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**Strategic Recommendations for  
A Growth & Yield Program  
for the Morice-Lakes IFPA Area**

Prepared for the  
Technical Advisory Committee of  
The Morice-Lakes IFPA

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## Executive Summary

This report gives our recommendations to members of the Morice-Lakes Innovative Forestry Practices Agreement (IFPA) for key components of a growth and yield program for the IFPA area (which includes the Morice and Lakes Timber Supply Areas). To complete the strategic planning process started in this report, the IFPA members should now set priorities for the growth and yield program and select individual program components for funding.

We believe that the most important strategic consideration for the IFPA members is the timber supply and habitat impacts of the current mountain pine beetle infestation (and to a lesser degree the balsam and spruce bark beetles). This catastrophic beetle infestation will impact virtually every aspect of forest management in the area for at least a decade, and thus is also the most important consideration for the growth and yield program. The Ministry of Forests recently increased the short-term harvest in the Lakes Timber Supply Area to help salvage some of the beetle-killed pine stands. However, the infestation is so large that some areas may not be salvaged for many years, and other areas may not be salvaged before the wood decays and is unusable.

The impact of the vast area of beetle-kill may result in a severe shortage of mature wood available for mid-term harvest (e.g., in 25-30 years). This potential wood shortage and corresponding reductions in timber harvest could devastate the forest industry and economies of the Burns Lake and Houston areas. A well designed, carefully implemented, and well funded growth and yield program for the IFPA area can provide data, information, and tools to help minimize the negative impacts of this potential mid-term timber supply shortage and help stabilize the forest industry and communities in the area.

The strategic role of growth and yield information is generally to support planning for timber supply analysis, silviculture planning, harvest planning, corporate and investment planning, and planning for other environmental programs such as wildlife habitat. Timber supply analysis will continue to be the most important use of growth and yield information in the IFPA area; however, emphasis will shift from the traditional role of supporting the short-term harvest to helping design short-term management and silviculture strategies to minimize the beetle impacts on the near mid-term timber supply. This focus on strategic harvest planning can help provide answers to questions such as:

- 1) Can the mid-term timber supply shortfall be reduced by focusing salvage and prompt regeneration on the highest productivity sites first?
- 2) Will the combination of strategic harvest planning and incremental silviculture in regenerated stands reduce the mid-term timber supply shortage?
- 3) Can overall recovery be increased by scheduling salvage to consider the shelf life of bug wood?
- 4) Will the mid-term timber supply shortage be exacerbated by leaving and not rehabilitating some beetle-killed stands?
- 5) Will the regeneration and subsequent growth of unsalvaged beetle-killed stands be so low that they must be rehabilitated?

The 31 recommendations in this report are presented by eight groups: 1) program infrastructure; 2) data capture and management; 3) inventory support and interface; 4) silviculture support and interface; 5) site productivity; 6) yield prediction; 7) product modeling; and 8) related issues. Each recommendation includes a brief discussion of the strategic impact, priority, and approximate cost. The key recommendations are:

- 1) Centralize growth and yield data management
- 2) Complete the strategic plan and operating plans for the growth and yield program
- 3) Update the forest cover inventory for beetle attack
- 4) Complete an inventory needs analysis
- 5) Implement a growth and yield monitoring program
- 6) Develop economic guides for silviculture
- 7) Complete ecosystem mapping in both TSAs
- 8) Use Site Index Adjustment (SIA) for forest level application
- 9) Develop beetle kill (shelf life) volume curves
- 10) Develop an ingress model for beetle-killed stands
- 11) Develop an ingress model for post-harvest regenerated stands
- 12) Implement an aspatial timber supply model
- 13) Develop a strategic harvest planning model

A carefully designed and implemented growth and yield program will provide IFPA members with strategically important information to help design and implement a management and silviculture program to minimize the mid-term timber supply impacts of the beetle infestation. The IFPA members have the opportunity to take charge and develop a proactive, cost-effective management program that focuses on IFPA goals. The strategic recommendations in this report provide the IFPA members with the blueprint to begin building this program.

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## 1. INTRODUCTION

### 1.1 TERMS OF REFERENCE

J.S. Thrower & Associates Ltd. (JST) prepared this report for members of the Morice-Lakes Innovative Forestry Practices Agreement (IFPA). Our team preparing this report was Jim Thrower, *PhD RPF*, Gord Lester, *RPF*, and Ian Cameron, *MF RPF* with assistance of other JST staff. The IFPA project leader was Larry McCulloch, *RPF* (Laing & McCulloch Forest Management Services). Forest Renewal BC funded this project through the IFPA pilot program.

We developed the strategic recommendations and this report in conjunction with a similar process for the Vanderhoof IFPA. This report was prepared first to accommodate the Morice-Lakes IFPA timelines and administrative structure. The Vanderhoof IFPA report will be similar in content as both areas have the same issues, similar inventory profiles, and some of the same licensees. However, the Vanderhoof report may be more tactical in focus. The sequential preparation of these reports allowed us to share costs in developing the reports and allowed our team to examine opportunities to develop growth and yield (G&Y) solutions to benefit both IFPA areas. The joint consideration of the two IFPA areas may also facilitate the recently announced Ministry of Forests (MOF) strategy to manage the mountain pine beetle epidemic across Timber Supply Area (TSA) and Forest District boundaries.<sup>1</sup>

### 1.2 BACKGROUND

Forest licensees<sup>2</sup> in the Morice-Lakes TSAs were awarded IFPAs in 1999 by the MOF as one of six agreements under a pilot test of the program.<sup>3</sup> This program was established to enable MOF Regional Managers to increase the allowable annual cut (AAC) for forest licensees undertaking innovative practices under an approved Forestry Plan.<sup>4</sup> The IFPA program has taken on an expanded role under the new provincial government and agreement holders are now being asked to “*assist industry and government in finding answers to many of the most serious challenges facing BC’s forest industry:*

- *The need for workable sustainable forest management in order to balance environmental, social, and economic values;*
- *The testing of performance-based forestry practices;*
- *The pursuit of meaningful community and First Nations involvement; and*
- *The application of the latest timber supply and environmental resource modeling techniques.”<sup>5</sup>*

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<sup>1</sup> <http://www.for.gov.bc.ca/PAB/News/Features/beetles/>

<sup>2</sup> Licensees in the IFPA include Babine Forest Products Ltd., Canadian Forest Products Ltd., Fraser Lake Sawmills Ltd., Houston Forest Products Ltd., and L&M Lumber Ltd.

<sup>3</sup> The six IFPA pilot agreements include: 1) the Arrow TSA; 2) Interfor Adams Lake operating areas (in the Kamloops TSA) and Hope operating area (in the Fraser TSA); 3) Lignum operating area (in the Williams Lakes and 100 Mile House TSAs); 4) the Merritt TSA; 5) Vanderhoof Forest District (in the Prince George TSA); and 6) the Morice and Lakes TSAs. A new IFPA was also recently awarded to licensees in the Okanagan TSA.

<sup>4</sup> Ministry of Forests. 2000. Innovative forestry practices agreement handbook. BC Min. For., April 2000. 17 pp.+ app.

<sup>5</sup> Innovative Forest Practices Agreement Provincial Working Group. 2001. The need for sustainable forest management and the benefits of the Innovative Forestry Practices Agreements. A submission to the Forest Renewal BC Program review by the IFPA Provincial Working Group. Aug. 2001. 18 pp. + attachment.

The Morice-Lakes and Vanderhoof IFPA areas are unique among others in the province because of the impact of the mountain pine beetle. This catastrophic infestation will override all actions and activities in the area, including the IFPAs, for a decade or more. The devastation of the pine beetle (and to a lesser degree the balsam and spruce beetles) must be considered in all aspects of the IFPA, including the G&Y program. Another unique aspect of the Morice-Lakes IFPA is that it includes two TSAs. This impacts the IFPA primarily in that timber supply analyses are done separately for each TSA, which will impact how some technical components of the IFPA are designed, developed, and applied in resource analysis and scenario planning.

Since licensees were awarded these agreements, a structure of committees has been established to administer the Morice-Lakes IFPA program. Most IFPA activities to date are centered on a computer modeling (scenario planning) process<sup>6</sup> that uses public advisory groups to develop scenarios around a variety of forest resources and issues. In this process, the impacts of different management scenarios on the various resources are tested using a spatially explicit resource analysis computer simulation model. The intent of this scenario planning process is to evaluate a wide range of forest management options leading to a Sustainable Forest Management Plan (under the CSA standard Z809) that achieves a balance among the many different stakeholders in the area.

The IFPA members recognize the importance of G&Y information in scenario planning and to reduce the mid- and long-term negative impacts of the current pine beetle epidemic. Accordingly, the IFPA has initiated a strategic planning process to help identify the key G&Y program components to support the IFPA.

### 1.3 PROJECT GOALS

The primary goal of this project and this report is to provide strategic recommendations to the IFPA Technical Advisory Committee (TAC) for G&Y program components to support IFPA goals. The three main goals of this report are to:

- 1) Emphasize the importance of the beetle outbreak and demonstrate how a G&Y program can help address some of the very important mid-term issues that will likely results from this infestation.
- 2) Discuss the strategic role of G&Y in the larger framework of overall forest management to provide TAC members a reference for how G&Y can be used to achieve strategic IFPA goals.
- 3) Present our G&Y program recommendations for consideration by IFPA members.

This report is not a strategic G&Y plan, but rather recommends key program components that can be included in a strategic G&Y plan. The IFPA members must decide which recommendations to accept and fund while considering other political, social, technical, and economic components of the IFPA.

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<sup>6</sup> The Morice-Lakes IFPA has selected the McGregor Model Forest approach to sustainable forest management, described at: <http://www.mcgregor.bc.ca/projects/approach.html>

## 1.4 THE PROCESS

We developed the strategic recommendations in this report using a gap-focused process. The process included reviewing IFPA goals, the current situation in the IFPA area, and suggesting how different G&Y program components could provide the tools and systems to meet our interpretation of IFPA needs. This requires forward thinking to identify G&Y components, issues, or projects that are strategically important - now and in the future. This planning process must be revisited as the current operating environment, anticipated future conditions, and possibly even IFPA goals change. Thus, the recommendations in this report are only the first of many steps that must be revisited over time. With the anticipated change in BC forest policy, it is reasonable to expect that this report and subsequent strategic and operational plans should be revisited frequently in this time of rapid change.

We completed the first three of the six key steps in this process – the IFPA members must complete the remaining three steps after reviewing this report and deciding how to proceed. These steps are:

1. **Situation analysis** – first we discuss some of the major issues regarding the development and strategic use of G&Y information in the IFPA area (Section 2). Much of this relates to the impact of the mountain pine beetle, as we believe this should be the most important consideration for the IFPA.
2. **Goals & objectives** – the IFPA has preliminary goals and objectives for the overall program (Appendix I) and has none for the G&Y program. Thus, we present some strategic goals and objectives for the G&Y program for consideration by the IFPA members (Section 4). To set the stage for these goals, we first discuss the strategic role of G&Y in the IFPA (Section 3).
3. **G&Y program components** – this is the main part of the report that includes those recommendations for the G&Y program components we believe are needed to support the IFPA goals and the local economy (Section 5). The IFPA members must decide which components are strategically important and which they will fund. To assist in this process, we provide some ideas for the next steps in implementing this process (Section 6).

*We believe the impact of the mountain pine beetle is the most important consideration for the IFPA – which will also drive the G&Y program.*

The remaining three steps to be completed by the IFPA members are:

4. **Develop the strategic plan** – the IFPA members must set priorities and choose key program components to include in the G&Y program.
5. **Develop operational plans** – the IFPA members (probably the TAC) should develop annual and five-year operating plans. Details should be developed in project work plans.
6. **Implement & monitor** – the strategic and operational plans must be implemented, monitored, and updated frequently to ensure they remain on track to achieve key IFPA goals. In the current state of rapid change in the IFPA area and in forest management policy in BC, it is reasonable to expect to complete these reviews at least annually.

## 2. SITUATION ANALYSIS

### 2.1 OVERVIEW

This section briefly outlines major issues in the IFPA area that directly impact the G&Y program. There are other issues that impact the G&Y program, however, we believe this is the most important information to discuss the strategic use of G&Y information in the IFPA area (Section 3), goals and objectives for the G&Y program (Section 4), recommendations for what G&Y program components should be considered by the IFPA (Section 5), and some suggestions on next steps for the IFPA (Section 6). Some of the information and issues in this section were discussed at the September 28, 2001 meeting<sup>7</sup> in Houston and others are from discussions with JST staff and other senior industry analysts and managers.

### 2.2 MOUNTAIN PINE BEETLE

The mountain pine beetle infestation is the most significant issue impacting the IFPA. This outbreak is primarily in the Lakes TSA and Vanderhoof Forest District, however, the beetle is moving toward the Morice TSA where it could devastate mature lodgepole pine stands. In addition, there is significant mortality in the Morice and Lakes TSAs from balsam and spruce bark beetles. These beetle infestations will dramatically impact almost every aspect of the forest industry in both TSAs, the Vanderhoof District, and other areas in the central interior for a decade or more. This infestation will have a major impact on the G&Y program as there are significant gaps in G&Y information that help managers with short- and medium-term decisions on dealing with the beetle impacts.

The G&Y program can provide information to help select areas to salvage or rehab first to provide the most upward impact on the mid-term timber supply, the regeneration delay and stocking levels in beetle-killed stands, how stands with partial kill grow over time, and the expected shelf life of dead wood. These G&Y tools and information will help model timber supply impacts on volume and value and select regeneration and rehab strategies. However, these strategies must be accompanied by regulatory flexibility to be successful.

Two reviews of the beetle issue in the central interior were recently completed to provide high-level direction to the Provincial Government. An MLA committee recently submitted a report<sup>8</sup> to the Minister of Forests that contained recommendations to help address the issue. The report focused largely on high-level issues related to Government policy and regulation such as stumpage, the Forest Practices Code, fiber allocation, parks and protected areas, and community stability. A

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<sup>7</sup> The purpose of the TAC meeting on September 28, 2001 in Houston was to provide background information for us to help prepare this report. This included a review of existing G&Y projects and discussion of general topics relating to the development and use of G&Y information in the IFPA area.

<sup>8</sup> Report of the Mountain Pine Beetle Task Force. 2001. A report submitted to the Minister of Forests, Oct. 3, 2001. 26 pp. MLAs on the committee included: John Wilson (Cariboo North), Pat Bell (Prince George North), Paul Nettleton (Prince George-Omineca), and Dennis McKay (Bulkley Valley-Stikine).

comprehensive report<sup>9</sup> by R&S Rogers Consulting group contained more specific recommendations on operational and business issues (some recommendations in the Rogers report relate to G&Y and are similar to some recommendations in this report). The MOF has also recently released an action plan to address the beetle issue based on these two studies.<sup>10</sup>

### 2.3 SHIFT IN AGE CLASS DISTRIBUTION

The current forest age class distribution in the Morice and Lakes TSAs is typical of many areas in the interior of BC and does not present any major problems for timber supply. The current distribution is weighted to older ages classes, which provides ample opportunities to harvest mature stands until younger post-harvest regenerated stands reach merchantable size. However, the distribution of area by age class will dramatically change with the current beetle infestation (Figure 1). This will have huge impacts on short- and mid-term timber supply in these two TSAs and other infested areas such as Vanderhoof.

A simplified view of the impact of beetle kill on the age class distribution is to consider it having the same impact as harvesting. All (or most) trees in the stand are killed, and a new stand will regenerate and thus enters age class 1. The potential shift in age classes is greatest in the Lakes TSA where approximately 60% of the standing inventory is susceptible to pine beetle. The Morice TSA contains less area susceptible to pine beetle but more area susceptible to the spruce and balsam beetles. The impacts of this age class shift on timber supply are discussed in the following section.

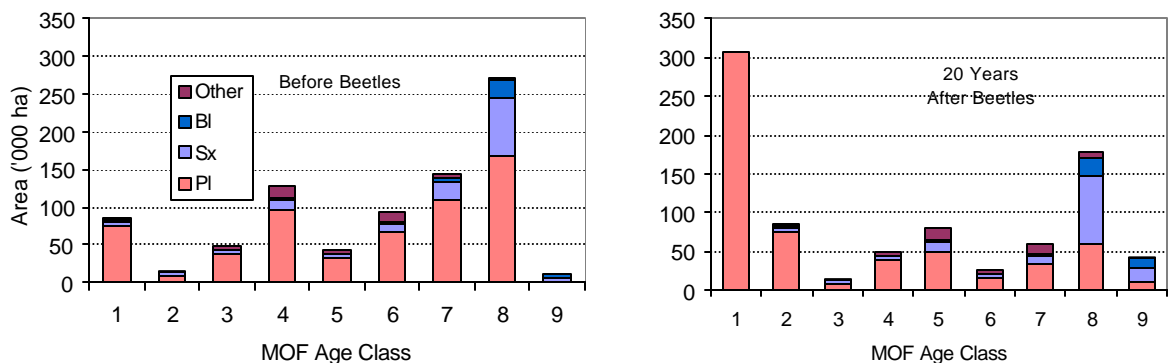


Figure 1. Hypothetical impact of pine beetle kill on the age class distribution in 20 years for the Lakes TSA. This example assumes that beetle kill or harvesting will remove 50% of pine leading stands in age classes 4, 5 and 6; and 75% in age class 7, 8, and 9. Age classes are in 20-year intervals, except class 8 (141-250 years) and class 9 (151 years and older).

<sup>9</sup> R&S Rogers Consulting Inc. 2001. West central BC mountain pine beetle strategic business recommendations report. Contract Report to the BC Ministry of Forests. Sept. 2001. 69 pp. + app.

<sup>10</sup> <http://www.for.gov.bc.ca/PAB/News/Features/beetles/>

## 2.4 MID-TERM TIMBER SUPPLY

The shift of beetle-killed area from older age classes to age class 1 will have a dramatic affect on the short- and mid-term timber supply. The area harvested from the beetle uplift<sup>11</sup> will revert to age class 1 after it is regenerated. Furthermore, attacked areas that cannot be harvested will also revert to age class 1. These young stands will then contribute to the timber supply according to their level of stocking and growth rate. Areas regenerated after harvest using basic silviculture will follow the usual managed stand yield curves; however, many areas likely cannot be salvaged and may regenerate slowly to low stand densities if left for natural regeneration. This reduced growth in areas that are not salvage or rehabilitated will exacerbate the negative timber supply impacts of the age class imbalance (Figure 1).

The timber supply impacts of the increased short-term harvest (salvage) and the resulting age class imbalance could potentially be followed by an equally dramatic decrease in cut (Figure 2). The long-term timber supply, however, could be higher in the IFPA area than the current AAC because managed stand productivity is likely higher than currently assumed in the MOF timber supply analyses.<sup>12</sup>

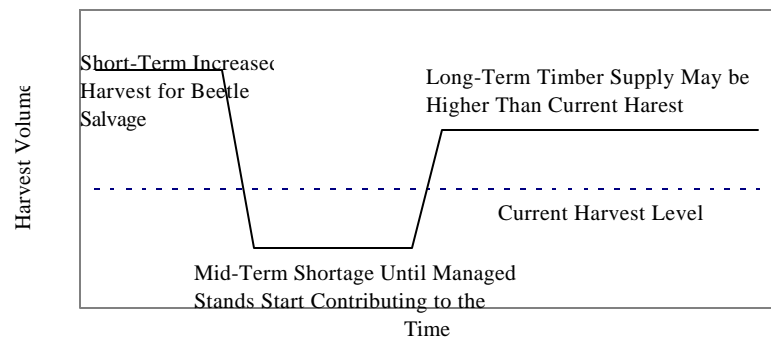


Figure 2. Theoretical timber harvest profile that may result from the current beetle infestation.

The potential mid-term decrease in available mature timber and associated harvest level could have dramatic negative impacts on the local economy. The IFPA activities should help determine the likelihood of this potential shortfall and how to deal with it. The G&Y program has a very important strategic role in providing information to help make decisions that may decrease or eliminate this potential mid-term shortfall and estimate the potential level of long-term sustainable harvest in the area. We believe this is one of the most important strategic short-term roles of the G&Y program and should be very high priority for the IFPA.

<sup>11</sup> The AAC in the Lakes TSA was recently doubled from about 1.5 to 3.0 million m<sup>3</sup> to account for beetle salvage. The new AAC in the Morice TSA will be determined in early 2002, which may also result in a large increase in harvest.

<sup>12</sup> There is considerable evidence throughout the province that the growth and yield of lodgepole pine stands is higher after natural stands that regenerate after wildfire are harvested and subsequently regenerated. This increased growth is the result of capturing the inherent productivity of forest land by removing the growth slowing impacts of height-growth repression. This biological phenomenon (repression) occurs in natural lodgepole pine stands when they regenerate to extremely high densities after wildfire (e.g., stands exceeding 100,000 trees/ha) but does not occur at the much lower stand densities that are typically regenerated after harvesting.

## 2.5 TIMBER SUPPLY & RESOURCE ANALYSIS

The IFPA has selected the McGregor Model Forest approach to scenario planning and resource analysis. This approach uses a detailed spatially-explicit computer simulation model to examine potential impacts of a range of management options and resources.<sup>13</sup> Stakeholders contribute in developing model inputs through a public involvement process. Computer simulations then examine the impacts on timber supply and other resource values of a wide range of management scenarios. Current plans include about 1,900 scenarios estimated to require about 10 person years to complete.<sup>14</sup>

In addition to providing feedback to help guide the G&Y program, the scenario planning processes (as currently described) includes many values that need G&Y information. For example, the scenarios currently include simulations requiring information on the G&Y impacts of spacing, pruning, commercial thinning, fertilization, tree improvement, product quality, technical harvest rotations, rehabilitation of dense lodgepole pine problem forest types (PFTs), successional pathways, second growth inventory for yield table inputs and identify areas to rehab, potential site productivity, increased utilization levels, and impacts of brush competition. First approximations for some of this information can be developed for initial simulations, however, considerable work will be required to develop reliable G&Y estimates for these factors.

*We believe one of the strategically most important short-term roles of the G&Y program is to help address the potential mid-term timber supply shortage resulting from the beetle infestation.*

## 2.6 G&Y INFORMATION

There is considerable G&Y information and tools developed by the MOF that are available to the IFPA. Most of these tools were developed from large areas such as the old public sustained yield units (PSYUs), forest inventory zones (FIZs), or the entire interior of the province. Most of these tools developed to support the timber supply review process are adequate for most areas (e.g., VDYP, TIPSU, standard inventory procedures, etc.). However, these systems likely will not provide the information needed by the IFPA to address beetle issues that impact short-term management decisions, mid-term timber supply, silviculture strategies, or habitat issues.

Some work to develop local G&Y information was started in the Babine Forest Products Enhanced Forest Management Pilot Project (EFMPP) in the Lakes TSA. These projects were done in a limited area, thus many cannot be applied to the larger IFPA area without additional work. Some EFMPP projects may provide general information that is not restricted to the specific landbase that can be generally applied to the larger IFPA area. Other projects started or completed under the EFMPP likely will not have any strategic importance to the IFPA.

<sup>13</sup> <http://www.mcgregor.bc.ca/projects/approach.html>

<sup>14</sup> Personal communication with Larry McCulloch, January 2002.

Other work has also been completed in or near the IFPA area that may contribute to G&Y program. For example, Predictive Ecosystem Mapping (PEM) has been completed in the Morice TSA and is being extended to the Lakes TSA. More detailed ecological mapping has been completed in the EFMPP area of the Lakes TSA. This mapping is high priority to complete for the IFPA as it will provide key information for the G&Y and other IFPA programs. There has also been considerable data collected for programs throughout the central interior that may contribute to information needs for the IFPA. These include the MOF programs for PSPs (permanent sample plots), data collected for the SIBEC database (site index-biogeoclimatic ecosystem classification), research in to the G&Y impacts of stems rusts, etc.

## 2.7 SITE PRODUCTIVITY

Site productivity is a fundamental component of all G&Y work. The inherent productivity of the land to grow trees (site productivity) affects all predictions of future G&Y, and thus accurate site productivity estimates (measured using site index in BC) are needed for most uses of G&Y information. For example, accurate estimates of site index are needed to estimate the future growth of stands in timber supply modeling and silviculture planning.

The forecasted future timber supply and community stability can be improved by using ecologically-based estimates of site productivity and enhancing G&Y tools to help make silviculture and harvest decisions (discussed in more detail in the following section). Some of the first work to improve productivity estimates for managed lodgepole pine stands<sup>15</sup> was done in the Morice and Lakes TSAs, however, application of this information has lagged behind much of the province and there are large gains to be made from further work. This should be one the highest priority projects for the IFPA (discussed in more detail later in this report).

The availability and use of site productivity information in the Morice and Lakes TSAs is typical of most interior TSAs. The inventory estimates of site index are adequate to project the growth of existing natural stands, but underestimate growth in post-harvest regenerated stands. The site index for lodgepole pine stands was adjusted to reflect the improved growth expected in post-harvest regenerated stands in the recently completed Lakes timber supply review<sup>16</sup> and is being done for the Morice review<sup>17</sup> currently underway. These adjustments were done in the base case for both TSAs using MOF paired plot studies and were applied to existing and future post-harvest regenerated pine stands in the SBSdk and SBSmc2 (about 32% of the productive forest landbase (PFLB) in the Morice and 59% in the Lakes). Sensitivity analyses included adjustments to site index for age class 8 and 9

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<sup>15</sup> The first work leading to the development of the provincial old-growth site index (OGSI) program was done simultaneously in 1993 in the Morice TSA and Merritt TSA.

<sup>16</sup> Ministry of Forests. 2001. Lakes timber supply area. Rationale for allowable annual cut (AAC) determination. BC Ministry of Forests, Victoria BC. Aug. 1, 2001. 50 pp. + app.

<sup>17</sup> Ministry of Forests. 2001. Morice timber supply area timber supply review data package. BC Min. Forests. Victoria, BC. 37 pp.

spruce and balsam leading stands in the SBSdk and SBSmc2 areas (about 13% of the PFLB in the Morice and 9% in the Lakes).

The adjustments to site index in these recent analyses result in positive pressure on the mid- and long-term timber supply; however, there are still significant areas in both TSAs where adjustments can be made to better reflect actual (and higher) productivity than is included in the MOF timber supply reviews. Consequently, the IFPA has an opportunity to further improve the projected long-term timber supply by developing site index adjustments that can be applied to the entire timber harvesting landbase. Furthermore, the IFPA approach to improving estimates of site productivity will likely be ecologically-based, which also provides substantial benefits to modeling environmental resources.

## **2.8 Two TSAs**

The Morice-Lakes IFPA is unique because it includes two TSAs. One advantage of this arrangement is that the two areas have the same licensees with very similar issues. Combining the two TSAs also provides the opportunity for economies of scale by funding activities that apply to both areas. Costs can be reduced by working with the Vanderhoof IFPA to develop program components common to both areas. Some of these potential efficiencies, however, may not apply to activities or processes that must be done separately by TSA. For example, the AAC is currently determined separately for each TSA and thus separate analyses are required. Some inputs to the timber supply analysis process must be TSA specific, but others may be developed simultaneously for both areas.

### 3. STRATEGIC ROLE OF G&Y FOR THE IFPA

#### 3.1 IN GENERAL

The field of G&Y in forestry is the art and science of predicting how trees, stands, and forests change over time under a variety of conditions. The primary role of G&Y for the IFPA, and elsewhere, is to use these predictions for strategic and tactical planning to guide decisions that aim at specific objectives. Generally, G&Y information is used in varying degrees in strategic planning for:

- 1) timber supply analysis, 2) silviculture planning, 3) harvest planning, 4) corporate planning, and 5) other areas such as wildlife habitat, recreation, and watershed planning.

#### 3.2 TIMBER SUPPLY ANALYSIS

The most important traditional use of G&Y information in BC is to support timber supply analysis. Accurate G&Y information is needed to forecast the timber flow that can be maintained under different management scenarios and the impacts on other tree, stand, and environmental factors. G&Y information will continue to be a key component of timber supply analysis in the IFPA area, however, the concern and strategic use will shift to considering the impacts of short-term management on mid-term timber supply. For example, the AAC in the Lakes TSA was recently doubled<sup>18</sup> to help address salvage of beetle killed pine stands, consequently, improved G&Y information will not impact the short-term harvest in the area.

One of the primary strategic uses of G&Y for the IFPA will be to help build strategies to address the mid- and long-term timber supply impacts of the beetle. The short-term harvest level will be determined by the amount of beetle salvage that can be maintained in the areas and will not be impacted by new G&Y information. However, new G&Y information can help make strategic decisions to minimize the potential mid-term timber supply shortage. For example, improved G&Y information to confirm higher site productivity could help decrease the mid-term timber supply shortage (arrow A in Figure 3). Also, new G&Y information may support strategies to help shorten the time of the mid-term shortfall (arrow B) before elevating to a higher long-term sustainable harvest (arrow C). This could be done by focusing harvesting and rehab (with prompt regeneration)

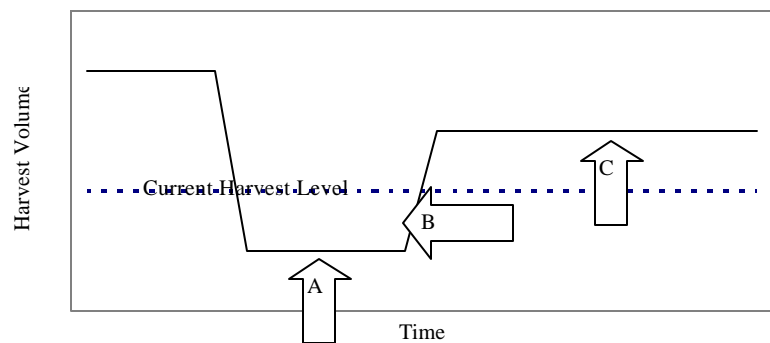


Figure 3. The strategic use of G&Y information can help build strategies to minimize the potential mid-term timber supply shortage that could result from the beetle infestation.

<sup>18</sup> Ministry of Forests. 2001. Lakes timber supply area. Rationale for allowable annual cut (AAC) determination. BC Ministry of Forests, Victoria BC. Aug. 1, 2001. 50 pp. + app.

on sites with the highest growth potential, or by silviculture treatments that bring stands to a merchantable size sooner than if not treated.

### 3.3 SILVICULTURE PLANNING

Silviculture should manage the growing environment of trees, stands, and forests to achieve particular outcomes and targets. G&Y predicts the consequences of various silviculture treatments and thus is an integral part of silviculture planning. Traditionally, G&Y information has not been used to its full potential for silviculture planning in BC because of political and regulatory constraints. However, the situation of the IFPA is now different because of the beetle issue and potential changes to forest policy in BC that will accompany the new era of forest management planned by the BC government. The strategic use of G&Y information for silviculture planning will be very important for the IFPA to help mitigate the potentially large negative mid-term timber supply impacts of the beetle infestation. Thus, the IFPA should take a strong lead role in developing silviculture strategies that address these very important issues.

Silviculture decisions made now in the IFPA area will impact the quantity, quality, and timing of wood that is available for future harvest. Given the potentially large negative impact of the beetle infestation on mid-term timber supply, the use of G&Y information to help make silviculture decisions today may have large consequences to the future of the industry in the IFPA area. For example, decisions of which areas to harvest, which to leave, which to treat, etc. could help close gaps in future timber supply (Figure 3). These decisions could also significantly impact the quality of the raw material for future conversion, and thus could define the future of the industry. G&Y information in conjunction with economic analyses can help make some of these critical short-term decisions.

### 3.4 HARVEST PLANNING

G&Y information also has a key role in strategic harvest planning; however, like silviculture planning, G&Y has not been widely used in BC for harvest planning because of political and regulatory constraints. The impact of the beetle on day-to-day management and potential changes in the regulatory environment in BC could create clear uses of G&Y information for harvest planning in the IFPA area. For example, the decision of where to harvest and rehab beetle-killed areas will impact the rate of growth and subsequent availability of future wood for harvest. G&Y information can help make strategic decisions of where and when to cut and how to regenerate these areas to help minimize the potential negative impacts of the current infestation on future timber supply.

New G&Y information and tools may also be of strategic use in salvage operations. For example, tools to predict the log profile in beetle killed stands, rates of natural ingress and regeneration when areas are not salvaged, and ecologically-based estimates of site productivity to better predict growth when stands are salvaged could help determine what areas to log, leave, and rehab. Most of these decisions will be made considering economics and access; however, there may be long-term benefits to focus harvesting in areas where the financial returns are highest now and regeneration or rehab

costs are lowest. Improved G&Y that addresses these specific issues can help managers make these decisions.

### **3.5 CORPORATE PLANNING**

Key investment decisions, such as the location and type of mills to build, have traditionally been made considering standing inventory and short to medium market forecasts. This is primarily because of the large supply of mature wood and the opinion that the mid- and long-term wood supply would be similar in quantity and quality as the current harvest. However, the beetle impacts in the IFPA will rapidly change the short-term timber supply and state of raw material available to the industry. Also, the resulting shortage of mature green wood for mid-term supply will likely require a faster transition to harvesting and processing trees from post-harvest regenerated stands than previously considered. G&Y information can help predict the state of the forest in 10, 20, and 30 years, which should be of major strategic importance for investment options for industry and the local economy.

### **3.6 OTHER PROGRAMS**

G&Y information and tools can also be used for strategic planning for wildlife habitat, watershed, and other non-timber values. The main application is to better predict future forest conditions on the landscape. For example, tree height is an important predictor of the quality of hiding cover and thermal cover for wildlife. Tree diameter and branching patterns are important forest attributes used to predict habitat suitability for many species. The growth rates of trees can be used to estimate the time to achieve green-up or hydrological recovery in burned, harvested, or insect killed watersheds. This application of G&Y is also not well developed in BC, however, the IFPA has an opportunity to develop this use of G&Y for environmental management in the area. The long-term impacts of the beetle attack and subsequent harvesting, regeneration, and rehab will have significant consequences to wildlife habitat, watershed characteristics and general hydrology, recreation potential, and many environmental forest values. G&Y information can help predict the outcomes of different scenarios and manage many of these values.

## 4. G&Y PROGRAM GOALS, OBJECTIVES, & FOCUS

### 4.1 IFPA GOALS

The goals and objectives of the IFPA should guide the G&Y and all other programs. These high-level IFPA goals are important to the G&Y program because they help determine the appropriate level of G&Y research and development needed to achieve the IFPA's vision of the future. The IFPA has developed preliminary goals and objectives with performance measures; however, they do not provide much direction for the G&Y program (Appendix I). Furthermore, these preliminary goals and objectives were developed before the beetle infestation was the primary concern in the area and thus may not accurately reflect current priorities.

### 4.2 G&Y PROGRAM GOALS

A meeting<sup>19</sup> of the TAC was convened in Houston on September 28, 2001 to help provide preliminary focus for us in beginning to prepare this report. The primary purpose of the meeting was to discuss general issues and conditions in the IFPA area to give us general background on the current conditions and issues in the area that may affect what the IFPA envisions for the G&Y program. Inherent in these discussions were ideas of the desired future state for the IFPA and what the TAC wants from a G&Y program. From the information obtained from this meeting and subsequent discussions with Larry McCulloch, we developed the following goals and objectives to help guide the IFPA program.

The overall goal of the Morice-Lakes IFPA G&Y program is to:

*Develop G&Y data, information, tools, and systems to support strategic planning and decisions in the IFPA area for timber supply analysis and scenario planning, silviculture planning, harvesting planning, and habitat modeling.*

From this primary goal, the primary strategic objectives of the IFPA for the G&Y program are to:

1. *Support the immediate needs of beetle management, such as where to salvage and where to rehabilitate beetle killed stands to minimize the potential negative mid-term impacts on wood supply and habitat.*
2. *Help alleviate the potential mid-term wood supply shortage, by developing silviculture regimes to: a) increase the volume and value of wood grown in managed stands after the beetle salvage; b) reduce the time to reach a merchantable crop of trees; and c) address*

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<sup>19</sup> Attending the meeting were Larry McCulloch, *RPF* (Laing & McCulloch Forest Management Services), Bill Chapman, *RPF* (Babine Forest Products, Burns Lake), Bobby Love, *RPF* (MOF, Smithers), Garth Ehalt, *RPF* (Houston Forest Products, Houston), Jim McCormack (Canfor, Houston), Karen Balkwill (Houston Forest Products, Houston), Liz Saunders (MOF, Smithers), Mike Buirs, *RPF* (MOF, Houston), Laurence Turney, *RPBio* (Ardea Biological Consulting, Smithers), Melissa Todd (Houston Forest Products, Houston), Jim Burbee, *RPF* (Venture Forestry Consulting Inc., Prince George), Tom Olafson, *RPF* (Fraser Lake Sawmills, Fraser Lake), Jim Richard, *RPF* (MOF, Burns Lake), Sue Jones, *RPF* (MOF, Houston), and Jim Thrower, *PhD RPF* (J.S. Thrower & Assoc. Ltd, Kamloops).

wildlife habitat and watershed issues that may arise from the large areas of beetle killed trees.

3. Support the scenario planning process, by providing information to help examine the potential impacts of different forest management options on a wide range of forest values.

#### 4.3 STRATEGIC FOCUS

We believe that the strategic focus of the G&Y program should be the modeling systems that predict the future state of trees, stands, and forests (Figure 4). These models, tools, and systems should focus on the strategic needs of the IFPA, which we believe are timber supply modeling, strategic silviculture planning, and strategic harvest planning. These strategic needs may change as the beetle issue subsides when more emphasis may be placed on planning for other environmental resources and less emphasis on the use of G&Y information for strategic timber supply and harvest planning.

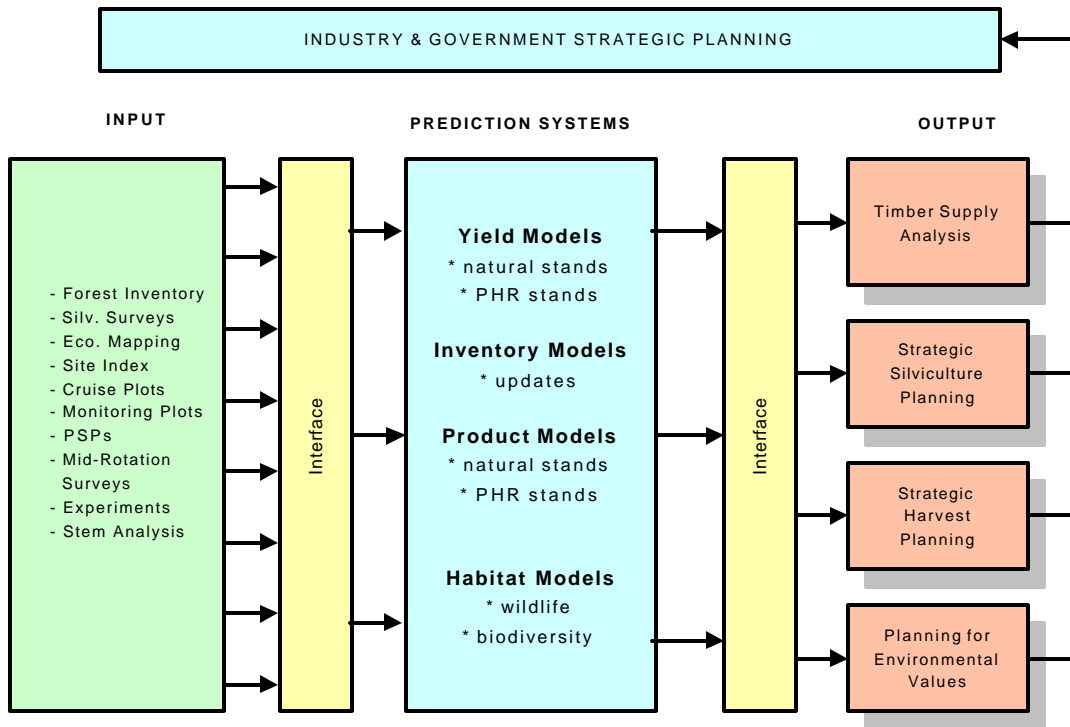


Figure 4. Flow of inputs and outputs from the modeling core of the G&Y program.

## 5. G&Y PROGRAM COMPONENTS

### 5.1 OVERVIEW

This section gives our recommendations for specific G&Y program actions. The major component groups of a G&Y program are described in Table 1 with specific recommendations in the remainder of this section. For each recommendation we include a brief rationale, estimate of priority and strategic impact, and a rough cost estimate to assist IFPA members in evaluating these suggestions. More accurate cost estimates will be needed for program budgeting. Recommendations for the product modeling component of G&Y program (Figure 4) are contained in inventory and silviculture related sections (Table 2).

Table 1. Major G&Y program groups.

| Groups                           | Purpose   |
|----------------------------------|---|
| Program Infrastructure           | <ul style="list-style-type: none"> <li>To ensure the G&amp;Y program is properly administered and achieves strategic objectives.</li> <li>Supports all strategic uses of G&amp;Y information.</li> </ul>  |
| Data Capture & Management        | <ul style="list-style-type: none"> <li>To ensure data to support the G&amp;Y program (input or output) are in appropriately designed and maintained databases.</li> <li>Supports all strategic uses of G&amp;Y information.</li> </ul>  |
| Inventory Support & Interface    | <ul style="list-style-type: none"> <li>To ensure the forest inventory provides key information needed for the G&amp;Y program and the G&amp;Y program provides tools for the inventory program.</li> <li>Supports all timber supply analysis, harvesting planning, corporate planning, and the use of G&amp;Y information for other environmental values.</li> </ul>  |
| Silviculture Support & Interface | <ul style="list-style-type: none"> <li>To ensure the silviculture program provides key information needed for the G&amp;Y program, and the G&amp;Y program provides tools for silviculture.</li> <li>Supports timber supply analysis, silviculture planning, corporate planning, and the use of G&amp;Y information for other environmental values.</li> </ul>  |
| Site Productivity                | <ul style="list-style-type: none"> <li>To develop and apply precise and accurate estimates of site productivity in all G&amp;Y applications. This includes productivity estimates for existing natural, existing post-harvest regenerated, and future post-harvest regenerated stands.</li> <li>Supports all strategic uses of G&amp;Y information.</li> </ul>  |
| Yield Projection                 | <ul style="list-style-type: none"> <li>To develop and apply models to predict the volume of existing natural, existing post-harvest regenerated, and future post-harvest regenerated stands. This includes no treatment and reasonable treatments options.</li> <li>Supports strategic use of G&amp;Y information in timber supply modeling, silviculture planning, and corporate planning.</li> </ul>  |
| Product Modeling                 | <ul style="list-style-type: none"> <li>To develop and apply models to predict the characteristics of stands, trees, and logs to predict value under different market and product scenarios. This includes no treatment and reasonable treatments options.</li> <li>Supports strategic use of G&amp;Y information in silviculture and harvest planning.</li> </ul>   |
| Habitat Modeling                 | <ul style="list-style-type: none"> <li>To establish clear relationships between stand/tree characteristics and stand age to better predict how wildlife habitat quality changes over time.</li> <li>To facilitate habitat supply, hydrological, and old growth modeling.</li> <li>To define future stand structure characteristics to meet old attribute, wildlife habitat, and botanical product objectives.</li> <li>Supports strategic use of G&amp;Y information for all environmental planning.</li> </ul> |

Table 2. Summary of recommendations, priority, and relative cost.

| Recommendations  | Priority & Strategic Impact | Relative Cost |
|--|-----------------------------|---------------|
| <b>Program Infrastructure</b>                                    |                             |               |
| 1. Establish a formal G&Y program                                | High                        | Low           |
| 2. Set priorities for the G&Y program                            | High                        | Low           |
| 3. Complete the strategic planning process                       | High                        | Low           |
| <b>Data Capture &amp; Management</b>                             |                             |               |
| 4. Centralize G&Y data   | Medium                      | Low           |
| 5. Consider centralized management of all IFPA data              | Medium                      | Medium        |
| 6. Spatially reference all plot data                             | Medium                      | Low           |
| 7. Document existing G&Y installations in the IFPA area          | Medium                      | Low           |
| <b>Inventory Support &amp; Interface</b>                         |                             |               |
| 8. Update the forest cover inventory for beetle attack           | High                        | High          |
| 9. Complete an inventory needs analysis                          | High                        | Low           |
| 10. Implement a G&Y monitoring program                           | High                        | High          |
| 11. Complete the PFT project currently underway                  | Medium                      | Medium        |
| 12. Assess the need for a log-profile prediction model           | Medium                      | Low           |
| <b>Silviculture Support &amp; Interface</b>                      |                             |               |
| 13. Develop economic guides for silviculture                     | High                        | Medium        |
| 14. Forecast future log quality                                  | Medium                      | Medium        |
| 15. Complete a needs analysis for experimental trials            | Medium                      | Low           |
| 16. Modify silviculture surveys to provide G&Y data              | Medium                      | Low           |
| <b>Site Productivity</b>   |                             |               |
| 17. Complete ecosystem mapping in both TSAs                      | High                        | Medium        |
| 18. Use Site Index Adjustment (SIA) for forest level application | High                        | Medium        |
| 19. Complete SIBEC sampling for stand level application          | Medium                      | Low           |
| 20. Refine site index conversion equations                       | Low                         | Low           |
| <b>Yield Projection</b>  |                             |               |
| 21. Develop beetle kill (shelf life) volume curves               | High                        | Medium        |
| 22. Develop an ingress model for beetle-killed stands            | High                        | Medium        |
| 23. Develop an ingress model for post-harvest regenerated stands | High                        | Medium        |
| 24. Investigate stand breakup                                    | Medium                      | Medium        |
| 25. Complete a model and yield projection needs analysis         | Medium                      | Low           |
| <b>Habitat Modeling</b>  |                             |               |
| 26. Define environmental indicators and key forest attributes    | Medium                      | Low           |
| 27. Assess current and future conditions for key indicators      | Medium                      | Low           |
| 28. Develop site specific stand and tree structure models        | Medium                      | High          |
| 29. Modify management scenarios                                  | Medium                      | Low           |
| <b>Related Issues</b>  |                             |               |
| 30. Implement an aspatial timber supply model                    | High                        | Medium        |
| 31. Develop a strategic harvest planning model                   | High                        | Medium        |

## 5.2 PROGRAM INFRASTRUCTURE

### **Recommendation 1: ESTABLISH A FORMAL G&Y PROGRAM**

*Rationale:* The IFPA will likely invest significant funds into G&Y projects in the next few years. Many of these projects will be expensive and will have high strategic importance to the IFPA. Thus, it is probably worth the small cost to manage these in a stand-alone G&Y program. A formal G&Y program should be responsible to coordinate activities, prepare budgets, administer contracts, and report to IFPA members. The IFPA has a technical committee, but does not have a formal G&Y program. The G&Y program could be a subset of the TAC or could be a separate group. It is best to have one person responsible for the program to ensure consistency. An efficiently run G&Y program is not costly relative to the many projects that will be executed under the project, or the potential benefits of the G&Y program to the IFPA.

*Priority & Strategic Impact:* High priority. All G&Y activities rely on a properly run G&Y program.

*Approximate Cost:* Low cost. Depends on sophistication of program. Could range from \$10,000 to 50,000/year. Function could be combined with other IFPA activities.

### **Recommendation 2: SET PRIORITIES FOR THE G&Y PROGRAM**

*Rationale:* Clear priorities are needed to guide IFPA G&Y activities. We suggest the three most important priorities as described in Section 4.2 are to: 1) support the immediate needs of beetle management; 2) help alleviate the potential mid-term wood supply shortage; and 3) support the scenario planning process. The IFPA members will consider other political, social, and economic information that was not available to us in developing this report. However, we suggest that the most strategically important priority for the G&Y program is to help address the short- and mid-term needs related to beetle management. The short-term needs are to help guide salvage operations to have the largest mid-term strategic impact; and mid-term needs are to help direct silviculture to minimize the potentially negative timber supply impacts that will result from the huge age class imbalance resulting from beetle kill. The G&Y program also has a large role in providing information for scenario planning and habitat modeling, which may also have important short- and mid-term impacts.

*Priority & Strategic Impact:* High priority. The G&Y program runs the risk of not having the appropriate information available at the appropriate time if up-front planning is not done and objectives are not clear.

*Approximate Cost:* Low cost. Mostly for time of IFPA members to review information, attend meetings, make decisions, and periodic review.

### **Recommendation 3: COMPLETE THE STRATEGIC PLANNING PROCESS**

*Rationale:* We recommend that the IFPA immediately follow the review of this report by completing the strategic planning process for the G&Y program. Strategic planning is often de-emphasized for more immediate issues or is not considered good value. However, most of the work to complete a strategic plan is done (this report) and the resulting document should be short, to the point, and focus

on big issues. Budget and scheduling should be given in 1- year and 5-year operating plans, with project details in project work plans. Document preparation can be simplified by including the strategic direction for the program in the annual operating plan. These plans should be reviewed at least annually and updated to reflect current information. This will be especially important in the next year or two as new forest policy develops in BC.

Priority & Strategic Impact: High priority. Our experience is that G&Y programs without strategic direction have a high chance of drifting into areas that do not contribute to the overall program goals, which ultimately increases cost and decreases value.

Approximate Cost: Low cost. The remaining cost to complete the plan is mostly for IFPA members to review this report, attend meetings, and make decisions on strategic direction and priorities (discussed in the recommendation above). Other costs may include staff to complete the strategic plan document and annual review and updates, which could cost \$10,000.

### 5.3 DATA CAPTURE & MANAGEMENT

#### **Recommendation 4: CENTRALIZE G&Y DATA**

Rationale: The management of G&Y and other data will become more important and more difficult as the IFPA completes more projects and demands increase for information about the landbase. To help address this problem, we suggest the IFPA create a central place that can be accessed by all stakeholders where G&Y data are described. All data would preferably be in the same database, however, this is not possible to achieve in the short term. Thus we suggest beginning by creating a central place that describes the data but does not store and manage the data. This central recording place could focus on describing the data, owners, methods of collection, where the data are stored, etc.

Priority & Strategic Impact: Medium priority. Won't impact short-term program. Strategic impact will be to streamline access and management of data in the future. The overall cost of uncoordinated data management may be higher than developing a centralized system.

Approximate Cost: Low to medium cost. Depends on approach, this could cost \$20,000 – \$100,000. Could involve low-level management and coordination by existing staff or expensive high-level sophisticated databases and systems.

#### **Recommendation 5: CONSIDER CENTRALIZED MANAGEMENT OF ALL IFPA DATA**

Rationale: Ideally all IFPA data and GIS information would be in one place. Recent advances in GIS-enabled data management systems such as Canfor's Genus system and Timberline's Forest Manager could centralize the storage and management of all data, including G&Y data. We suggest that the IFPA review the costs and benefits of these systems and consider their implementation for the IFPA members. These systems may require large up-front costs, but result in significant long-term cost savings. Consideration of these systems may also be timely given the potential policy changes

that may be associated with the new era of forest management proposed by the government where licensees may be responsible for all data management that is currently done by government agencies.

*Priority & Strategic Impact:* Medium priority. Won't impact short-term program. Long-term strategic importance could be high by reducing overall data management costs and providing better information to increase management efficiency.

*Approximate Cost:* Medium cost. Committing to a large data management system for the IFPA may take several years. This would likely be done outside the formal IFPA.

#### **Recommendation 6: SPATIALLY REFERENCE ALL PLOT DATA**

*Rationale:* We recommend that all data collected in the IFPA include a spatial reference (e.g., UTM coordinates). This should include all silviculture survey and cruise plots (both examples are discussed later in other recommendations). This can be done at low cost at the time of sampling or after using GIS. The spatial reference of data allows much more sophisticated and powerful analyses when combined with other landbase information through GIS processing. For example, data from silviculture surveys can be linked with ecological and geographic data (e.g., from TRIM) to examine trends for ingress and survival among site series, elevation, aspect, etc.

*Priority & Strategic Impact:* Medium priority. Strategic importance is increasing the potential for more sophisticated analyses of G&Y data with wider application.

*Approximate Cost:* Low cost. Will involve more GPS units in the field, post-processing some coordinates, and costs to add information to databases.

#### **Recommendation 7: DOCUMENT EXISTING G&Y INSTALLATIONS IN THE IFPA AREA**

*Rationale:* There have been significant investments in collecting G&Y and other data in the Morice and Lakes TSAs by the IFPA, the EFMPP, forest licensees, MOF, and many others. IFPA members may not know the existence and state of many of these projects. This effort should be limited only to important data that may significantly contribute to the IFPA.

*Priority & Strategic Impact:* Medium priority. Strategic importance is in potentially allowing the IFPA to use existing data that it may otherwise spend money to collect. Given low cost, this could potentially have a very high benefit/cost ratio.

*Approximate Cost:* Low to medium cost. Depends on detail and could be \$10,000 – \$100,000.

## **5.4 INVENTORY SUPPORT & INTERFACE**

#### **Recommendation 8: UPDATE THE FOREST COVER INVENTORY FOR BEETLE ATTACK**

*Rationale:* An accurate forest cover inventory is a fundamental component of the timber supply, silviculture, and habitat modeling that must be done to direct operational activities to address the short-term beetle management issues and the mid-term timber supply problems. The current inventory is dramatically inaccurate because it does not reflect recent beetle activity. We strongly

recommend that the IFPA develop a method to frequently and accurately update the inventory. The update process must consider the frequency at which updates are needed and the costs of the updates. We expect that one or more levels of remote sensing could be used to update for red attack and a network of plots under a continuous forest inventory (CFI) design could update growth. This could also be combined with a G&Y monitoring program (discussed below).

**Priority & Strategic Impact:** High priority. This is critical to all strategic planning for timber supply, silviculture, habitat, corporate, and economic factors.

**Approximate Cost:** High cost. Updating the inventory on both TSAs will be expensive under any scenario, however, there are options and the cost and benefits of each should be considered carefully. This could cost up to \$1,000,000 with remeasurement costs of \$500,000, however, plots could be integrated with a G&Y monitoring program (discussed below) to reduce overall cost.

#### **Recommendation 9: COMPLETE AN INVENTORY NEEDS ANALYSIS**

**Rationale:** In addition to the beetle update recommended above, the IFPA should consider completing an inventory needs analysis. The beetle update is critical to virtually all management in the IFPA area; however, there may be other needs from the inventory that will not be addressed by updating the old inventory to reflect new beetle attack. For example, accurate estimates of species composition are likely more important now than in the pre-beetle era. The recent MOF inventory audits in the Lakes and Morice TSAs showed sample volume was very similar to the inventory, however, these audits also showed that inventory type groups in mature stands were correct in only 50-60% of the samples. There is also increasing need for better estimates of tree attributes for post-harvest regenerated stands to support timber supply analysis, strategic silviculture planning, and habitat modeling.

**Priority & Strategic Impact:** High priority. The IFPA should take a critical look at what information will be required of the inventory in the next few years to decide if it is worth investing money now to address the information gaps.

**Approximate Cost:** Low cost. Should not exceed \$25,000.

#### **Recommendation 10: IMPLEMENT A G&Y MONITORING PROGRAM**

**Rationale:** The successful implementation of a properly designed G&Y monitoring program is one of the highest priority items for the IFPA G&Y program. This will provide information to immediately check G&Y estimates to ensure they accurately reflect actual stands in the IFPA area. Growth of the forest can then be checked after the first and subsequent remeasurements (likely in five years from establishment). This independent check of G&Y estimates would provide high credibility to processes that use the information such as timber supply modeling and silviculture planning. This provides reliable information for internal planning that will also withstand external scrutiny for certification and third-party audits. A G&Y monitoring program would likely include a set of random or systematic PSPs located across the two TSAs. These plots could also be integrated with the forest

level inventory under a CFI design to help address the beetle update issue discussed above. The IFPA members should also consider expanding the G&Y monitoring program to track recoverable volume from harvested stands.

***Priority & Strategic Impact:*** High priority. This project has tremendous strategic impact on the IFPA because it provides key information to check the G&Y inputs to all strategic uses. A monitoring program will help address the mid-term timber supply shortage by ensuring yield predictions reflect actual stand growth, provide feedback on silviculture, may help with inventory updates, and will help support third-party market certification.

***Approximate Cost:*** High cost. A G&Y monitoring program will involve locating a large number of PSPs across the areas of interest. If this area is the entire productive forest landbase of both TSAs, this could involve 300 or more plots for an installation cost of up to \$1,000,000. However, these plots could be combined with those used for a CFI for inventory update.

#### **Recommendation 11: COMPLETE THE PFT PROJECT CURRENTLY UNDERWAY**

***Rationale:*** We suggest completing the current IFPA initiative to expand the timber harvesting landbase by including problem forest type (PFT) area. Experience in other areas of the province shows that many PFT areas have adequate growth potential but are excluded because of poor inventory information. This project will require some G&Y support to quantify potential productivity and predict the growth of the existing PFT stands and the stands replacing them after they are harvested and regenerated.

***Priority & Strategic Impact:*** Medium priority. This project will not have any short term impact, but will positively contribute to the AAC when it is needed to help minimize the potential negative mid-term timber supply impacts.

***Approximate Cost:*** Medium cost. This project will likely require intense G&Y and inventory sampling on a relatively small area. Depending on the approach, this project could cost \$100,000 to \$200,000.

#### **Recommendation 12: ASSESS THE NEED FOR A LOG-PROFILE PREDICTION MODEL**

***Rationale:*** A log profile prediction model could predict diameter distributions and log profiles in stands using forest cover inventory, geographic, ecological, and other landbase information. This information could be used to help direct beetle salvage operations and operational planning by enhancing the forest cover inventory. This model could be used in a decision support system to help address the short-term concerns of where to salvage beetle wood by considering the implications to mid-term timber supply. This model would essentially provide information that is currently provided by operational cruising but with less accuracy. We suggest that work in this area begin with a needs survey to quantify the level of accuracy needed for these applications and what technical options may provide the information. The two current options to provide this information are the Tree List Generator tested in the Babine EFMPP and the cruise plot database developed by Canfor in Houston.

***Priority & Strategic Impact:*** Medium priority. This model, when used as part of a decision support system, could impact the short-term program by helping direct beetle salvage operations. This system and use of the information could have significant impacts by helping reduce the potential negative impacts of the beetle on the mid-term timber supply.

***Approximate Cost:*** Low cost. This review should not cost more than \$25,000.

## 5.5 SILVICULTURE SUPPORT & INTERFACE

### **Recommendation 13: DEVELOP ECONOMIC GUIDES FOR SILVICULTURE**

***Rationale:*** The strategic use of silviculture is one of the most powerful tools available to the IFPA to help minimize the impacts of the beetle attack on mid-term timber supply and control the quality of wood grown in post-harvest regenerated stands. There are many silviculture options and it is important to consider the costs and benefits of each in helping achieve IFPA goals. Some treatments or regeneration options are expensive and may contribute little to IFPA goals while others may cost little and contribute much more. Thus, we suggest the IFPA develop a process to guide stand-level decisions using return on investment (ROI) when considering forest-level impacts. This can be done using readily available economic analysis processes with a forest-level timber supply model (similar to the MOF Type II silviculture strategies); however, these analyses must be based on accurate G&Y forecasts for the important components of wood quality and log value.

***Priority & Strategic Impact:*** High priority. Silviculture is very expensive, but is one of the few ways the IFPA can minimize the negative impacts of the beetle on the mid-term timber supply. Consequently, it is important that the IFPA invest silviculture funds to maximize benefit to the IFPA.

***Approximate Cost:*** Medium cost. There are high and low cost options and this could cost \$100,000 – \$150,000.

### **Recommendation 14: FORECAST FUTURE LOG QUALITY**

***Rationale:*** Log and wood quality from future post-harvest regenerated stands could be much lower than the current mill diet of lodgepole pine trees that have regenerated to high densities after wildfire and thus have low taper, small knots, tight rings, and low juvenile wood content.<sup>20</sup> This issue of potentially lower wood quality could be one of the most important future industry issues, thus we suggest that the IFPA complete preliminary analyses to examine different silviculture options and their potential impacts on log and wood quality. This G&Y information will be a key component of forest-level analyses to develop economic guides to silviculture as discussed above.

<sup>20</sup> Forintek Canada Corporation has completed several detailed studies on the wood quality and lumber recovery of different lodgepole pine stands in relation to stand density at older ages. These studies give important information on the basic tree and wood properties, however, the results are not linked to silviculture regimes or early stand conditions. More work is needed to help forecast the impacts of stand establishment and silviculture regimes on important log and wood quality characteristics.

**Priority & Strategic Impact:** Medium priority. This work could impact stand-level silviculture if results suggest that current methods do provide the desired future wood profile. This could be of key strategic importance to the future of the industry and could greatly affect current silviculture costs.

**Approximate Cost:** Medium cost. Most of the cost of this work could be in developing new yield tables to predict wood quality instead of volume. This analysis will also require a (simple) forest - level model to evaluate the results. Depending on the approach and level of sophistication, this could cost \$100,000 - \$150,000.

#### **Recommendation 15: COMPLETE A NEEDS ANALYSIS FOR EXPERIMENTAL TRIALS**

**Rationale:** Experimental trials are the only method to obtain reliable information on the impacts of some silviculture treatments. The strategic use of silviculture will be critical to help the IFPA minimize the negative timber supply impacts of the beetle attack. Thus, we recommend that the IFPA complete a needs analysis to help determine which (if any) trials are needed to help support the IFPA. New trials will not provide useful information for 5-10 years; however, the sooner the trials are installed the sooner they yield information. The analysis should identify information needs, review existing information (including existing trials), and costs of the different options. There are many traditional G&Y trials already installed to address issues of espacement and spacing in lodgepole pine, however, there are fewer for spruce and almost none for balsam. There are even fewer trials that focus on the G&Y interactions between silviculture, genetic, forest health, and treatments such as species composition, espacement, fertilizing, etc.

**Priority & Strategic Impact:** Medium priority. This analysis will identify information needs and may identify research trials that will help meet IFPA goals that otherwise would not have been known. If information needs are identified and trials are installed, the important strategic impact will be 5 and 10 years in the future when the trials start to yield useful information to help guide silviculture.

**Approximate Cost:** Low cost. This review would be inexpensive relative to the cost of installing trials and relative to the cost of silviculture treatments. This could cost up to \$25,000.

#### **Recommendation 16: MODIFY SILVICULTURE SURVEYS TO PROVIDE G&Y DATA**

**Rationale:** Silviculture surveys could be a tremendous source of information for G&Y modeling and inventory update. With minor adjustments, silviculture surveys could provide information to continually inventory stands as they are harvested and subsequently regenerated. Accurate and appropriate information from young post-harvest regenerated stands will be of great importance to the IFPA as these stands will fill-in the forecasted mid-term timber supply shortage. Modifications to silviculture surveys to provide better information on stand structure for G&Y modeling is being considered in other areas of BC such as the Forest Practices Code results-based pilot project on TFL 49 near Kelowna.<sup>21</sup>

<sup>21</sup> This results-based forest practices code pilot project is being completed by Riverside Forest Products Ltd. in conjunction with the MOF. Modifications to silviculture surveys and links to G&Y modeling is being done by J.S. Thrower & Assoc. Ltd.

Priority & Strategic Impact: Medium priority. Won't impact short-term program. Strategic importance is in the mid-term when accurate information is needed to accurately model the G&Y of post-harvest regenerated stands to help fill the mid-term timber supply gap.

Approximate Cost: Low cost. The cost to design a new silviculture survey method is relatively low and should not be more than \$25,000 if it builds on existing work. Field testing could be done in conjunction with existing programs. There will be additional costs to store and manage the new data.

## 5.6 SITE PRODUCTIVITY

### **Recommendation 17: COMPLETE ECOSYSTEM MAPPING IN BOTH TSAs**

Rationale: Ecological mapping is the foundation to apply ecologically-based estimates of potential site index and habitat modeling in the IFPA area. These new site indices better reflect growth of post-harvest regenerated stands and are needed to apply new G&Y estimates in the IFPA area for timber supply analysis and all other long-range planning. We recommend completing the PEM process currently underway for the Lakes TSA. The Lakes PEM should use the same methods as the Morice and build on the work done in the Babine EFMP if possible. The PEM will provide strategic level information for the IFPA and is the only mapping method that can deliver results in a short period of time. However, the IFPA should carefully evaluate and test the PEM after it is completed and consider upgrading the polygon resolution of the map and database.

Priority & Strategic Impact: High priority. We believe this is one of the highest priority projects for the IFPA because it is needed for timber supply modeling, silviculture planning, harvest planning, and habitat modeling.

Approximate Cost: Medium cost. The PEM was completed by the MOF at low cost in the Morice TSA. The Lakes PEM could use the same process and build on the Morice work, which should cost approximately \$150,000. This higher cost for the Lakes TSA recognizes MOF time that was not included in the cost for the Morice TSA PEM.

### **Recommendation 18: USE SITE INDEX ADJUSTMENT (SIA) FOR FOREST LEVEL APPLICATION**

Rationale: Statistically-adjusted site indices are more credible when applied to forest-level planning than other methods with potentially more bias. Site indices for post-harvest regenerated stands were adjusted in the recent timber supply analyses for the Lakes and Morice TSAs, thus some of the higher growth impacts have been captured in the timber supply forecasts. However, the IFPA has the opportunity to extend these adjustments to the entire landbase and to improve the reliability of these estimates by using the SIA process. The SIBEC estimates developed for the IFPA and adjacent areas can be used in to develop preliminary estimates of site index in the SIA process that are later adjusted using statistical methods.

***Priority & Strategic Impact:*** High priority. This project is the foundation of almost all other aspects of G&Y in the IFPA. This project also has the potential to significantly impact short-term decisions on strategic harvest planning.

***Approximate Cost:*** Medium cost. This will require random sampling of a large landbase in two separate administrative units. Some economies of scale should be available with good planning, however, we expect this project could cost up to \$400,000.

#### **Recommendation 19: COMPLETE SIBEC SAMPLING FOR STAND LEVEL APPLICATION**

***Rationale:*** Reliable estimates of the average potential site index by BEC site series can help develop more appropriate stand level silviculture prescriptions, and can contribute to the SIA process described above. SIBEC estimates are available for most common site series in the IFPA area; however, more work is needed to complete the sampling matrix and to strengthen estimates in some site series. We suggest that the IFPA use data from the provincial SIBEC database where appropriate, but develop estimates specific to the IFPA area.

***Priority & Strategic Impact:*** Medium priority. Estimates are already available for most important site series, thus additional refinement in incremental value. The most important short-term value of this work is to support the SIA process (described above) to allow application of the estimates to the forest level.

***Approximate Cost:*** Low cost. Relatively little sampling is needed to complete the SIBEC sampling matrix in the IFPA area.<sup>22</sup> We expect this could be done for \$50,000.

#### **Recommendation 20: REFINE SITE INDEX CONVERSION EQUATIONS**

***Rationale:*** Site index conversion equations are needed to complete the application of adjusted site indices to the ecological map for application in timber supply analysis. The MOF has equations to convert site indices for the major species in the IFPA area, thus this is not a high priority project; however, the confidence in these equations will be higher if they are refined using local data. These data can be collected through other sampling programs at little or no cost (e.g., from site index sampling for statistical adjustment, modified silviculture surveys, post-harvest regenerated stand reinventory, etc.).

***Priority & Strategic Impact:*** Low priority. Equations already exist which can be used; however, refinements using local data will provide more credibility to the process.

***Approximate Cost:*** Low cost. Most of the data may be collected through other program; however, costs could be up to \$50,000 if new data are needed.

<sup>22</sup> Personal communication with Bobby Love, RPF.

## 5.7 YIELD PROJECTION

### **Recommendation 21: DEVELOP BEETLE KILL (SHELF LIFE) VOLUME CURVES**

*Rationale:* One of the major information gaps in mid- and long-range planning for beetle salvage is the question of how long beetle-killed wood lasts on the stump. This information is critical to help develop short-term salvage plans to help maximize the overall recovery of beetle wood. This was also one of the recommendations of the R&S Rogers report.<sup>23</sup>

*Priority & Strategic Impact:* High priority. This work should begin immediately; otherwise the information may be too late to have any strategic impact on planning. Strategically, this information is very significant given that it could make the difference of salvaging or losing millions of cubic meters of wood.

*Approximate Cost:* Medium cost. Depending on approach, this work could cost \$100,000 - \$200,000, or more if mill studies are done. This could start with literature reviews and interviews with industry personnel throughout the province with experience in harvesting and milling beetle-killed wood.

### **Recommendation 22: DEVELOP AN INGRESS MODEL FOR BEETLE-KILLED STANDS**

*Rationale:* Another key information gap is knowledge of how beetle killed stands regenerate naturally if they are not salvaged or rehabed. This information is critical to help develop salvage and rehab strategies. For example, the best solution may be to leave some areas for natural regeneration where it will adequately occur within a reasonable period of time. However, other areas may take longer to regenerate to low densities only to produce a crop of low volume and low quality wood. This could help direct salvage and regeneration with standard silviculture in areas that otherwise would not regenerate adequately.

*Priority & Strategic Impact:* High priority. This information is needed to make short-term decisions and thus should proceed immediately. These short-term decisions are important and will have large impacts on the mid-term wood supply.

*Approximate Cost:* Medium cost. This project will require considerable detailed fieldwork, thus could cost up to \$100,000 - \$200,00.

### **Recommendation 23: DEVELOP AN INGRESS MODEL FOR POST-HARVEST REGENERATED STANDS**

*Rationale:* Leaving some areas for natural regeneration after logging should be reexamined as part of the solution to manage the IFPA. This may be more of a viable option in many areas if free-growing regulations change under proposed new BC forest policy. One of the advantages of this would be that silviculture funds could be redirected to other areas that may have a larger impact on the mid-term wood supply. Currently, however, there is no reliable way to predict the amount and timing of

<sup>23</sup> R&S Rogers Consulting Inc. 2001. West central BC mountain pine beetle strategic business recommendations report. Contract Report to the BC Ministry of Forests. Sept. 2001. 69 pp. + app.

ingress in these areas. Thus, we suggest that the IFPA initiate work to develop an ingress model that could help predict where, when, and how much ingress may occur after logging using different methods, in different stand types, and in different ecological types.

Priority & Strategic Impact: High priority. This information could immediately help direct silviculture programs. An ingress model will take two years to build, thus we suggest the work starts soon to start benefiting from more focused silviculture regimes. Strategic importance is in helping direct silviculture funds now with the associated impacts on mid-term timber supply.

Approximate Cost: Medium cost. This work will require considerable detail fieldwork and could cost \$150,000 – \$250,000.

#### **Recommendation 24: INVESTIGATE STAND BREAKUP**

Rationale: Current yield tables do not include stand breakup. When applied in timber supply analyses, these curves assume that volume growth continually increases (possibly at a slow rate) or stays the same at very old ages (i.e., flatlines). The extent to which stand breakup occurs in older stands and the potential impacts on timber supply analysis should be investigated. The probability and amount of breakup is probably higher in stands susceptible to spruce and balsam bark beetle attack. This could be studied using existing PSPs, temporary sample plots, and retrospective analyses of existing stands.

Priority & Strategic Impact: Medium priority. Won't impact short-term program, however, special sensitivity runs in timber supply analyses should be completed soon to estimate the potential mid- and long-term impact of stand breakup on timber supply. The strategic importance of stand breakup could be accentuated by the potential to hold older stands longer to direct harvest to beetle salvage.

Approximate Cost: Medium cost. Depending on approach and amount of fieldwork this could cost \$75,000 – \$200,000.

#### **Recommendation 25: COMPLETE A MODEL AND YIELD PROJECTION NEEDS ANALYSIS**

Rationale: Models to predict G&Y for timber supply analyses, silviculture planning, harvest planning, and habitat management are fundamental components of the IFPA G&Y program. Existing models (e.g., TIPSYP/TASS, VDYP) generally predict tree and stand attributes for timber volume with reasonable precision, however, the reliability of their ability to predict product attributes or habitat characteristics is not known. The IFPA has specific modeling needs to support scenario and silviculture planning, thus we suggest the IFPA quantifies these modeling needs to determine if additional model development work is required. Model development and calibration is often costly and takes several years, thus the IFPA should have a high level-of-comfort that funds are spent efficiently in model development and calibration of the results are available when needed.

Priority & Strategic Impact: Medium priority. This won't impact the short-term program, however, this review should be done soon to allow adequate time for planning of more lengthy and possible

costly follow up action. Not having the necessary modeling capabilities when needed in the future could delay other programs of high strategic importance.

Approximate Cost: Low cost. Approximately \$25,000.

## 5.8 HABITAT MODELING

### **Recommendation 26: DEFINE ENVIRONMENTAL INDICATORS AND KEY FOREST ATTRIBUTES**

Rationale: Recognizing that the landscape will be dramatically altered with or without human intervention, it is important to anticipate the values that may be lost and their significance to communities. Some resource values such as wildlife have high value for recreation and consumption (e.g., moose) while others are essential resources for communities (e.g., clean water). Action to reduce impacts on forestry activities should also consider value-added approaches that mitigate environmental impacts. Much of this may already be available from the scenario planning process.

Priority & Strategic Impact: Medium priority. It is important to recognize which resources are most at risk so data collection and management is adjusted and focused to achieve the greatest benefit to the IFPA and local communities.

Approximate Cost: Low cost. We expect that much of this information is already available from other IFPA programs. This summary should not cost more than \$10,000 unless some information missing and meeting/consultation is required.

### **Recommendation 27: ASSESS CURRENT AND FUTURE CONDITIONS FOR KEY INDICATORS**

Rationale: It should be possible to assess the current status and likely future conditions for key indicators identified above using ecosystem mapping and timber supply modeling. This analysis will help identify which important values may be at future risk and thus should be managed to avoid an undesirable future condition. Some or all of this may be addressed by the scenario planning process.

Priority & Strategic Impact: Medium priority. Data analysis should clearly identify expected future forest management regimes and resources showing declining trends. This should also help identify opportunities that relate to other programs that may help mitigate potentially undesirable outcomes.

Approximate Cost: Low cost. These analyses can be included in scenario planning and could cost up to \$25,000, depending on the level of input available from other IFPA programs.

### **Recommendation 28: DEVELOP SITE SPECIFIC STAND AND TREE STRUCTURE MODELS**

Rationale: Resources in short supply based on the analysis above should be the focus of management. G&Y data collected in the field should be supplemented with habitat attribute sampling to establish predictive relationships.

*Priority & Strategic Impact:* Medium priority. Data analysis should clearly identify the resources that show declining trends. Opportunities to link model requirements with G&Y studies should be identified.

*Approximate Cost:* Medium cost. This work will require field collection of local data to calibrate and validate models.

#### **Recommendation 29: MODIFY MANAGEMENT SCENARIOS**

*Rationale:* On-the-ground management should be modified to improve the status of key resources that have high value and where modeling indicates significant improvements may be achieved. Current information suggests the response of key resources to changes in management may only be measurable in the long term. Thus, it is important to adequately document and validate the information and interpretations used to develop alternate management strategies.

*Priority & Strategic Impact:* Medium priority. Results may not be measurable for many years.

*Approximate Cost:* Low cost. Approximately \$10,000.

## **5.9 RELATED ISSUES**

#### **Recommendation 30: IMPLEMENT AN ASPATIAL TIMBER SUPPLY MODEL**

*Rationale:* We believe the IFPA would benefit greatly by having a relatively simple, aspatial timber supply model to provide direction on high-level strategic timber supply issues. The IFPA must make some very important strategic (and potentially very costly) decisions in the next few years. Many decisions should consider the impacts on mid- and long-term timber supply (in quantity and quality). Some decisions that would benefit from strategic-level timber supply analyses are related to different beetle salvage options to bring second growth stands on line sooner. This model could also help address strategic silviculture questions about timber supply impacts on wood quality and quantity related to different regeneration and rehab options.

We recommend the IFPA first explore using the spatially explicit scenario planning timber supply model to provide this information. If this system cannot provide the high-level strategic information with quick turnaround time, we recommend the IFPA develop a parallel timber supply modeling system. This parallel system could build on the recently completed MOF timber supply reviews in the Lakes and Morice TSAs using FSSIM and the associated base case data. Another option is to build this simple model using the WOODSTOCK formulation for the Type II silviculture analyses<sup>24</sup> completed for the Lakes TSA under the Babine EFMPP.

<sup>24</sup> Laing & McCulloch. 2000. Intensive silviculture opportunities, 1998-2000 final report. Contract report prepared for Babine Forest Products Ltd. by Laing & McCulloch Forest Management Services Ltd. and Olivotto Timber under the EFMPP. 41 pp +app.

*Priority & Strategic Impact:* High priority. The results of carefully implemented high-level strategic analyses on some key decisions could save IFPA members millions of dollars in silviculture costs over the next few years. In addition, this high-level model could provide quick feedback on what silviculture strategies may help to begin filling-in the mid-term timber supply shortage.

*Approximate Cost:* Medium cost. The cost to build on existing FSSIM or Woodstock models could be \$100,000 - \$150,000. We don't have a good estimate of cost to include this role with the existing scenario planning process.

### **Recommendation 31: DEVELOP A STRATEGIC HARVEST PLANNING MODEL**

*Rationale:* IFPA members may have an opportunity to minimize the potential mid-term supply shortage by considering the strategic implications of short-term harvest, rehab, and silviculture programs. The use of these management actions should be balanced with available funds for treatment to select which beetle-killed stands should be salvage, which should be left for natural regeneration, which should be rehabilitated,<sup>25</sup> and which silviculture regimes should be used in salvaged and unsalvaged stands to maximize the positive mid-term timber supply impact.

A simple, aspatial timber supply analysis model is probably the best way to integrate the key information needed to examine these strategic issues. This system could use productivity information from the PEM and site index sampling project, piece size information from the log profile model, managed stand yield tables that include preliminary estimates of wood quality impacts of silviculture, and economic information. This model could then specifically examine different management strategies on current harvest, access cost, short-term economics, and the potential to positively impact mid-term timber supply.

*Priority & Strategic Impact:* High priority. There are large potential benefits from work, thus it should be high priority. Strategic importance is potentially very high as this information could help minimize the mid-term timber supply shortage.

*Approximate Cost:* Medium cost. There are many options to develop this system, and depending on the approach, this could cost \$200,000 or more. Costs will be lower if coupled with the timber supply model suggested above.

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<sup>25</sup> We agree with the R&S Rogers report on a "go slow" approach to rehab of beetle killed stands and believe the decision support system as suggested here would help address some of the economic issues identified in the Rogers report.

## 6. NEXT STEPS

We suggest that the next steps for the IFPA members in developing the G&Y program are:

1) **Review the recommendations in this report.**

We expect that the IFPA members will accept some of our recommendations and not others. Some of our recommendations may not adequately reflect the many other factors that must be considered by the IFPA members in balancing priorities among the different programs.

2) **Set priorities for the overall direction of the G&Y program.**

We hope that after reviewing this report the IFPA members will consider the importance of setting strategic direction and provide high-level guidance for the IFPA G&Y program. We expect the priorities and strategic direction of the program will be set considering the information in this report and other political, social, and economic considerations of which we are not aware. These priorities should also consider strategically important deadlines such as anticipated windows of opportunity associated with different aspects of beetle management, timeframes to develop a Forestry Plan for the IFPA, and anticipated changes in forest policy.

3) **Select projects and activities for the IFPA G&Y program.**

The next step is to select and prioritize projects to include in the G&Y program for the next few fiscal years. Some projects (e.g., the various recommended reviews) can be completed quickly, however, others may span two or more years. The selection of projects should consider their strategic impact, cost, and their relationship to other projects in the program. This could be done using a decision matrix or process to rank projects.

4) **Combine projects with the Vanderhoof IFPA.**

Several of the projects recommended in this report can be combined with the G&Y program planned for the Vanderhoof IFPA area. This will provide economies of scale and will allow the IFPA to direct the cost savings to other important G&Y projects. After the Vanderhoof report<sup>26</sup> is completed, we recommend the IFPA members meet with the Vanderhoof IFPA to jointly fund projects where possible.

5) **Develop an annual and five-year operating plan.**

The projects selected for single or joint funding should be budgeted in more detail and included in an annual operating plan. This plan should show timelines, linkages, budgets, and milestones of when projects will deliver products and how they interface with other programs to achieve the strategic direction of the IFPA. These projects should then be included into a five-year operating plan that shows IFPA members a longer-term view of the program but with less detail. These plans should be reviewed and updated at least annually to ensure the G&Y program continues to provide value in achieving IFPA goals and objectives.

6) **Consider a workshop in the early summer to discuss G&Y issues.**

The IFPA members should consider convening a two-day workshop in early summer of 2002 to

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<sup>26</sup> We (JST) are also preparing the Vanderhoof report, which is planned for completion in March 2002.

review and discuss some of the technical G&Y components in this report, that are included in the IFPA G&Y program, or that that are of related interest. This was initially planned under this project and in conjunction with the Vanderhoof IFPA, however, was subsequently removed from the contract because there was not sufficient time to plan and deliver the workshop in the fall of 2001.

## APPENDIX I – PRELIMINARY IFPA STRATEGIC OBJECTIVES (GOALS)

These preliminary objectives were set by the Morice-Lakes IFPA.

| Strategic Objective  | Performance Measures   | Performance Targets   |
|--|--|---|
| <b>Community and First Nations Involvement:</b> <i>Develop socially acceptable plans and practices</i>   |  |   |
| 1. Effectively involve local people in scenario planning processes to develop Sustainable Forest Management Plans for the Morice & Lakes TSAs                | <ul style="list-style-type: none"> <li>▪ Transparent &amp; inclusive process for resource management planning</li> <li>▪ Shared decision making for SFM plans</li> <li>▪ Communications program</li> </ul> | <ul style="list-style-type: none"> <li>▪ Third party review of CNFI with participant interviews</li> <li>▪ Established terms of reference for decision making</li> <li>▪ Developed and implemented</li> </ul> |
| 2. Involve First Nations in resource management planning and decision making   | <ul style="list-style-type: none"> <li>▪ First Nation awareness of opportunities for involvement</li> <li>▪ # First Nation participation in IFPA activities</li> </ul>                                     | <ul style="list-style-type: none"> <li>▪ Documentation, observations, interviews</li> <li>▪ One First Nation per TSA by year end 2002</li> </ul>  |
| 3. Create and maintain sustainable forest based jobs   | <ul style="list-style-type: none"> <li>▪ Employment (# full time direct jobs)</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Maintain or enhance # direct jobs based upon 1999 levels</li> <li>▪ Maintain or enhance 1999 level of direct local employment</li> </ul>                             |
| <b>Forest Productivity:</b> <i>Enhance basic drivers of timber supply</i>  |  |   |
| 4. Increase site productivity on productive forest land base   | <ul style="list-style-type: none"> <li>▪ m<sup>3</sup>/ha/year</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Increase MAI of the TSR II managed THLB 30% by 2020</li> </ul>   |
| 5. Maintain or increase the area of timber harvesting land base  | <ul style="list-style-type: none"> <li>▪ Hectares</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Maintain minimum THLB @ 2002 SFM Plan level over the long term</li> </ul>  |
| <b>Ecosystem Function:</b> <i>Maintain environmental values</i>  |  |   |
| 6. To sustain quality and quantity of terrestrial and aquatic ecosystems   | <ul style="list-style-type: none"> <li>▪ Adopt, adapt, develop tools to assess habitat supply and habitat quality for selected ecosystems and species</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Habitat supply analyses and indices of biological integrity</li> </ul>   |
| 7. To maintain ecosystem process and functions   | <ul style="list-style-type: none"> <li>▪ Adopt, adapt, develop tools to implement ecosystem-based management</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Inventories, assessments, frameworks and tools to support ecosystem based management</li> </ul>  |
| <b>Adaptive Management Framework:</b> <i>Innovative approaches implemented, policy affected and learning transferred.</i>                                    |  |   |
| 8. Influence policy changes  | <ul style="list-style-type: none"> <li>▪ Government policy, company policy</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Input adopted into policy and practice by resource management bodies</li> </ul>  |
| 9. Incorporate new information and knowledge into practice through continuous improvement  | <ul style="list-style-type: none"> <li>▪ Management systems, tools, knowledge, management approaches</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Continuous improvement of knowledge and information</li> </ul>   |
| 10. Transfer new knowledge and information to others   | <ul style="list-style-type: none"> <li>▪ Technical transfer program</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Technical transfer program developed and implemented</li> </ul>  |
| 11. Forest management will be demonstrably moving toward sustainability (i.e., meeting eligibility standards for international sustainability certification) | <ul style="list-style-type: none"> <li>▪ CSA standard Z 809</li> </ul>   | <ul style="list-style-type: none"> <li>▪ SFM Plan is certifiable to CSA standards</li> <li>▪ Continuous improvement of management results</li> </ul>  |