. steep slopes, sensitive soils) or regeneration challenges. These inaccuracies in the current inventory could be the result of the original photo interpretation of attributes or the result of inaccuracies in the models and/or data used to project growth, endemic mortality, and general change over time.

Several options exist for sampling and updating the current inventory. These include:

- conducting a full VRI of the low site polygons including photo interpretation;
- conducting a VRI using the current polygon delineation or retrofitted VRI information;
- updating the inventory by using Ian Moss' *Stand Structure Protocol*; or,
- applying other Growth and Yield methodologies.

Option 1: Full VRI with photo interpretation for low site polygons

This option would enable an update of the current forest inventory information for low site polygons. Restratification of low site forest types using VRI photo interpretation would improve the accuracy of the results, as there may also be inaccuracies in the current polygon delineation and attributes in terms of leading species. It should be recognized that conducting a VRI addresses only inaccuracies in the current inventory at one point in time. Therefore, there is limited future benefit in terms of improving the accuracy of growth and yield information. This option is best suited to being conducted in conjunction with a full VRI over the entire Morice and Lakes TSA area because it would be difficult to restratify isolated low site polygons without substantially affecting surrounding polygons in the remainder of the TSA.

Option 2a: VRI using current forest cover polygon delineation

This option is similar to Option 1 but does not include photo interpretation. It is less expensive and time consuming than Option 1 but also less accurate. The Ministry of Forests no longer supports forest cover information so there is little value in updating information that will soon be outdated.

Option 2b: VRI using retrofitted forest cover information

This option is very similar to Option 2a. The one difference lies in using VRI plots to update retrofitted VRI information rather than updating forest cover information. (Retrofitting is the process of translating and upgrading an existing photo-based inventory to VRI standards.) Retrofitted VRI information will require updating with VRI plots because the process involves only the translation of current forest cover information into a VRI format. Therefore, this process will merely translate the current inaccuracies in the forest cover information into a new format; the inaccuracies will not be corrected.

Option 3: Stand Structure Protocol

The *Stand Structure Protocol* (developed by Ian Moss and Lignum Ltd.) is designed both to update inventory information and work with growth projections to project future stand growth and endemic mortality (pers. comm.). These models would be locally calibrated to the Morice and Lakes TSAs. Selecting this option would allow the IFPA to both update the inventory and improve growth projections. Perhaps the most significant drawback to this option is the uncertainty in whether the Chief Forester will accept information gained from this protocol if the results indicate a change in AAC. Currently the Ministry of Forests supports the VRI protocol as the primary means by which the inventory is adjusted and upon which the AAC is determined.

Option 4: Alternate growth and yield methodologies

Numerous growth and yield methodologies exist with respect to establishing plots to measure growth and yield including the existing permanent sample plots (PSPs). Further research could be conducted to determine a growth and yield protocol that would improve the current inventory and growth and yield projections. However, as with the *Stand Structure Protocol*, uncertainty exists as to whether the Chief Forester would accept the information obtained.

Conclusion

In conclusion, the results of the preliminary verification fieldwork indicate substantial inaccuracies in the forest cover information for low site polygons. The primary recommendation of this report is that the current inventory be updated. The report points out several available options. These options vary in their suitability for addressing both current inventory discrepancies and improving growth projections. Conducting a VRI would significantly improve the inventory; however, considering some of the limitations listed above, we recommend further research into non-VRI based options. It is highly recommended that the M&L IFPA consider whether improving growth projections is also an objective. If this is the case, the *Stand Structure Protocol* deserves further exploration.

Acknowledgements

The Low Site Polygon Preliminary Field Verification work was conducted by Mountain View Silviculture Ltd. John Brockley and Jim McCormack of Canadian Forest Products provided technical direction. The Ministry of Sustainable Resource Management, Terrestrial Information Branch, provided technical and statistical assistance. This project was funded by the Forest Investment Account through the Morice and Lakes IFPA.

Editing and layout by Ritchie Morrison of Tetrad Communications.

Contacts

Mike Bandstra,
Mountain View Silviculture Ltd.
Tel: (250) 847-4822
E-mail: mview@bulkley.net

John Brockley,
Project Administrator,
Canadian Forest Products Ltd.
Tel: (250) 845-5200
E-mail: jbrockley@mail.canfor.ca

For More Information...

Morice & Lakes IFPA

For more information on the Morice & Lakes IFPA, please contact:

Jim Burbee, RPF, IFPA Manager
c/o Tweedsmuir Forest Ltd.
3003 Riverview Road
Prince George, B.C. V2K 4Y5
Tel: 250-564-1518
e-mail: venturefc@telus.net

www.moricelakes-ifpa.com