April 2007
Summary No.54

Morice & Lakes Innovative Forest Practices Agreement

Project Summary

Ecosystem Management

Forest Productivity

Public Involvement

Adaptive Management

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.

Morice and Lakes SIBEC Sampling

Introduction

British Columbia's Biogeoclimatic Ecosystem Classification (BEC) system is used to organize knowledge of ecosystems and provides a biophysical framework within which to manage forest resources. Trees on different sites attain different growth rates and the BEC system is commonly used as a basis to classify forest land productivity. Correlating BEC site factor information with measures of site productivity, or site index (SI), has greatly enhanced confidence in timber supply analysis. The SI-BEC correlation process is known as SIBEC (Site Index Biogeoclimatic Ecological Classification). This SIBEC project was begun during the fall of 2006 and will continue into 2008. The data collected during the term of this project will greatly increase the accuracy of site index determination within the sampled matrix of the Morice and Lakes Timber Supply Areas.

Objectives

Project objectives are as follows:

a) Consult with the Ministry of Forests, Research Branch to determine current sampling matrix gaps in order to fulfill statistical requirements of each cell that falls within the Morice and Lakes operating areas. Subsequently build a sampling matrix based on these findings.

b) Develop a prioritized work plan that addresses methodologies of plot establishment outlined in the SIBEC Sampling Standards document (June 2001). Ensure the data adheres to these guidelines and subsequently incorporated into the SIBEC provincial database.

c) Execute the work plan, prioritising field data collection within the growing season. Site selection and plot establishment is to be executed simultaneously with strict adherence to the sampling matrix.

d) Upon completion of field sampling, the data will be entered into VENUS 5.1 providing the Forest Service with a digital format consistent with the provincial database.

e) Present the data in a concise package, which is easily auditable. Prepare extension material for practitioners.

Methods

Sampling Matrix

The sampling matrix is an integral part of the sampling system. This matrix is divided into tree species and BEC site units. It has been proven by the Ministry of Forest's Research Branch, Site Productivity Section that a sample of seven trees per "cell" is sta-

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tistically valid to provide an average site index. In order to ensure a high standard of accuracy it was decided that this project should target ten samples in each cell. Table 1 is an example of the matrix used for this project. The matrix is divided into five sub zones and further divided into species associated with those subzones.

As an example of how the matrix works, the bolded number **2** in Table 1 indicates that two samples need to be collected for spruce-leading SIBEC correlations in the SBSmc2-09 site series. This also indicates that eight samples have been collected previously for a total of 10 samples in that cell. Cells that have a null value have previously been satisfied.

Site index is defined as the "total height (meters) of a tree at breast height age 50 (years)". Therefore, if the site index of a tree is 21, this means that when the tree reaches 50 years at breast height it will be 21 meters in height. This is a reflection of the growth potential of a tree. When repression and suppression are encountered in a stand the site index of that stand fails to accurately reflect the true site productivity of the site. Because the ecology of the site is not impacted by stand conditions the site index correlated to that site through collected data should accurately reflect the productivity of the second growth stand having density control. Because of the importance of this value the Forest Service developed a standard methodology that greatly increases the accuracy of site index. The system is based on detailed ecological data, laboratory condition age determination, and accurate height measurements. This standard was used to establish BEC locations and to determine the SI of representative trees at those locations.

Digital forest inventory maps are assessed to identify potential sampling areas, based on access, age, species and BEC data. Field crews then target the sample areas looking for stands of acceptable age (10-120 years), having no evidence of repression or suppression, and being in the desired sub zone and site series as determined from the matrix. In order to show optimal site productivity only trees that have realized their true growth potential and in turn represent the true productivity of the site they grow on are sampled. Once a site and sample tree has been selected, this entails walking through potential stands in search of these desirable site factors. Detailed vegetation and soils information is collected and recorded along with tree mensuration data. Tree cores are field counted and assessed for repression or suppression, then collected in straws so they may be counted in the lab. Plot center and tie point GPS coordinates are taken and mapped at the truck to ensure plotting accuracy. Access notes are taken in order to facilitate a quality control re-visit. Crews continue to collect samples and continuously update the sampling matrix in order not to over sample. Internal quality checks (10%) are performed in order to ensure site and mensuration data is accurate. As samples are collected and the matrix begins to fill out, it becomes increasingly more difficult to find samples. This affects productivity and is the main contributor to pay-per-plot based risk factors. As the sample matrix fills, the difficulty of finding acceptable samples increases, and the risk of a no plot and therefore no-pay crew day is increased. This risk must be assessed by the contractor and is reflected in the plot rates.

Table 1. Target Sampling Matrix

		Site Series										
Subzone	**Tree Species**	02	03	04	05	06	07	08	09	10	12	**Totals**
SBSmc2	**Bl**		7				6		8	10	7	**38**
	Sx		7				4		**2**	10	5	**28**
SBSdk	**Sx**	5		7	6		7	7		6		**32**
SBSwk3	**Bl**	6		5		9	10	9				**39**
	Sx	6	7	4	5	3	9	8				**42**
ESSFmc	**Bl**	7	7		3		10	7	7	7		**48**
	Sx	7	7	1	3		10	7	7	7		**49**
												276

Table 2. Number of samples Targeted vs. Sampled

		Site Series									TOTAL
Subzone	Species	02 T/S	03 T/S	04 T/S	05 T/S	07 T/S	08 T/S	09 T/S	10 T/S	12 T/S	"S"
SBSmc2	Bl		7/4			4/2		2/4	10/7	5/2	19
	Sx		7/7			6/4		8/8	10/10	7/7	36
SBSdk	Sx	5/5		7/2	6/6	7/7	7/7		6/6		33
SBSwk3	Bl	6/0	7/0	4/0	5/0	9/0	8/0				0
	Sx	6/0		5/0		10/0	9/0				0
ESSFmc	Bl	7/5	7/7		3/3	10/1	7/4	7/0	7/7		27
	Sx	7/6	7/6	1/1	3/3	10/0	7/1	7/5	7/7		29
											144

Once the field sampling is complete, all field data is entered into VENUS 5.1, (a Ministry of Forests data entry program) designed especially for SIBEC. Access notes are summarised and waypoint files are finalised to show geographic distribution of the samples. Summary reports are produced and the package is delivered to the client. Data is also provided to the MOF Research Branch so that quality checks can be performed and the data entered into the provincial database.

Results

Table 2 shows the number of samples established and the number of cells filled (shaded), where T/S indicates the number of samples T (targeted), and S (sampled). For example, the cell represented by SBSmc2 Sx in the 09 site series indicates "8/8". This means that there were 8 samples targeted for sampling and that 8 samples were collected. Also implied is that there were two previous samples already in the database. This cell is full and does not require subsequent sampling. The SBSwk3 was not sampled this season. Of the 41 target cells, 15 of them were filled and eight sampled to substantial completion. In total, 144 trees were sampled throughout the two timber supply areas. There are 575 SIBEC samples identified as required in the Morice – Lakes TSAs. Priority 1 targets the completion of 289 spruce and balsam samples. Sampling began on September 20 and was completed by October 27. In total 58 crew days were expended.

Discussion

The results of this study can best be utilised in post-harvest site productivity estimates. Regenerated stands differ from natural stands mostly by means of density control. This is achieved through silviculture treatments such a planting or spacing that focus on reducing intraspecific competition while maximizing growth potential. Controlling density allows forest managers to greatly reduce the amount of inherent suppression / repression in a stand. When SIBEC is used for operational purposes, the ecologically based site index for a second growth stand can be accurately projected. This results in increased confidence levels of production for future tree crops. Site productivity studies such as the paired plot studies undertaken in the Morice – Lakes TSAs showed a 4.5 meter increase in site index in managed stands over natural stands growing on similar ecological sites.

Recommendations

In order to achieve the goals of the M&L IFPA SIBEC project, the following steps are suggested:

1. Take steps to ensure a full season of sampling; this means contracts in place by early June so that field prep can be completed to capture the earliest possible sampling window.
2. The production of themed digital maps that identify all possible sampling areas.

References

SIBEC Sampling and Data Standards; B.C. Ministry of Forests, Site Productivity Working Group, Version 5.1, Revised June 2001.

Morice & Lakes Innovative Forest Practices Agreement, Request For Proposal: Morice & Lakes TSA, SIBEC Plots Project 332.01

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For More Information...

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