Climate change adaptation in a fire-adapted landscape in the Southern Sierra Nevada

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Sequoia/Kings Canyon National Parks
George Wright Society -- Session 1
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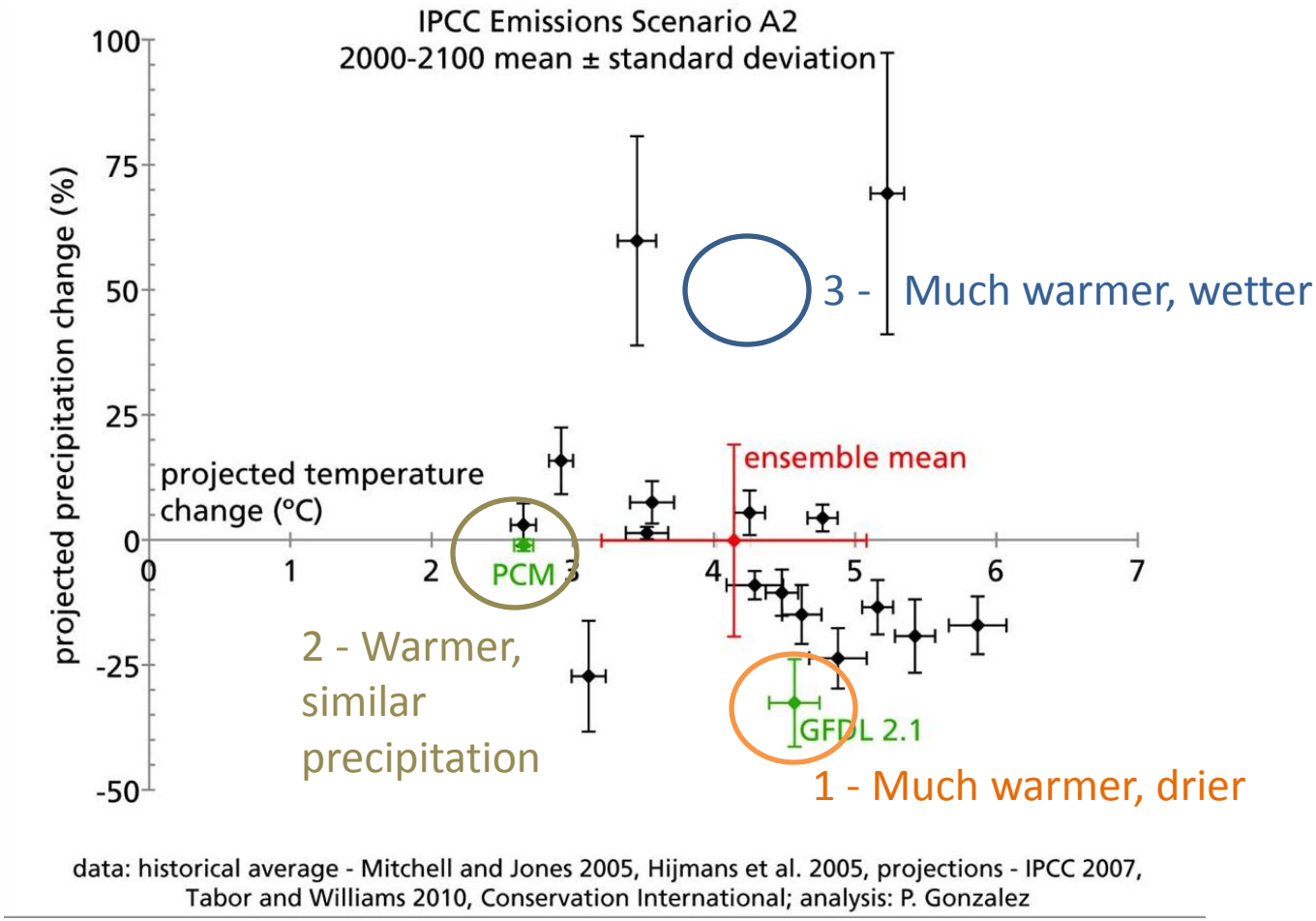
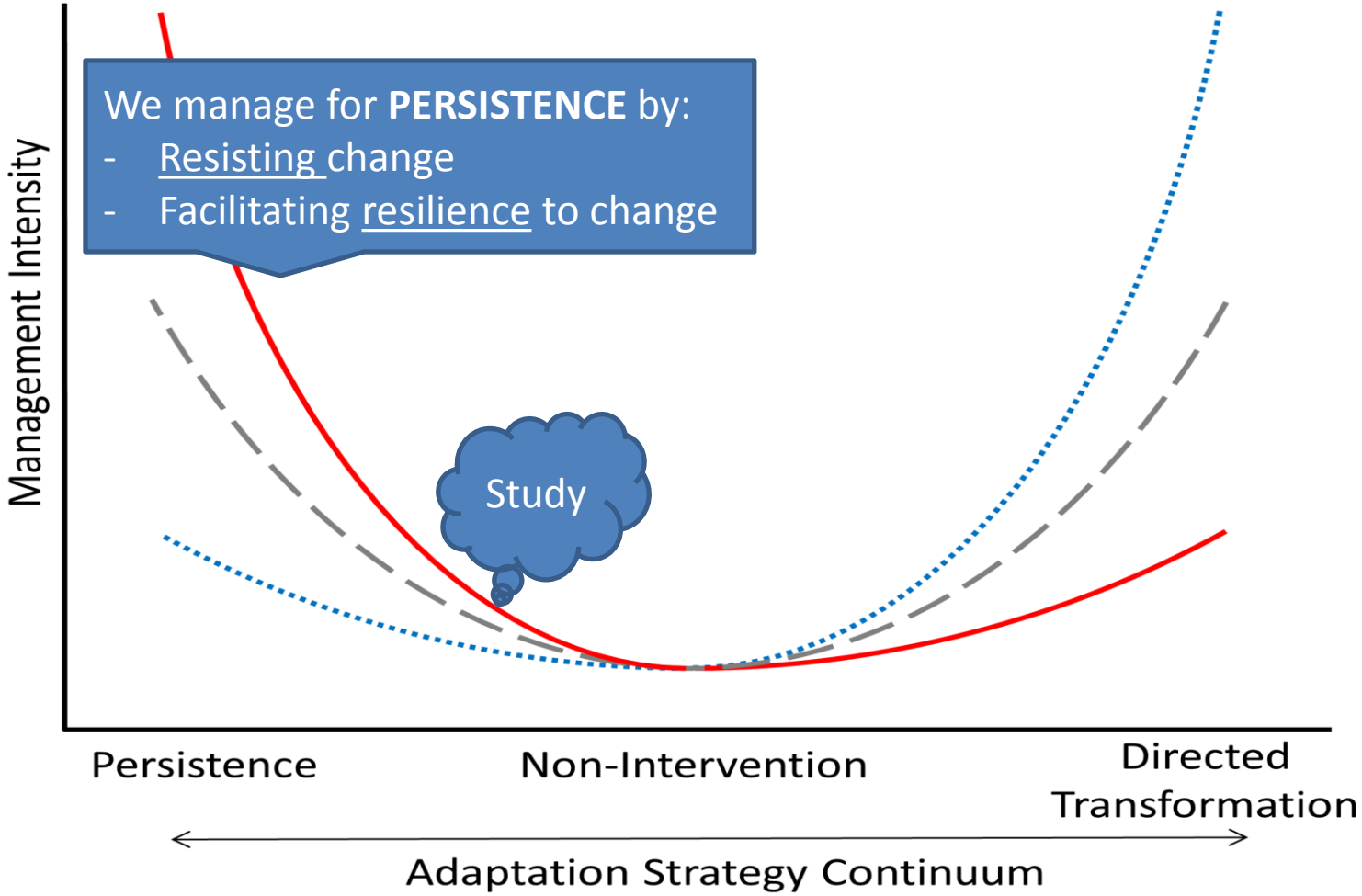
Sequoia and Kings Canyon National Parks' Perspective

- What are we <u>doing now</u>?
- What are we <u>trying to do</u>?
- <u>Where</u> should we do it?
- What do we <u>need</u> to move forward?

Future Climate Projections for the Southern Sierra Nevada



Where are we on the ”adaptation strategy continuum?”



What are we doing now to adapt?

Meadows & Wetlands

- Avoiding and restoring visitor and admin impacts
- Early detection and control of invasive plants

Forest Ecosystems

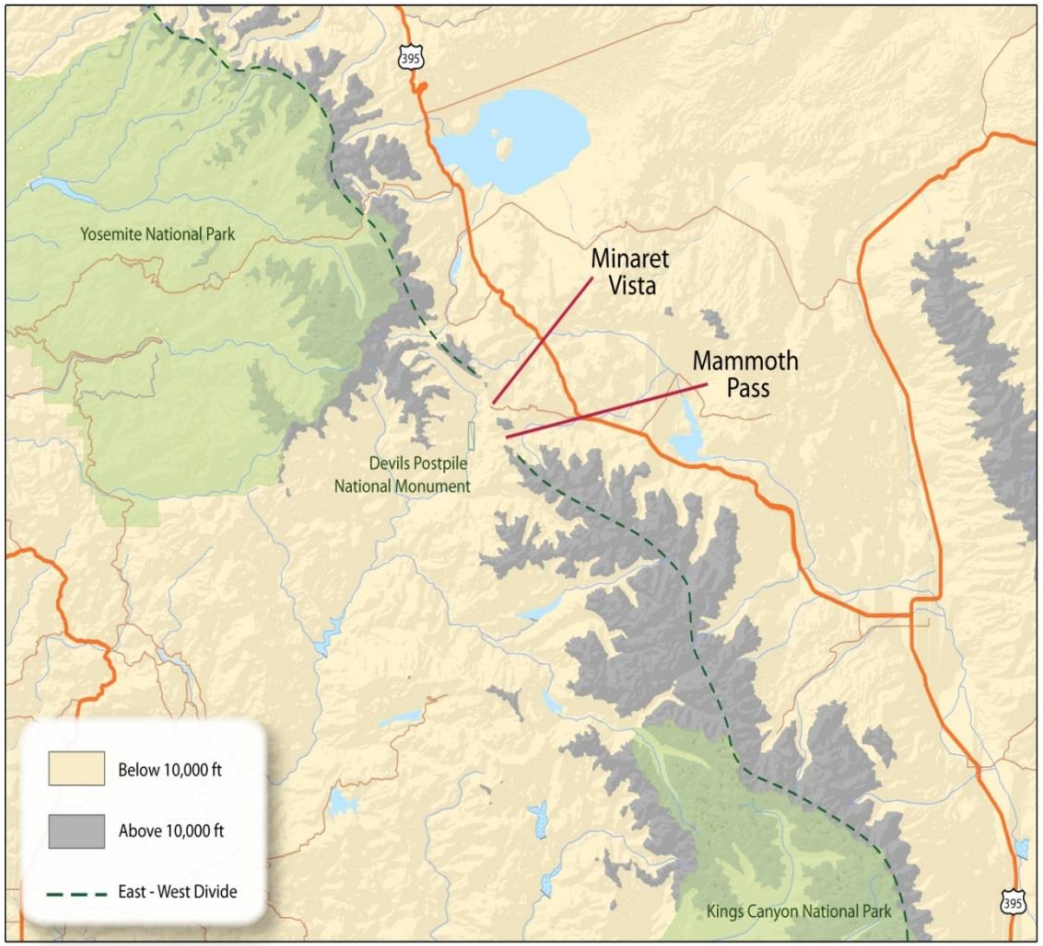
Treatments based on historic range of variability (HRV) concept as guiding framework

- Managed wildfire
- Prescribed fire
- Mechanical treatment

Aquatic Ecosystems

- Removing established populations of non-native trout to save endangered frogs

We have successfully managed for persistence at the site scale.



It is unlikely that we will ever be successful at the landscape scale which means we cannot attained desired conditions in most areas.

Educating & Engaging Stakeholders

What do we **value?** Where do we value it most?

What are **current objectives** for these things?

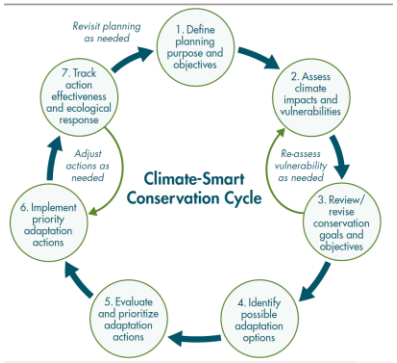
How **vulnerable** are these things? Where, when & why?

Do current objectives make sense? What are **revised objectives**?

What **strategies & tools** accomplish revised objectives?

How to **prioritize /decide** (What to do? Where? When?)

SCIENCE + VALUES



Plausible Future Scenarios

20 years

80 years

1 - Much warmer drier

Fewer sequoia seedlings. Fire increases. More open forests. More ponderosa pine, incense cedar, and black oak. Less firs and sugar pine.

No more snowpack in most groves. Almost no sequoia seedlings. Fire activity still increasing. Conifer die-offs in 30% of groves; half of mature sequoia die. Conifers replaced by shrubs, hardwoods, and weeds. By 2100 sequoia restricted to high elevation, N aspects in wettest locations. Limited expansion into drying wetlands after they burn.

2 – Warmer, similar precip.

3 - Much warmer wetter

More flooding and erosion. Forest productivity & ladder fuels increase. Fires less frequent but more severe. Dense fir-dominated forest in unburned areas with patches of oak and sequoia thickets following fire.

No more snowpack in most groves. Winter storms cause severe erosion and mass wasting. Forests much denser. More breakage and pathogens. Many seedlings infected by fungus. A few groves decimated. In dry years, fires sometimes stand-replacing – converts to oaks, shrubs, and weeds.

We Are All Stewards Scenario Game and its 2050!

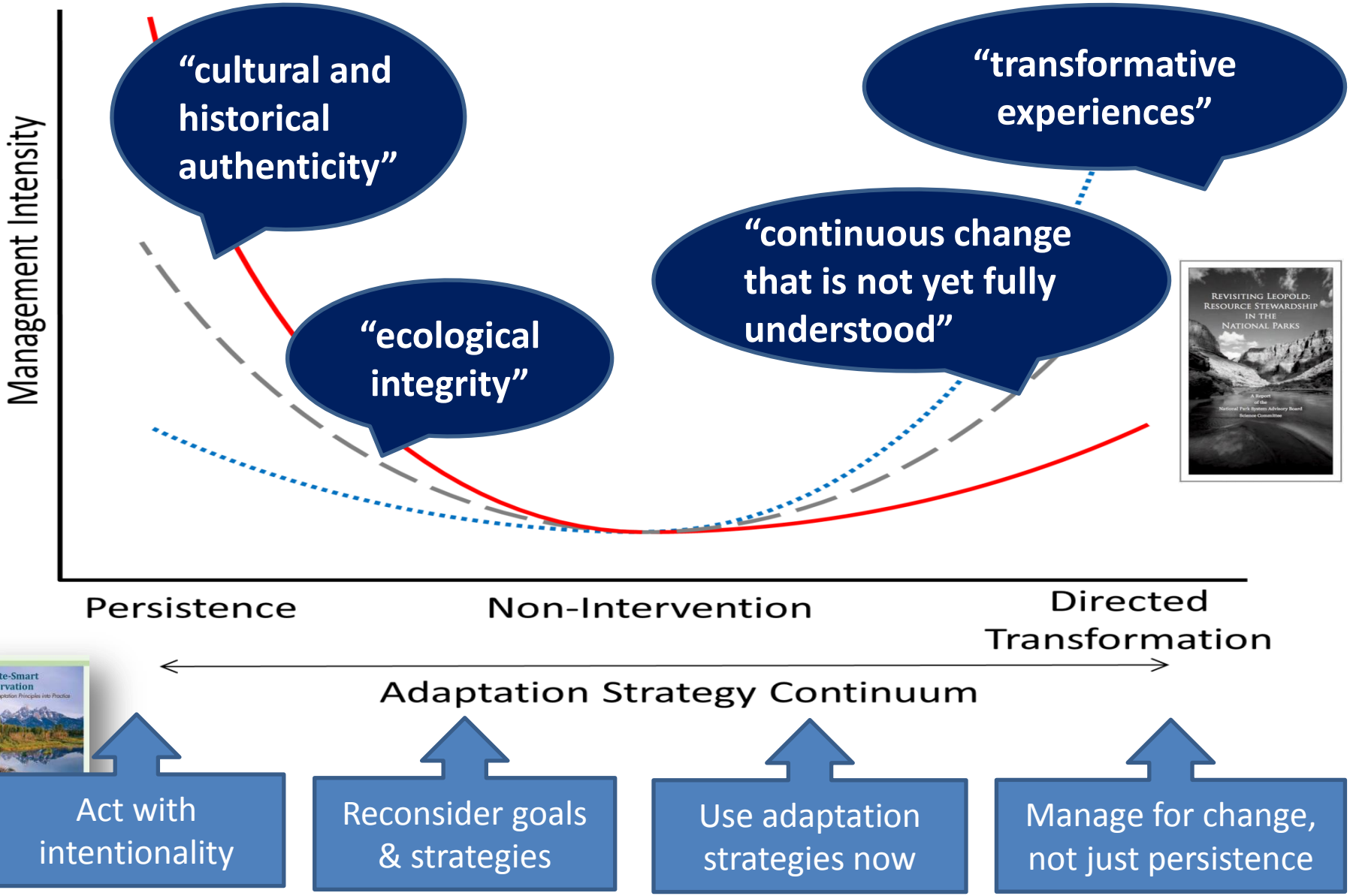
“Why didn’t they do

_____

(fill in the blank)

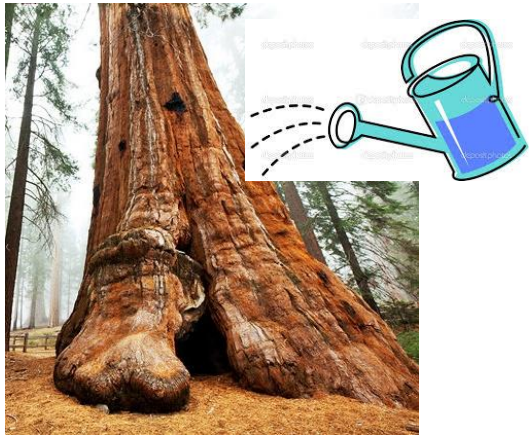
30 years ago?”

Adopting New Stewardship Principles



Potential management interventions

Soil and hydrology



- Irrigating individual trees
- Augmenting flow
- Erosion control

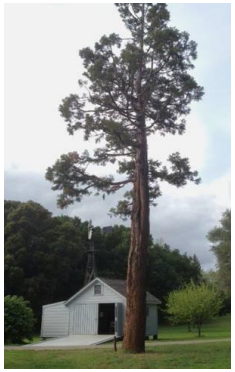
Fire and fuels

Non-native plants

Insects & pathogens

Removing hazard trees

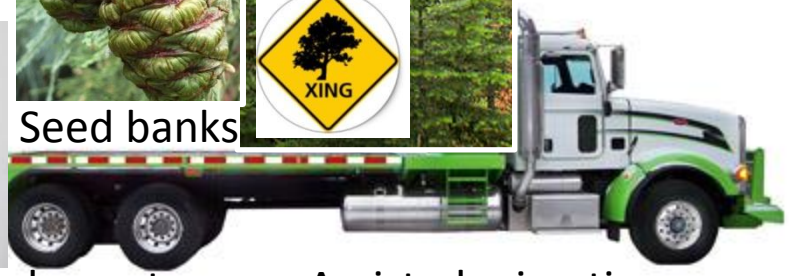
Spraying high value trees



Seedling regeneration

Adapted species and genotypes

Seed banks



Assisted migration

Response to Abrupt, Extreme Events

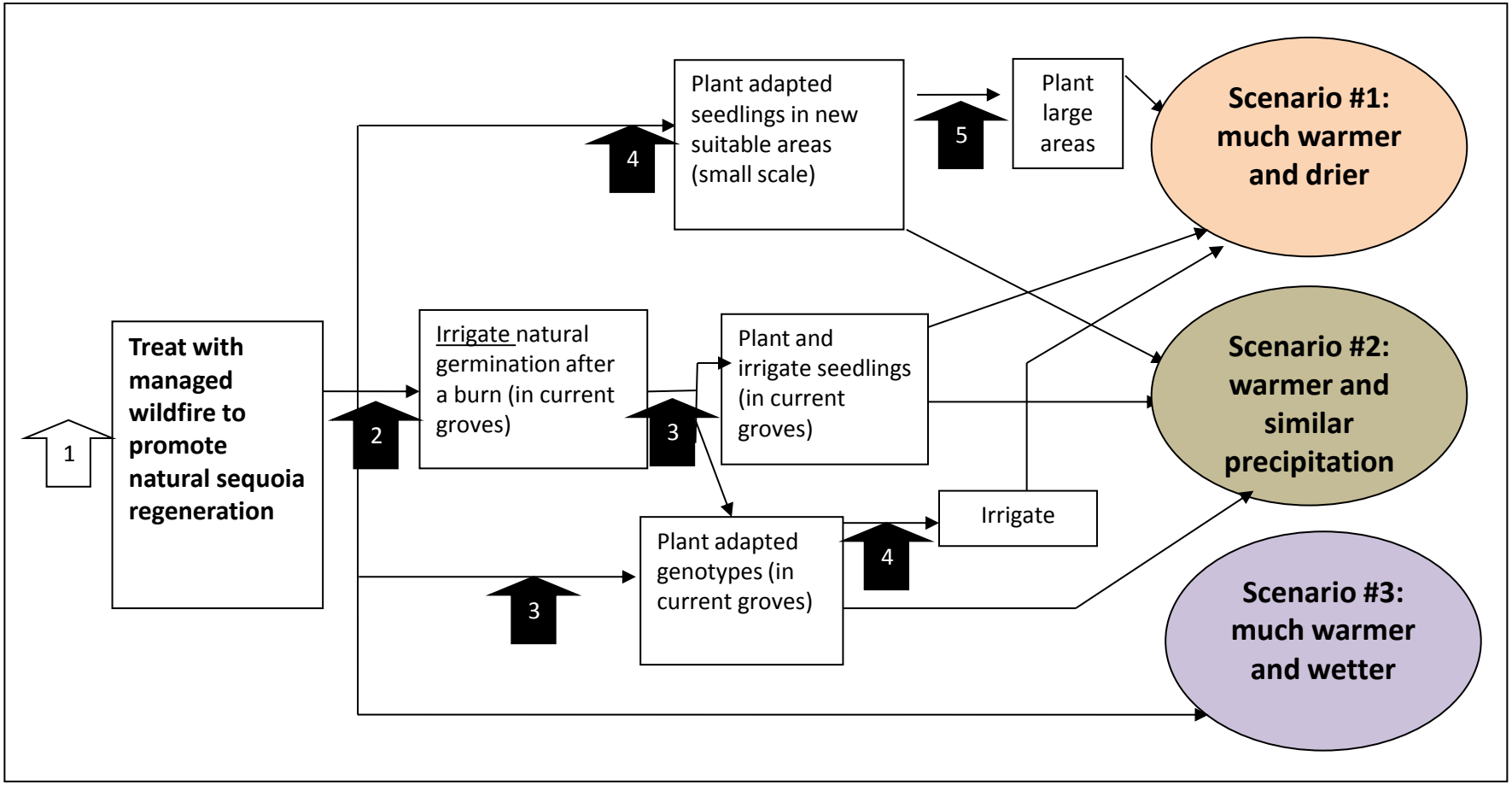
When to take action

(giant sequoia regeneration)

Early warning trigger	Intermediate trigger	Imminent loss trigger
Continue but watch out!	**Initiate new actions**	**Initiate extreme actions**

1 2-4 5

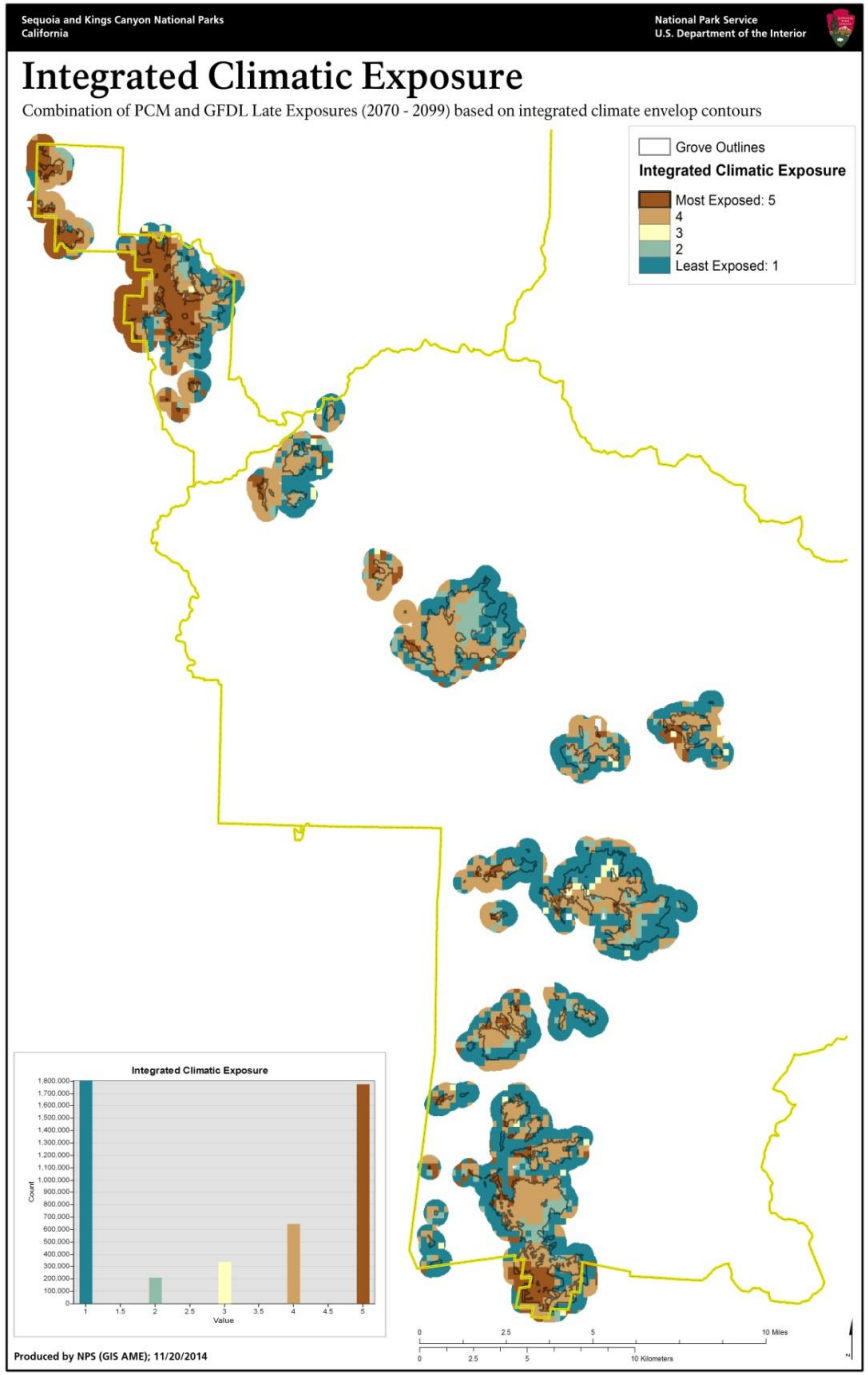
Desired Condition	Intermediate condition	Degraded condition



Where to take action

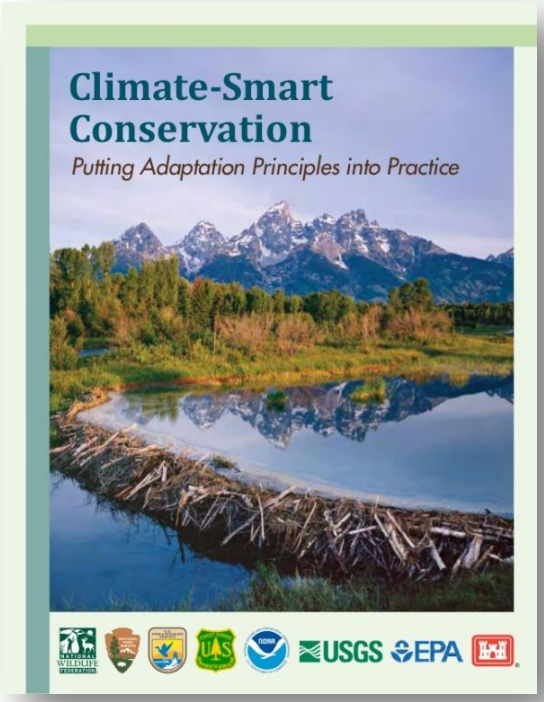
Potential Factors:

- Resource Values
  - Biodiversity Conservation Value
  - Cultural Resource Conservation Value
  - Social Value (visitation)
- Vulnerability (climate, fire)
- Feasibility of Management

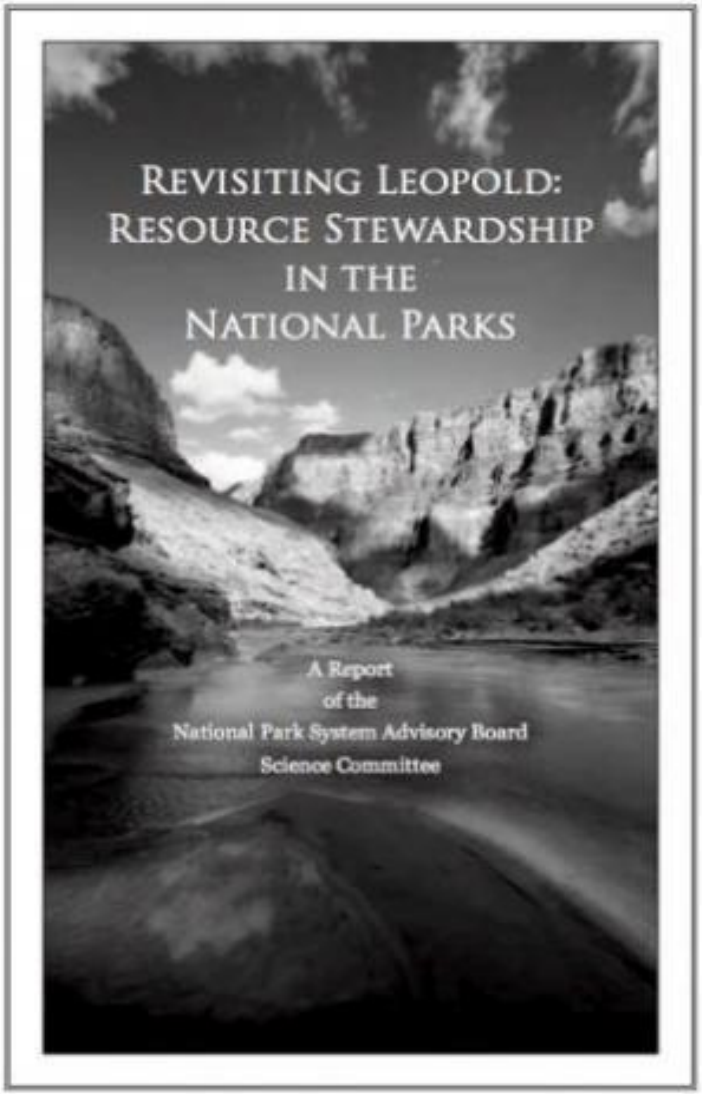


What do we need to move forward?
New governance paradigms

- Revised resource stewardship fundamentals fully integrated into policies and plans



- Definitions
- A mandate and a means for effective coordinated regional planning
- Demonstration areas for experimentation
- Ability to accept inevitable losses
- Revised management goals, objectives, & polices.



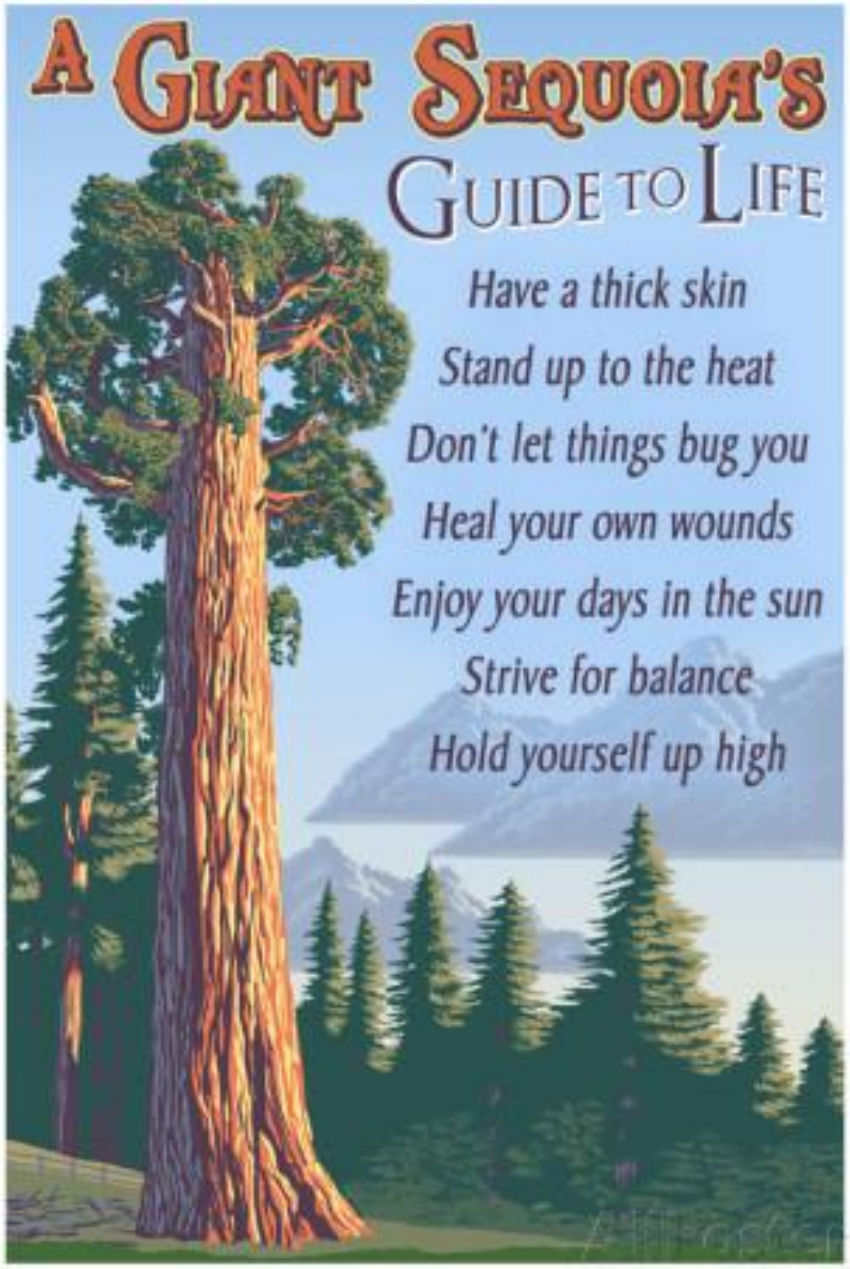
What do we need?
Better Knowledge and Tools

- Vulnerability assessments across space and time for our fundamental resource values
- Understand the opportunities and limits of so called “climate refugia”
- Much better down-scaled climate models for the Sierra Nevada
- Regional information clearinghouses
- Climate-smart adaptation planning tools
- Tools to optimize investment decisions

What do we need to move forward?
Engaged Stakeholders

- ✓ Political and institutional leaders, managers, and advisors
- ✓ Facilitators, educators, and philosophers
- ✓ Scientists, scholars, and inventors
- ✓ Partners in conservation and public engagement
- ✓ Citizens with diverse perspectives

We need to engage everyone to prepare for a "better or worse" type of relationship with the natural world.



Thank you for listening.

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For more information at the conference visit these posters:

- **A Climate-smart Resources Stewardship Strategy? (7862)**
- **How can we effectively talk about and adapt to climate change? Catalyzing climate-smart stewardship. (7859)**