Determining Return on Investment for Forests for Tomorrow

Forests For Tomorrow

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(supersedes earlier FFT ROI documents)

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To be eligible for FFT funding the prescribed treatment regime must meet the FFT Return on Investment (ROI) criteria. A 2% rate of ROI is employed to balance the economic return of silviculture investments with future timber supply and other resource values and objectives. Variation to levels between 0 and 2% will be utilized when benefits to timber supply or other resource values reflect a higher social priority.

Throughout this and other FFT ROI documents the terms return on investment (ROI) and internal rate of return (IRR) are used synonymously. IRR is the chosen method for determining ROI.

Introduction

There are two different methods employed by the FFT program to estimate ROI:

1. ROI field cards, or
2. ROI analyses using TIPSY and FAN$IER software.

The purpose of this document is to describe the situation and circumstances where each method should be used.

1. ROI field cards

The ROI field cards are primarily designed for use on fire origin stands, where the disturbance occurred within the last 5 years and natural regeneration is expected to produce less-than-desirable stocking. They are intended for use as a "coarse filter" approach to screening for regeneration investment suitability. They will help to identify the obvious cases where investment is either definitely warranted or not. Other, not so obvious, cases require further investigation with TIPSY and FAN$IER.

The ROI field cards should only be used if ***ALL*** of the following conditions are met:

- Stand is predominantly even-aged, with little or no advance regeneration in excess of 1 m in height
- Stand is $\leq$ 6 years old
- Stand is currently mainly comprised (meaning > 80%) of lodgepole pine, interior or Englemann spruce, subalpine fir, Douglas fir, or western larch.

The inputs for this screening aid are subject to considerable uncertainty which can dramatically affect assessment outcomes:

- Considerable local knowledge of species response to disturbance, coupled with assessments of seed source and seed bed conditions, will be required to predict stocking that will occur without intervention
- Many sources of site index (SI) data for individual sites will underestimate site potential by 2 to 3 m or more. Of particular concern are inventory estimates of SI and estimates of SI from first generation SIBEC. The best sources will be from:
    a) height/age or growth intercept measures on nearby stands with similar species and ecosystem parameters (site series, soil, slope, aspect, etc.), or

b) second generation SIBEC estimates.

Users should be cognizant of the risk of uncertain inputs and question how the results might be different if the inputs have a significant error. In all cases, where results from these charts indicate a maximum expenditure that is close to the expected expenditure, it would be prudent to test the scenario using TIPSY and FAN$IER. Such actions will not reduce uncertainties related to stocking or SI inputs, but will avoid the simplifying assumptions required to build the screening charts.

Basic Application

Inputs required for the ROI field cards include the current dominant species, the site index for that species, and a prediction of the well-spaced stocking at the time of the free growing assessment. Using this information:

1. Select the appropriate chart based on the current most prevalent species

2. Locate the appropriate position on the chart based on the site index and your best estimate of what stocking will be present at the end of the free growing assessment window.

3. Interpolate between the closest isolines to determine the maximum investment value.

The value determined from the charts represents the maximum amount of money that can be spent to achieve a free growing stand with target stocking (or close to it) while still maintaining a 2% return on investment.

Key Assumptions, Limitations and Caveats

A financial analysis tool in the form as presented in the ROI field cards is, by necessity, a gross simplification. Use of the ROI field cards should be only completed with the understanding of the following limitations and caveats:

Limitations:

- The ROI maximum cost tables are designed to estimate the allowable expenditure for single species only.
- The current most prevalent species on site is assumed to be that used for further regeneration treatments
- The maximum cost table does not provide the estimated maximum allowable expenditure for stands with less than 100 stems/ha at FG.
- Where the prescribed species is different from the existing species on the site, the maximum allowable expenditure most likely is underestimated.
- The highest Regeneration Delay value which TIPSY allows is 50 years.
- The field cards were developed with an earlier version of TIPSY with a minimum initial density of 287 stems /ha.

- The non-timber values, such as wildlife value, are not quantified in the Return of Investment (ROI) analyses.

Caveat 1. *Where a species shift is planned (a different species will be planted than what is currently the most prevalent species), an additional margin of uncertainty is required. Maximum expenditure values should be interpreted with at least a +/- 40% margin of error.*

Caveat *2. Where a species shift is planned and where a fully stocked stand of the new species will have a significantly greater cMAI than a fully stocked stand of the original species, the field sheets will underestimate the maximum allowable expenditure. The magnitude of this underestimation is highly variable based on several factors such as the current stocking and the relative magnitude of the productivity differences.*

2. ROI analyses using TIPSY and FAN$IER software

Refer to the following companion publication for greater detail:
Using TIPSY 4.3 and FAN$IER in Forests for Tomorrow (FFT) Return on Investment (ROI) Calculations

The procedure for completing an ROI analysis on the benefits of stand rehabilitation consists of two major steps. The first of these is the production of growth and yield estimates for the two scenarios (base and treated cases) using TIPSY. The second step is running ROI analysis on these yields with FAN$IER. Based on differentials in operational costs and product values, a set of economic indices are calculated (e.g., IRR, net present value, etc) to help evaluate the financial viability of proposed treatments.

Information required to run the analyses:

- BEC to the site series level
- Site Index for each species
- Average slope and Forest District (for default cost estimates)
- Estimated Regeneration delay in years and predicted stocking densities by species.
- Prescribed planting density by species
- An estimate of silviculture treatment costs to Free Growing
- Year of disturbance (fire)
- Estimated total trees/ha and well-spaced trees/ha at Free Growing by species

Key points to consider:

1. Regeneration Delay
    - An untreated option with a long natural regeneration delay increases the ROI of the treated option
2. Initial stocking density
    - An untreated option with low estimated initial density increases the ROI of the treated option
3. Treatment cost
    - Treatment costs should be chosen carefully as they are one of the major determining factors in NPV and IRR.
4. Site Index
    - Generally, higher site indices have higher Internal Rates of Return.
5. Species
    - Pines, generally, have lower economic value at low densities than other coniferous species

Exceptions to 2% Internal Rate of Return criteria.

It is recognised that the IRR approach does not account for factors other than future timber value. In some instances addressing a landscape or stand level issue, such as the future timber supply or critical wildlife habitat, may not result in an IRR of 2% or above. In these instances, the prescribing Forest Professional may prepare a rational to accept an IRR below 2%.