Integrating Timber and Non Timber Values into FFT Silviculture Investment Decisions

(Multiple Accounts Decision Analysis)

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Table of Contents

Table of Contents ii
List of Tables ii
Acknowledgements ii
1.0 Introduction 1
2.0 Objective and Guiding Principles 1
3.0 Considering Timber and Non Timber Values 2
4.0 Multiple Accounts Decision Analysis (MADA) 2
5.0 FFT Program Overview 3
5.1 Connection to Silviculture Strategies (Type I and II) 4
5.2 First Nations' Participation 4
5.3 Identifying the FFT Landbase 4
5.4 FFT Investment Decisions 5
6.0 Benefits Associated with Reforestation Activities 7
7.0 Landscape Level Ranking of FFT Candidate Areas 9
8.0 Determination of FFT Treatment Eligibility 15
9.0 Implementation 17
9.1 Prioritization Process: 17
9.2 Treatment Eligibility Process: 17
Appendix I – Objectives, Performance Measures and Fiscal Responsibility 19
Appendix II – Standardizing Scores 20
References and Citations 21

List of Tables

Table 1. Multiple Accounts Impacted by Reforestation Treatments 7
Table 2. Relative Timber Values Scoring and Rationale 11
Table 3. Relative Non Timber Values Scoring and Rationale 12
Table 4. FFT Treatment Decision Matrix for Areas with <2% IRR and Specific Non Timber Values 16

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1.0 Introduction

The Forests For Tomorrow (FFT) program was established by the BC Ministry of Forests and Range in an effort to ensure that stewardship issues associated with disturbed forest land without any tenure holder's regeneration obligations, are addressed. The program's key objective is to reduce the amount of Not Satisfactorily Restocked (NSR) Crown forest land in BC that lies outside industry obligations, in an effort to improve future timber supply, while also reducing risks to biodiversity, water, fish, wildlife, and habitat. [1]

Currently, FFT stand level silviculture investment decisions are based predominately on a timber focused discounted cash flow model. Investments in the timber harvesting land base (THLB) must achieve an internal rate of return (IRR) of 2% or greater, based on a stand-level calculation. Where these conditions are not met, there is an opportunity for FFT managers to approve the expenditure based on benefits to non-timber resource values.

First Nations input has been valuable to the design of this draft approach and will continue to inform FFT decisions through strategic level participation. Such information and involvement is integral to increasing program efficiency and efficacy. Through their knowledge of the landbase, First Nations are also seen as a key partner in identifying targeted areas for treatment and or areas to avoid early in the planning process. We recognize that this framework may not fully represent the desired multiple analysis approach for First Nations, particularly as First Nations decision making regimes may vary between different nations across the province. Perspectives of forest values and co-management of forests vary considerably amongst all levels of forest use and management. The MADA described in this document represents a starting point and a useful tool to initiate conversations with First Nations about their views.

A Multiple Accounts Decision Analysis (MADA) framework was desired to integrate non-timber values into the FFT investment decision making process in a consistent manner. Development began in 2006/2007[2] and is continuing. This document describes an updated FFT Multiple Accounts Decision Analysis (MADA) framework that is designed to provide FFT decision makers with a transparent and objective tool for directing silviculture funding to those sites that best enhance multiple economic, environmental and social values.[3] The MADA framework could also be used to address other programs with different investment criteria.

2.0 Objective and Guiding Principles

The primary objective is to:

> **Develop a Multiple Accounts Decision Analysis (MADA) Framework that consistently recognizes the range of economic, social and environmental values at the planning phase, in order for FFT funds to be allocated to the highest priority projects that will, collectively, meet land use and forest management objectives as well as FFT Program objectives.[4]**

Another key objective of the Multiple Accounts Decision Analysis Framework is that FFT will use the resulting information to keep track of key program metrics for evaluating how decisions are made, and what values (Timber and Non-Timber) are benefiting across the landscape.

Guiding Principles: The MADA framework has been designed to be:

Transparent: Decision-making process follows clearly defined rules and procedures, with logical outcomes that are fully documented;

Reliable: Ranks projects reflecting FFT program management, land use and resource management objectives;

Practical: Indicators are measurable, closely correlated to outcomes, and data are available at a relatively low cost;

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1 *FFT Program Management Plan 2007*. http://www.for.gov.bc.ca/hfp/fft/FFT_Mgt_Plan_2007.pdf

2 *Developing A Multiple Accounts Decision Analysis Process For Effective Silviculture Investment Decisions (*Timberline, March 2007).

3 This document has been revised following testing of the framework on the Merritt TSA (November, 2007) and subsequent workshops held in Kamloops and Prince George (February 2008) to get feedback on the process. Details on the pilot testing can be found in a companion document titled "Pilot Testing: FFT Multiple Accounts Decision Analysis Framework".

4 See Appendix I for a description of objectives and key performance measures guiding this project.

Defensible: Rationales are provided for analysis assumptions and methods;

Consistent: Outcomes would be consistent if different people use the framework; and

Adaptable: Can be used to prioritize for a range of values or perspectives (timber, non timber, both).

3.0 Considering Timber and Non Timber Values

Society increasingly views forest ecosystems as needing to be managed for a wide range of ecological, economic and social values. This represents a paradigm shift from the conventional management view where investment is made to maintain levels of resource extraction, to a focus on finding ways to invest in sustaining the ecosystems that provide a variety of resources and services (Thomas, 1995; Rauscher et al., 2000; Seely et al., 2004). Such a holistic approach requires that we recognize and incorporate the hierarchical nature of forest ecosystems into the way we develop management strategies and decision tools. Furthermore, the shift to managing for multiple values means that managers need to assess the potential impacts of their decisions on a broad range of values – biodiversity, timber production, community well-being, carbon sequestration, recreation, community water supplies and other values.

The approach suggested here for FFT considers the full range of values impacted by FFT investment decisions at both the landscape and stand levels, to meet timber and non timber objectives.

In addition to meeting specific timber and non timber objectives, benefits of the multiple accounts approach may include (not in any order):

- Increasing carbon sequestration rates from managed forests;
- Lending tangible expression to the New Relationship and improving First Nations opportunities;
- Increasing citizen satisfaction with forest management;
- Increasing community economic well-being through local investment;
- Reducing the ratio of total forest area disturbed (fire, pests, harvesting) to area reforested;
- Complying with provincial, national, and international conservation/sustainable forest management commitments;
- Mitigating environmental damages from MPB/fire;
- Contributing to long-term sustainability of the timber resource;
- Ensuring long-term ecosystem health and resilience;
- Enhancing the productive capacity of forests for multiple benefits;
- Enhancing forest-related ecosystem services (clean air and water);
- Managing watersheds and riparian areas for water quantity and quality; and
- Maintaining a range of seral stages and structurally diverse forests across the landscape.

4.0 Multiple Accounts Decision Analysis (MADA)

Often referred to as “multi-criteria decision analysis”, “multiple criteria decision support” or “decision support systems”, various definitions of the concept exist:

- *An umbrella term to describe a collection of formal approaches which seek to take explicit account of multiple criteria in helping individuals or groups explore decisions that matter* (Belton and Stewart, 2002);
- *Procedures and mathematical algorithms for aiding decision making when multiple objectives are considered* (Howard, 1991).

The concept has several consistent aspects (Mendoza and Martins, 2006):

1. The approach is formal. It recognizes the need for a structured and rational management approach that can integrate many key forest management elements.
2. Multiple criteria are present. It recognizes the multi-functional, multiple services of forests
3. Decisions are made either by individuals or groups. It recognizes the presence of multiple interest groups each with their own views and goals for forest management.

There are several classifications of multi-criteria decision analysis approaches based on the number of alternatives under evaluation and how that evaluation is accomplished (Malczewski, 1999; Hwang and Yoon, 1981; Belton and Stewart, 2002). The FFT approach most closely resembles a ‘value measurement model’

where numerical scores are constructed in order to represent the degree to which one decision option may be preferred to another. Value scores are developed initially for individual criteria and then synthesized or aggregated into higher level preference models. These value statements or objectives (Mendoza and Martins, 2006):

1. impose a form of discipline in the building of the preference model;
2. help decision-makers obtain greater understanding of their own values and justify their final decisions when required; and
3. encourage explicit statements of objectives and acceptable trade-offs between criteria.

Over the last two decades, there has been a number of literature reviews published dealing with the application of multi-criteria decision analysis to natural resource management problems. Examples of these reviews includes: Mendoza et al., 1986, 1987a; Romero and Rehman, 1987; Tarp and Helles, 1995; Hayashi, 2000; Kangas et al., 2001a; and Steiguer et al., 2003)[5].

MADA techniques should enhance decision makers' grasp of the options and decisions being made, and not cloud important issues or conceal value judgements. The ultimate goal of decision support systems is to "**amplify the power of the decision makers without usurping their right to use human judgement and make choices**" (Rauscher, 1999).

Literature shows that multi criteria decision analysis, decision support systems are most effective when implemented within an adaptive management cycle, including a well-defined set of objectives, indicators, monitoring regime, and mechanism for feedback from participants (Walters, 1986; Rauscher, 1999). The intention is to incorporate an adaptive management cycle into the implementation of the FFT MADA framework.

5.0 FFT Program Overview

The FFT Program Management Plan 2007[6] states:

> "Forests for Tomorrow was established to address the provincial government's concern with the growing area of Not Satisfactorily Restocked Crown forest land and the effects on future timber supply. The program was designed to improve the future timber supply through silviculture treatments, initially focusing on areas affected by recent wildfires and the mountain pine beetle epidemic. Forests for Tomorrow activities will also reduce risks to biodiversity, water, fish, wildlife, and habitat.
>
> The Forests for Tomorrow program stemmed from the result of extensive wildfires in the summers of 2003 and 2004 when a total of almost half a million hectares of Crown land burned. Many of these fires covered large areas that require rapid treatments to prevent soil erosion and the establishment of invasive species, and to restore timber and non-timber values. As well, the recent mountain pine beetle epidemic throughout the BC Interior has caused widespread mortality of mature and immature lodgepole pine. Mountain pine beetles have infested 8.7 million hectares, and by the end of 2005 had killed over 400 million cubic meters of timber.
>
> The Ministry of Forests and Range measures its success in maintaining the landbase in a productive growing state by tracking, through a five-year rolling average, the ratio of area reforested to the area harvested or disturbed by fire and pests. This measure is seen as a critical indicator of sustainability in forest management."

In summary, the FFT program was established by the BC Ministry of Forests and Range to reduce the amount of Not Satisfactorily Restocked (NSR) Crown forest land in BC that lies outside forest industry obligations. The immediate goal of the FFT program is to improve future timber supply while also reducing risks to biodiversity, water, fish, wildlife, and habitat.

[5] See reference section for a complete list of references used in this report and suggested reading on the topic.

[6] *FFT Program Management Plan 2007*. http://www.for.gov.bc.ca/hfp/fft/FFT_Mgt_Plan_2007.pdf

5.1 Connection to Silviculture Strategies (Type I and II)

Strategic silviculture planning in BC is designed to identify future issues around timber quality, timber supply, and habitat supply, and then develop silvicultural strategies to address these issues.

A Type I Silviculture Strategy compiles existing information and the knowledge of First Nations, local forestry and environmental professionals and stakeholders to identify issues related to timber supply, timber quality, and habitat supply in the TSA, and then engages participants in a workshop setting to identify silviculture strategies that can be used to address the issues. These potential strategies will need to be quantified and/or refined in a more in-depth Type II analysis in order to develop operational plans. The spatial component of the Type II analysis can be used to locate potential retention, restoration, and rehabilitation areas within an MU, and allows FFT to target funds into large areas that are identified as critical for treatment. This process is a management unit scale tool that helps design silvicultural treatments to help achieve a desired future forest state at the landscape level. The outputs from Type II strategies provided important context information about the landscape and non timber values that can be utilized in a multiple accounts process.

FFT has completed Type I Silviculture Strategies on most impacted TSAs and Type II Silviculture Strategies on several impacted MUs, which will subsequently direct funding to selected treatments on the land base.

The prioritization phase of the Multiple Accounts Decision Analysis (MADA) Framework can be completed independently of a Type II Silviculture Strategy or may use the data obtained through the Type II as inputs. If no Type II has been done, it will be important for the MADA process to include an early component of stakeholder and First Nations information sharing. Fundamentally, Type 2 strategies make the completion of the prioritization process described in this document simpler to complete. The Type 2 project will provide a dataset with much of the needed information already present and hopefully is able to provide key context information (e.g. % disturbance in watersheds post MPB, % disturbance in visuals post MPB, areas likely to go unsalvaged, etc).

5.2 First Nations' Participation

The FFT program is committed to involving First Nations at all levels of the process from the development of Management Unit (MU) Silviculture Strategies to site level implementation activities[7]. Strategic level input is gathered at information sharing meetings with First Nations as early as possible. Such information and involvement is integral to increasing program efficiency by identifying targeted areas for treatment and/ or areas to avoid early in the process, and gaining support from First Nations.

The MADA Framework highlights the importance of working with First Nations in the impacted MUs, to identify (spatially if possible):

a) Areas on the landscape where reforestation activities should be excluded (eg, spiritual areas), or delayed (eg, berry picking sites); and
b) Areas on the landscape where reforestation activities should be promoted.

The challenge is to involve First Nations in a manner that is advantageous and effective for them, and timely for making FFT decisions.

5.3 Identifying the FFT Landbase

In order to identify the best investment opportunities for FFT, it is first necessary to identify the subset of the landbase where FFT treatments could potentially be applied. There are three primary areas of focus for FFT treatments:

1. Stands recently impacted by fire with no planned salvage and no existing silviculture obligations;
2. Immature stands impacted by forest health issues with no silviculture obligations (i.e. were Free Growing before infestation); and
3. Mature stands impacted by forest health issues with no expectation of salvage.

[7] FFT FN Information Sharing Guidelines: (http://www.for.gov.bc.ca/ftp/hfp/external/!publish/FIA%20Documents/Standards/FFT_FN_Info_Sharing_Consultation.pdf)

Mature Mountain Pine Beetle (MPB) stands represent by far the largest opportunity for FFT in terms of area. While the first twp areas of focus are relatively easily defined using existing mapping products, the third is much more challenging to address as uncertainty remains about which stands will remain unsalvaged.

5.4 FFT Investment Decisions

In the operational delivery of the Forests for Tomorrow program, two primary investment decisions must be made:

1. Which stands are the highest priority for investment? This question requires a method to prioritize eligible stands at a landscape or management unit level (e.g., a TSA) to identify those that will maximize the benefits associated with silviculture investments.

   Ideally, all FFT candidate stands in a management unit would be identified and sufficient information would be available to prioritize them for treatment. However, it is impractical to visit all potential sites to identify those that require treatment and develop prescriptions prior to deciding where to invest. Thus, a strategic GIS analysis is required at the management unit level to identify which potential candidate areas can best be expected to provide timber and non-timber benefits. These candidates can then be prioritized for field based work, reconnaissance, surveys and prescriptions.

   In order to remain flexible around how funding is allocated to different objectives, prioritization must consider timber and non timber values independently and together.

2. Which stands are financially eligible for investment? This very different question requires a set of minimum thresholds to be established to indicate whether FFT will invest in a particular site. This question is answered for each site/stand after field verifying all of its timber and non timber values and assessing required treatments. A financial timber value threshold already exists (ie, IRR>=2%[8]) but certain benefits to non timber values may make sites with <2% IRR eligible.

   Government funding eligibility is ultimately a social choice made by government through its managers and, as much as possible, in collaboration with multiple agencies, First Nations and stakeholders. Thus, any tool that will be used operationally to clarify funding eligibility needs to be designed to mimic the types of choices that managers would have made if they were consulted. Such a tool is an expert system. Because a clear minimum threshold already exists from a timber perspective (IRR>=2%), there are two distinct categories of candidates to consider from a multiple accounts perspective:

   1. **Category 1 - Opportunities where investment yields at least a 2% IRR.**

      This population is clearly eligible for treatment from the timber financial criterion, so the focus for these stands is around prioritizing where investment will yield the most benefit (timber and non timber). Note: IRR is only relevant in the THLB[9] because timber must be logged to generate revenue for the calculation.

   2. **Category 2 - Opportunities in the Non THLB or where investment would yield less than a 2% IRR.**

      This population requires assessment according to a set of minimum thresholds linked to non timber values, below which investments are no longer considered a wise use of resources. The multiple accounts approach, by design, can identify stands with poor non-timber values that are still eligible for funding based the non timber benefits that can be achieved.

These two primary investment decisions require different approaches because of the varying levels of detail available at each scale (landscape and stand level), and the order in which decisions are made.

[8] Internal Rate of Return. http://www.for.gov.bc.ca/hfp/fft/return_on_investment/Guidance%20for%20estimating%20IRR.doc

[9] The Timber Harvesting Land Base (THLB) is the area that is expected to support economic timber production in the future. An approximation of the THLB is mapped for planning purposes but it is best assessed in the field after understanding the cost of access/logging and the value of the crop of timber that is on (or will be on) the site.

Figure 1 illustrates how FFT investment opportunities are ideally developed to accommodate an MADA approach. First a landscape level ranking process is used to identify high priority areas using a GIS. Next, field assessments (eg, flights, walk thru's or low density surveys) identify stand level treatment opportunities. Then a detailed survey program is developed to target specific treatment prescriptions, and examine local knowledge and operational efficiency issues. Adjacent logical units to those originally identified are also typically investigated and may require eligibility testing. *It is impossible to wait until all candidate areas in a management unit (ie, TSA) have field data before deciding which stands to start investing in.*

The separate eligibility requirements (ie, Category 1 and Category 2) ensure only those sites acceptable to FFT are ultimately treated.

Where numerous candidates are identified concurrently in the field, and there are insufficient resources to fund them all, a secondary ranking could be conducted using field data and revised targets.

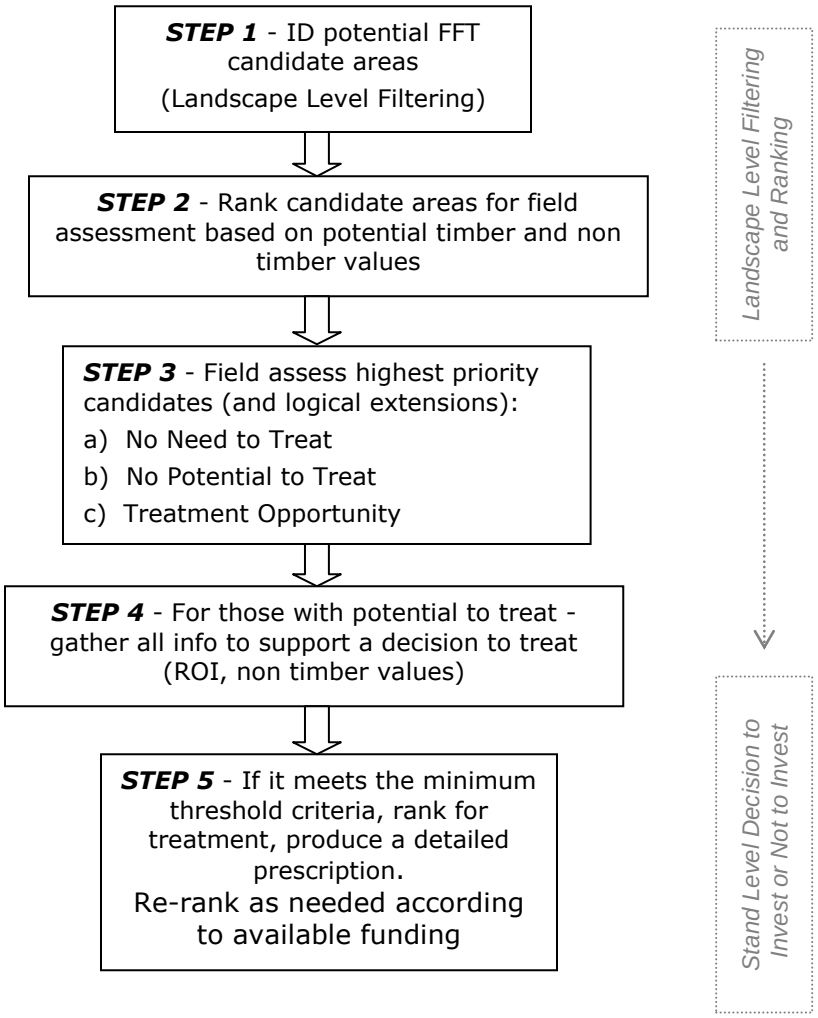


Figure 1. Workflow diagram for developing FFT treatment decisions

6.0 Benefits Associated with Reforestation Activities

In order to determine when and where FFT silviculture investment decisions should be influenced by non timber values, it is first necessary to understand which non timber values will benefit from or be negatively impacted by silviculture treatments related to reforestation (site prep, planting, brushing, etc). This review of benefits/impacts to non timber values assumes that FFT investments will only involve silviculture treatments aimed at establishing, maintaining, or improving plantations at this time. For details on how to develop treatments that improve habitat, see *Strategies for Maintaining or Recruiting Habitat in Areas Affected by Mountain Pine Beetle and other Catastrophic Events, 2006*[10].

Table 1 contains a wide range of non timber values grouped into economic, social, and environmental accounts. Each of the values has been assessed for circumstances where silviculture investments could be linked with benefits. Circumstances where silviculture treatments would have negative impacts on values are also identified so they can be avoided. Table 1 should be consulted in Step 1 – Landscape level identification.

Table 1. Multiple Accounts Impacted by Reforestation Treatments

Accounts	Value	Investment Circumstance /Criteria	Dataset	Benefit from Reforestation[11]
Economic	Future Timber Supply	IRR >2%: Stand level volume/value gains relative to $'s invested over time	Field based data or forest cover attributes/assumed treatment regime/costs	Cost effective increase in future harvest volumes/values.
		Type 2 Silviculture Strategy points to landscape level issues where investment can improve timber supply at certain points by addressing non timber constraints. (ECAs, wildlife habitat requirements, etc)	Type 2 Analysis Report and associated datasets. Likely have to develop datasets for various non timber values.	Increased available harvest in midterm resulting from satisfying non timber constraint sooner (ECAs, visuals, greenup, etc).
	Non Timber Forest Products	Some silviculture investments may benefit the production of non timber forest products.		
Social	Visually Sensitive Areas	VQO = P or R or PR[12] polygons exceeding disturbance limits.	VQOs and Forest cover (Could come from Type 2 analysis)	Speeds up visual recovery in impacted areas.
	Water Quality and Quantity	Community or Domestic watersheds with expectation of >20% ECA. *All impacted stands benefit if no need to remove snags or build roads. Limits would exist where these are required.*	Results from Type 2 analysis or other watershed level analyses. Field information on stand, soils, road access issues.	Speeds up hydrological recovery with the goal of minimizing changes to peak/low flows and reducing events that will introduce sediment. Largest benefit will be gained when treating sites in the upper elevations of the watersheds (Above H60)[13].

[10] http://wlapwww.gov.bc.ca/wld/documents/fia_docs/mpb_habitat_maintenance_recruiting_strategy.pdf

[11] There is the possibility that benefits could be offset by elements of the treatment (e.g. aggressive site preparation) or the need to construct roads, etc. It is necessary to consider the short and long term benefits and negatives associated with each specific investment opportunity. For all treatment opportunities, minimize road related activities that could have negative impacts on non timber values.

[12] Visual Quality Objectives: P= Preservation, R= Retention, PR = Partial Retention

[13] The top 60% of the watershed (in elevation) is considered the most sensitive influencing peak flows unless better data is available.

Accounts	Value	Investment Circumstance /Criteria	Dataset	Benefit from Reforestation[11]
	Community Safety	Fuel Management Zones – within 10km of a community or interface zone with 10+ structures/km^2.	Protection Branch (Matt Barker- GIS Analyst) 2004 dataset, with 2001 data for community interface structures.	Contribute to fuel management by reducing fuel loads in high risk areas through site prep and planting mixed species including deciduous at lower densities.
	FN Concerns	Flagged as area of interest or concern (eg, cultural significance)	FN input through info sharing and Type 2s	To be determined by FN.
	Public Concerns	Flagged as area of interest or concern	Public input – through info sharing and Type 2s	To be determined by public.
	Recreation	Within 1km of PPAs, Recreation Sites or trails	MOE/MOTSA/MFR Recreation sites and trails data FN datasets & knowledge if available/accessible	Improve recreational experience of public (including public safety).
Environmental	Biodiversity	OGMAs/WTPs	Spatial OGMAs, WTP mapping	Reforest some of these areas to re-establish old growth forest conditions sooner
		Rare Ecosystems	CDC/MOE dataset	None – best to avoid treatments unless experimental.
	Species at Risk/Wildlife Habitat	Red and Blue listed species areas (Spotted Owl, Pileated Woodpecker, etc)	CDC/MOE dataset, WHAs	Species specific, most prefer no treatment. Many species benefit from increase in snags (see below for specific application to Caribou).
	Specific Wildlife Habitat	Deer Winter Range Habitat Cover	LRDW or LRMP datasets FN datasets & knowledge if available/accessible	Re-establish functioning cover habitat ASAP where it was impacted (eg, Fd killed by fires). Ensure all capable habitat areas are regenerated to provide habitat sooner for the longer term[14]
		Moose Habitat	LRDW or LRMP datasets FN datasets & knowledge if available/accessible	Area impacted by MPB next to wetlands would benefit from cover re-establishment with specific tree species[15]
		High Value Caribou Habitat with large contiguous areas impacted.	Caribou habitat mapping in LRDW databases FN datasets & knowledge if available/accessible	Small spotty fires in ESSF are not an issue for habitat – dead trees are of value as lichens grow on them. Cover is a long term issue if large contiguous areas are impacted. Ongoing research in pine areas will yield better silviculture recommendations[16] [17].

[14] H. Armleder, 2007
[15] D. Lewis, 2007
[16] S. Wilson, 2007
[17] See http://www.env.gov.bc.ca/fia/nt_treatments.html

Accounts	Value	Investment Circumstance /Criteria	Dataset	Benefit from Reforestation[11]
Environmental (con't)		High Value Grizzly Habitat	ILMB Grizzly habitat mapping (or LRMP data). FN datasets & knowledge if available/accessible	None – Avoid establishing cover in these areas as berry production is desired. Possibly some benefit if berry production is shade dependant[18]. If treatment is for timber purpose – modify prescription to meet grizzly values.
	Aquatic Habitat (Fish or Tailed Frog)	High Value Fish Habitat or Tailed Frog Habitat present in watershed with ECA >20% or within 30m of site.	MoE mapping if available or local knowledge FN datasets & knowledge if available/accessible	Speed up hydrologic recovery generally and/or re-establishing riparian areas with deciduous/confers will generate habitat sooner.
	Watershed Resilience	Community or Domestic watersheds with >30% ECA. Or other watersheds identified as high risk.	Results from Type 2 analysis or other watershed level analyses. FN datasets & knowledge if available/accessible	Speeds up hydrological recovery with the goal of minimizing changes to channel structures and streamside vegetation. Need to minimize road related activities that could introduce sediment during treatments.
	Carbon Sequestration	Carbon tied up due to the incremental increase in growing stock (m3/ha) resulting from treatment.	Estimate of volume differential (treat / no treat) times carbon multiplier of ~250 kg/m^3 of wood. Carbon makes up ~50% of the mass of a m^3 of wood and BC species have specific gravities in the range of 400-600 kg/m^3.	Increased sequestration of carbon - planting trees can contribute to carbon sequestration subject to the development of a carbon accounting protocol for BC[19]
	Fire Maintained Ecosystems	Avoid Open Forest or Open Range Ecosystems	PEM or TEM mapping FN datasets & knowledge if available/accessible	None – avoid as the intent is to reduce stocking in these stand types; or consider on a fill plant basis.
	Range	Treatments can impact the mobility of cattle (can open up areas or limit movement with windrows depending on prescriptions)		To be determined locally.

7.0 Landscape Level Ranking of FFT Candidate Areas

Objectives:

1. Identify and rank candidate FFT treatment areas at the landscape level to:
    a. Ensure investments are selected that match the strategic objectives of the program.
    b. Ensure FFT is focusing investment on sites that will provide maximum benefit to timber and non timber values. Ranking considers timing of benefits (see Table 1 and Table 3) and risk of

[18] T. Hamilton, 2007

[19] The BC government is part of the Western Climate Initiative, to design (among other things) a cap and trade system for carbon credit offsets. Any efforts under the FFT will have to relate to internationally accepted accounting systems.

investment loss, and therefore shows preference to opportunities that provide short term benefits.[20] .

c. Ensure field investigations are efficiently focused on sites with a high probability of meeting the criteria for treatment.

Scope: Prioritization ideally occurs at the management unit level in order to maximize benefits (all potential opportunities are considered) and ensure that forest-level considerations play a role in FFT investment decisions. Prioritization can only address those issues that can be represented within GIS datasets available across the area of interest.

Outcomes: The process of prioritizing candidate sites for investment will generate a ranked list of sites based on timber and non timber values/circumstances. The highest ranking areas would be targeted for field review first.

Responsibilities:

1. Government will lead the process of ranking areas at the landscape level – either as part of a Type 2 Silviculture Analysis or as a separate analysis project (ideally completed by the recipient holder).

Methodology

1. Build a GIS resultant database for the area of interest (ie, a TSA or portion)
   a. Include all existing relevant data layers needed to identify candidate areas and associated timber and non timber values/circumstances.
   b. Translate non-GIS data into the GIS database by interpretation if needed.
   c. All input datasets must cover the entire area of interest, as relative rankings are being assigned.
   d. If only partial datasets are available, the MU could be divided into smaller units, with a prorated funding amount assigned – this would be a joint decision between the district, region and HQ staff.

2. Identify Candidate Areas (Netdown or Filtering)
   a. Identify the portion of the Crown Forested Land Base (CFLB) that is:
      i. outside parks and protected areas (PPAs)[21], and
      ii. free of licensee silvicultural obligations (free growing if previous logged), and
      iii. impacted by fires or mountain pine beetle (MPB), and
      iv. there is no expectation of salvage harvesting. (This is difficult but a starting point is to ensure that all currently planned harvest blocks in the unit are not included, and poor economic stands are excluded (low volume/cable/small piece size, etc). The rest of the issue can be dealt with in the ranking process.), and
      v. slopes are <80% (for treatment feasibility).

   b. Remove any other mapped areas where it is known that FFT treatments will not be acceptable (eg, First Nations or known areas of concern, etc).

3. Assign Timber Value Ranks to Candidates (Table 2)
   a. Develop raw scores - Use attributes in the GIS dataset to identify those sites likely to require treatment and have the highest IRRs when visited in the field. IRRs are not actually calculated during this phase because treatment costs are unknown until sites are visited on the ground. However, sites with attributes that correlate well with higher IRRs and requirements for treatment are identified. See Table 2 for scoring, suggested data sources, and scoring rationale. Ideally include all issues shown in the table in the assessment, but the scoring system will still function if some layers are absent (see note at bottom of table). The key goals of the timber scoring systems are:

[20] Details on prescription develop that improve habitat can be found in "*Strategies for Maintaining or Recruiting Habitat in Areas Affected by Mountain Pine Beetle and other Catastrophic Events*", 2006 http://wlapwww.gov.bc.ca/wld/documents/fia_docs/mpb_habitat_maintenance_recruiting_strategy.pdf

[21] If PPAs are to be treated, the areas can be sorted separately and ranked according to specific program criteria.

- Identify sites with the highest probability of requiring treatment.
- Identify sites that will likely provide the largest return on investment. At a landscape level, detailed financial information is not available so surrogates are used for predicting sites that will yield high timber values when harvested in the future (THLB, site index, proximity to roads, merchantability).

b. Rank areas - standardize raw scores out of 10 (see appendix II). Highest raw score receives a 10 and all others are proportional. Negative scores are to remain negative. Note: If a subset of sites is being prioritized again after field work is complete, the timber rank can simply be based on IRRs derived from the field work, sorted from highest to lowest.

Table 2. Relative Timber Values Scoring and Rationale

Issue	Subgroups	Score	Data Source / Definition	Scoring Rationale
Timber Harvesting Land Base	Within THLB	100	TSR Dataset	Only interested in THLB areas for timber investments so weighting is very high.
Fires	All impacted stands	50	FAIB fire dataset	Fire areas are of high priority for treatment.
MPB Immature Dense stands with Other Forest Health Agents present	≤ 30% live crown; DBH ≤ 12cm; poor height/diameter ratio; not dominant or co-dominant trees ≥30% live crown; DBH ≥ 12cm; good height/diameter ratio; dominant or co-dominant trees	50 0	*See FFT FLTC/Overstorey Removal Stand Selection Criteria Standard	In dense Pl stands and in younger managed Pl stands, forest health agents that are not going to kill the tree in the short term should not be used to reject green Pl trees as well as spaced trees if they have these criteria.
MPB Immature (age class 2)	>70% Pl, S or VS Attack >70% Pl, Mod Attack >70% Pl, Trace or Low Attack 50-70% Pl, S or VS Attack 50-70% Pl, Mod Attack 50-70% Pl, Trace or Low Attack All others	50 40 30 20 15 10 0	Veg inventory, MPB attack mapping (forest health overview mapping or FAIB MPB "map of the dead") *See FFT FLTC/Overstorey Removal Stand Selection Criteria Standard	Stands with higher levels of mortality will be higher priority for treatment. Below 50% Pl, treatments are unlikely to be feasible because of green volume on site (low IRR). Dense, older immature Pl stands with low levels of IBM attack should not be selected for overstorey removal where they occur in large contiguous areas
MPB Mature (age class 3 and up)	>70% Pl, Low Salvage Potential >70% Pl, Mod Salvage Potential >70% Pl, High Salvage Potential 50-70% Pl, Low Salvage Potential 50-70% Pl, Mod Salvage Potential 50-70% Pl, High Salvage Potential All others	30 10 0 10 5 0 0	Veg inventory, MPB attack mapping. Or Type 2 Analysis may provide map of areas not expected to be salvaged. Assume the low end of the stand profile will not be salvaged (Low SI, low m3/ha, cable logging, etc)	FFT does not want to invest in areas that are likely to be salvaged so only sites with a lower probability of salvage occurring get points. The higher the percent pine, the more likely the stand will be viable for treatment / will need treatment.
Probability of Nat Regen	Low Moderate High	0 -10 -100	Type 2 Analysis, or local knowledge, or Arbourtech natural regeneration probability model	Sites with natural regen are less likely to require treatment and/orhave lower IRRs because the volume gains associated with treatment are smaller.
Site Index	>=20 15-20 <15	5 3 $-(17-SI)^2$	Veg inventory or SIBEC correlations if available. Veg SI OK because it's a relative ranking. Cutoff may need to be adjusted for other TSAs (based on Merritt).	Assuming equal treatment costs, higher productivity areas will yield the highest IRRs. Don't want to visit poor sites so negative & exponentially larger below SI 15. (eg, SI 8 gets -81)
Proximity to Roads	<300m 300-1000m >1000m	2 1 0	Buffered Existing Roads data (TRIM or Consolidated FDP)	Sites within existing access are better candidates for treatment due to lower treatment costs.
Spaced or Pruned	Yes	1	Results data queries linked to veg inventory.	Sites with previous investment are likely to be good sites with

Issue	Subgroups	Score	Data Source / Definition	Scoring Rationale
				reasonable access.
Stand Level Economics	Uneconomic Marginally Economic Economic Highly Economic	-10 0 1 2	Any measure of stand level economic will work (economic operability assessments).	Sites with higher net economic value at harvest are preferred. Merchantability considers stand value and all costs associated with harvesting the stand.

NOTE: Not all issues shown in this table are necessary to complete the timber scoring assessment, although the more that are included the better the result will be. Where specific attributes are not available, then they can be ignored and the issues that are used will still direct investment toward preferred sites. It is highly recommended that at least a THLB layer, forest cover, and MPB mapping be included as a minimum.

4. Assign Non-Timber Priority Ranks to Candidates (Table 3)

   a. Develop raw scores - Apply scoring (Table 3) to identify areas that will yield maximum non-timber values. The presence of particular attributes will add points toward a total raw score for each candidate area. The scoring will ensure that the areas with the most values present (that will benefit from reforestation activities) will rise to the top. The key goals of the non timber scoring are to:
      - Identify sites where the most non timber values occur and favour those sites with the most direct link to benefits from reforestation activities. Short term benefits are scored higher than long term benefits. The current conditions or context for the issues is also a critical consideration – reforestation in a community watershed that has little disturbance will provide little benefit to water values, while treating a highly impacted watershed is more likely to result in benefits to water values.
      - Avoid sites where there is a negative relationship between reforestation activities and non timber values.

   b. Rank areas - Standardize raw non timber scores out of 10 (see appendix II). Highest raw score receives a 10 and all others are proportional. Negative scores are to remain negative.

First Nations have specific perspectives on many non-timber values and many are interested in participating or influencing forest management in a holistic way, which means input into the full range of non timber values being considered. This is the principle on which we all base our commitment to co-management of the landscape; collectively considering all values and having input into the priorities for each management consideration. The co-management of the forest will take a while but we can use the FFT opportunity to increase First Nations and stakeholder participation.

Table 3. Relative Non Timber Values Scoring and Rationale

Issue	Subgroups	Score	Data Source / Definition	Scoring Rationale
Watersheds	Community Watersheds or MoE/MoF Identified Fish Sensitive Watersheds or Designated Sensitive Watersheds	20	CWS and DWS (LRDW), Sensitive Watersheds , other watersheds (Provincial 3rd order dataset from MoE). Post MPB ECA can be calculated assuming that all Pl leading stands >30 yrs old contribute 100% toward ECA (unless more a sophisticated approach is developed/available).	Reforestation efforts will have a significant hydrological benefit that will be realized in a short timeframe relative to wildlife cover habitat benefits. Watershed health is a critical social and environmental issue. Post MPB ECA is used in order to capture both existing disturbance levels in the watershed and the expected impacts from loss of Pl. This ECA value will represent a worst case scenario to help with relative rankings between watersheds. Treatments above H60 line are preferred.
	Domestic Watersheds (Kootenay HLPO)	7.5		
ECAs	Post MPB ECA > 50% >30 to 50% 20 to 30%	20 10 5		
	Site is above H60 line in watershed (if available)	5		

Issue	Subgroups	Score	Data Source / Definition	Scoring Rationale
Riparian / Connectivity	% of productive forest in early seral condition within 30m of mapped 2nd and higher order streams (% early seral) by LU/BEC. >50% >30-50% 15-30%	 10 5 3	Provincial stream networks available on LRDW (have stream order attribute), forest cover (post MPB impacts). Buffer where order >1. Early seral defined as <40 yrs old.	The more riparian area in a disturbed state, the higher the risk to watershed health and riparian habitat features. Only stream orders higher than 1 are included because they typically have riparian reserves associated with them.
Known Priority Areas	Mapped area of FN or other special interest where a desire for treatment has been expressed.	20	Local knowledge of special interests by FN liaison officer, FNs, staff from MoF/ MoE/MTSA/ Public special interest group etc.	Focused interest in specific areas by FNs or special interests that are not specific to one particular non-timber value are covered by this category and may not be captured in GIS datasets.
Species at Risk	Mapped red and blue listed species areas (WHAs)	-100	http://www.env.gov.bc.ca/wld/frpa/iwms/wha.html	Without detailed knowledge of impacts and issues - best to avoid these areas.
Fire Maintained Ecosystems	Open Range or Open Forest Ecosystems	-100	Local NDT4 restoration plans, or TEM/PEM data	Avoid reforestation treatments in these areas as the intent is to reduce stocking in these stand types.
Visually Sensitive Areas	Preservation VQO with >5% under 20 yrs	10	VQO polygons and established VQO ratings. The % under 20 yrs will need to be calculated for each VQO polygon. Forest cover will provide age classes in each VQO polygon.	Reforestation will help restore visual quality promptly. Only those VQO areas where disturbance is above acceptable levels warrant prioritization. Scoring not as high as watersheds because visuals are considered less important than watersheds.
	Retention VQO with > 10% under 20yrs.	10		
	Partial Retention VQO with >15% under 20 yrs.	10		
Fire Risk / Community Safety	Within 10km of a community or interface zone with 10 structures per km2.	10	Buffered towns, villages, municipalities, cities, in BC Gazetteer. OR Protection Branch can provide a dataset show these Fuel Mgmt Zones.	Treatments within this zone can help to reduce fuels and provide an immediate reduction in risk. Only some prescriptions will actually result in reduced risk.
Recreation	Within 1km of mapped recreation sites or trails.	10	Recreation sites/trails on LRDW (Buffered).	Reforestation will help improve recreation values in a short timeframe.
Biodiversity / Represent-ation	% Early Seral by LU/BEC variant (post MPB) >60% 46-60% 30-45%	10 7.5 5	Forest cover, Landscape Units, BEC linework, spatial OGMAs, THLB. If no spatial OGMAs exist, use Old Growth Order targets as basis for comparison (% old in req ha's). Post MPB ECA can be calculated assuming that all Pl leading stands >30 yrs old contribute 100% toward early seral (unless more a sophisticated approach is available).	The more early seral (disturbance) present, the higher the risk to general biodiversity. Early seral defined as <40yrs of age. The more deviation from the desired amount of old seral, the higher the risk to general biodiversity. The higher the % of a LU/BEC variant in the THLB, the higher the risk to general biodiversity (higher potential for change relative to historical conditions).
	% of spatial OGMAs in an old seral condition by LU/BEC variant (Post MPB) <30% 30-50% 50-70%	10 5 2		
	% of each LU/BEC variant that is productive forest and outside the THLB. <10% 10-30% >30-50%	10 5 2		
Terrestrial Wildlife Values	% of Deer Winter Range considered suitable to provide thermal cover (Post MPB) <15% 15-25% 26-35% >35%	7.5 5 2.5 0	UWR habitats specified in HLP's or GAR orders or Section 7 notices. Thresholds can be adjusted to reflect the management requirements specified for the UWR. Consider depleting all Pl to evaluate a worst case MPB scenario.	Reforestation activities will help provide cover habitat in the long term. Where snowpack is a consideration in management, gains would be highest (all other things being equal) in habitats with deeper snowpack ratings.
	Moose Winter Range within 200m of wetlands.	5	ILMB - moose habitat mapping.	Area impacted by MPB next to wetlands would benefit from cover re-establishment (long term benefit)

Issue	Subgroups	Score	Data Source / Definition	Scoring Rationale
	High Value Caribou Habitat where cover requirements are not currently met.	10	ILMB - caribou habitat mapping and forest cover.	Reforestation will help to provide cover habitat in the long term. Score higher than other long term benefits because of Species at Risk status.
	High Value Grizzly Foraging Habitat	-100	ILMB Grizzly habitat mapping.	Establishing cover in these areas is seen as negative because berry production is key. Possibly some benefit if berry production is shade dependant. This issue should not encourage reforestation investments but it should not significantly stand in the way of other issues. Ideally these would be netted out of the FFT landbase prior to scoring.
Aquatic Wildlife Values	High Value Riparian/Fish Habitat	10	High value fish habitat mapping.	Restoration of riparian areas will improve habitat for aquatic wildlife in short term.

Context for Scoring of Timber and Non Timber Values:

The raw scoring values that are used to derive the timber and non timber scores reflect an inherent weighting scheme. The weighting of scores IS NOT comparable between the timber and non timber tables but the scores within each category are meant to reflect the relative importance of the value and the type of benefit associated with the value (short term vs long term; low risk vs high risk; etc), related to FFT objectives for reforestation. Strongly negative scores are designed to push investment away. For example, there is a desire to avoid sending crews to sites with a high probability of having natural regen / advanced regen so this factor has a strong negative number in the timber scoring scheme where credible data is available. Another example, would be that the benefits of reforestation in heavily impacted community watersheds is considered to be greater and realized more quickly than the benefits associated with reforestation of moose habitat, so the former is given a higher score. These weighting decisions (raw scores) are NOT about timber versus non timber values, but work to identify the highest priority sites within each of these categories. Weightings are also linked to risk levels where we can identify them, and the desire to result in less risky conditions. A watershed with little disturbance will be scored less than an equivalent watershed with a high degree of disturbance (indicating risk to water quality and increased peak flow regimes).

Once the raw timber and non timber scores have been standardized out of 10, then comparisons between timber and non timber value can be made for each site.

5. Assign Multiple Account Scores to Candidate Areas
    a. *Weightings* are applied to the timber and non timber standardized scores and then combined to get a Multiple Accounts *S*core as shown below (Figure 2).

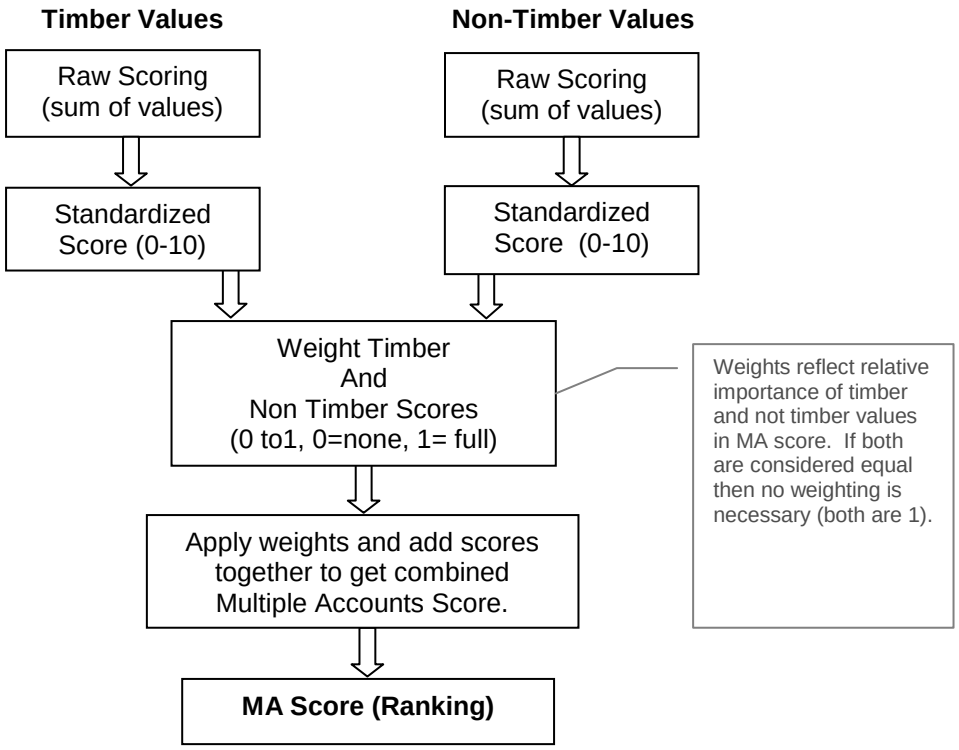


Figure 2. Multiple accounts scoring flowchart

This scoring flowchart shows how candidate area (stand or polygon in the dataset) are separately ranked for timber and non timber values using the criteria defined above. It is important to note that several aspects of the non timber scoring consider a stands context within a larger area, such as a watershed or habitat area.

Timber and Non Timber scores are standardized separately out of 10 to allow meaningful comparison between timber and non timber values. Then the timber and non timber values are weighted and combined in the final multiple accounts scoring as described below. This final multiple accounts scoring is to be used to drive the prioritization of field level survey work. Ideally field crews would visit concentrations of high priority areas first (while also reviewing logical extension around these areas to maximize survey efficiencies).

FFT Program Suggested Weighting:
Timber = 0.75 (75%) and Non Timber = 0.25 (25%)

The choice of a 75/25 weighting reflects the FFT program objectives, and ensures that the highest priority sites for field investigation will be those with high timber and high non timber scores. It also ensures that high non timber values alone don't make low timber value sites look attractive for treatment.

This weighting proportion is appropriate for the main body of investment dollars in the FFT program. If specific funding envelopes are designed within the FFT program (eg, Ecosystem Restoration) then alternative weightings could be applied to find projects to target those dollars.

8.0 Determination of FFT Treatment Eligibility

The final decision to treat occurs when a candidate area is field checked and detailed stand level data has been obtained. If an IRR is determined to be at least 2%, the area is automatically eligible for treatment by FFT. If the area has an IRR <2%, Table 4 can be used to justify a treatment decision based on the presence of specific non timber values. In general, sites with IRR<0% will be funded from separate funding envelopes aimed specifically at non timber values (FFT funds or other funds).

Table 4 is only applicable for areas within the THLB. Small areas of Non THLB (<5% of the total treatment area) are eligible for treatment when they are productive sites mixed in with, or adjacent to, THLB sites planned for treatment (e.g. riparian areas, WTPs, etc). More significant areas of non THLB will require FFT manager approval.

The table is populated with "Yes", "No", and "-" responses on whether to treat under various conditions. If a "No" is present then treatment should be avoided, even if other values exist, because there is a negative link between treatment and the specific non timber value. Such areas are usually avoided at the landscape level, however, if an area gets included in the field check it will be made ineligible at this point. If a "-" is present, then the area is not eligible for treatment funding based solely on that value, but other values could still lead to a "yes" decision. If a "Yes" is present, then the area is eligible for treatment funding unless the opportunity is also associated with a "No" elsewhere in the table.

Table 4. FFT Treatment Decision Matrix for Areas with <2% IRR and Specific Non Timber Values

Non Timber Value	Treatment Decision*		
	THLB: IRR <0%	THLB: IRR 0-1%	THLB: IRR >1-2%
First Nations Concerns (spiritual, archeological, etc)	No	No	No
Rare Ecosystems / WHAs[22]	No	No	No
High Value Grizzly Bear Habitat (Mapped forage sites)	No	No	No
Fire Maintained Ecosystems [Open Range or Open Forest] [23]	No	No	No
Reforestation of important impacted watersheds[24] (with a net hydrological benefit).	-	Yes	Yes
Reforestation of impacted riparian areas associated with high value fish streams or species at risk habitat (fish and tailed frog). Includes logical block areas surrounding riparian area.	-	Yes	Yes
In a Community Interface Area and treatment will contribute to a reduction in fire hazard (reforestation treatments only).	-[25]	Yes	Yes
First Nations Non Timber Priorities (identified geographic areas)	-	Yes	Yes
Recreation Values (impacted areas adjacent to rec sites and trails)	-	-	Yes
Impacted (>15%) Visually Sensitive Areas (Preservation, Retention, or Partial Retention VQO's)	-	-	Yes
OGMAs (supported by local MoE)	-	Yes	Yes
Spotted Owl Habitat	-	Yes	Yes
High Value Caribou habitat with large contiguous disturbances (supported by MoE).	-	Yes	Yes
Deer Winter Range area (wetter ecosystems – mod or deep snowpack where cover habitat is deficient)	-	Yes	Yes
Important Moose Habitat adjacent to wetlands with substantial amount of cover removed.	-	Yes	Yes
SARA species not mentioned in this table if supported by MoE	-	Yes	Yes
Unstable terrain where reforestation activities will incrementally reduce risk of landslides. – consultation with engineer.	Yes[26]	Yes	Yes
A Type 2 analysis has shown treatment of a particular set of stands to be useful in mitigating timber supply impacts, eg, by reducing regen delay, or reducing constraints to harvesting.	-	Yes	Yes
Areas adjacent/ in close proximity to an approved FFT site where economy of scale can be achieved	Yes	Yes	Yes
Terrain with high potential for scouring/ soil erosion over time that will	-	Yes	Yes

22 In a very few circumstances, an FFT treatment may enhance a WHA, eg, tailed frog. MOE should be specifically consulted if such circumstances exist in a particular unit

23 Alternative funding sources should be sought, e.g. Ecosystem Restoration Program.

24 For example, fisheries sensitive watersheds, community or domestic watersheds with ECA's > 20%. Alternatively, local MOE staff could be asked to review circumstance and decide if they support treatments based on an accounting of the positive and negative impacts of completing work on the site.

25 Alternative funding sources should be sought, e.g. fuel management funding.

26 In cases that present a risk to human life or property.

have a significant impact on critical non timber values (identified by hydrologist, geoscientist or soil scientist)[27]			

"No" = treatment not desired (ineligible) and overrides all other non timber values
"-" = treatment not fundable based on only this value, others values must exist to make area eligible
"Yes" = Treatment eligible as long as no other values exist on the site with a "No"

This table of treatment decisions can be viewed as an expert system database that "remembers" treatment eligibility decisions already made by managers. As new or different circumstances are encountered in the future, the table can be revised to incorporate those decisions if there is a reasonable expectation that others may encounter similar circumstances. The table should not be expected to cover off all possible scenarios that will arise in the field, but it should aim to reduce the number of circumstances requiring manager review by a significant margin (60-80%). With assessments of the effectiveness of this framework over time, and appropriate changes, the number of circumstances requiring manager review should decline.

9.0 Implementation

9.1 Prioritization Process:

Who: The delivery of the strategic planning component of the FFT program is being done by government (not given to recipient agreement holders). Thus, it is the Ministry of Forests and Range who will ensure that the prioritization process is completed and utilized by recipients. At this point in time, it is seen as most efficient and practical for recipients to complete this work with financial and technical support from the MFR. Integration of this work with the operational process will maximize efficiency and ensure useful products are produced. Many recipients are already using similar approaches to identify candidates for survey work. Where recipients are unable to take on the prioritization process, they should find a subcontractor to do the work or talk to FFT managers, who may do it with internal resources.

When: As the field survey programs are typically developed by recipients in mid winter, this product should be available to them by mid December. Ideally, the process is updated each year to reflect changes in the FFT footprint (changes in MPB mortality, ability to access mature impacted stands, etc).

Standards Document: This document presents background material, multiple account considerations, and a recommended approach for prioritization of FFT reforestation treatments as guidance. Some specific components of the MADA approach are considered a standard. For example, the calculation of the multiple account score using 75% timber / 25% non timber weightings is a provincial standard, while the detail of how the best timber and non timber sites are identified will have considerable room for local flexibility. Documentation of all assumptions will be required so that an annual 'continual improvement' process can be implemented.

9.2 Treatment Eligibility Process:

Who: Based on thresholds established by government managers, treatment eligibility decisions are made by recipient agreement holders using the information collected on individual stands. Where circumstances outside of the established thresholds are encountered, eligibility decisions can be elevated to FFT managers. The multiple accounts treatment eligibility table provided in this document is meant to be used by recipient holders and annually reviewed and updated by FFT managers. It will serve as a place to document decisions that are likely to be encountered by other recipient agreement holders, will provide consistency across the program, and will reduce the amount of time FFT managers need to spend making eligibility decisions.

When: The eligibility table will be used whenever recipient holders are making decisions on whether low IRR stands or non THLB stands are eligible for FFT reforestation investments. The table will be updated at least annually by FFT managers.

[27] Mainly applies to fire areas where prompt reforestation can reduce hydrophobicity and associated changes in runoff; likely reforestation is conducted along with other restoration treatments.

Standards: The treatment eligibility table will become a standard for recipient agreement holders. A separate standards document will be produced using the information in this document and then updated annually.

Appendix I – Objectives, Performance Measures and Fiscal Responsibility

The direction taken in this project and the values selected have been shaped by the goals, objectives and performance measures of the Government of British Columbia, the Ministry of Forests and Range Service Plan, the MPB Action Plan, and the FFT Program Management Plan. At the TSA level, this approach also ties into objectives articulated in land use plans, recovery plans or silviculture plans with authority in the management unit. This section sets the context for the Framework in the goals, objectives and performance measures of government and FFT.

2007–2008 Speech from the Throne: "Our government will substantially increase its tree-planting efforts, which will increase the amount of carbon that is offset each year through reforestation and afforestation."

The Ministry of Forests and Range Service Plan Goal 1: *Sustainable forest and range resources*.

The Key Performance Indicator of "Sustainable Forest Resources": *the ratio of area reforested to area harvested or lost to fire and pests, on a 5-year rolling average*.

FFT surveys, reforestation activities, and backlog/impeded file reviews are the primary contributors to the maintenance of the Key Outcome Indicator (KOI) ratio for areas that lie outside industry obligations. Ongoing additions of non-obligation NSR area can occur from fire, insect or disease, licensee defaults, and the small-scale salvage program.

The FFT Corporate Performance Measure: *Percent of catastrophic event hectares within the FFT strategic plan assessed for reforestation.*

The two Internal FFT Performance Measures include:

1. *Percent of FFT fire-impacted areas treated compared to area planned for treatments in the fiscal year.*
2. *Percent of FFT pest-impacted areas treated compared to area planned for treatments in the fiscal year.*

The Multiple Accounts Decision Analysis process will improve the corporate and internal performance measures by increasing the probability that the areas selected for site assessment will be treated.

The Provincial 2006-2011 MPB Action Plan Objectives that relate to the Forests For Tomorrow are:

Objective 4: Conserving the long-term forest values identified in land use plans (water resources etc.)

Objective 6: Restoring the forest resources in areas affected by the epidemic

The overarching goal of Forests For Tomorrow is to *reduce the amount of Not Satisfactorily Restocked (NSR) Crown forest land and address the ratio of area reforested to the total area either harvested or impacted by fire or pests.* The immediate goal is to improve the future timber supply following the impacts of recent wildfires and the mountain pine beetle epidemic and to reduce risks to biodiversity, water, fish, wildlife, and habitat.

FFT Objective 1 is to accelerate the recovery of the timber supply, and biodiversity and other non-timber forest values, in forest management units affected by catastrophic mountain pine beetle infestations and recent large fires, through strategically planned reforestation and restoration activities.

For further information about FFT program goals, objectives, and structure, see the 2007 FFT Program Management Plan[28].

To ensure wise investment of funds, FFT uses silviculture financial analysis to evaluate the return on investment (ROI) (> 2%) relative to benefits gained.

The objective of the Multiple Accounts Decision Analysis Framework is to provide FFT with a transparent and objective tool for directing silviculture funding to those sites that enhance multiple economic, environmental and social values. For each 'value' the benefit of FFT reforestation has been articulated (Table 1) and then reflected in the relative scoring tables (Table 2 & Table 3).

[28] *http://www.for.gov.bc.ca/hfp/fft/FFT_Mgt_Plan_2007.pdf*

Appendix II – Standardizing Scores

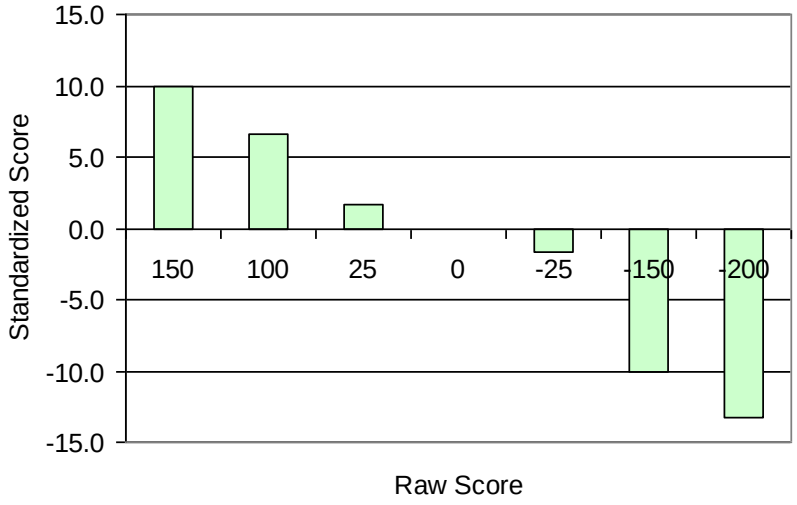
To standardize scores to a maximum of 10:

1. Determine the maximum score (i.e. timber or non timber) from all candidates.
2. Divide each candidate's score by this maximum value.
3. If the candidate had a negative score, leave it negative. This can result in negative numbers in excess of 10 and this is intended. Large negative scores are meant to be strong deterrents to achieving high priority rankings. Standardizing everything between 0-10 (no negatives) is avoided in this situation because of the loss of differentiation in the positive values and the reduction in the impact of the negative values.

Example:

Candidate Scores

Raw	Standardized
150	10.0
100	6.7
25	1.7
0	0.0
-25	-1.7
-150	-10.0
-200	-13.3



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