Project Overview for the Central Washington Initiative (CWI) "demo" project cwi_demo

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Purpose: Orient BioSum users to the demo *project* (a collection of inputs, parameter and model outputs associated with a BioSum analysis on a defined landscape) that can help users learn and practice BioSum workflow and operations

This document: cwi_demo_overview.pdf

Companion documents and data: cwi_demo_formulation_step-by-step.pdf, cwi_demo_project.7zip

Data

This demonstration project, provided to facilitate learning of and practice with the BioSum workflow, derives from a 2024 analysis of opportunities to expand the pace and scale of fuel treatments in the Central Washington Initiative Priority Investment Landscape designated under the Wildfire Crisis Strategy. While this project has fewer prescriptions and scenarios than the original analysis, it includes all FIA data for the landscape. 1,168 FIA "conditions" and over 36 thousand trees on plots loaded into this BioSum project represent all forest lands and owner groups (private, national forest and other public, NFS). These FIA data are the from the most current available inventory cycle as of Fall 2024, and derive from field crew visits to these plots over the ten-year period of 2011-2021. Parameters within the project were the best available information at the time the project was conceived; refinements are continuing, so consider them illustrative.

The table below outlines the current conditions of the Eastern Cascades (EC) landscape in central Washington. NOTE: There are a few plots added to this project from the WC variant to provide practice working with >1 variant; this table describes ONLY the plots in the EC variant.

Total Forested Acres*	2,298,139
Total # of Stands	1,168
Total # of forested, non-reserved stands	1,157
Total # of live trees	36,934

*All acres of forested (cond.cond_status_cd=1) and unreserved (cond.reservcd=0) land

Prescriptions (Rx) & Prescription Packages

The project contains definitions of and FVS East Cascades variant model output from two active management prescriptions, labeled 873 and 874, and a grow-only (GO), unmanaged reference case labeled 999. Prescriptions (Rx) and prescription-packages (RxPkg) have a one-to-one correspondence in this project in that an RxPkg consists of one Rx implemented repeatedly over up 4 BioSum cycles if conditions warrant.

RxPkg	Thinning Style	Species Retention Preferences	Thinning Trigger (% of MaxSDI)	Diameter Cap
999 (GO, baseline)	N/A	N/A	N/A	N/A
873	Thin from Below (TFB)	WP>PP>DF	30%	30″
874	Thin Across Diameter Range (TAD)	N/A	30%	30″
863*	Thin from Below (TFB)	WP>PP>DF	30%	21″

*Rx 863 is not currently uploaded into the project but can be added as a practice opportunity (see below)

The following assumptions apply for all active management RxPkgs:

- Target residual stand density of 50 sq. ft./acre basal area (BA)
- For cut trees, remove 95% of stems and 90% of branches by whole-tree harvest;

however, surface fuel treatment method differs:

- 873 – When post-thinning surface fuel load exceeds 12 tons/acre, pile and burn those fuels if on low slope (<40%) or broadcast burn if steep (≥40%). Apply surface fuel treatment only in connection with a harvest operation (this logic is coded in the keyword control program [KCP] file for this RxPkg)
- 874 –Broadcast burning following commercial thinning and harvest operations; burns are not contingent on surface fuel loads calculated in the event monitor (this approach does NOT need to be coded in the KCP file)
- 863 – analyst choice
- Prescription Packages were constructed using the same prescription for each BioSum cycle (denoted below by position in the RxPkg label and color). This setup is reflected in the naming of the FVS Run Titles (to view run titles, see the FVSOut.Cases table, which contains a record for every stand for every run title). The names of the FVS runs/treatment packages used in this project are:

Cyc1 Cyc2 Cyc3 Cyc4

- Rx 999: FVSOUT_EC_P999-999-999-999-999
- Rx 873: FVSOUT_EC_P873-873-873-873-873
- Rx 874: FVSOUT_EC_P874-874-874-874-874

Please note that, while we have opted to apply the same Rx at each BioSum cycle, RxPkgs can also be constructed to apply different prescriptions in different cycles—for example, a thin across diameter range at cycle 1, followed by a "tune-up" thin from below and prescribed fire 20 years later to extend treatment longevity. It is also possible to define different RxPkgs from the same prescription (e.g., P001_874-999-999-999, which applies Rx 874 at BioSum cycle 1 only and P003_874-999-874-999 that applies prescriptions at cycles 1 and 3 if it is important to track these timing choices in the BioSum's RxPkg allocation).

Processor & Optimizer Parameters

- Processor
    - Escalators: Default escalators are loaded, representing an assumed 4 percent annual discount rate (or alternative rate of return; *see project step-by-step for details*)
    - Additional Cost Components:
        - Rx 873: pILE (pile/burn on low slopes if warranted, $150) OR bROAD (broadcast burn on steep slopes if warranted, $300)
        - Rx 874: bROAD (broadcast burn on any slope, $300)
- Optimizer

Scenario	Description	Avg 40-yr Δ in Variable 1	Optimization /filter	Tie-Break
1	Any increase in SURVRATE	> 0% (SURVRATE)	Max SURVRATE/ netrev >= 0	Max net revenue
2	Increase 40-yr mean CBH by at least 2 ft above grow-only mean with treatment yielding mean CBH of at least 15 ft	≥ 2 ft (CBH)	Max CBH/ netrev >= 0	Max net revenue

    - The primary effectiveness and optimization metric used in scenario 1 is WEIGHTED.SURVRATE (survival rate calculated as volume in trees expected to survive a fire with a 6-8 foot flame length divided by all live volume immediately preceding the fire, averaged over the 40-yr analysis period)
    - The primary effectiveness and optimization metric used in scenario 2 is WEIGHTED.CBH (canopy base height as calculated via the Fire and Fuels Extension, which is the height at which a critical canopy bulk density threshold is exceeded, averaged over the 40-yr analysis period)

Practice Opportunity:

Note that Rx 863 is not yet utilized by any RxPkg.

To build experience with the BioSum workflow, consider creating a package that utilizes Rx 863, simulate that package in FVS, load the FVS output data to BioSum, run the package through Processor, and evaluate its efficacy and economic feasibility relative to the other packages in Optimizer. This project includes a KCP file for Rx 863 that you can review and

modify as desired (for example, the coded fuel treatment assumptions could be replaced with your own).

Other ways to learn

All included packages have been run through Processor (only one scenario is included, but feel free to copy and depart from it by developing others) and optimizer (two scenarios included). Inspecting these, and the outputs they generate is a great way to begin learning what BioSum can do. More detailed documentation for this tutorial/demo dataset and ideas for using it to master BioSum workflows may be developed in the coming months—check back, or send a request to get on the distribution list for updates to support@biosum.info