

Mega-disturbances cause rapid decline of mature conifer forest habitat in California




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Outline

- Past – Historic disturbance dynamics & how they've changed
- Present - Quantifying mature forest habitat decline
- Future - Can we find new healthier disturbance dynamics?



Steel et al. *Mega-disturbances cause rapid decline of mature conifer forests habitat in California*. 2023. *Ecological Applications*

California's Dynamic Ecosystems



California Ecological Origin
Laura Cunningham

Karok Tribe, Rx cultural burn
Klamath TRES
California Ecological Origin



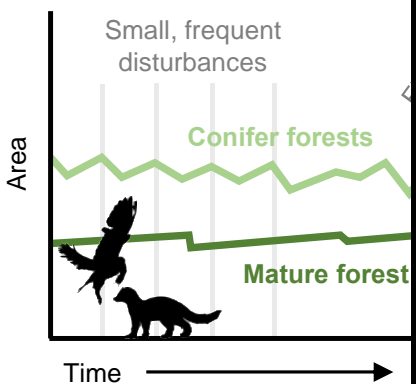
California's Dynamic Ecosystems



California Ecological Origin
Laura Cunningham



(a) Historical dynamics



Altered disturbance dynamics

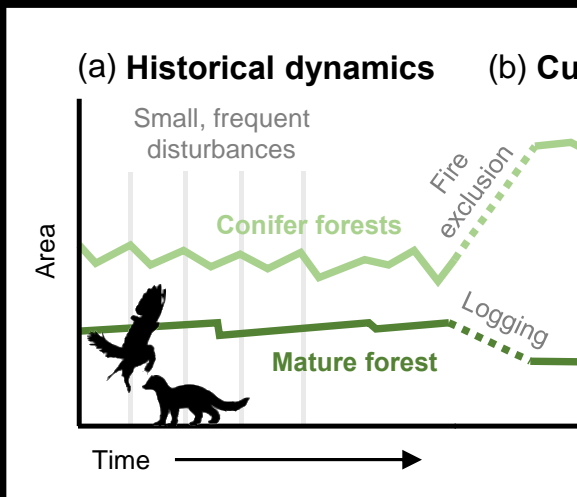
- Exclusion of Indigenous fire stewardship
- Fire suppression
- Climate change



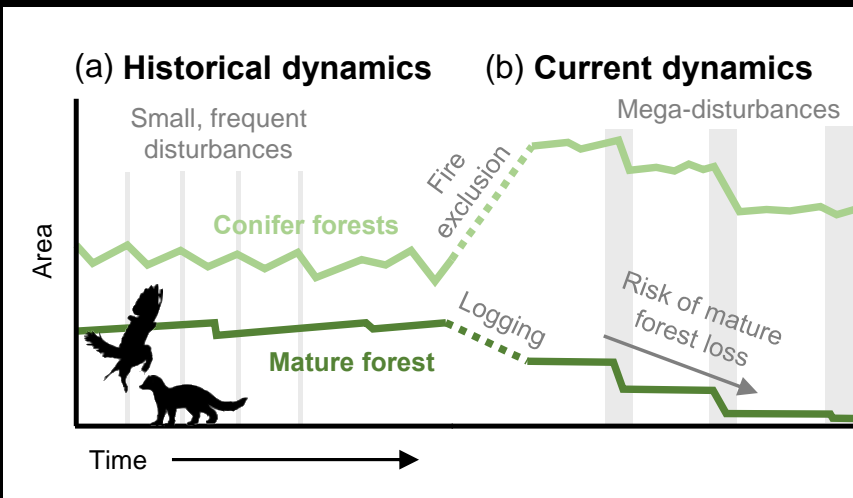
Mariposa Grove - 1890



Mariposa Grove - 1970



Altered disturbance dynamics



Study Objectives

1. Assess recent declines in mature forest from wildfire and drought
2. Quantify how much disturbance may have been beneficial
3. Test whether protected Spotted Owl habitats fared better



1) Mature Forest Habitats



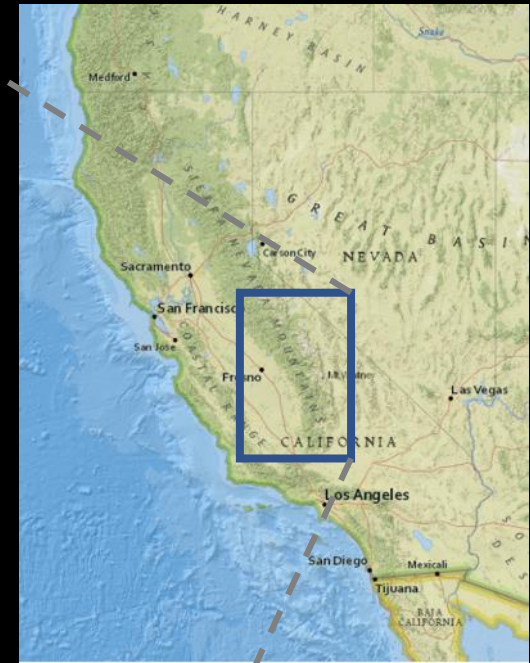
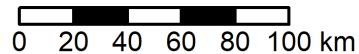
2012

Forests (>25% CC)

Mature Forest (>40% CC & >30m avg tall trees)

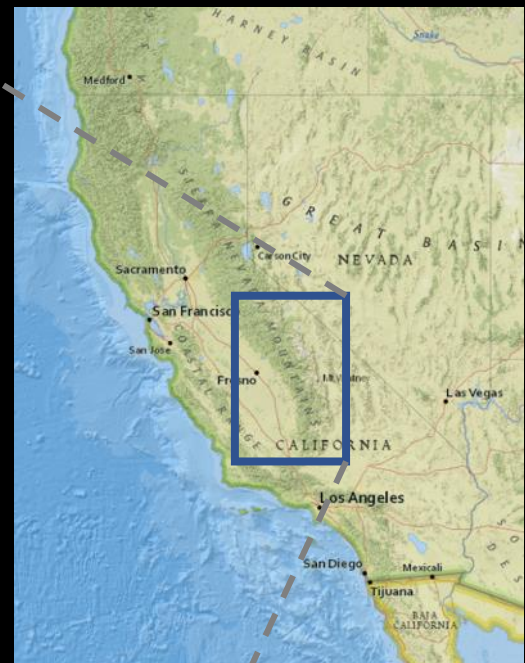
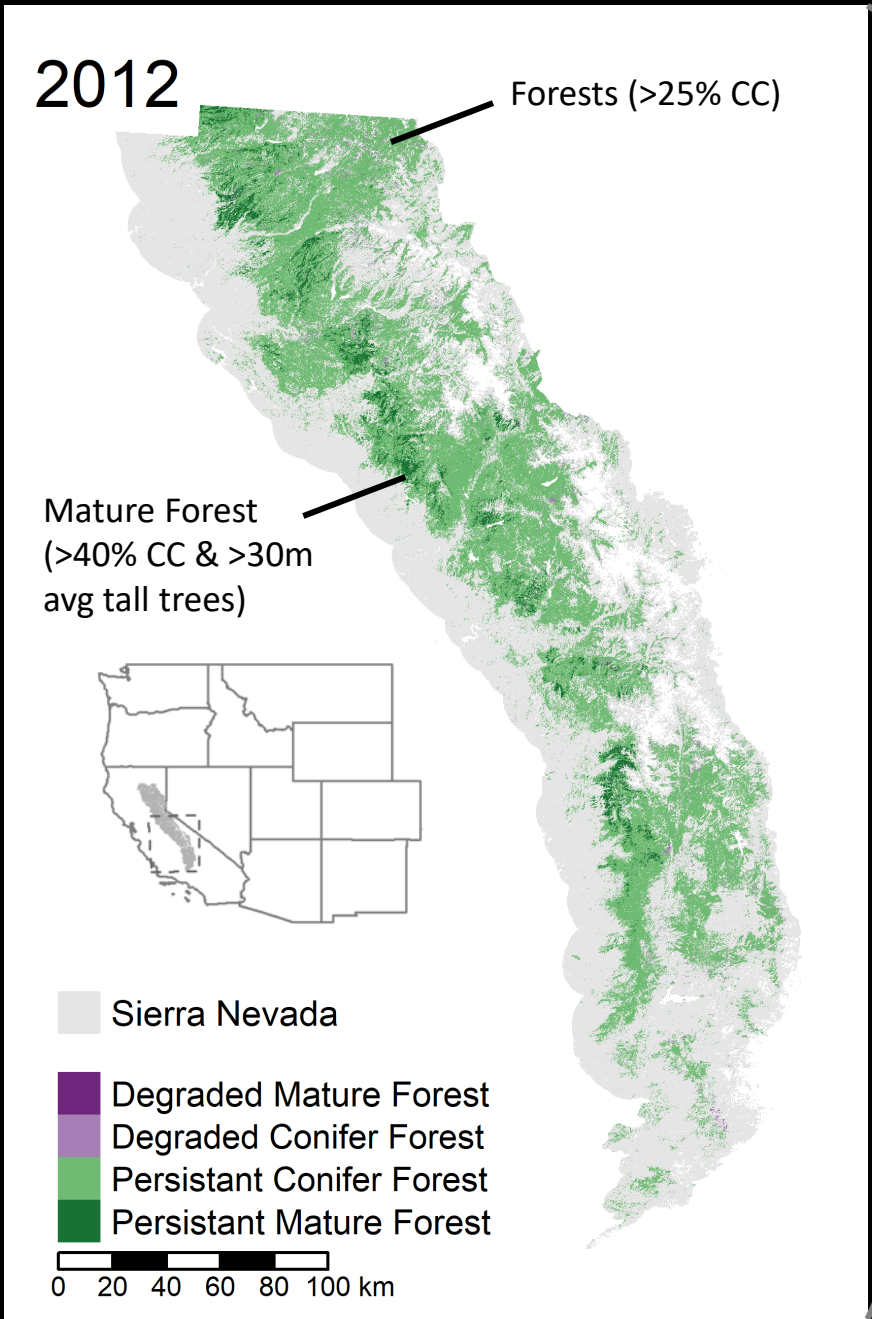


- Sierra Nevada
- Degraded Mature Forest
- Degraded Conifer Forest
- Persistent Conifer Forest
- Persistent Mature Forest



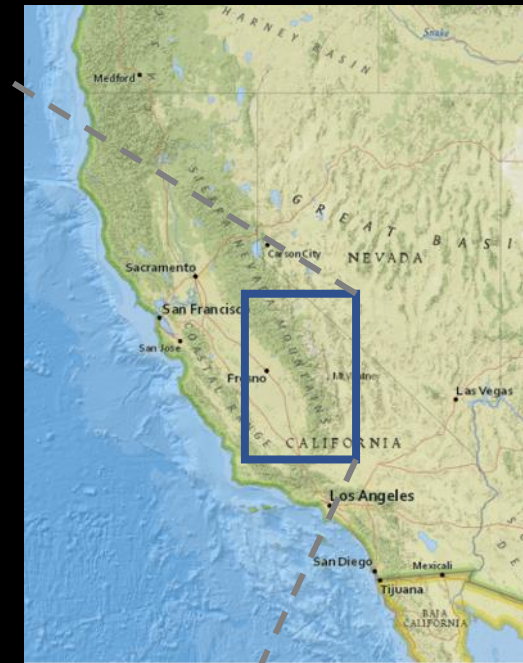
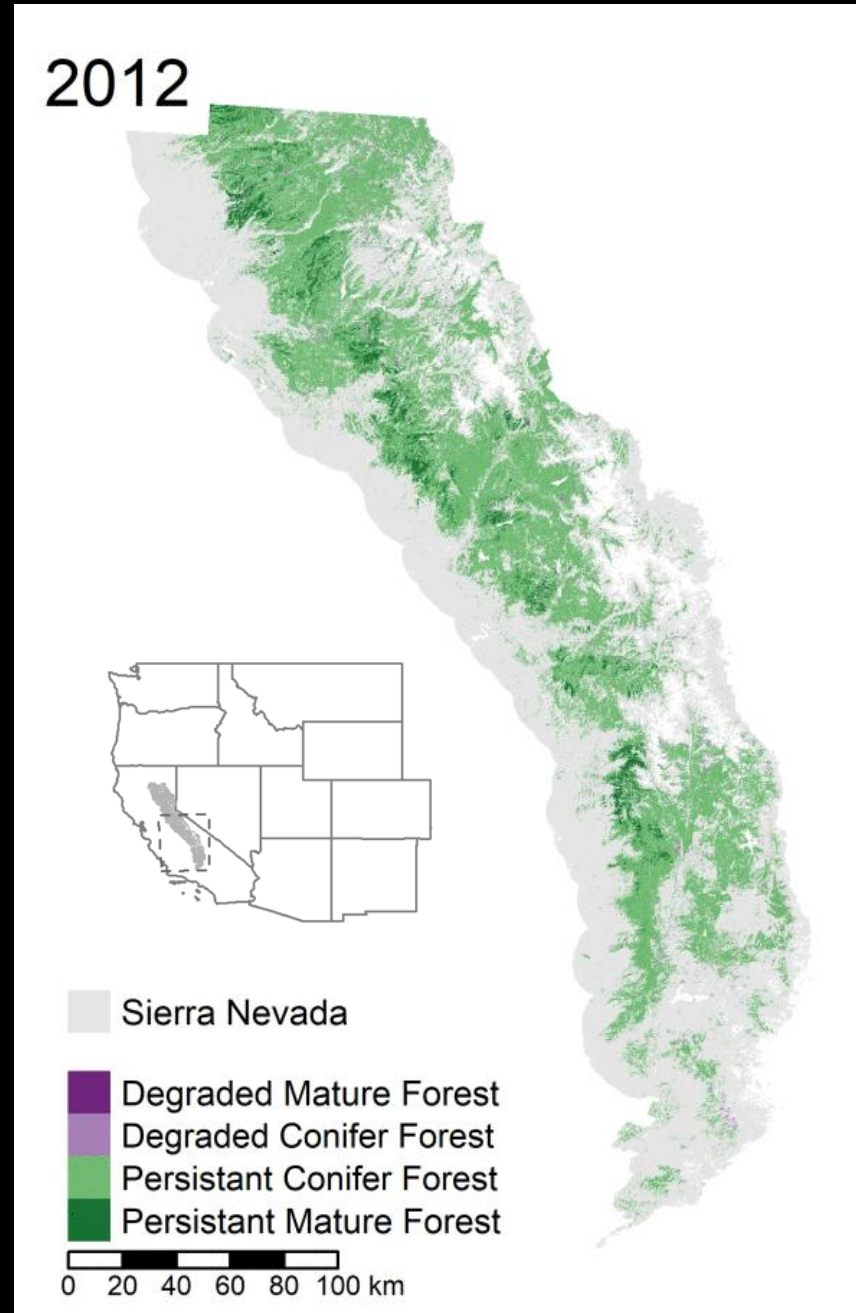
1) Mature Forest Habitats

- 2011-2020 – a period of extreme drought & extensive wildfire
- F³ Data for initial forest characterization



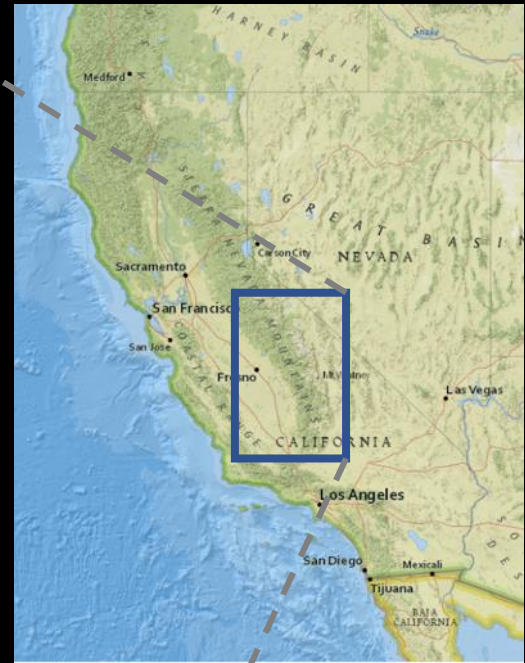
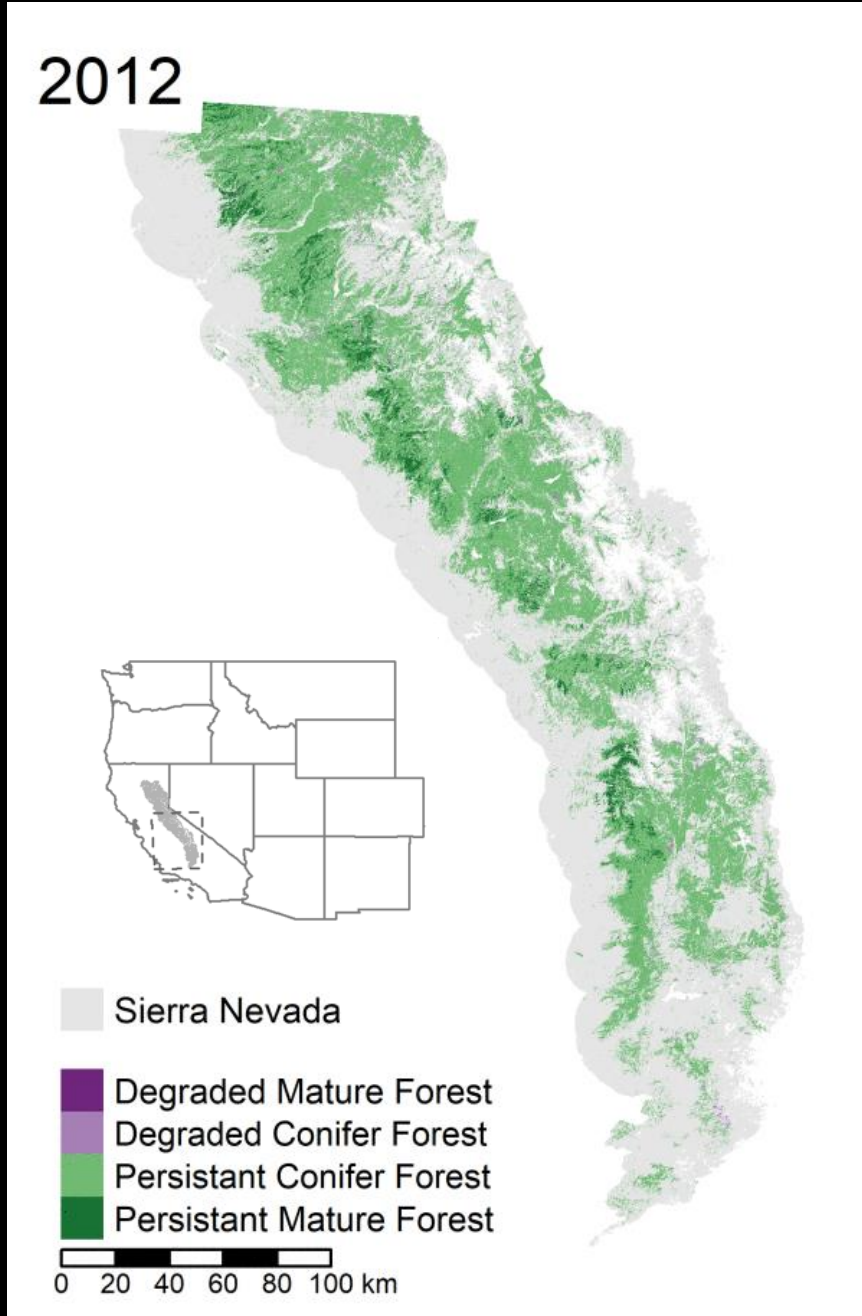
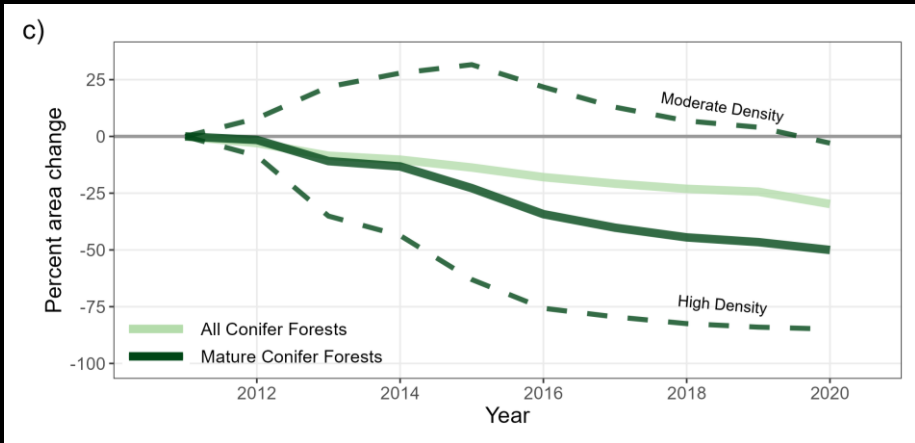
1) Mature Forest Habitats

- 2011-2020 – a period of extreme drought & extensive wildfire
- F³ Data for initial forest characterization
- eDaRT disturbance algorithm
 - Detection of yearly canopy cover loss

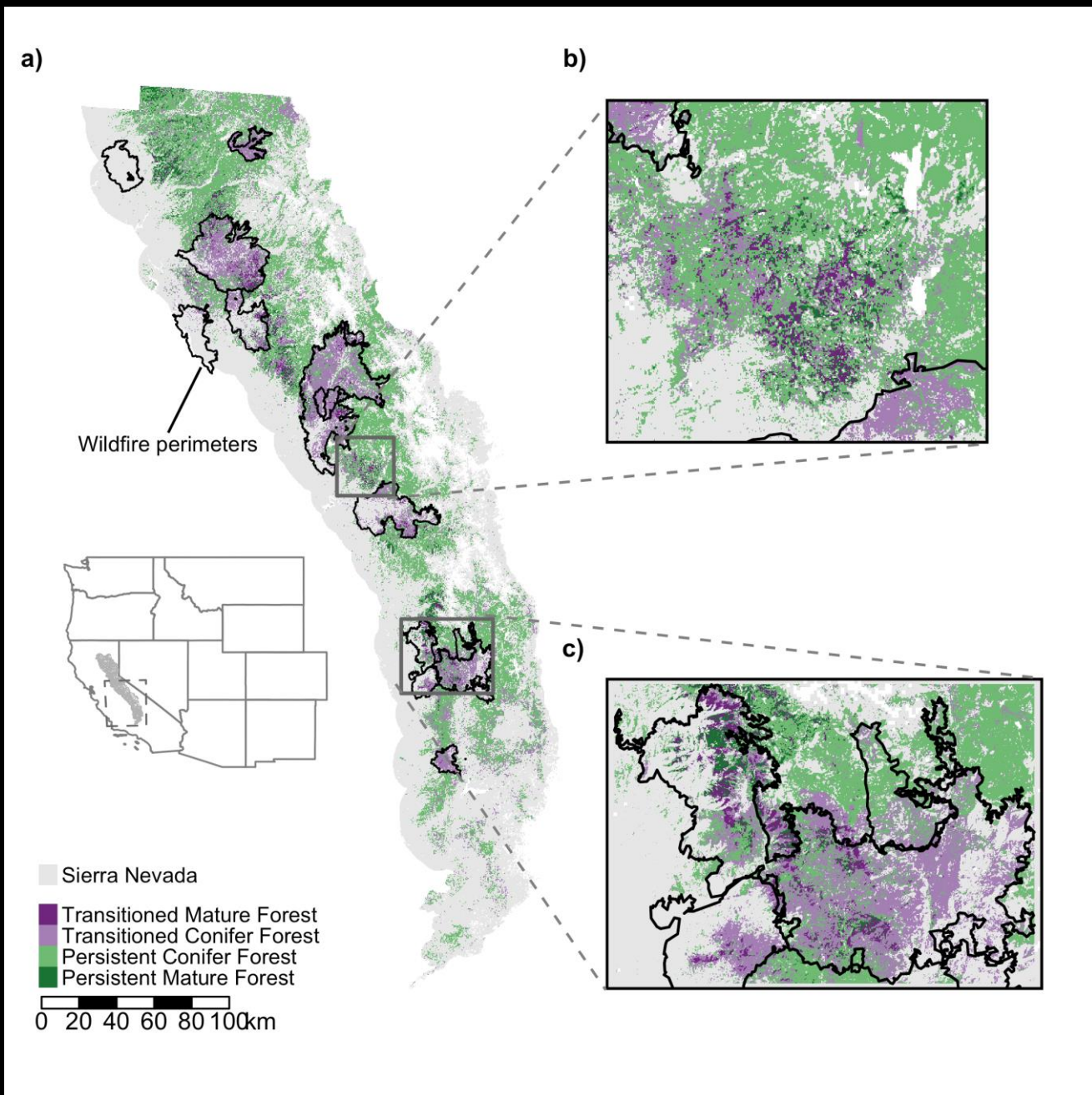


1) Mature Forest Habitats

- 30% transition from forests
- 50% degradation of mature forests



- Wide-spread drought mortality
 - Loss of valuable large trees
 - Increase fuel loading
- Large high-severity burn patches
 - Homogenous & fragmented wildlife habitat
 - Lower forest recovery

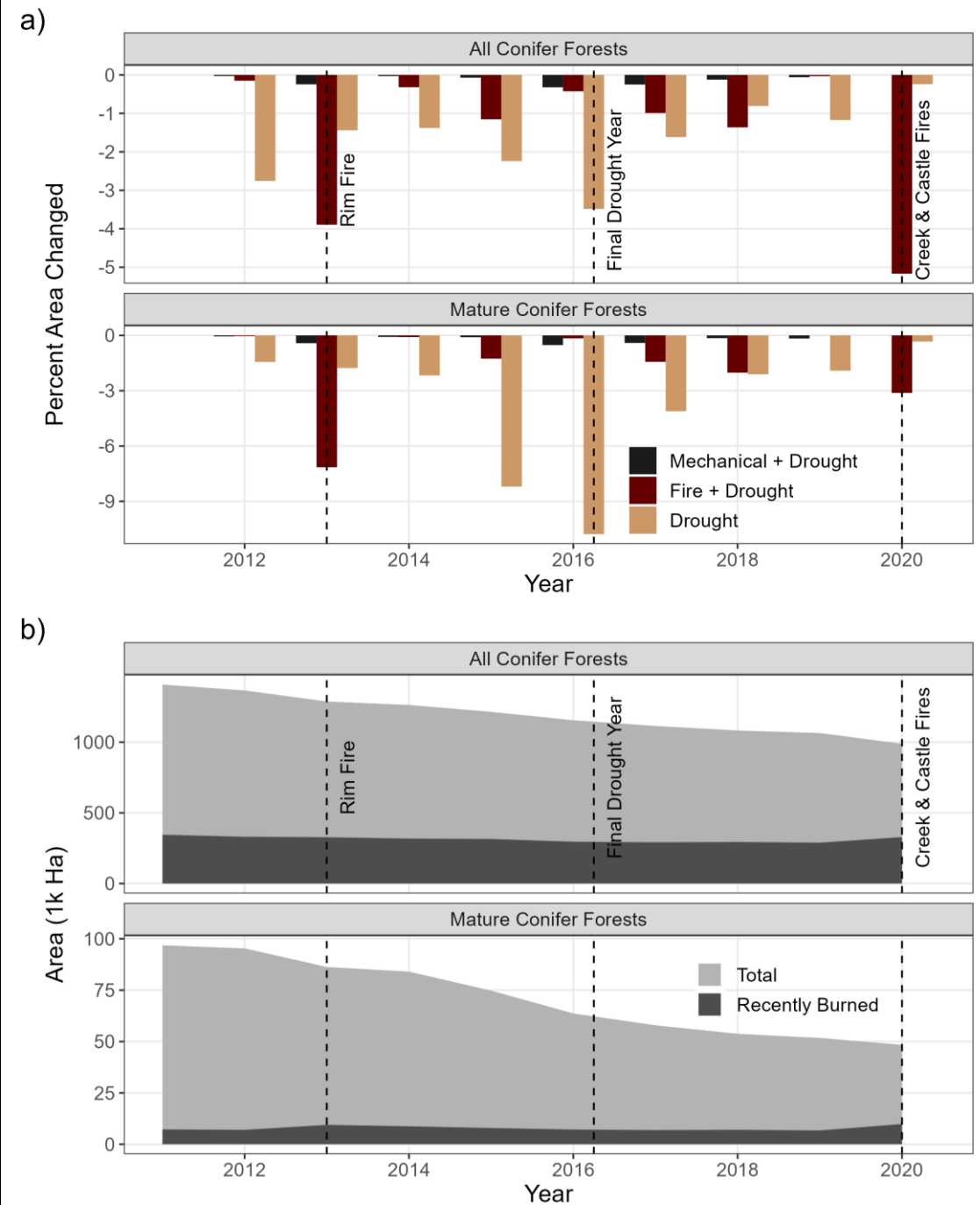


2) Any 'good' disturbance?

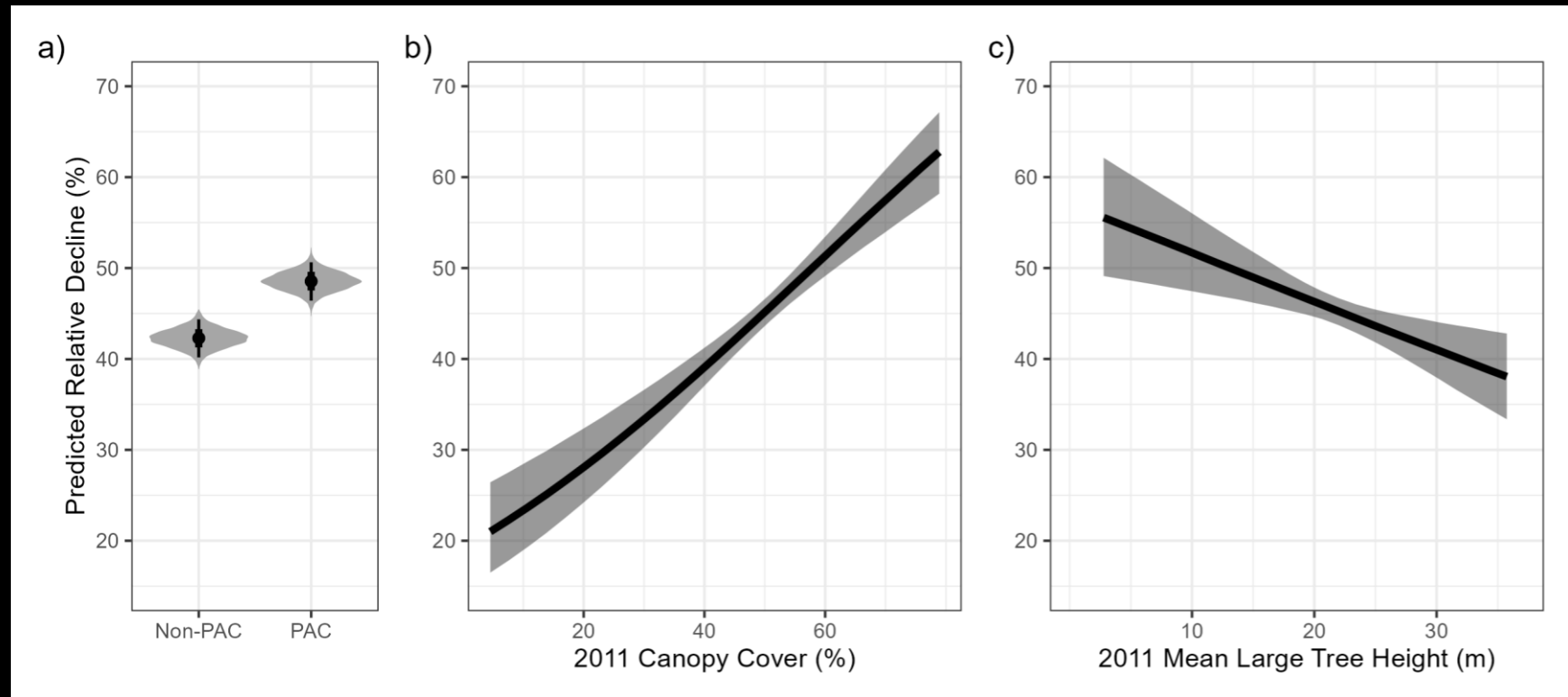
- Low-severity fire (and management) can be restorative



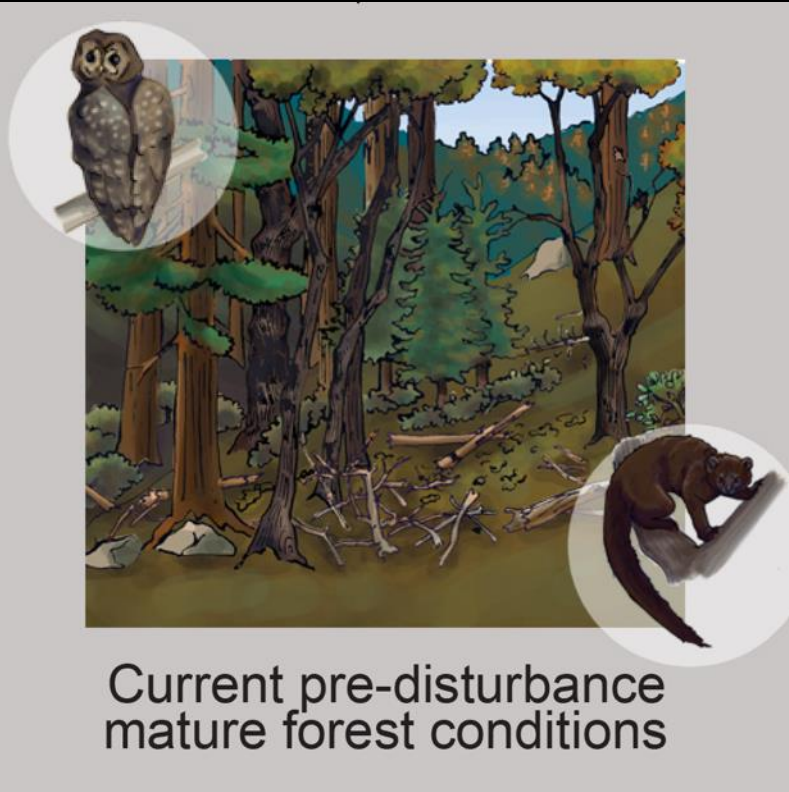
Peter James



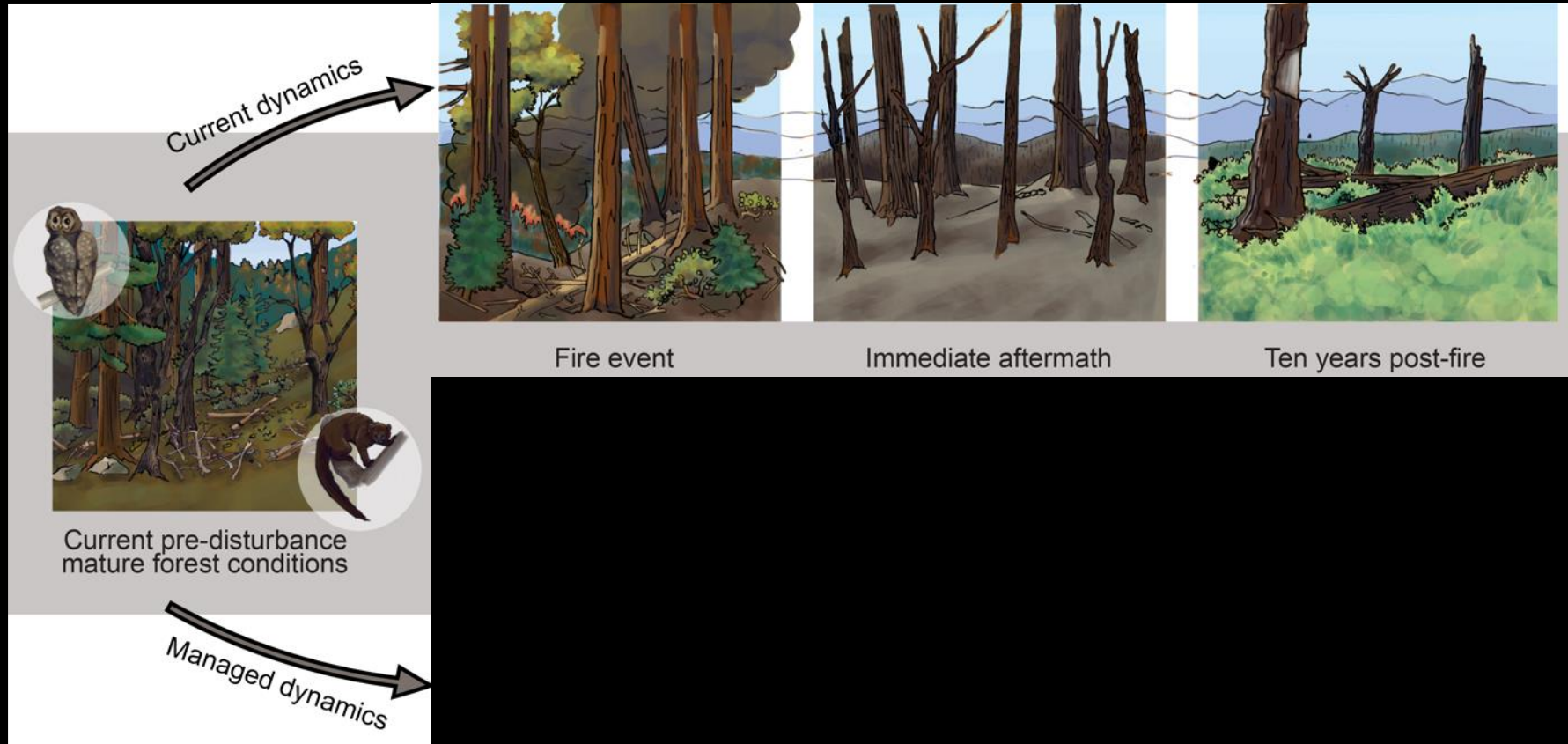
3) Do PACs protect from natural disturbance?



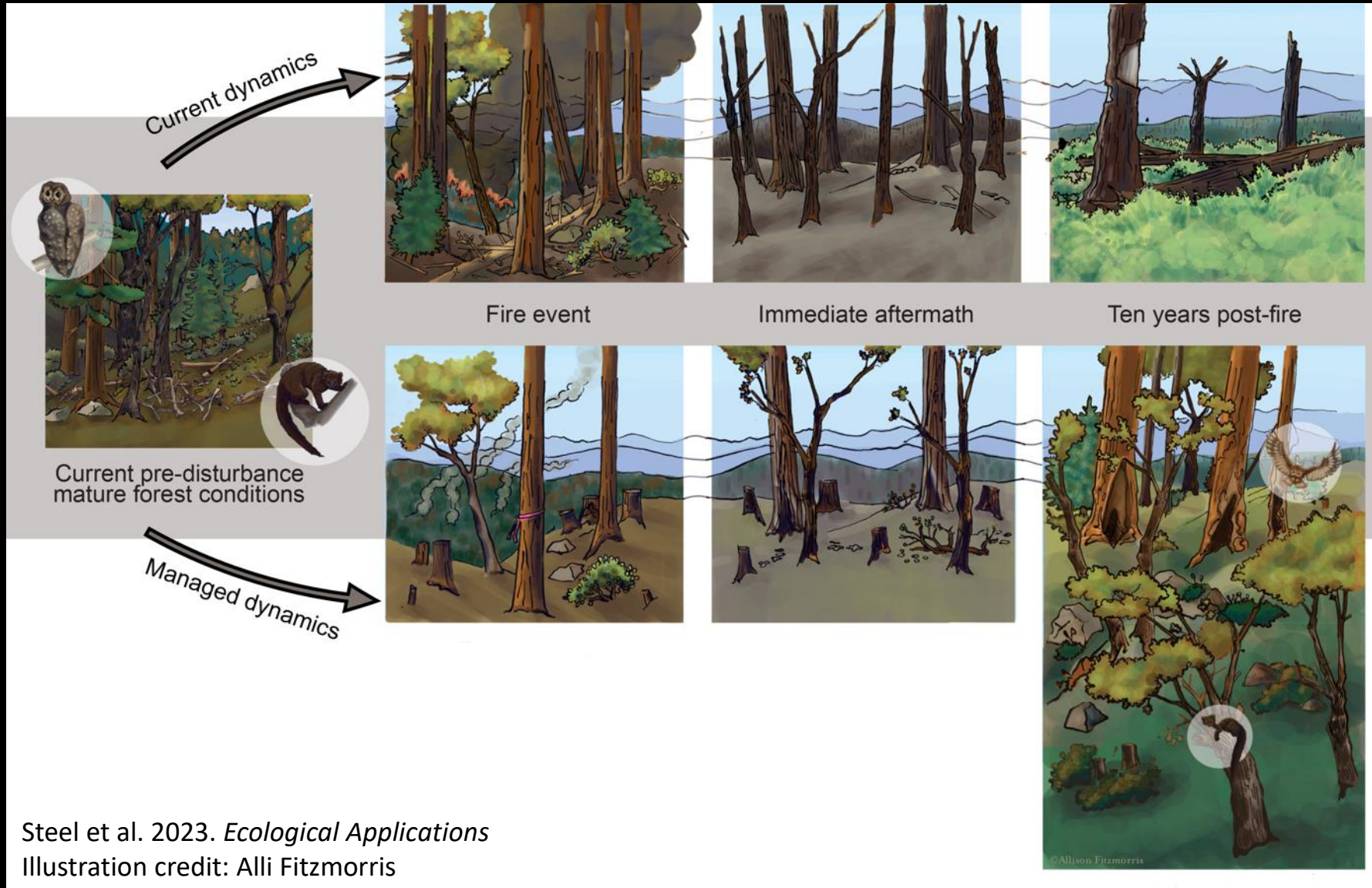
Cost of action vs. *Cost of inaction*



Cost of action vs. *Cost of inaction*

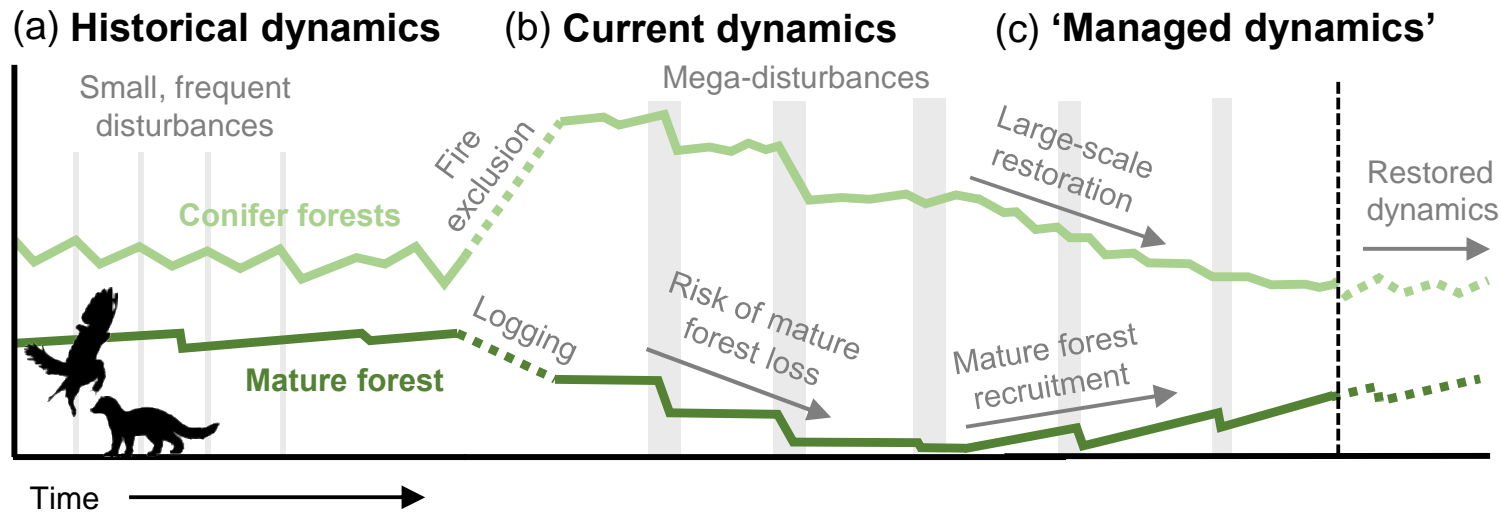


Cost of action vs. *Cost of inaction*



Steel et al. 2023. *Ecological Applications*
Illustration credit: Alli Fitzmorris

Managing new disturbance dynamics



Managed Wildfire, @YosemiteFire



Karok-Tribe, Rx cultural burn
California Ecological Origin



Acknowledgements, Contact, Questions



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