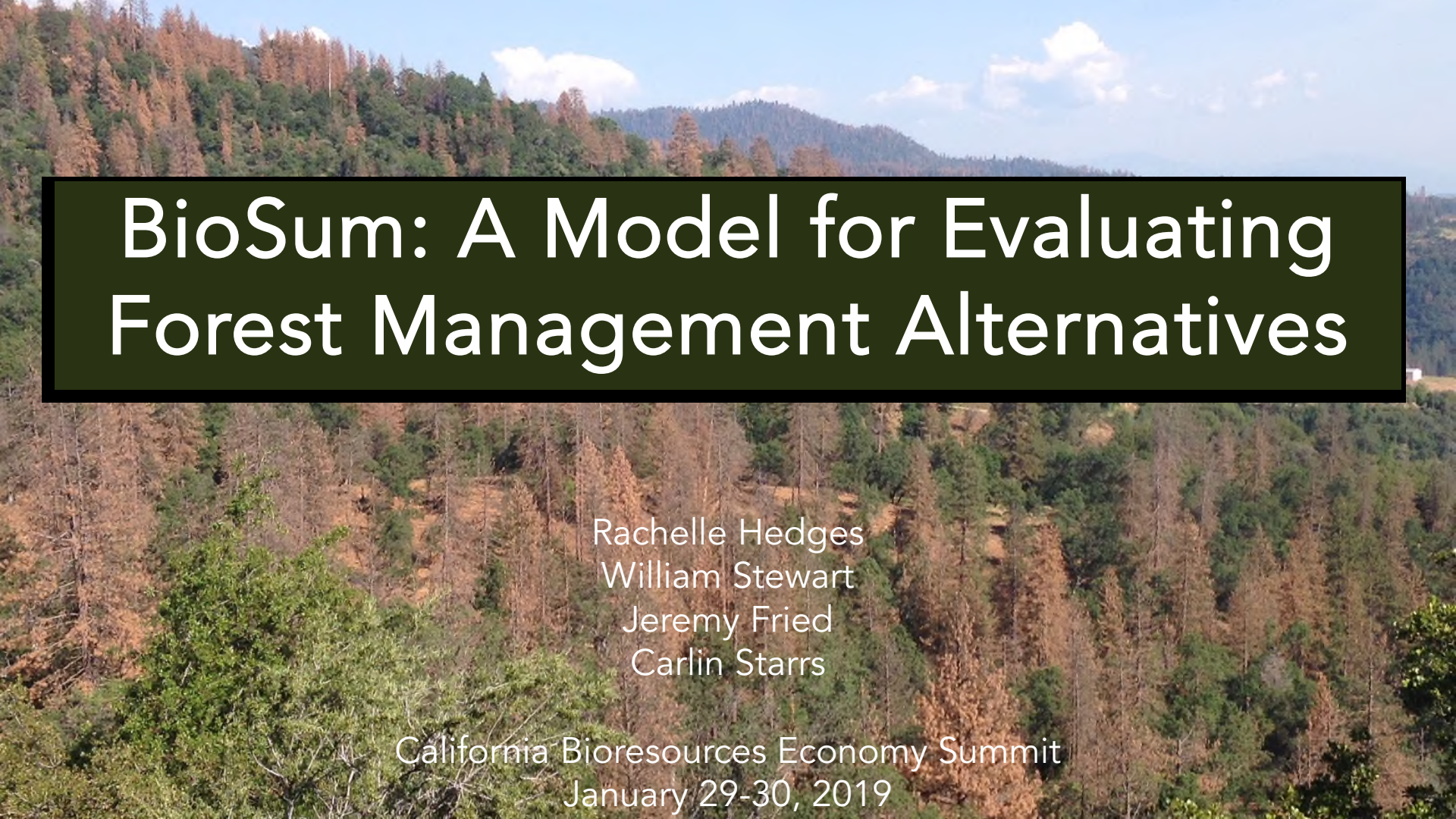

BioSum: A Model for Evaluating Forest Management Alternatives

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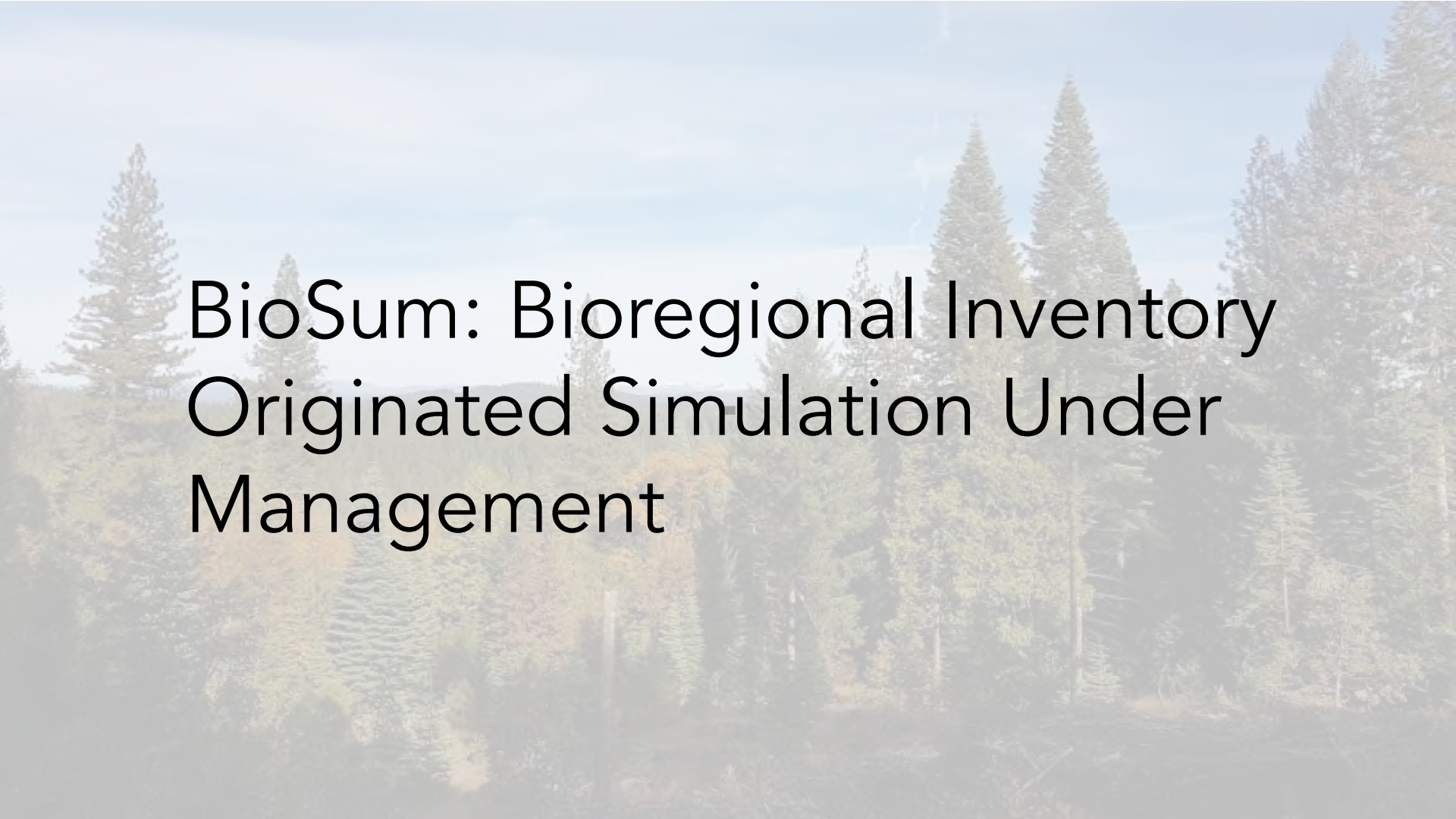
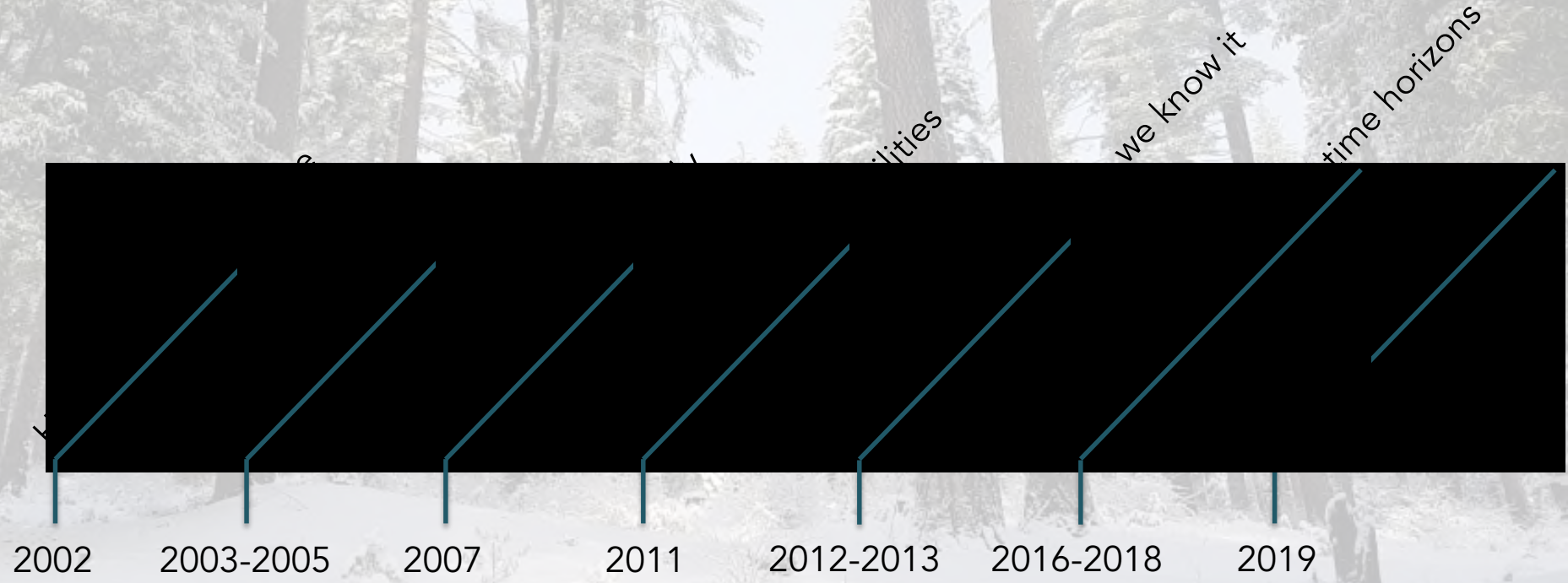
California Bioresources Economy Summit
January 29-30, 2019

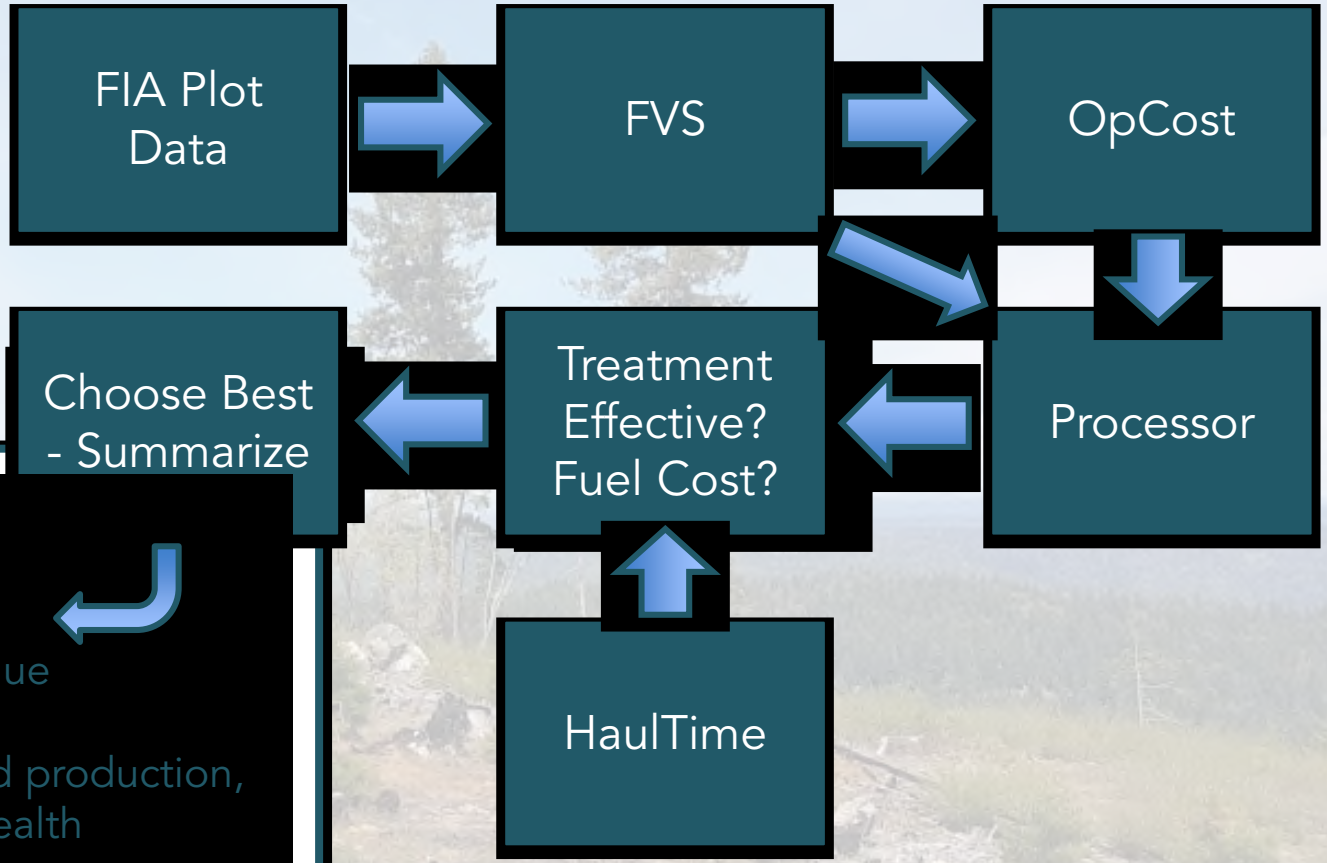


BioSum: Bioregional Inventory Originated Simulation Under Management

BioSum: A Brief History



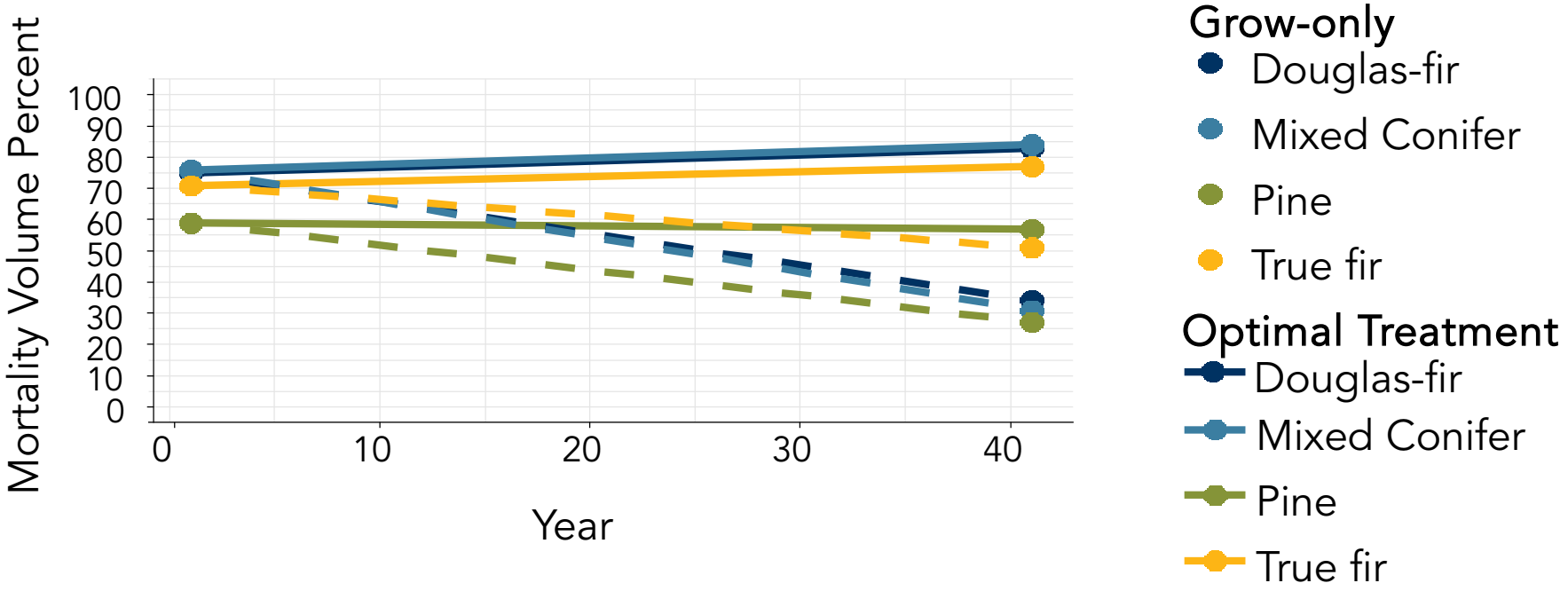
Workflow


FIA Plot Data
FVS
OpCost
Processor
Treatment Effective? Fuel Cost?
HaulTime
Choose Best - Summarize
1. Acres treated
2. Resilience score change
3. Treatment longevity
4. Treatment cost and revenue
5. Cost effectiveness
6. Co-benefits such as wood production, climate benefits, forest health

Input Data	User Variables	Models	Outputs
Forest-specific stand and fuels data	Forest habitat to maintain components	FVS (forest growth)	Change in fire risk metrics by area
Harvest system production and cost data	Forest treatment packages	FVS FFE (fire model)	Post-treatment stand conditions
Road system	Fuels treatment packages	Operation Cost Model	Harvest outputs
Processing facilities	Subsidy and cost share rules	Optimal transportation network	Gross and net revenue
Commodity prices		Core analysis – optimization	Carbon sequestration balance

Outputs

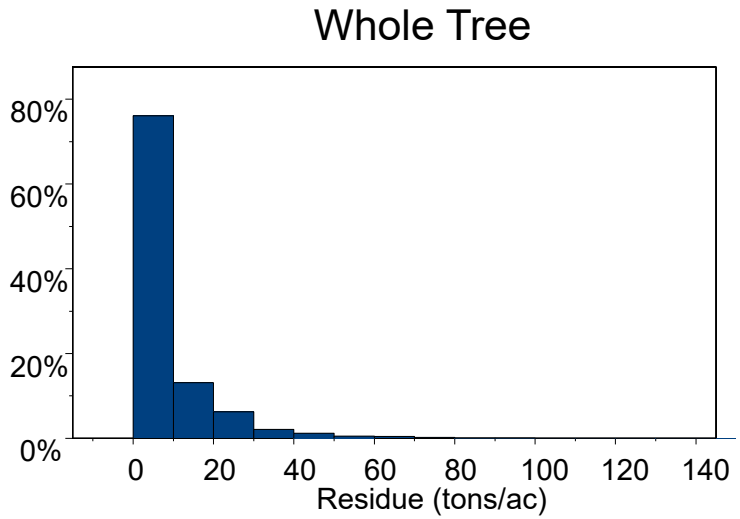
Average Mortality Under Severe Fire Weather by Forest Type

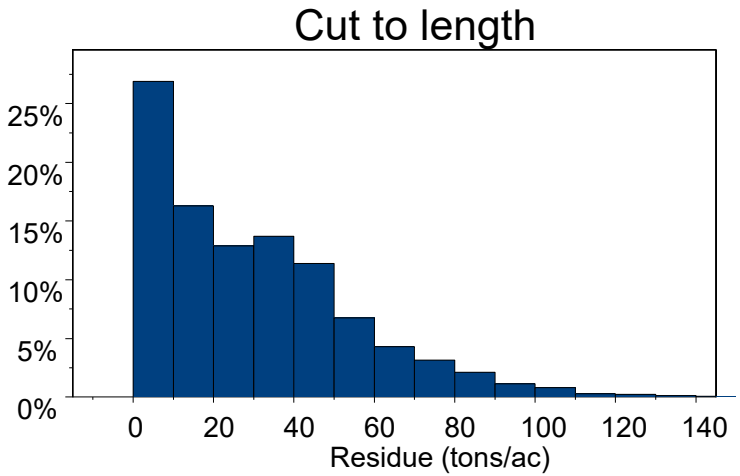


Outputs

Activity fuels=f(harvest system)

- Whole tree leaves mainly very small (sub 5”) trees
  - Supplemental surface fuel treatments are much less
  - But purchased chip volume is declining
- Cut To Length (CTL) also leaves tops and limbs from larger trees plus boles of non-commercial species and cull trees
  - Harvest cost lower but leave more surface fuels
- BioSum will choose WTL where operationally feasible (not too steep)

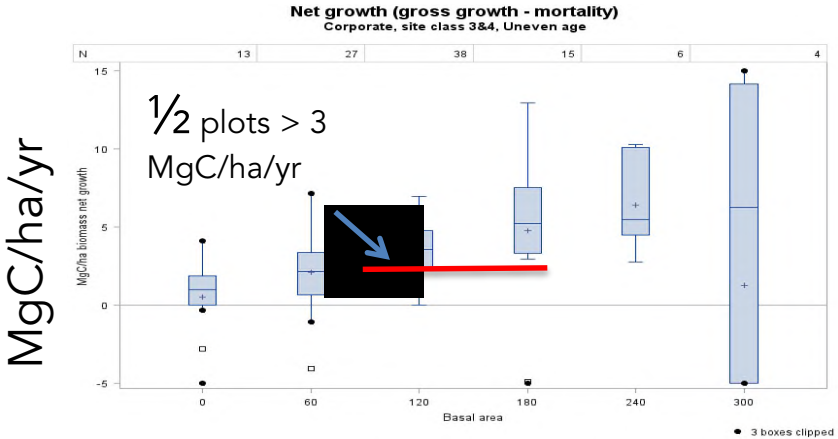




Outputs

Net growth (gross growth – mortality) FIA Sites 3&4, Uneven age stands

Corporate Timberlands

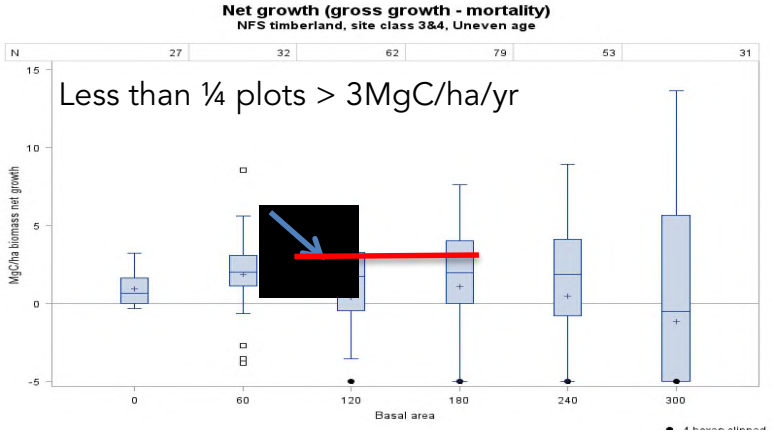


MgC/ha/yr

0-59 60-119 120-179 180-239 240-299 300+

Initial basal area/acre

USFS Timberlands

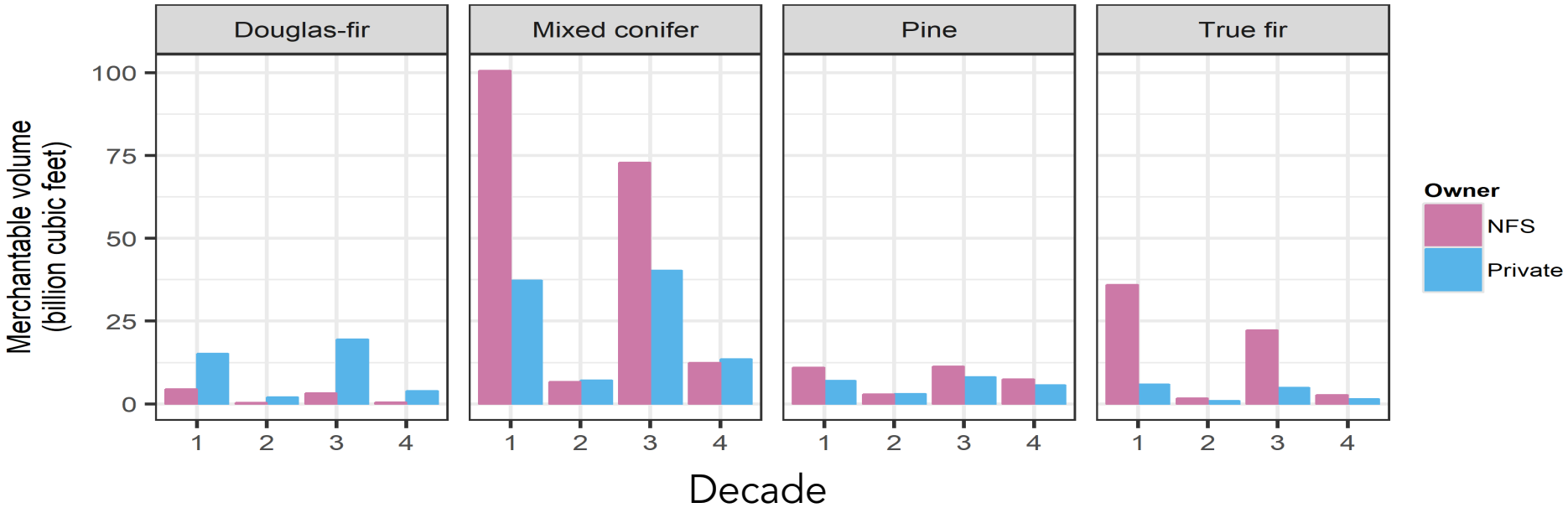


0-59 60-119 120-179 180-239 240-299 300+

Initial basal area/acre

Outputs

Results for Optimal system where BioSum identified the best sequence for each plot – with lots of actions to improve fire resistance



The Context in Which We Operate

Fire is top of mind for forest managers

- Burn area across all forest types are steadily increasing
- We are seeing more large-scale high severity patches than ever before
- Suppression costs are also increasing

Vegetation management is not on pace with wildfire risk and mortality

- We know vegetation management has been proven to be a cost effective way to reduce wildfire risk, but state policy cannot be based on small set of anecdotes

We need to scale up

- There is a $7.5 billion backlog of forest restoration to be conducted in California
- Agencies are shifting towards collaboration in theory, but what about in practice?
- Without a better handle on limiting “mega” wildfire events, our forests will start being net carbon sinks AND we will to increase fossil-fuel based substitutes or imports to meet consumers’ needs for building materials, packaging and energy

Why BioSum?

There are dozens, if not hundreds, of models to simulate forest growth, fuels treatments and other silvicultural activities. Many are agency based, while others are created by researchers for their own use. So, why BioSum?

- BioSum is a constantly evolving tool that links together a number of massive databases in an system to provide statistically robust estimates for different scenarios based on input conditions and goals
- We have detailed information on forest stands, forest & fire risk growth models, forest & fuels management costs, harvest and transportation costs, commodity values (sawlogs, chips, carbon offset contracts)
- The BioSum model can be used across numerous forest ownership types, taking into account the numerous and varying constraints faced by each agency
- There is no one "correct" way to use BioSum
- It's free, as is support in learning how to use it

The Future of BioSum

- Proposed updates to the BioSum tool include FIA plot growth calibration, better fire probability calibration, more fire risk metrics and new cost data
- Stakeholder meetings designed to solicit needs and wants from land managers throughout the state, across agencies
- Training sessions for agency staff to help familiarize them with the BioSum model and how to run it
- A ubiquitous, systematic decision support tool for decision-makers to evaluate different strategies appropriate for different goals and budget levels

Thank You

Presentation photos courtesy of Ariel Thompson at Berkeley Forests

BioSum journal articles

- Barbour, R. James, Jeremy S. Fried, Peter J. Daugherty, Glenn Christensen, Roger Fight. (2008). Potential biomass and logs from fire-hazard-reduction treatments in Southwest Oregon and Northern California. *Forest Policy and Economics, 10*(6), 400-407.
- Bell, Conor K., Keefe, Robert F., & Fried, Jeremy S. (2017). Validation of the OpCost logging cost model using contractor surveys. *International Journal of Forest Engineering, 28*(2), 73-84. doi: 10.1080/14942119.2017.1313488
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- Fried, J.S., G. Christensen. (2004). FIA BioSum: a tool to evaluate financial costs, opportunities, and effectiveness of fuel treatments. *Western Forester, 49*(5), 12-13.
- Fried, J.S.; Christensen, G.; Weyermann, D.; Barbour,, & R.J.; Fight, R.; Hiserote, B.; Pinjuv, G. (2005). *Modeling opportunities and feasibility of siting wood-fired electrical generating facilities to facilitate landscape-scale fuel treatment with FIA BioSum*. (Gen. Tech. Rep. PNW-GTR-656).
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- Fried, Jeremy S., Loreno, Sara, Sharma, Benktesh, Starrs, Carlin, & Stewart, William C. (2016). *Inventory based landscape-scale simulation to assess effectiveness and feasibility of reducing fire hazards and improving forest sustainabiilty in California with BioSum*. California Energy Commission ARFVT Program, March 2016.
- Fried, Jeremy S., Potts, Larry D., Loreno, Sara M., Christensen, Glenn A., & Barbour, Jamie R. (2017). Inventory Based Landscape-Scale Simulation of Management Effectiveness and Economic Feasibility with BioSum. *Journal of Forestry, 115*(4), 249-257. doi: https://doi.org/10.5849/jof.15-087