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FFT Investment Analysis: Calculating inc-IRR using TIPSY-FAN$IER

Steve Stearns-Smith, RPF
Stearns-Smith & Assoc.

FFT ROI Courses
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Incremental IRR (Internal Rate of Return)

- Inc-IRR is FFT's preferred method for assessing investments against its 2% return threshold.
- The incremental return over and above the base case (without treatment), ignoring sunk costs. Not simply the difference in IRRs.
- TIPSY and FAN$IER work together to calculate inc-IRR.

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Resources & Support

http://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/land-based-investment/forests-for-tomorrow/return-on-investment

FFT ROI Website contains:

- TIPSY download link (includes FAN$IER)
- ***Two tutorial videos***
- **PDF:** Using TIPSY 4.3 and FAN$IER in FFT ROI Calculations (2013)
  - Quick Start Guide
  - TIPSY characteristics and behaviors relevant to damaged stands
  - Examples and Tools (e.g., fill planting, etc)

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The Tools: TIPSY

- Used in TSR (AACs) since 1991
- Interpolates values from canned yield tables generated by FAIB's TASS-II model
- Characteristics to keep in mind:
  - Primarily even-age, single-spp (like TASS-II)
  - Multi-spp yields reflect fixed spp comp (no spp dynamics; no aspen mixes)
  - Single-age/layer stands (lump and/or ignore)
  - Wide density range, only 3 spatial patterns
  - Yields reflect healthy, undamaged stands
    Adjustments are mostly kludges (OAFs, etc), which require a basic understanding of how TIPSY behaves.

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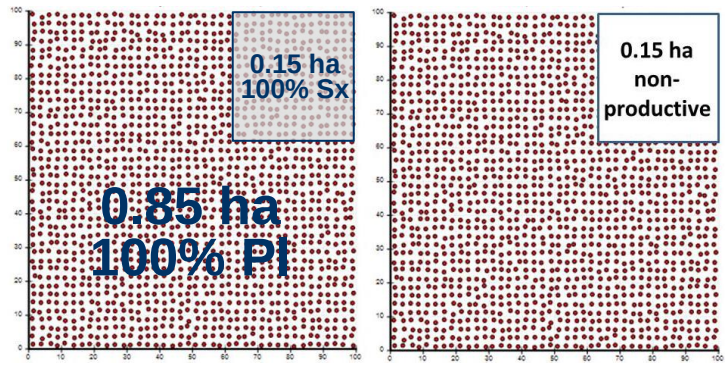
Two hectares, two TIPSY concepts

Species Composition
= Pl85 Sx15

OAF1 = 0.85
(yield multiplier)



Both remain fixed (constant over time).

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The Tools: FAN$IER

- Financial analysis software (FAIB)
  - Packaged with and linked to TIPSY
- Populated with BC-based default costs & prices
  - Over-write with caution (normally limit to treatment costs)
- Characteristics to keep in mind:
  - Originally designed for textbook analysis of full-rotation silviculture prescriptions by computing NPV, SV, IRR
  - Inc-IRR added later for FFT (ignore sunk costs, etc)
  - Uses constant 2006 dollars to adjust for inflation
  - Lumber pricing issues with hardwoods & balsam fir (Bl) as SPF

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4 Basic Steps

From PDF:
Using TIPSY 4.3 and FAN$IER in FFT ROI Calculations (2013)

Step 1: Produce TIPSY runs for two regimes:
Base case (do-nothing), disturbed stand
Treated case

Step 2: Send both TIPSY regimes to FAN$IER

Step 3: Configure both regimes in FAN$IER

Step 4: Check inc-IRR results in the Compare Tab

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Fire Example (same as Nigel's)

- **TIPSY Base Case:** Young plantation, burnt strata 85-90% mortality.
  - Fill-plant volume recovery tool (2013 PDF) only goes up to 50% mortality
  - Instead, make some (very) simplifying assumptions:
    - Work with the fill-plant spp comp (Sx80Pl20, the dominant future stand)
    - Mimic 85% mortality by applying Custom OAF1 of 0.15 to each spp (Species Specs). Because the std OAF1 (Stand Specs) can't go less than 0.50
    - Turn off std OAF1 (set to 1.00), retained std OAF2 (0.95).
    - Finally, by trial and error, found a TIPSY initial planting Density (1600), which approximates the survey density at age 12 (i.e., ~225 Ttph, ignoring 50% aspen).
  - Save as the Base Case
- **TIPSY Treated Case:** simply becomes the unrestricted base case
  - Turn off the fire mortality (Custom OAF1s) and restored the std OAF1 (0.85)
  - Save as Treated Case

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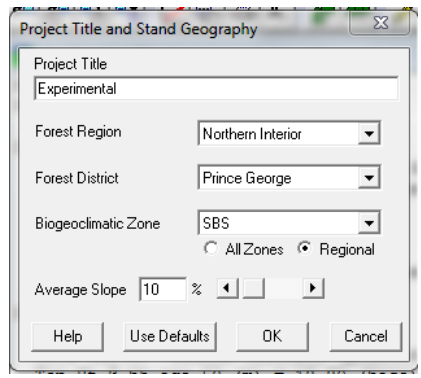
Fire Example: Step 1a: TIPSY Base Case

Stand Geography Settings:



- Do not affect on yield.
- Control default costs in FAN$IER (silv, harvest, etc)
- TIPSY presence an artifact of the TIPSY Economist, now replaced by FAN$IER

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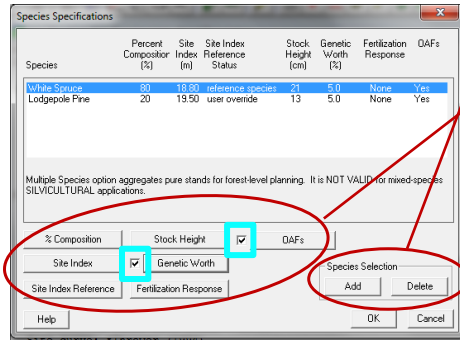
Fire Example: Step 1a: TIPSY Base Case

Species Specifications:



Sx80 Pl20

Add/delete species, then

Adjust individual spp settings

- Species Composition (fixed)
- Site Index
  - From reference spp, or
  - User defined
- Genetic Worth (if planted)
  - None (old or unknown)
  - Std Class B+ = 5%
  - Class A, planting records
- Custom OAFs

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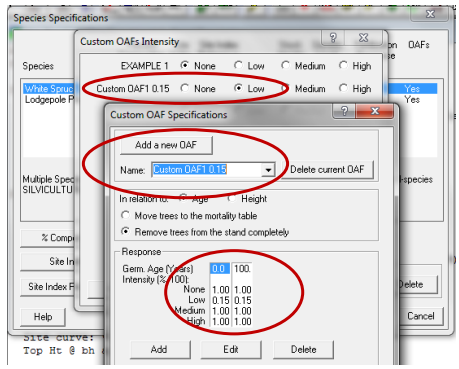
Fire Example: Step 1a: TIPSY Base Case

Species Specifications:



- Custom OAFs are defined and applied to individual species.
- See Help for details.
- OAF1, a constant value, only needs to be defined at 2 extreme ages.
- Intensity level (Low-Med-High) only needs to be consistent in this case.

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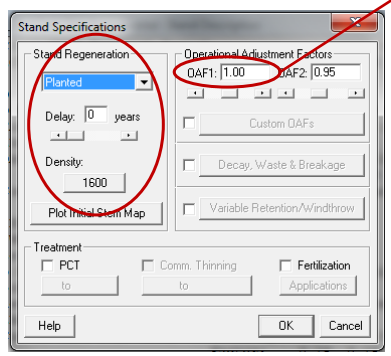
Fire Example: Step 1a: TIPSY Base Case

Stand Specifications:



- Turn off stand-level OAF1, set it to 1.00 (yield multiplier). Retain default OAF2.
- Regen Method
  - Planted (~ rows)
  - Natural (purely random)
  - Clumped (slightly)
- (regen) Delay (zero usually fine)
- Last, Density (initial establishment)
  - Known, or more commonly,
  - Estimated by trial & error from surveyed age & total tree count: 1600 yields ~225 Ttph @ age 12
- SAVE as the Base Case

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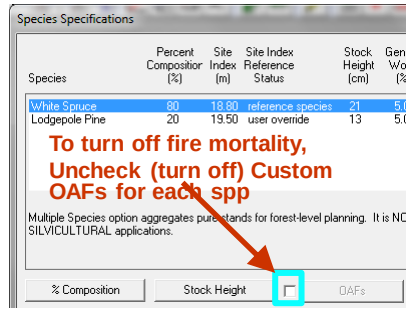
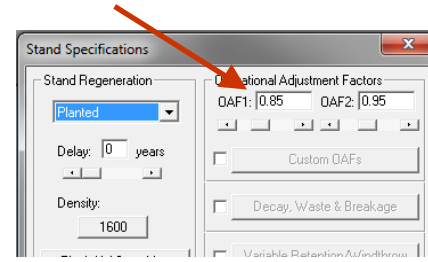
Fire Example:
Step 1b: TIPSY Treated Case

Duplicate Base Case Settings: File - Save As, rename, and modify:





Then save again.

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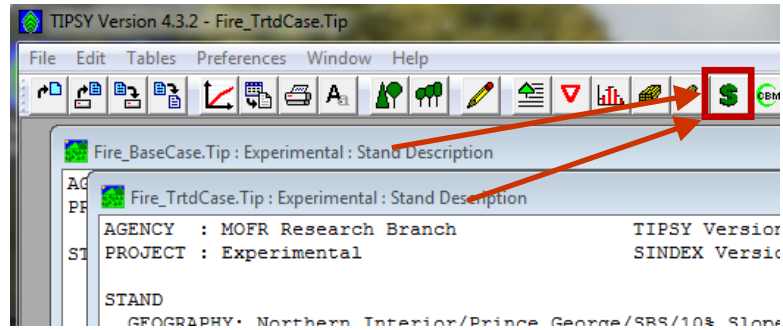
Step 2: Send both to FAN$IER



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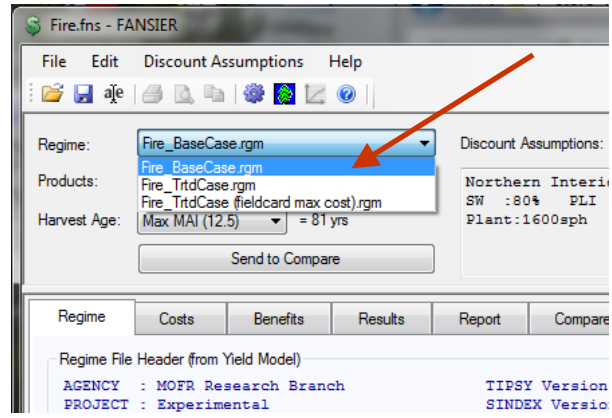
Step 3: Configure both in FAN$IER

Select and configure both regimes, one at a time:



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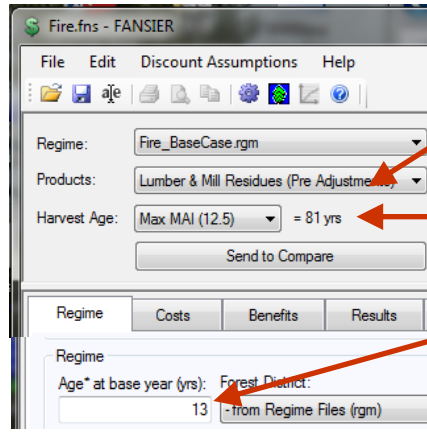
Step 3: Configure both in FAN$IER

Same 3 settings for both Base & Treated Cases:



- **Products = Logs (coast) Lumber (interior)**
- **Harvest Age = Max MAI (default) or Target age(s)**
- **Age at Base Year = Trtmt age + regen delay**

Ignores sunk costs

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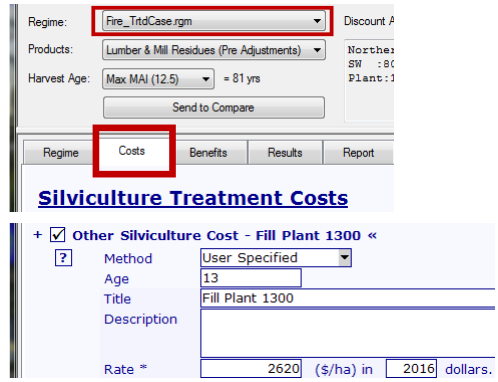
Step 3: Configure both in FAN$IER

For the Treated Case, enter treatment cost in the CostsTab:



Enter fill plants as "Other Silv Costs"

Enter:

- Treatment age
- Descriptive title
- Treatment cost
- Dollar year (e.g., cost in 2016 dollars)

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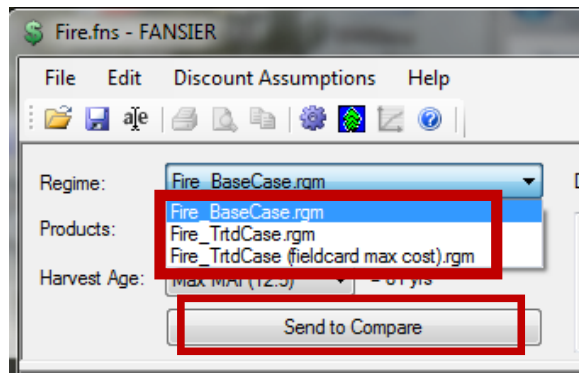
Step 4: Send both to Compare and check inc-IRR

Select and send each regime to Compare



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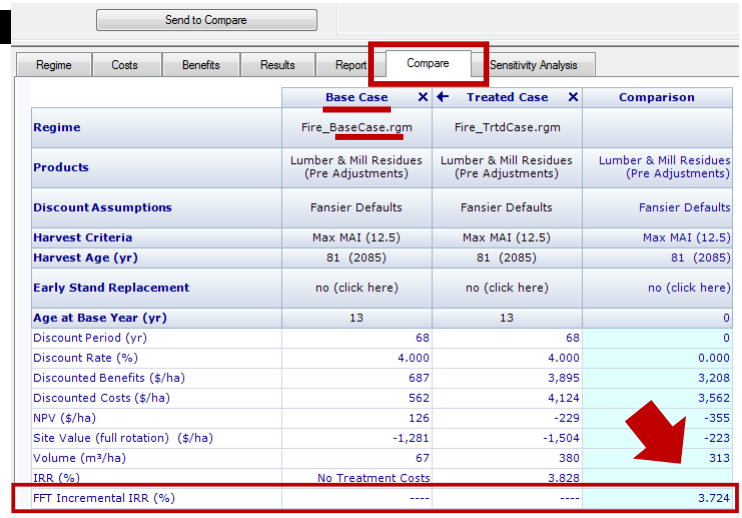
Step 4: Send both to Compare and check inc-IRR



	Base Case	Treated Case	Comparison
Regime	Fire_BaseCase.rgm	Fire_TrtdCase.rgm	
Products	Lumber & Mill Residues (Pre Adjustments)	Lumber & Mill Residues (Pre Adjustments)	Lumber & Mill Residues (Pre Adjustments)
Discount Assumptions	Fansier Defaults	Fansier Defaults	Fansier Defaults
Harvest Criteria	Max MAI (12.5)	Max MAI (12.5)	Max MAI (12.5)
Harvest Age (yr)	81 (2085)	81 (2085)	81 (2085)
Early Stand Replacement	no (click here)	no (click here)	no (click here)
Age at Base Year (yr)	13	13	0
Discount Period (yr)	68	68	0
Discount Rate (%)	4.000	4.000	0.000
Discounted Benefits ($/ha)	687	3,895	3,208
Discounted Costs ($/ha)	562	4,124	3,562
NPV ($/ha)	126	-229	-355
Site Value (full rotation) ($/ha)	-1,281	-1,504	-223
Volume (m³/ha)	67	380	313
IRR (%)	No Treatment Costs	3.828	
FFT Incremental IRR (%)	----	----	3.724

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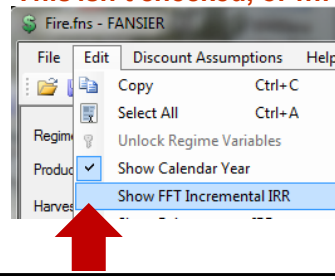
Step 4: Send both to Compare and check inc-IRR

Site Value (full rotation) ($/ha)	-1,281	-1,504	-223
Volume (m³/ha)	67	380	313
IRR (%)	No Treatment Costs	3.828	

No Inc-IRR Showing ??? 2 possibilities:

This isn't checked, or ….



The incremental IRR could not be calculated because:
- The incremental IRR is negative.

at the bottom, it says it's negative.

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Configuring an ITSL analysis: TIPSY

Assumes professionals recognize future merch potential, with minimal health risks. Otherwise, skip the base case.

Base Case: Dead pine overstory + residuals

- Target layer(s) with greatest future merch potential, ignore the rest
- SIBEC usually overestimates OG SI. Compute SI from survey age/ht ??
- Modify OAF1 if un-mapped non-productive gaps exceed 15%
- Clumped regen (generally more natural than Natural)
- Lastly, Density by trial and error to approximate Ttph of the target layer(s) at the time (age) of survey.

Treated Case: stand replacement (plantation)

- Straightforward input of the regen prescription (species & density)
- Use SIBEC SI, add Genetic Gain (5% for Class B+, or look up Class A)
- Default OAFs (0.85, 0.95)

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Configuring an ITSL analysis: FAN$IER

Both regimes:

- Lumber
- Max MAI (or target rotation ages if known)

Base Case:

- Age at Base year = proposed ITSL harvest (or knockdown) age

Treated Case:

- Age at Base year = 0 !!*********
- Cost Tab edits
  - Turn off (uncheck) or edit individual costs as appropriate.
    See PDF:
    "Revised FFT ROI Guidelines for TIPSY-FAN$IER"
  - Development (or knockdown) cost entered as "Other Silviculture Costs",
    Then trial and error to find max cost @ 2% threshold

Send both to Compare and check inc-IRR
(or just Treated Case IRR if skipping Base Case)

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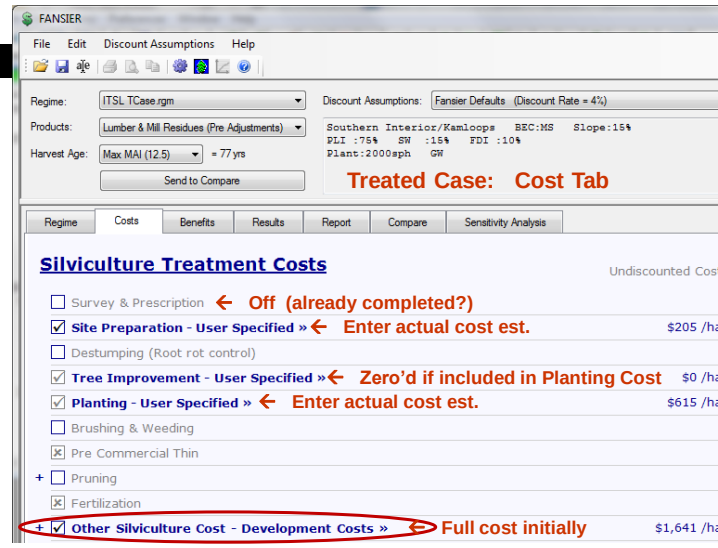
Configuring an ITSL analysis: FAN$IER



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That's it. Questions?