

**Moving forward with changed
conditions: The future of CA
forest with climate change and
extreme events**

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Novel Ecosystems

Interactions among stressors are creating threshold conditions



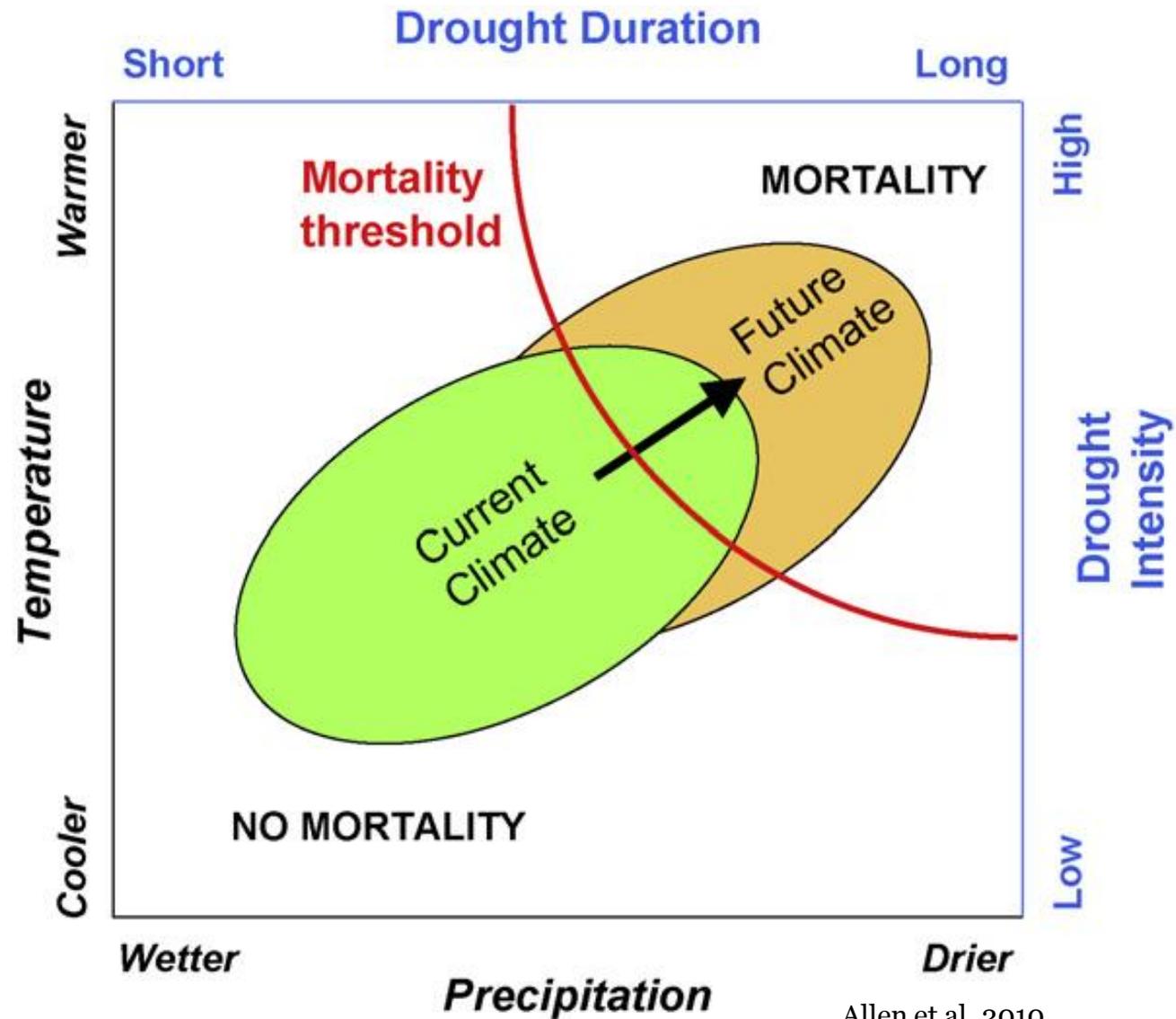
Jeffrey pine killed by fire in S. California, 6 yrs post-fire with no regeneration: fire X temperature X drought X pine beetles



Massive tree mortality: drought X pine beetles



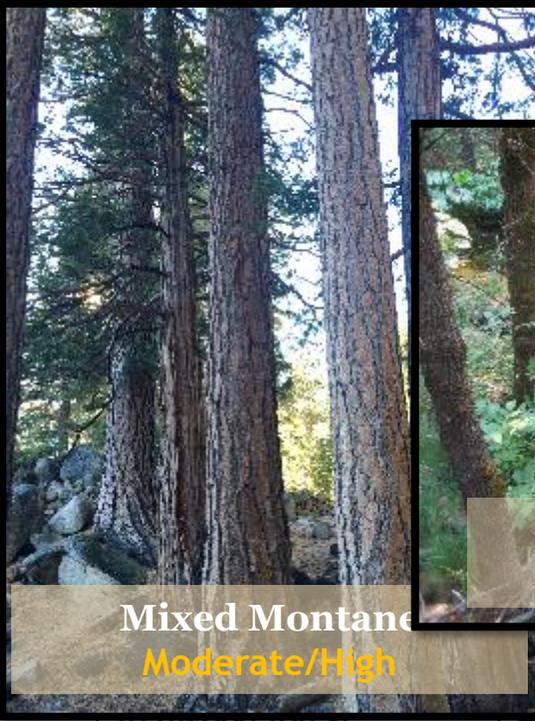
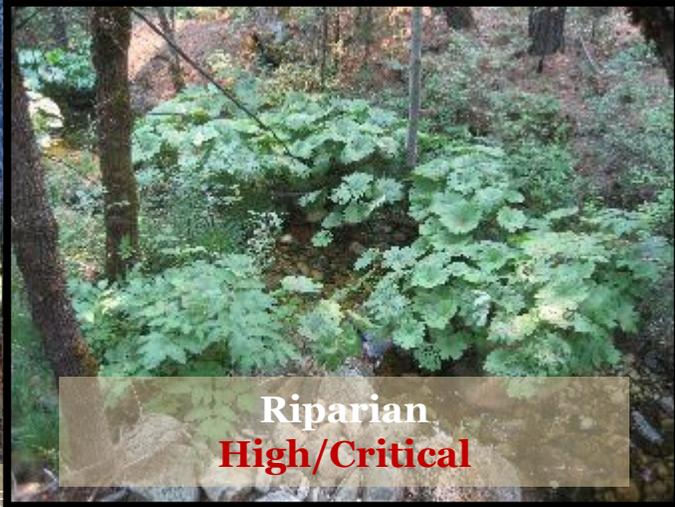
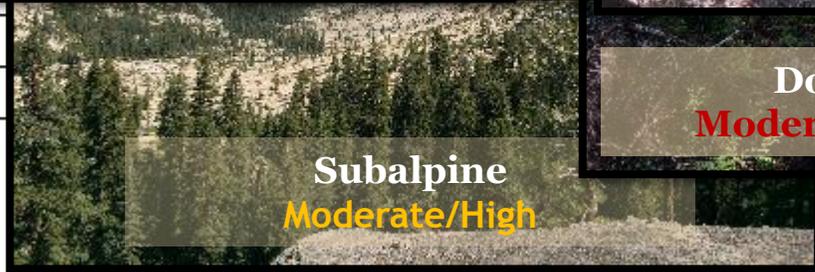
Future Climate and Drought Interactions



Allen et al. 2010



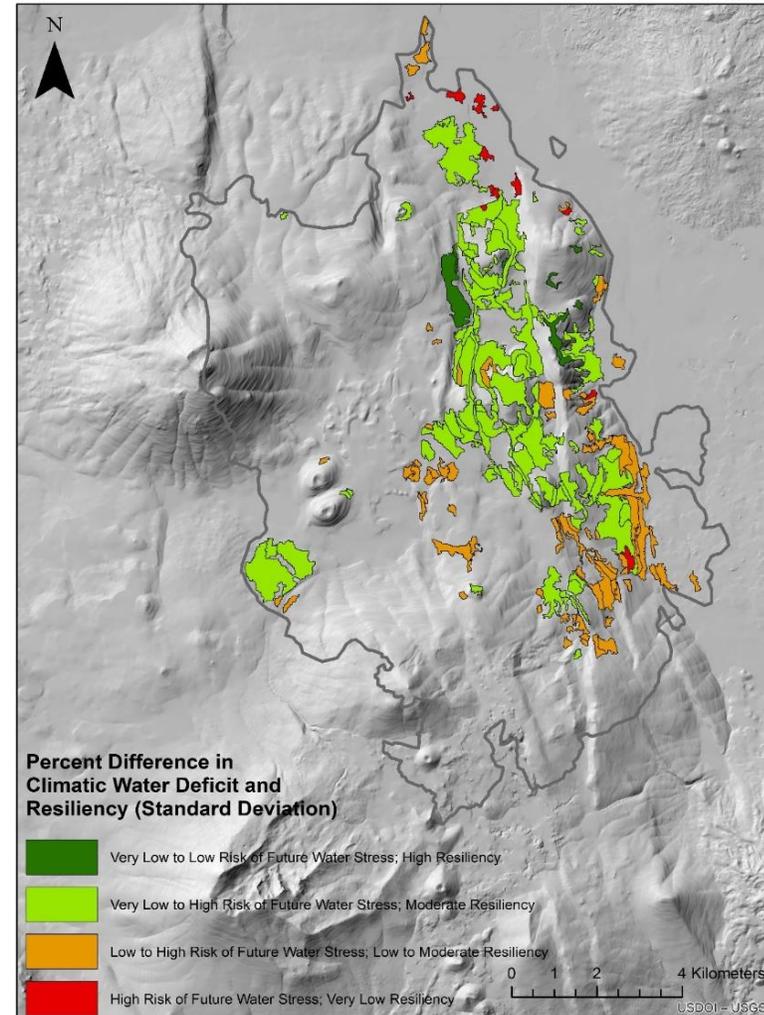
Vulnerability of Forest Systems

Forest type	Climate Class	MRI	5										
 <p>Mixed Montane Moderate/High</p>													
 <p>Riparian High/Critical</p>													
 <p>Subalpine Moderate/High</p>													
 <p>Red Fir High/Critical</p>													
 <p>Douglas-Fir Moderate to Critical</p>													
 <p>Ponderosa/Jeffrey Pine Forest Moderate/High</p>													



Adapting Management to Climate Change

Use tools to help identify areas of potential water stress in the future and adapt management. Assess particular vegetation types based on the ecological condition and biophysical data to guide post-fire restoration



Adapting Management to Climate Change

Planned Adaptation:
Restore forest structure,
function and composition to
promote resilience through
targeted treatments
(prescribed fire, mechanical
treatments).

Think outside the box!



Adapting Management to Climate Change

Restore fire to fire-adapted ecosystems to minimize fuel loading and reduce the potential for high severity fires, which are predicted to increase in the future as a result of climate change



Transition to M. North slide



“Forest Light”
Bente Hansen

North: Most Needed Research:

- By forest type, what tree density and spatial arrangement foster greater forest resilience to drought and fire?
 - Context: Lower densities and some tree group/gap patterned is needed but how to achieve with limited budgets and aggressive competing vegetation?
- When and how is prescribed burning best used as a silvicultural tool to increase resilience?
 - Context: Early & often but how to have better control?
- What administrative changes and economic incentives will most effectively increase treatment pace and scale?
 - Context: Money & expedited processes are lacking



Active fire group/gap with
regene. cluster



JOHN EXLINE

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