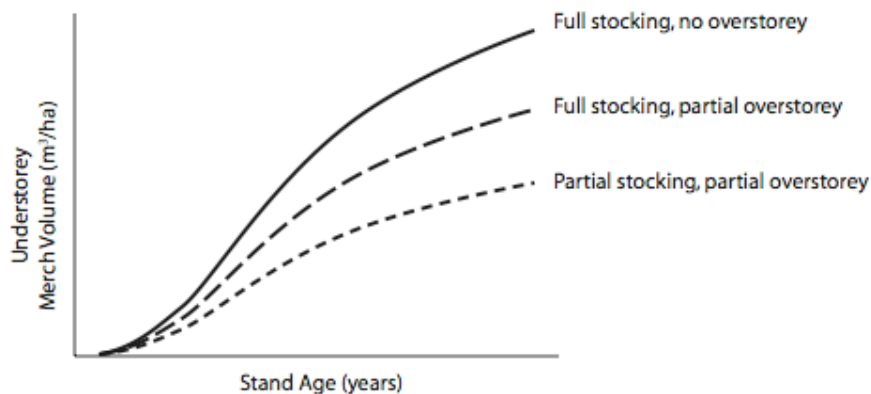


IRR Workbook: Using Data from DFP Surveys in MPB Residual Stands

Stands attacked by mountain pine beetle often have a residual structure that has two layers, complicating G&Y modeling and subsequent analyses (see figure below). Financial investment decisions for such stands using the IRR workbook and data from DFP surveys requires use of the Variable Retention options in TIPSYS. These options will account for the effects of the residual overstorey on growth of understorey trees.

In addition to the yield impacts of the overstorey, we must also account for reductions related to low stocking. Where normally we would use establishment densities to account for these differences, with the DFP surveys we have another method. Reductions in yield due to low stocking have already been assessed and are represented in the calculated DFP values. For use in TIPSYS, we will convert the DFP values into a new or additional OAF.



Compared to a fully stocked stand with no overstorey, a fully stocked stand under an overstorey will produce less volume due to the competitive effects of the overstorey. If the understorey is not fully stocked, there is a further yield penalty. In the IRR workbook, we will typically be comparing the understorey yields for fully stocked versus partially stocked stands, both with very similar levels of overstorey (the only differences being those caused by treatment).

Step 1: Compile DFP statistics

From the DFP survey, compile the stratum level basal area and DFP statistics. For detailed descriptions of procedures, refer to MoF 2004, MoF 2005a.

For basal area, you will need two separate values:

1. For basal area in the *untreated* stand, include all live trees minus those that are obviously likely to die in the near future (the moribund tree class). For newly harvested stands, you may also wish to reduce the basal area to account for expected windthrow losses in the first few years (assuming such information is locally available).

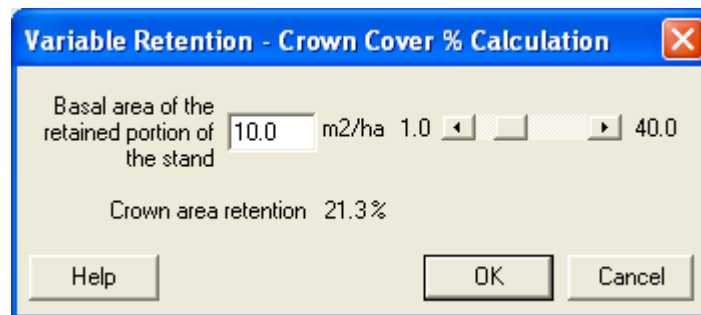
- For basal area in the *treated* stand, you should also exclude trees that will be eliminated during treatment. This may include trees with undesirable form or of a species that is not desired in the future stand.

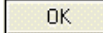
Step 2: Generate a TIPSY yield table for the *treated* stand

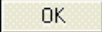
Start generating a TIPSY yield table for a fully stocked stand (i.e. 1600 trees/ha planted or >2500 trees/ha natural) in the standard fashion. When you get to the Stand Specifications form, select the Variable Retention check box. The following form will appear:

Here you will enter descriptive parameters for the residual overstorey:

- First, enter the top height for the residual stand. If this value was not measured in the field, a reasonable estimate will suffice, based on your knowledge of typical values for local mature stands.
- Second, select the check box beside “Calculate CC% from basal area”. This will enable a secondary form in which you can enter the basal area for the treated stand calculated from the DFP survey plots (make sure to account for anticipated losses either from mortality or due to treatment):



Enter the basal area of the residual overstorey, then click 

3. Ensure that the **Formula** radio button is selected under the section titled “Determine edge length by”.
4. If you know the distribution of the residual canopy in aggregated groups versus dispersed stems, enter the values. If unknown, a reasonable distribution is 40% aggregated, 60% dispersed.
5. Click .

For a portion of the understorey stand that would fall directly under the residual crowns, TIPSY assumes that half of the regenerating trees are killed outright, and growth is reduced on the remainder. The resulting yield table will reflect these effects.

Once the variable retention effects have been added, you can generate a TIPSY economist table and export it for use in the IRR workbook.

Step 3. Generate a TIPSY yield table for the *untreated* stand

For the untreated stand, start with the same TIPSY run as for the treated stand. If necessary, adjust the residual basal area in the Variable Retention forms to eliminate BA reductions related to the treatment.

Yield impacts due to poor stocking in the understorey are accounted for in the calculated DFP statistics. With the addition of a minor calculation, the DFP value can be incorporated into the TIPSY yield tables as an OAF value. Depending on the magnitude of the DFP value, there are two options:

OPTION 1: Low DFP values

Calculate OAF* where:

$$\text{OAF*} = (1\text{-DFP}) \times \text{OAF1}$$

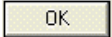
If $\text{OAF*} > 0.5$, enter OAF* in place of OAF1. Otherwise, you must use Option 2 below.

OPTION 2: High DFP values

TIPSY versions 3.2 and 4.0 do not allow any OAF1 values below 0.5. If the calculated value of OAF* is less than 0.5, a more complicated means of making the required yield adjustments must be employed. For this option, you will leave the OAF1 set as it was for the treated stand, and create a new custom OAF for the DFP value.

1. In the Stand Specifications dialogue box, select the Custom OAF check box. The following form will appear:

2. Select the **Add/Edit Custom OAFs** button. In the form that appears, click the **Add a new OAF** button, and change the name for the new OAF to “DFP”. Toward the bottom of the form, click the **Add** button.

3. In the form that appears, enter 100 for the age from germination. In the field beside “Low”, enter a value equal to (1-DFP). Click .



Custom OAF Response

Germ. Age Years

None

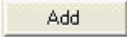
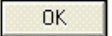
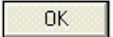
Low

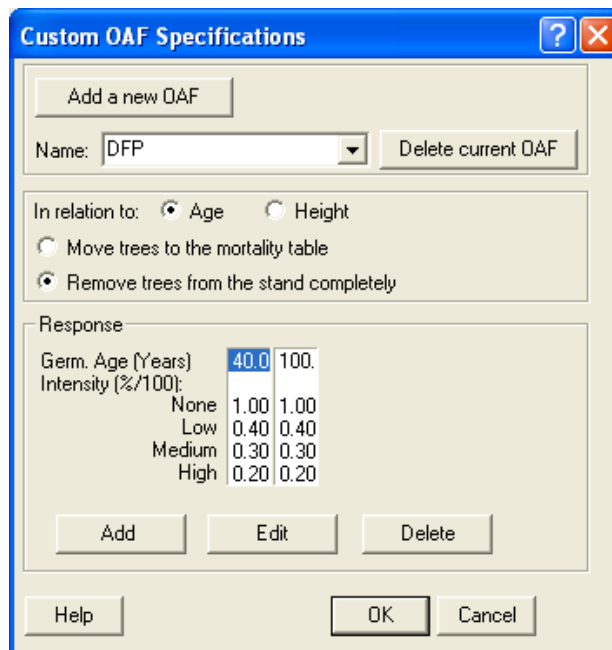
Medium

High

Buttons: Help, OK, Cancel

Note: in this use of the custom OAF form, the terms low, medium and high are meaningless. Instead, you could think of them in terms of scenario 1, scenario 2 and scenario 3. You would then enter values (1-DFP) for three different strata, to save time coming back to this form. As illustrated, stratum 1 would have a DFP of 0.6, stratum 2 a value of 0.7, and stratum 3 a value of 0.8. If making multiple entries, note separately which is which as they will be labeled “low, medium and high”.

4. Click the  button a second time, and repeat step 3, only this time using an age of 40. Duplicate any (1-DFP) values as in step 3 above. Click .
5. The “Custom OAF Specification” form should now look similar to that shown below, although with different OAF values. Click .



Custom OAF Specifications

Buttons: Add a new OAF, Delete current OAF

Name:

In relation to: Age Height

Move trees to the mortality table

Remove trees from the stand completely

Response

Germ. Age (Years)	40.0	100.
Intensity (%/100):		
None	1.00	1.00
Low	0.40	0.40
Medium	0.30	0.30
High	0.20	0.20

Buttons: Add, Edit, Delete, Help, OK, Cancel

6. Ensure that one of the DFP levels is selected on the “Custom OAFs Intensity Form” (below). If you entered a DFP-based OAF for only one stratum, select the “Low” level adjacent to **DFP**. Click .

The screenshot shows a dialog box titled "Custom OAFs Intensity". It contains a list of radio button options for different intensity levels: None, Low, Medium, and High. The first two rows are labeled "EXAMPLE 1" and "EXAMPLE 2". The third row is labeled "DFP" and has the "Low" radio button selected. Below the rows is a button labeled "Add/Edit Custom OAFs". At the bottom are "Help", "OK", and "Cancel" buttons.

Once the custom OAF values have been added, you can generate a TIPSy economist table and export it for use in the IRR workbook.

Further descriptions for using the IRR workbook can be found in the workbook documentation (MoF 2005b).

References

- MoF 2004. **A new approach to stocking assessment in stands resulting from MPB salvage partial cutting**. Draft Training Session Workbook. BC Ministry of Forests and Natural Resource Canada, Victoria. 46p.
- MoF 2005a. **DFP survey procedures manual**. Review Draft. BC Ministry of Forests, Forest Practices Branch, Victoria. 25p.
- MoF 2005b. **Stand rehabilitation financial analysis, worksheet documentation**. BC Ministry of Forests, Forest Practices Branch, Victoria. 23p.