Joint NW/SW Regional Forest Practices Committees Meeting April 9, 2015

Modeling results update – Jeremy Groom, Oregon Department of Forestry

At the last RFPC meeting, voluntary increased variable retention and gap-minimization alternatives were proposed. There were three main groups, Options A, B, and C. Option A involved a two-sided harvest where additional basal area was retained in the form of additional hardwood. Also, more leave trees were included. Option B described an approach for conducting a staggered harvest of two sides of a stream, with several years passing between the two operations. The first side was harvested with a set no-entry RMA width, and the second bank was harvested according to the FPA. For specifics, please see the handout summarizing these, VolRX_Proposed_NWSWRFPC.xlsx. Option C involved shifting basal area retention based on valley azimuth.

I have modeled Option A; or, more specifically, A1 and A3. I did not model A2 because of the performance of A1/A3 (see below). I modeled the effects of harvesting the first bank for Option B. I did not model harvest of the second bank because the second bank's harvest occurs four years after the first, when the vegetation is expected to cause an unknown amount of shade recovery. Our data did not come from such a system, so although the harvest of the second bank may be warranted as described, I did not want to misrepresent it with a model built around single-entry harvest. The model cannot incorporate valley azimuth meaningfully, so I forewent modeling Option C as well.

Option A Simulation

The simulation acts on each vegetation plot separately. Specifically, it operates on pre-harvest stand data.

Assumptions:

- No basal area credit will be provided by snags
- No basal area credit will be provided by hardwoods to represent conifers. Hardwood BA is explicitly included (see below)
- For the Hardwood scenario (below) I included a 30' No Cut buffer on Medium streams in which no conifer is harvested but hardwood harvest occurs. This aligns with *629-640-0100(6)(c)* which is similar in construction.

Simulation steps:

1) Remove all snags from consideration
2) Reduce RMAs to 50/70' width for S/M streams
3) Set the Standard Target (conifer, 40/120 sq ft per 1000', same as the current FPA) by stream size
4) Set the New Target, which is 80 or 160 sq ft./1000' for small/medium stream size classs
5) Set the live conifer retention (20/1000 for small streams, 40/1000 for large streams)
6) Does the stand meet the Standard Target (total conifer BA)? New Target (all BA)? Live conifer number?
    a. If it meets all three, conduct the Conifer Harvest (below)

   b. If it fails to meet the Standard Target but meets the New Target (or has insufficient numbers of live conifers), conduct the Hardwood Harvest
   c. If it does not meet the New Target, no trees are removed in the RMA
7) Conifer Harvest
   a. Identify the needed number of live conifers nearest to the stream with DBH ≥ 6" and keep
   b. Determine which conifers to keep to meet the Standard Target. Select the closest ones to the stream
   c. Determine which hardwoods to keep to meet the New Target. Select those nearest the stream
   d. If the site is fairly conifer-dominated, there may not be sufficient basal area to meet the New Target from the Standard Target + available hardwood basal area. Once this is determined, select more conifers near the stream for retention.
   e. Keep all trees within 20' of the stream
8) Hardwood Harvest
   a. Keep all conifers within the RMA
   b. Select sufficient hardwoods to meet the New Target, using those nearest the stream.
   c. Keep all hardwoods within 20' (small) or 30' (medium) of the stream.
   d. The remaining hardwoods are harvested.
9) Summarize harvest information for analysis

Observations for Option A

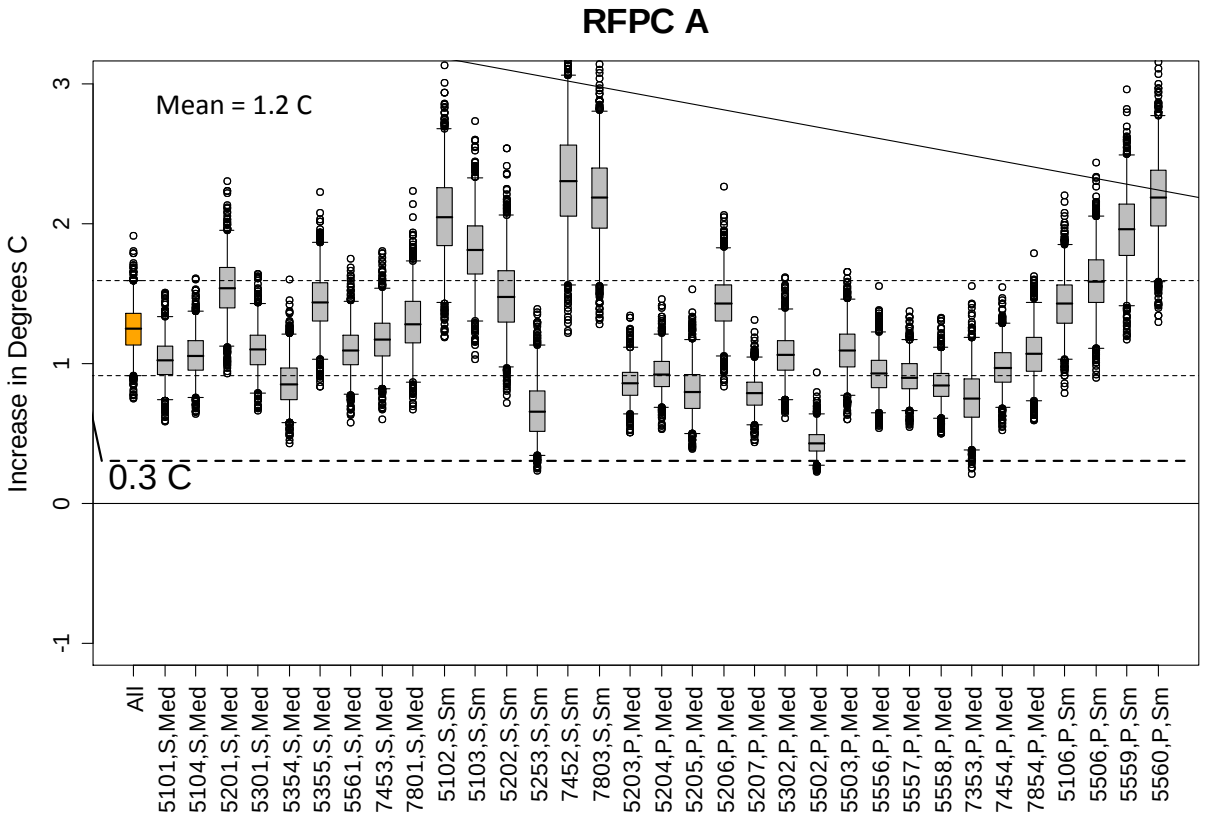
Although I've never cruised timber, the prescription seems to me to be logistically challenging. The basal area of conifer and hardwood needs to be tracked. The focus on hardwoods making up the difference between the Standard Target and the New Target means that a cruiser's first consideration would be whether the standard target is met, then whether there is sufficient hardwood BA to meet the New Target, and then accounting for the Standard Target + available hardwood, determining which conifers need to be additionally retained.

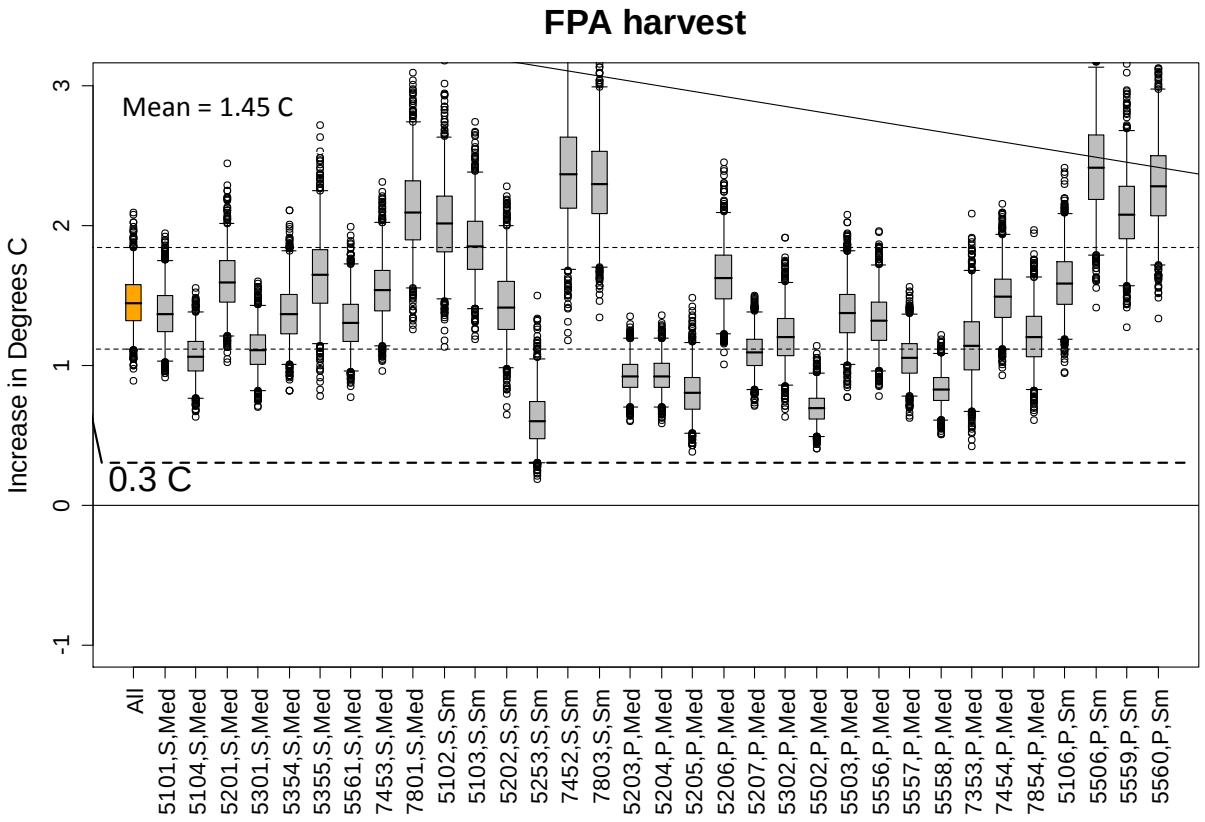
There were some sites with sufficient conifer and hardwood to meet the New Target within 20' of the stream. Thus, some sites experienced no change relative to a FPA harvest.

For small streams, retaining all trees within 20', all live conifers, and enough hardwood to meet the New Target, they can end up with well over 80 square feet/1000.

Results for Option A

We predicted that Option A would result in a slight improvement in temperature increase outcomes. In the two figures that follow the model predicts that the mean (orange box) increase across all sites if harvested according to Option A would be 1.2 C (95% CI of 0.9 C to 1.6 C). As a comparison, the model predicts that the FPA harvest increase would be 1.45 C (1.1-1.8).


RFPC A
Mean = 1.2 C
Increase in Degrees C
0.3 C
3
2
1
0
-1
All
5101,S,Med
5104,S,Med
5201,S,Med
5301,S,Med
5354,S,Med
5355,S,Med
5561,S,Med
7453,S,Med
7801,S,Med
5102,S,Sm
5103,S,Sm
5202,S,Sm
5253,S,Sm
7452,S,Sm
7803,S,Sm
5203,P,Med
5204,P,Med
5205,P,Med
5206,P,Med
5207,P,Med
5302,P,Med
5502,P,Med
5503,P,Med
5556,P,Med
5557,P,Med
5558,P,Med
7353,P,Med
7454,P,Med
7854,P,Med
5106,P,Sm
5506,P,Sm
5559,P,Sm
5560,P,Sm


FPA harvest
Mean = 1.45 C
Increase in Degrees C
0.3 C
3
2
1
0
-1
All
5101,S,Med
5104,S,Med
5201,S,Med
5301,S,Med
5354,S,Med
5355,S,Med
5561,S,Med
7453,S,Med
7801,S,Med
5102,S,Sm
5103,S,Sm
5202,S,Sm
5253,S,Sm
7452,S,Sm
7803,S,Sm
5203,P,Med
5204,P,Med
5205,P,Med
5206,P,Med
5207,P,Med
5302,P,Med
5502,P,Med
5503,P,Med
5556,P,Med
5557,P,Med
5558,P,Med
7353,P,Med
7454,P,Med
7854,P,Med
5106,P,Sm
5506,P,Sm
5559,P,Sm
5560,P,Sm

Outputs for Option A
See the handout of the table "Option A Stats.pdf"

Option B simulation

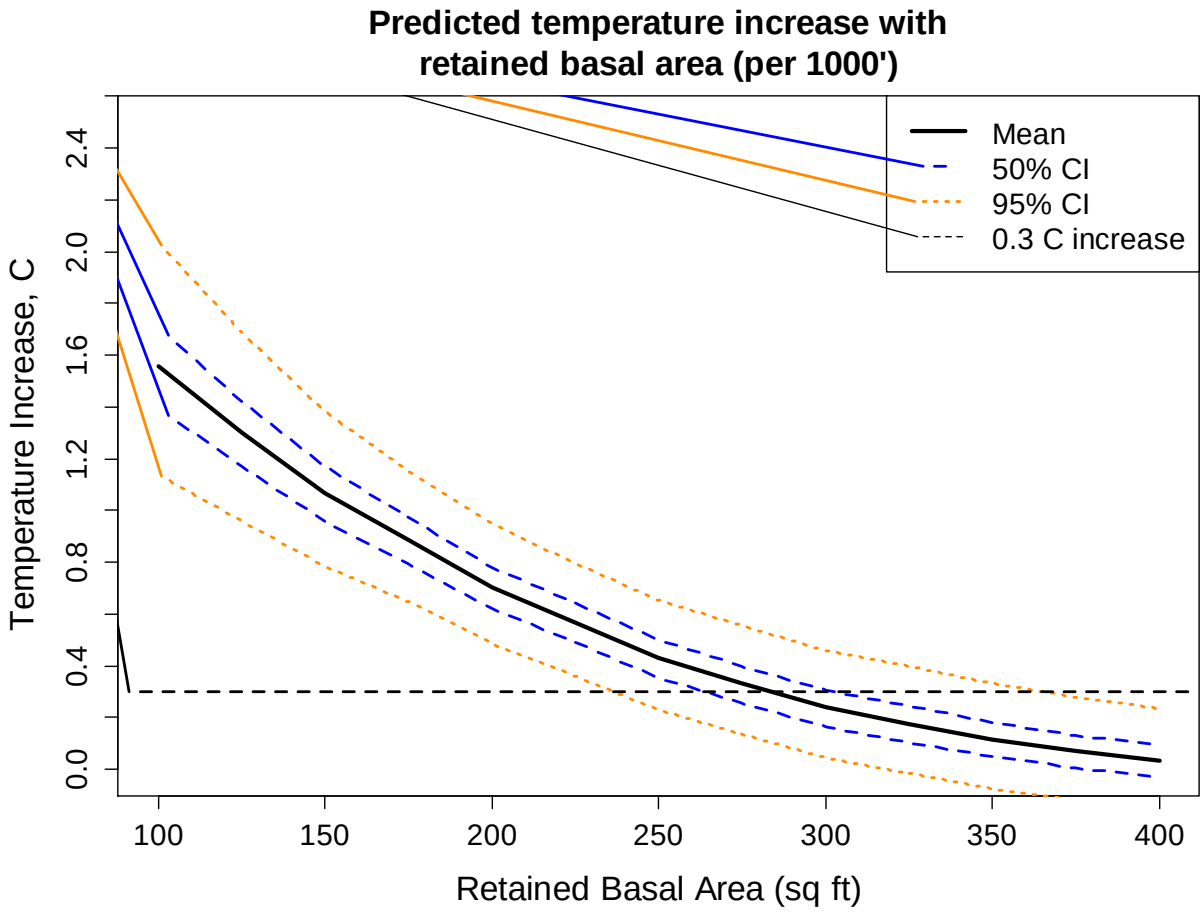
Option B has two harvesting regimes: the initial entry removes trees down to a no-touch buffer of 50' or 70', depending on whether the stream is a small or medium stream. The second entry happens 4 years later, targeting the other side of the stream. The second bank is harvested down to current FPA targets, except that the live-tree retention standard basal area criterion is reduced to include all trees ≥ 6", and includes 5 live trees per 250 feet (or 20 trees/1000').

We can model the first entry, but do not believe that the model is appropriate for modeling the effect of the second entry. Our field data involved collecting information on stands and stream temperature response that did not include double-entries. How the stands and shrubs respond to increased light over the 4-year period and then influence the shading of the stream for the second entry is not known. Therefore, although this approach may certainly be a promising line of inquiry, the predictive model is not the correct tool to use in this case.

For the first entry, we found that the average predicted temperature increase was 0.68 C. The analysis for this aspect has not been entirely completed, so at this time I do not have a 95% CI to go with this number.

Basal Area Behavior

Similar to how the Committees have seen a no-harvest distance portrayed, I modeled the consequences of simply retaining certain amounts of basal area, irrespective of hardwood/conifer classification. The no-cut width was maintained at 20'. The figure presents findings in BA/1000', while the table handout numbers are per 500'.


Predicted temperature increase with
retained basal area (per 1000')
Mean
50% CI
95% CI
0.3 C increase
Temperature Increase, C
0.0
0.4
0.8
1.2
1.6
2.0
2.4
100
150
200
250
300
350
400
Retained Basal Area (sq ft)