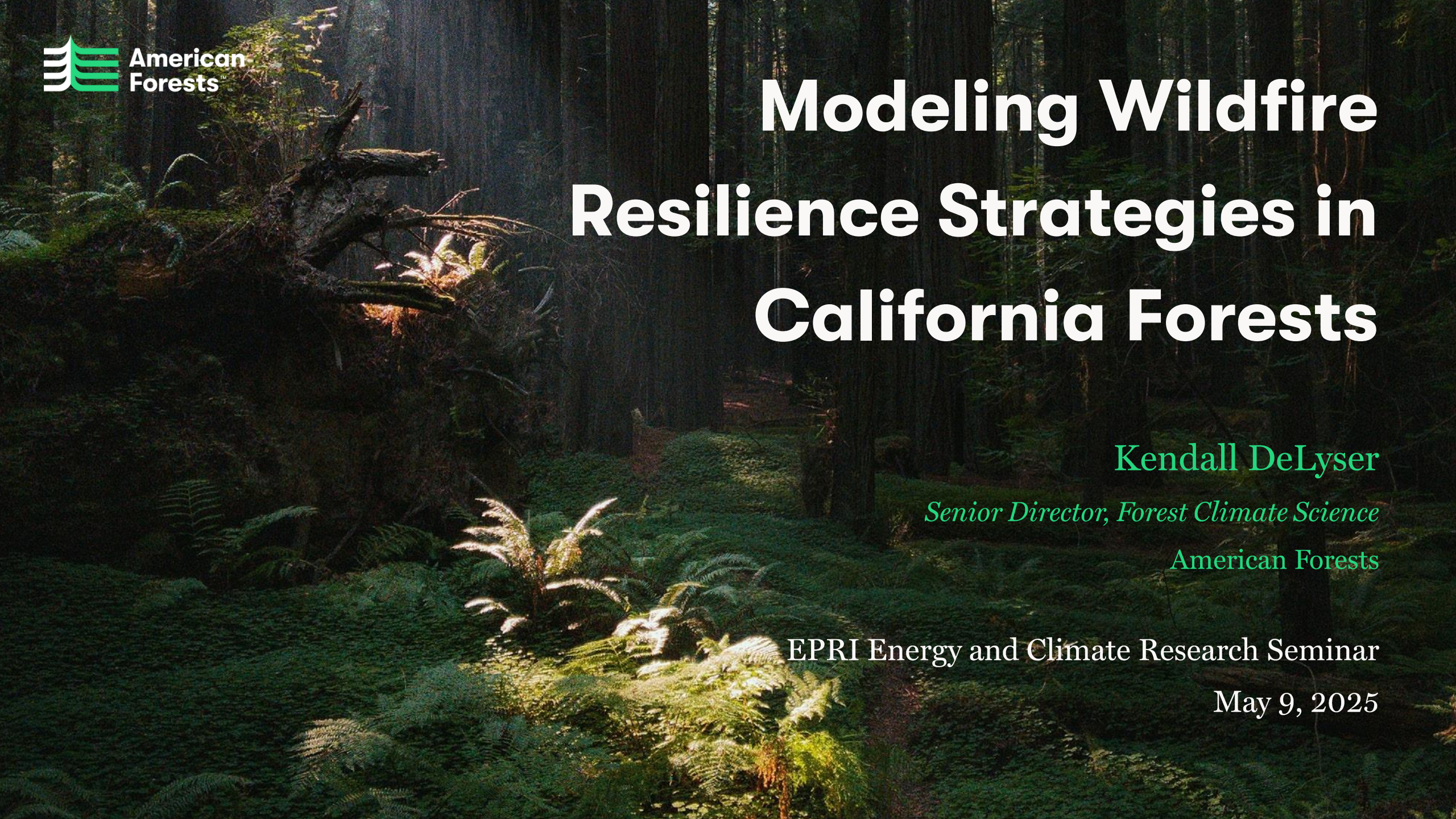

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Modeling Wildfire Resilience Strategies in California Forests

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Modeling state-level forest management & wood use

American Forests™ | NIACS Northern Institute of Applied Climate Science

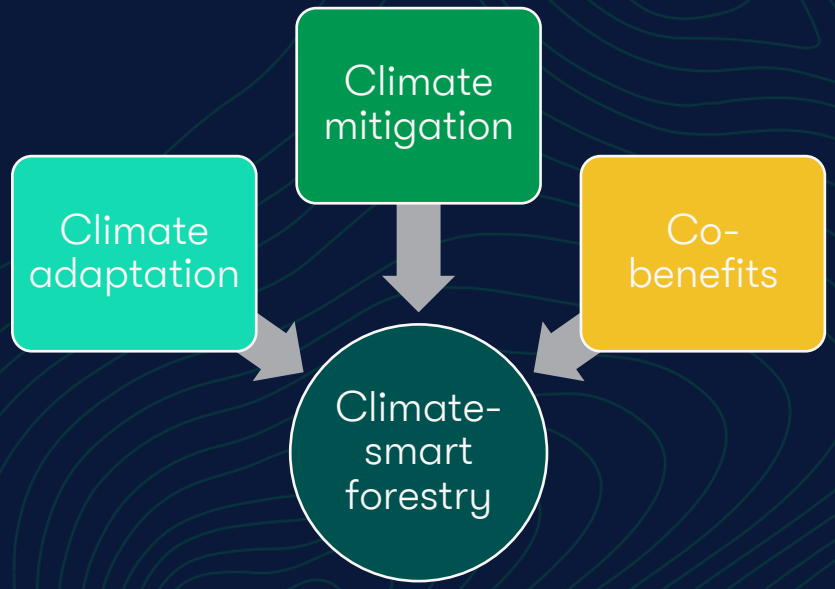
Forest Carbon and Climate Program
Department of Forestry
MICHIGAN STATE UNIVERSITY

Forest Service U.S. Department of Agriculture | Canada Natural Resources Canada Canadian Forest Service

✓ State agency partners in 7 US states (MD, PA, MN, MI, WI, OR & CA)

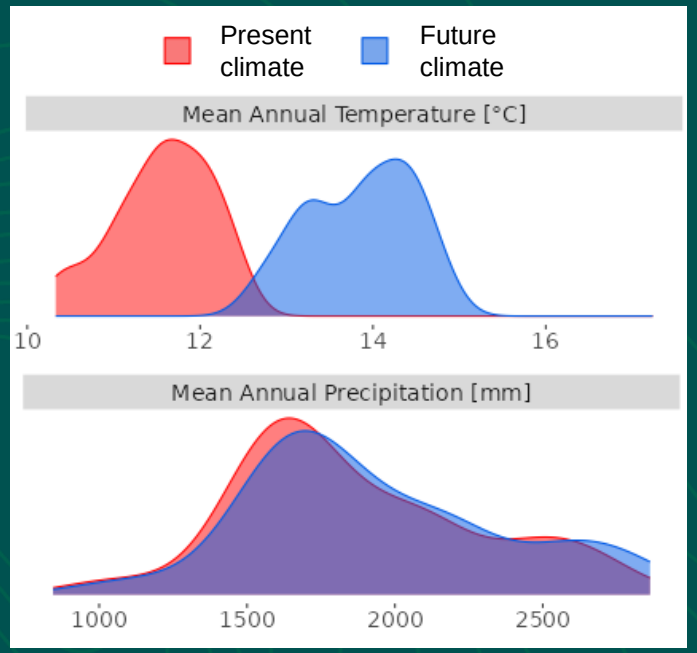
Objectives:

- Model carbon impacts of forest management, wood utilization, and natural disturbance scenarios
  - Ecosystem + wood products + substitution (+ economics)
- Understand climate mitigation potential of scenarios & identify climate-smart forestry practices
- Integrate resilience (or carbon) in forest management and planning
- Integrate forests as natural climate solutions in state climate planning and funding



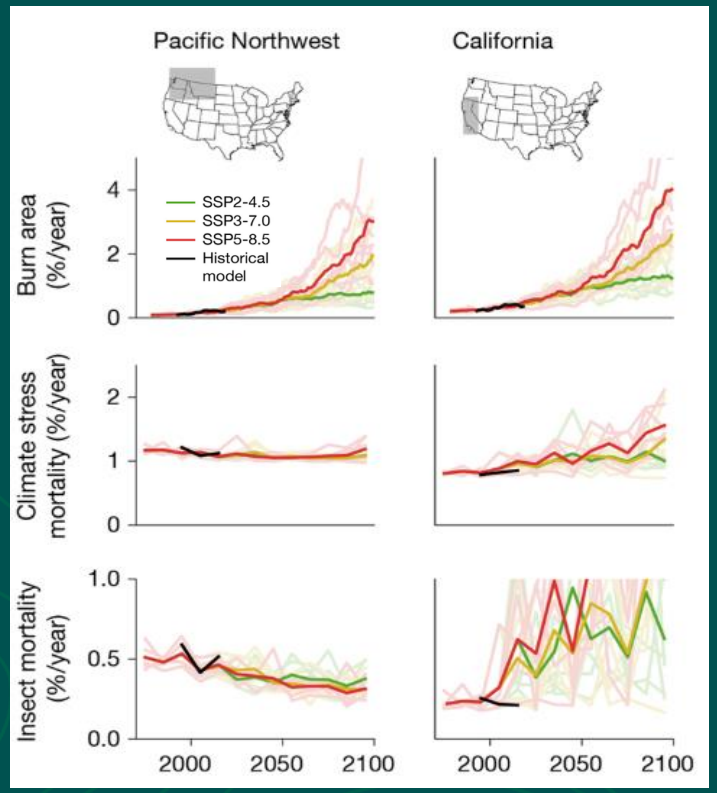
Simulating climate change impacts in California

Forest growth:
Change in growth and productivity due to climate dissimilarity



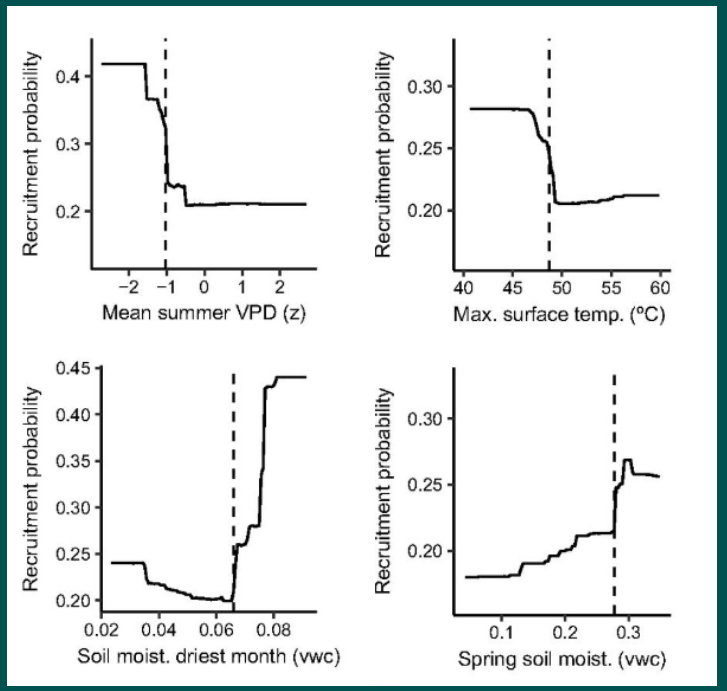
Climate Adapted Seed Tool (Joe Stewart)
reforestationtools.org/climate-adapted-seed-tool/

Natural disturbances:
Change in frequency and severity of wildfire, insect outbreaks, and drought mortality (RCP 8.5)



Anderegg *et al*. 2022 (Ecology Letters)

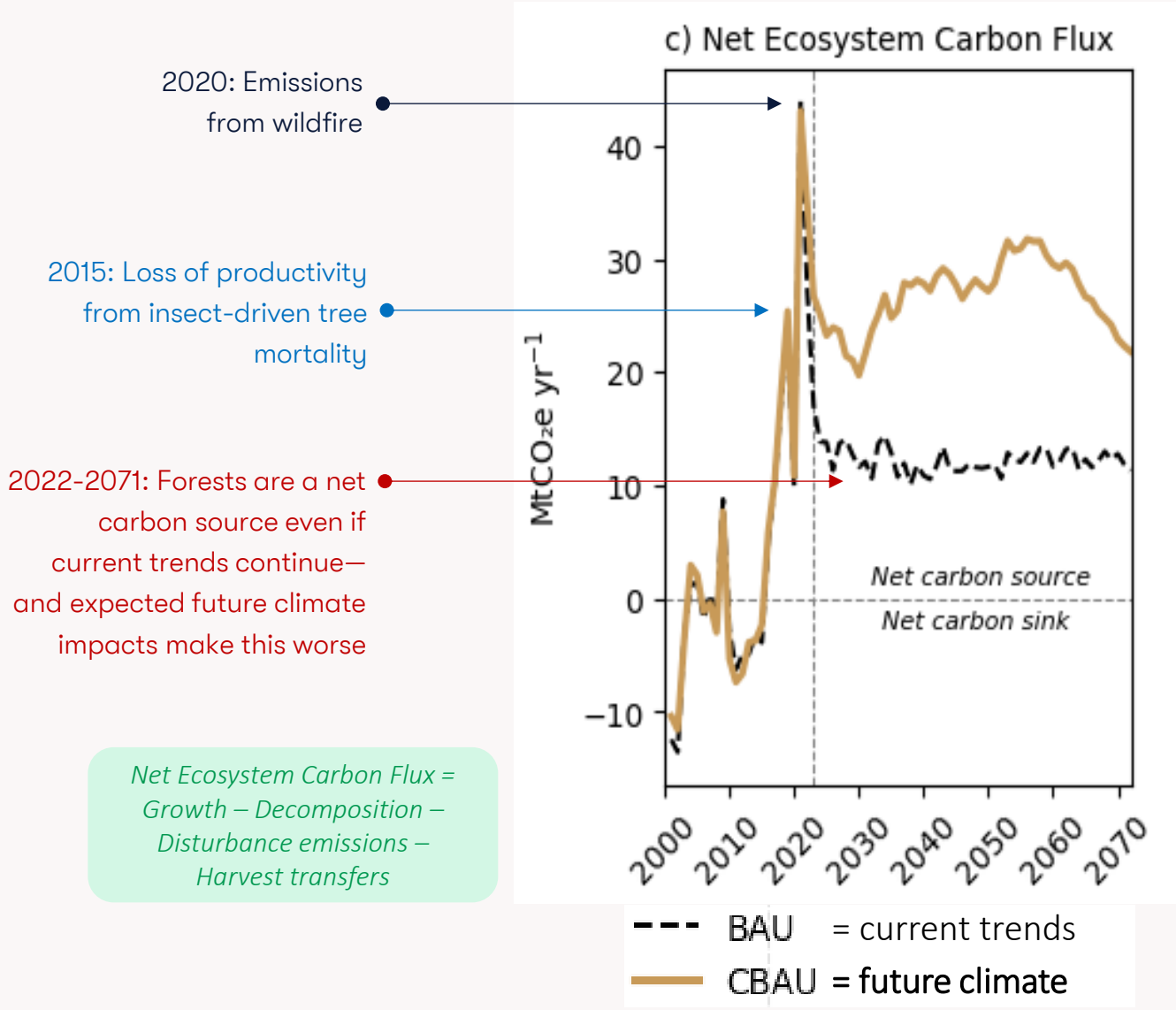
Post-fire regeneration failure:
% of forest area that could fail to regrow after high-severity wildfire



Davis *et al*. 2023 (PNAS)

Influence of future climate in California

- Forest ecosystem became a net carbon source in 2015 with large insect-driven mortality events following severe drought
- Modeled climate impacts:
  - **28%** decline in forest productivity
  - **82%** of forest could fail to regenerate after high-severity wildfire
  - **262%** increase in average annual acreage of high-severity wildfire
- Projected over the next 50 years:
  - **48%** loss of forest area
  - **50%** decline in carbon stocks
  - **49%** higher carbon emissions



Source: Martha Conklin (theconversation.com)

Wildfire resilience & restoration

Many Western US forests are more dense than historic conditions, enabling more extreme wildfire behavior.

Source: Steve Rondeau (Davis et al. 2024)

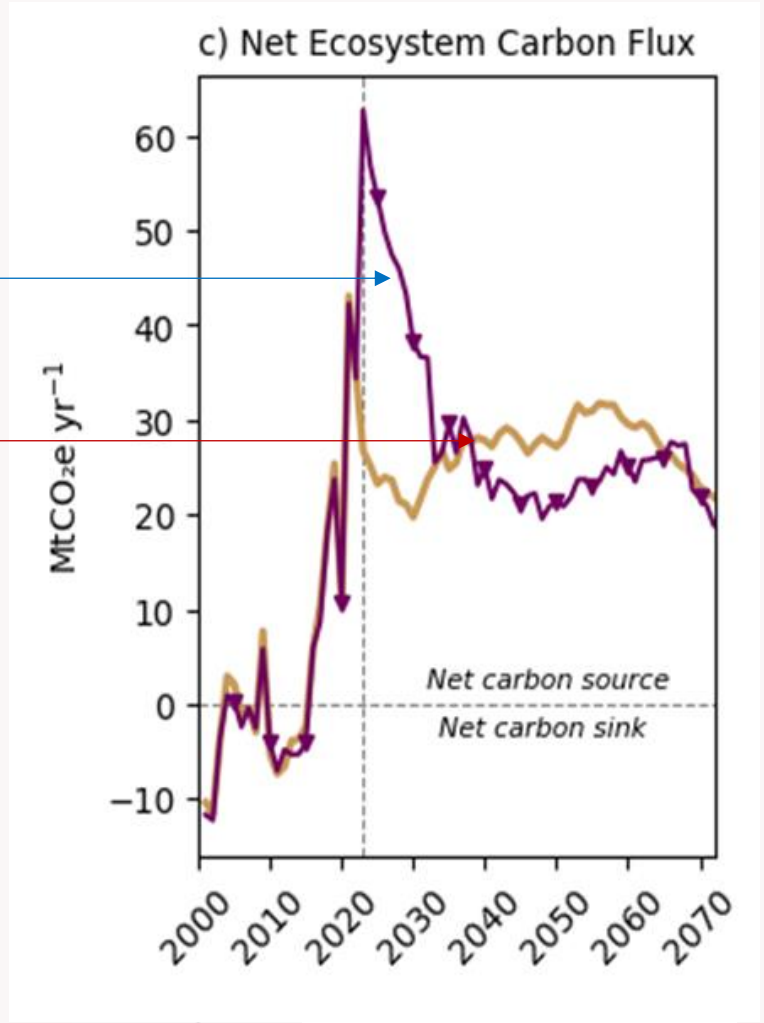
Source: Luis Vidal / American Forests

Resilience treatments (thinning, Rx fire, or both) can help reduce tree mortality from high-severity wildfire.

This in turn helps reduce the chance of post-fire regeneration failure.

Restoring resilience in California forests

- **11.2 million acres** need restoration to reduce high or very high wildfire hazard in California
- Successful fire resilience treatments:
  - Reduce future wildfire severity and post-fire regeneration failure
  - Protect **40%** of forest from wildfire-related losses
  - Incur an up-front carbon cost to **stabilize forests** in the future
- There is a **limited window of time** to act before future climate impacts intensify.



Major report finding:

(DeLyser et al. 2025)

Climate-smart forestry can reduce annual forest carbon emissions by **14%** in California over the next 50 years.

Climate-smart forestry includes fire resilience treatments, post-fire reforestation, forest conservation, silvopasture, extended rotations, and innovative wood utilization

Climate-smart forestry and wood utilization in California

- **6%** of annual benefits from climate-smart forestry come from innovative wood utilization
- Resilience treatments include cutting small trees that aren't currently considered "marketable"
- **New uses and markets** for this small-diameter material are critical to maximize benefits of treatments
  - Potential products include transportation fuels, biochar, and mass timber
- Wood processing **capacity needs to double** to use this material, even after maxing out current bioenergy capacity
- Revenues from wood products could **cover 31%-94%** of treatment costs depending on timber prices, so investment is needed from other sources

Source: University of California Agriculture and Natural Resources

Key takeaways and opportunities

Our research shows:

1. California's forests are currently a net carbon source and will continue to be at least through 2071.
2. Climate-smart forestry, including fire resilience treatments and post-fire reforestation, can reduce annual forest carbon emissions by 14% over the next 50 years.
3. There is a limited window of time for action before future climate impacts intensify.

Opportunities for action:

1. Implement fire resilience treatments quickly to reduce wildfire hazard before fires get more severe.
2. Support new wood product uses and industries to maximize landscape-scale restoration benefits.

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Thank you!

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NEW! Scan this code to open our new report for California

Read more:

https://www.americanforests.org/project/forest-carbon-modeling/