

Sustainable Lands and Trails in a Changing Climate

2013 California Trails and Greenways Conference
Granlibakken, Tahoe City

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ASCENT
ENVIRONMENTAL

Speakers

- **Curtis E. Alling, AICP**
Principal, Ascent Environmental, Inc.
- **Sydney B. Coatsworth, AICP**
Principal, Ascent Environmental, Inc.



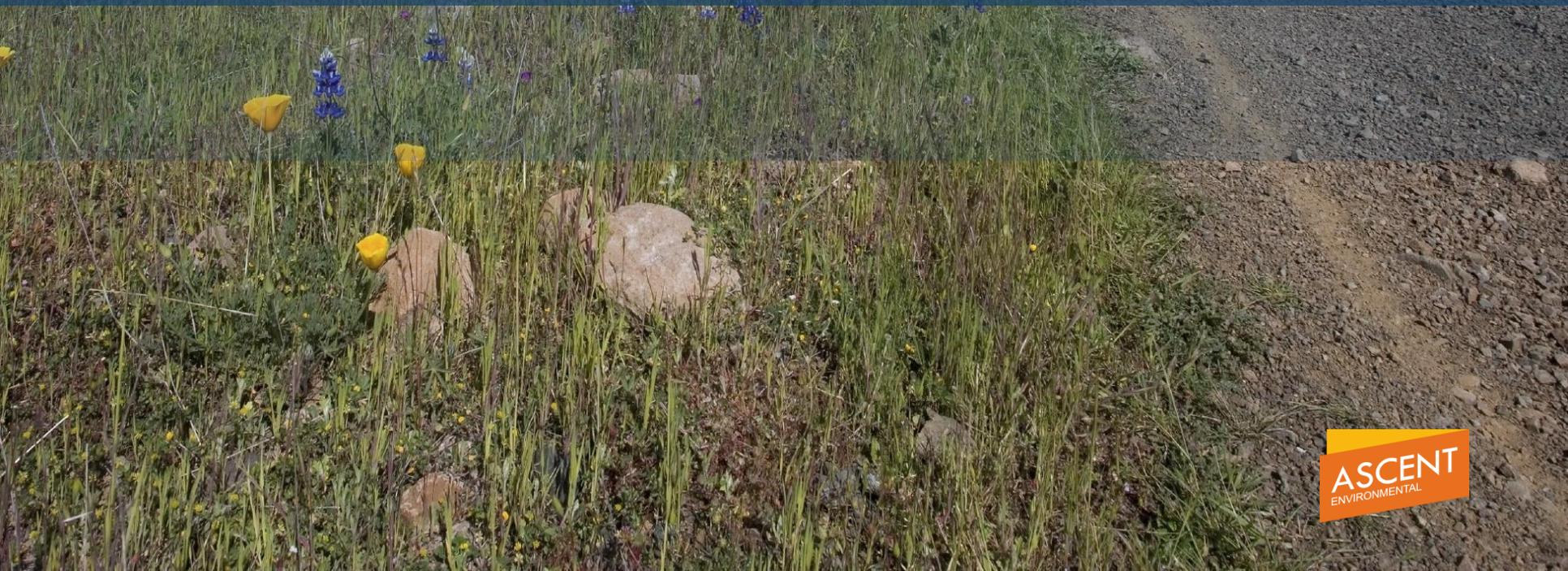
Topics Today

- **Climate Change Impacts of Concern for Trails and Public Lands**
- **Sustainability Responses for Direct Climate Risk Vulnerability**
- **Trail Use and Land Management Issues**
- **Adaptation Planning for Future Climate Conditions**
- **Useful Resources**





Climate Change Impacts of Concern for Trails and Public Lands



Climate Effects Important to Trails and Public Lands – Wildfire



Climate Effects Important to Trails and Public Lands – Sea Level Rise

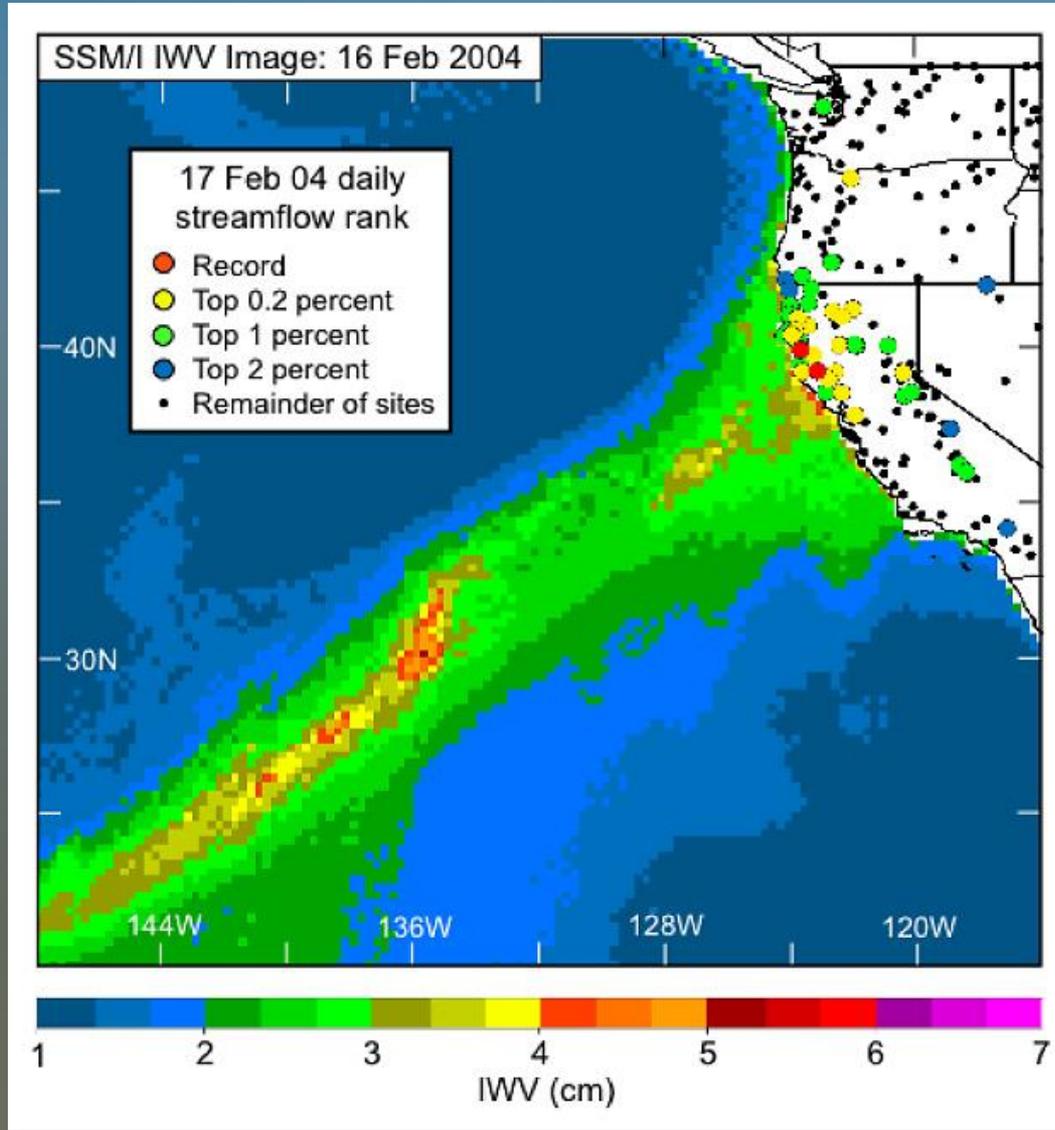


Climate Effects Important to Trails and Public Lands – Rainfall and Results



ight © Derek Hendstee 2011

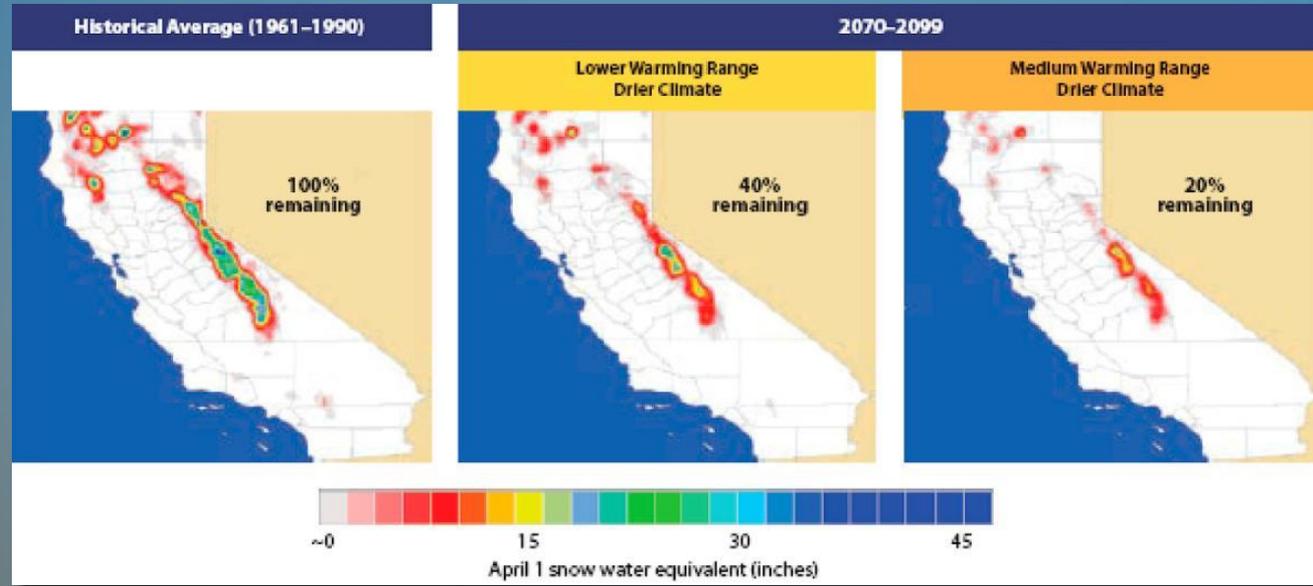
Greatest California Rainfall/ Flood Hazard Scenario



Atmospheric Rivers:

- Warmer
- Higher Vapor Content
- Greater Intensity

Climate Effects Important to Trails and Public Lands – Snowpack and Water

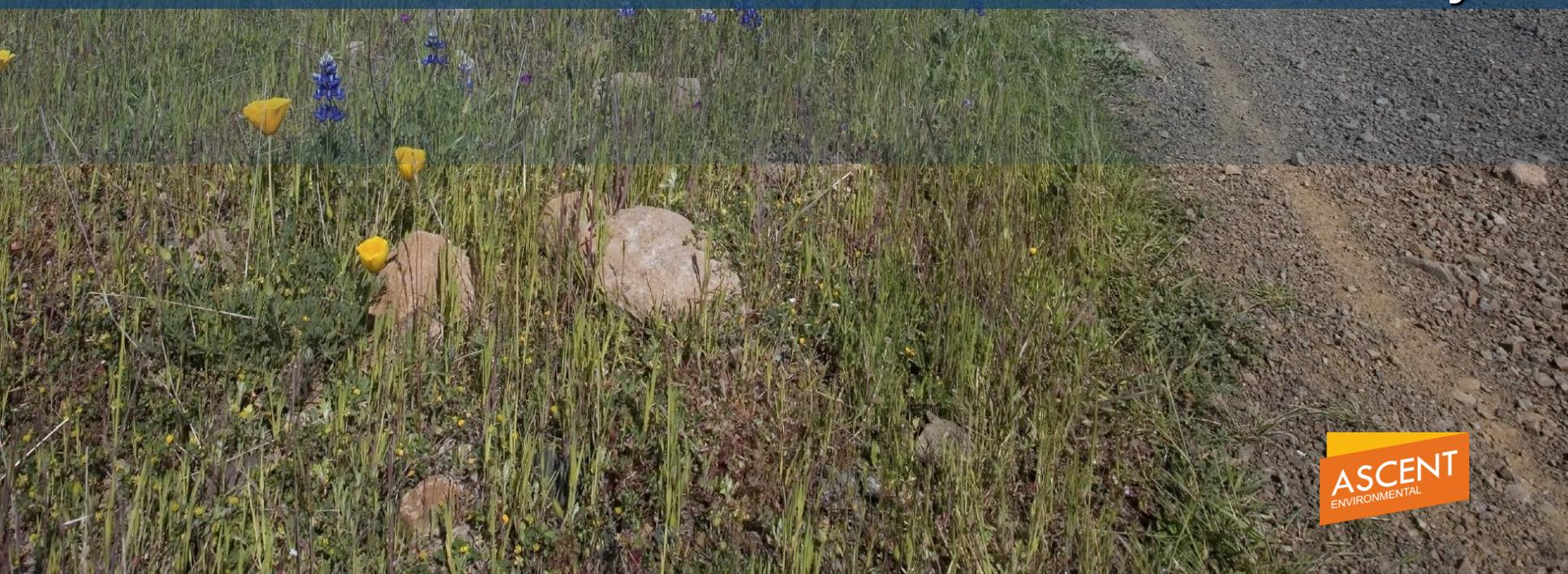


Key Stakeholders for Snowpack Sustainability





Sustainability Responses for Direct Climate Risk Vulnerability



Direct Vulnerability – Sea Level Rise

- High Tide Inundation



- Coastal Erosion



Sustainability Response to SLR

- SLR projections for the trail/public park
- Realignment or elevation/protection, where feasible
- Facilities tolerant of regular inundation
- User information for periodic closures



Creative SLR Protection for Park HQ



Direct Vulnerability – Changed Hydrology



Sustainability Response to Hydrology

- Find/review downscaled projections for your area
- Design improvements to better accommodate drainage
- Communication of hazards to users



If (Land) Trail Design Improvements Are Not Feasible, Change to a Water Trail



Direct Vulnerability – Erosion/Slope Issues



Sustainability Response to Erosion/Slope Issues

- Determine meteorological predictions/assess risks
- Modified slope protections and erosion-control designs
- Increased budget for slope and trail maintenance/repair, if needed



Alternative Sustainable Design for Overly Steep and Erosive Slopes



Direct Vulnerability – Wildfire



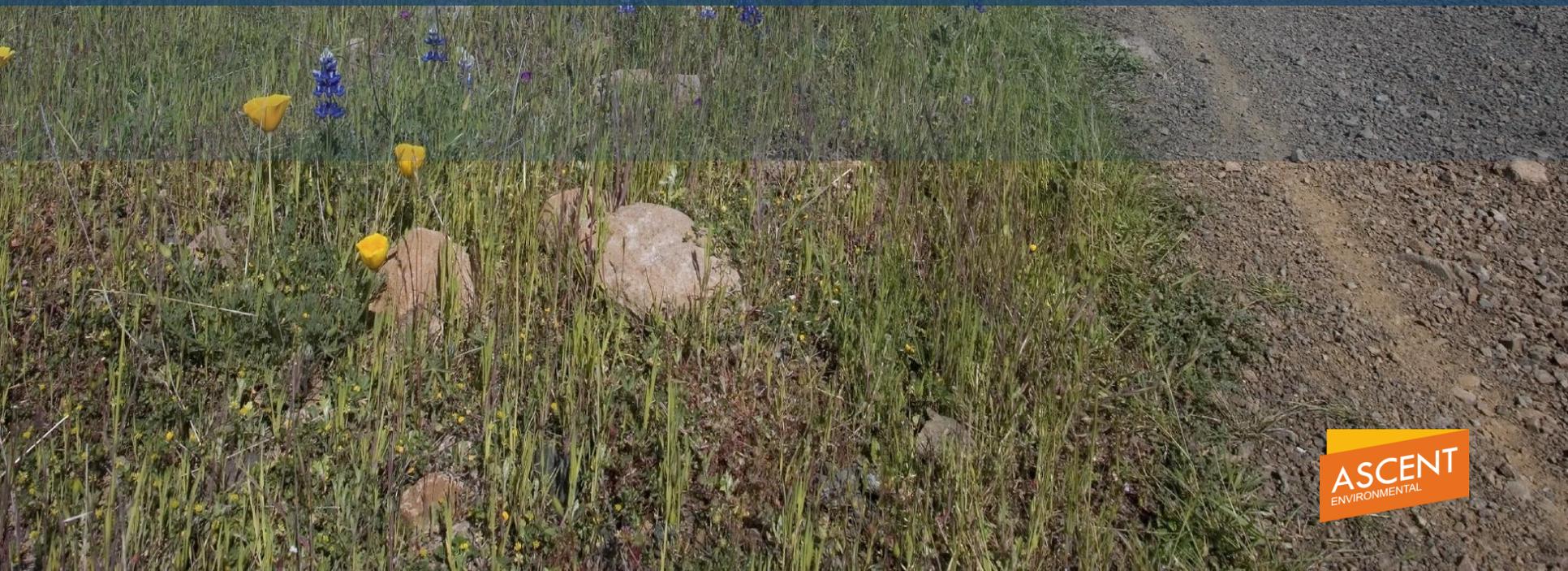
Sustainability Response to Wildfire Risk

- Understand changing wildfire risk projections
- Enhanced fire fuel management approach
- Restoration strategy contingency plans
- User education





Trail Use and Other Land Management Issues



Climate Change and Trail Use Management

- Changes in trail/resource attractants – snow persistence for Nordic trails, wildflower trails, autumn colors, wildlife
- Accessibility/weather and trail use patterns – reduced demand for cold weather uses, earlier high country snow clearance, earlier and longer warm weather season, increase in early morning/late evening or night trail use in hot weather
- Changing/increasing outdoor disease vectors



Resources Management with Changing Climate

- Changing habitat management needs
- Wildlife seasonal behavior changes, mobility, and dispersal
- Water supply and availability
- Challenges for revegetation, ecosystem restoration
- Benefit? Longer construction seasons in some areas
- GHG management and sequestration opportunities

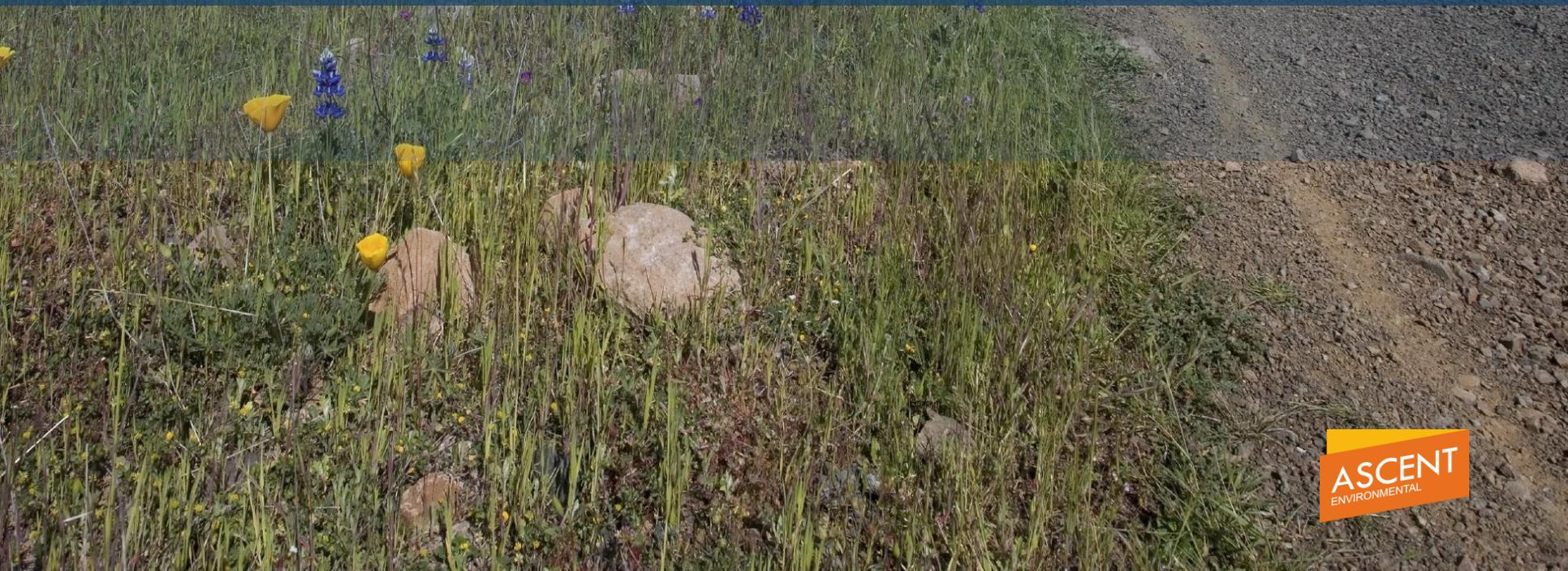


Creative GHG Management for Grazing on Public Lands





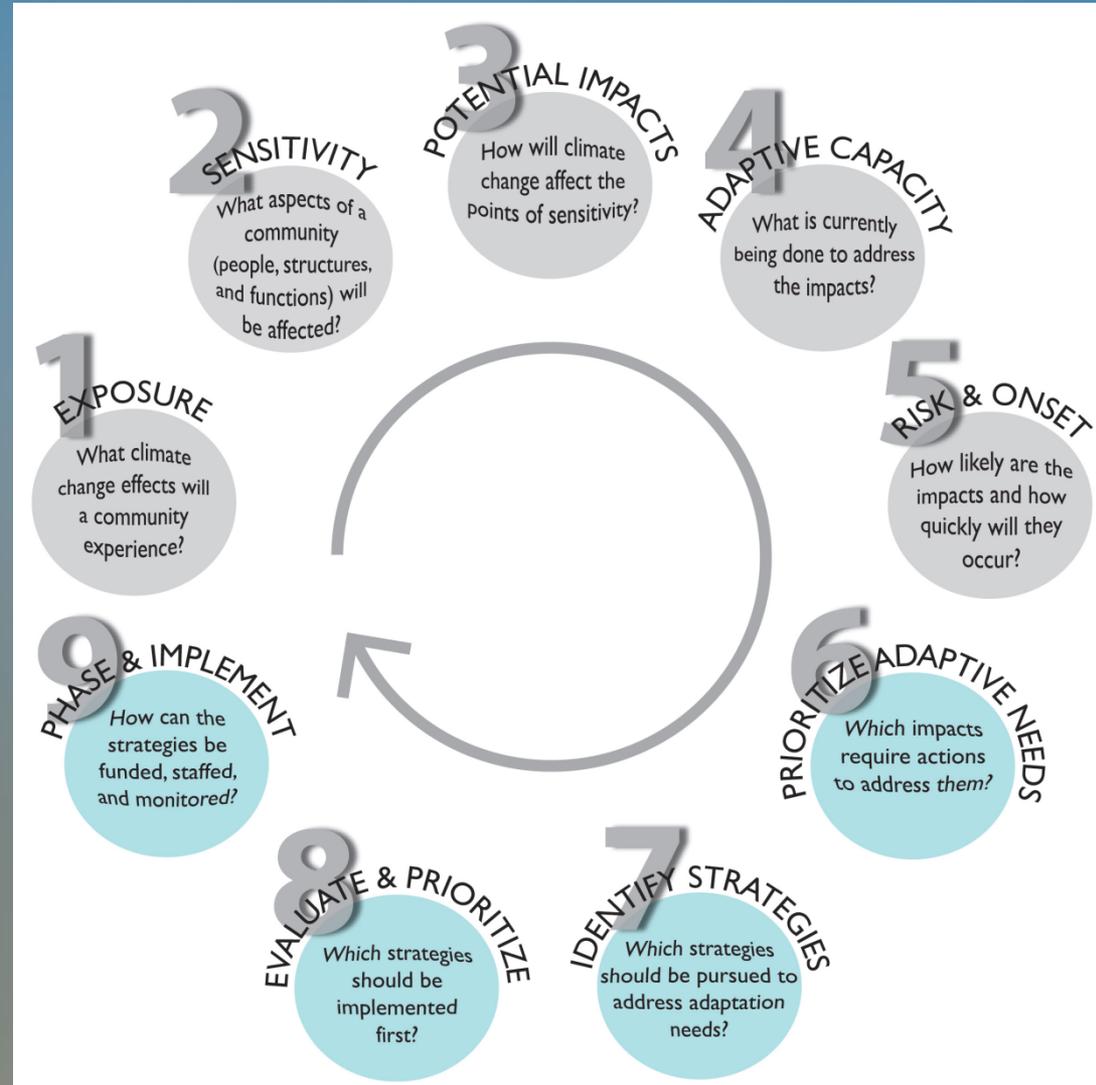
Adaptation Planning for Future Climate Conditions



Climate Change Adaptation Planning Process

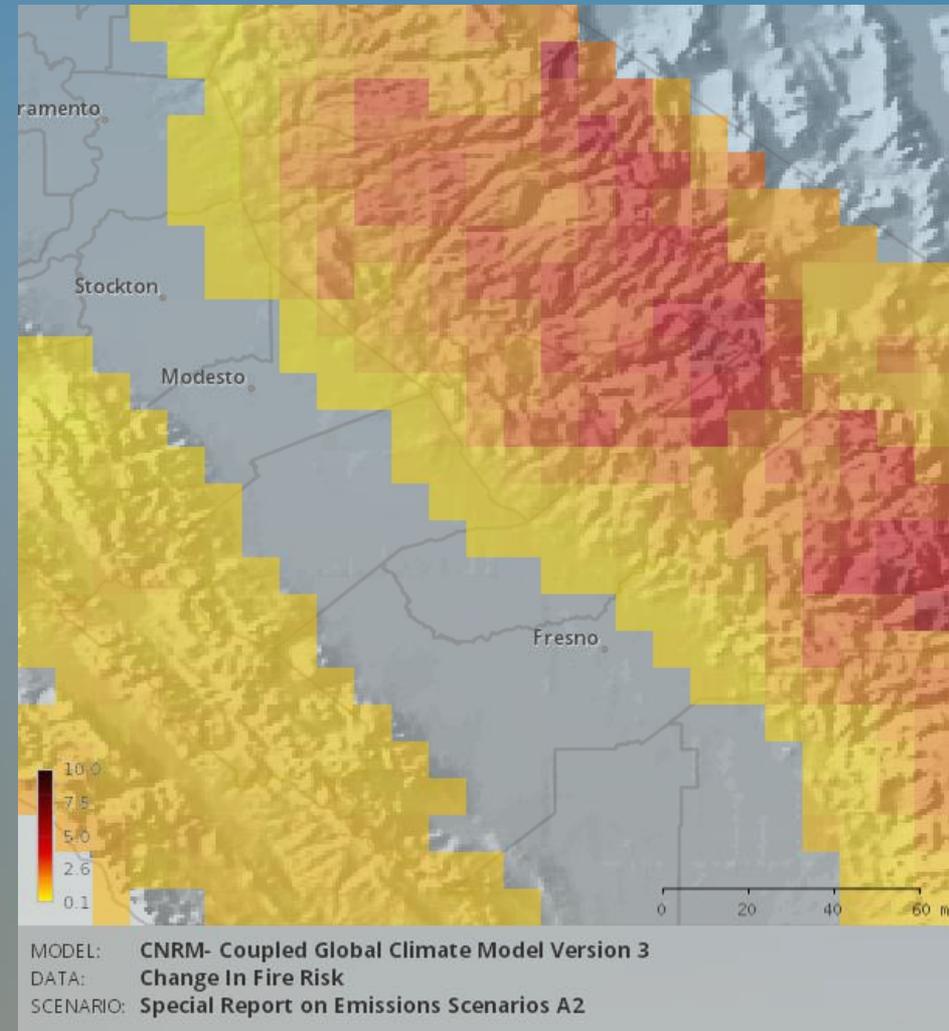
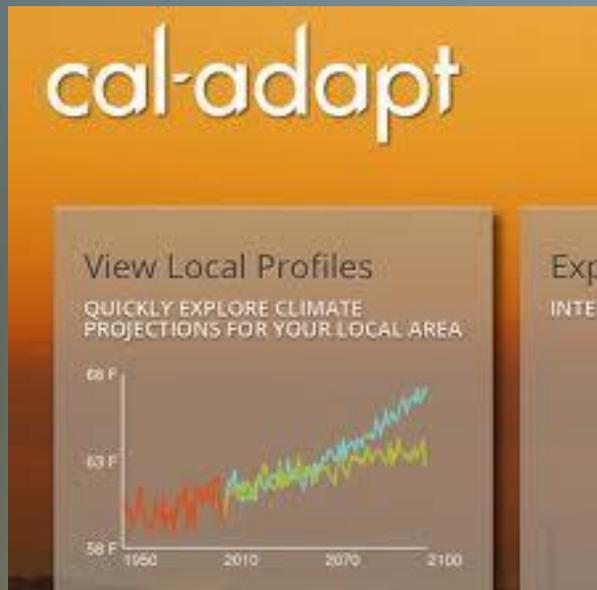
- Well established planning methods
- Tailor to trails and public lands

(From: California Adaptation Planning Guide, 2012)



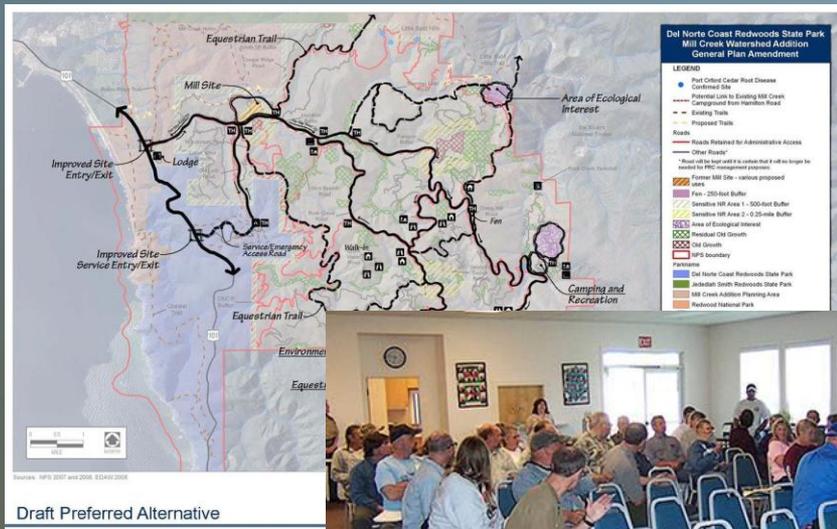
Climate Adaptation Planning – First, ...Best Available Information

- Evolving science and downscaling
- Risk, vulnerability, and cost assessments
- Best available climate information leads to best feasible practices



Comprehensive Planning for Sustainability in Climate Change Era

- Linking with universities
- Including climate change component in land and trail plans
- Public outreach, education, and interpretation
- Adaptive management approach is essential



Useful Resources

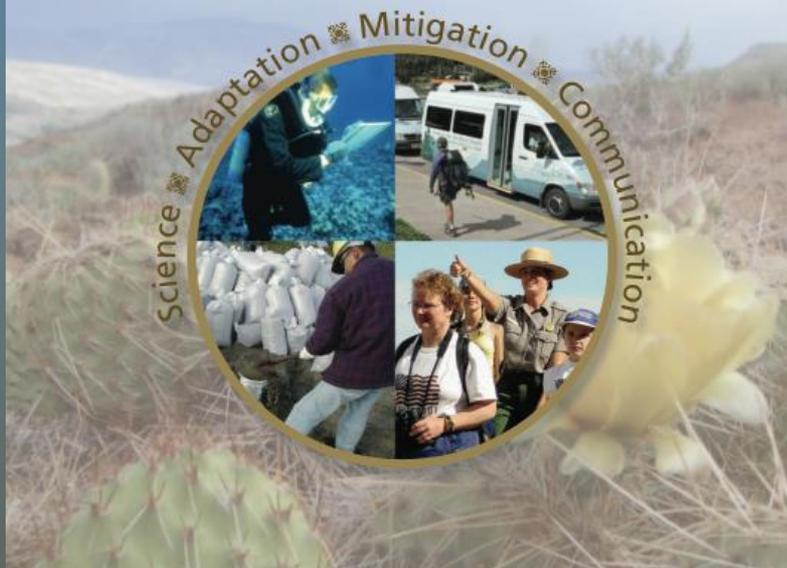
- [NPS Climate Change Response Strategy](#)
- [USFS Climate Change Resource Center](#)
- [U.S. EPA Climate Adaptation Guidance](#)
- [BLM Landscape Approach](#)
- [California Climate Adaptation Strategy and Adaptation Planning Guide](#)
- [Australian Department of Climate Change](#)



NPS Climate Change Response

National Park Service Climate Change Response Strategy

September 2010



National Park Service
U.S. Department of the Interior



Green Parks Plan

Advancing Our Mission through
Sustainable Operations



April 2012

USFS Climate Change Resource Center



U.S. Environmental Protection Agency



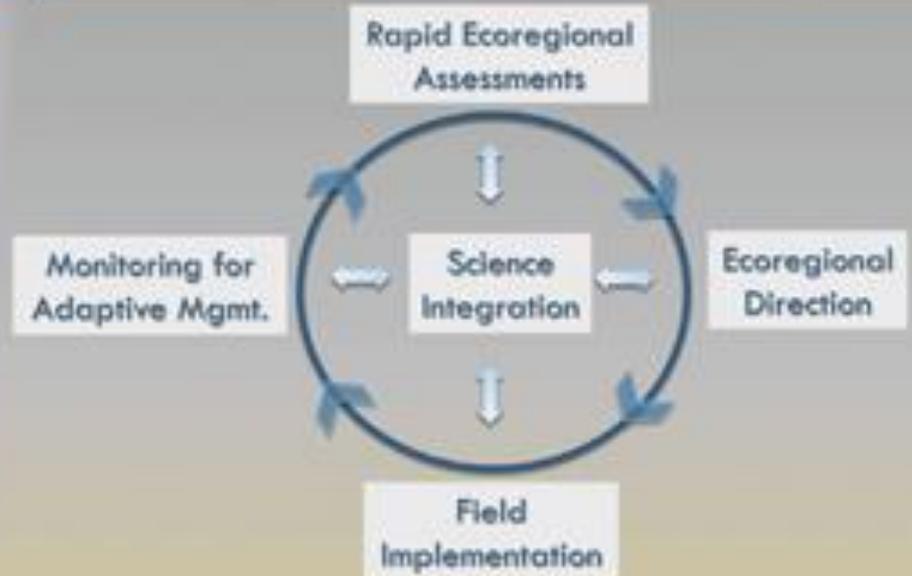
- [Climate Change Impacts & Adaptation Webpage](#)



BLM Landscape Approach – Climate Adaptation



BLM's Landscape Approach Concept



California – Adaptation Planning Guide

CALIFORNIA ADAPTATION PLANNING GUIDE



PLANNING FOR ADAPTIVE COMMUNITIES



Australia



Australian Government
Department of Climate Change
and Energy Efficiency

CLIMATE CHANGE ADAPTATION ACTIONS FOR LOCAL GOVERNMENT

Report by SMEC Australia





Questions and Discussion

Thank you!



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