

Results of a Climate Change Vulnerability and Adaptation Assessment for Focal Resources of the Sierra Nevada

Climate Change Integration Team
Webinar Series
January 16, 2014



R5 Climate Change
Integration Team

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Presenters

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Results of a Climate Change Vulnerability and Adaptation Assessment for Focal Resources of the Sierra Nevada

Chrissy Howell, Regional Wildlife Ecologist, Region 5

Jessi Kershner, Lead Scientist, EcoAdapt

Emrys Treasure, Biological Scientist, Eastern Threat Center and
TACCIMO

Outline

1. Project History and Need
2. Components and Process
(including TACCIMO)
3. Broader Impacts of Project
4. Next Steps

Project History

- 2010-2011: Stakeholder input sought by the Regional Office from forests and partners in 2010 and 2011 on conducting a climate change vulnerability assessment
- Spring 2012: EcoAdapt & partners submit a grant proposal to the California LCC to conduct a vulnerability assessment and develop adaptation strategies for focal resources of the Sierra Nevada
- Fall 2012: EcoAdapt project started with funding awarded from the California LCC!

Project Need

- Feedback from Climate Scorecard
- Forest Plan revision
- Facilitate stakeholder input
- Tap into outside expertise

The Forest Service Climate Change Performance Scorecard, 2011 (version 1.3) To be completed annually by each National Forest or Grassland (Unit).		
Scorecard Element	Unit Name	Yes/No
Organizational Capacity		
1. Employee Education	Are all employees provided with training on the basics of climate change, impacts on forests and grasslands, and the Forest Service response? Are resource specialists made aware of the potential contribution of their own work to climate change response?	
2. Designated Climate Change Coordinators	Is at least one employee assigned to coordinate climate change activities and be a resource for climate change questions and issues? Is this employee provided with the training, time, and resources to make his/her assignment successful?	
3. Program Guidance	Does the Unit have written guidance for progressively integrating climate change considerations and activities into Unit-level operations?	
Engagement		
4. Science and Management Partnerships	Does the Unit actively engage with scientists and scientific organizations to improve its ability to respond to climate change?	
5. Other Partnerships	Have climate change related considerations and activities been incorporated into existing or new partnerships (other than science partnerships)?	
Adaptation		
6. Assessing Vulnerability	Has the Unit engaged in developing relevant information about the vulnerability of key resources, such as human communities and ecosystem elements, to the impacts of climate change?	
7. Adaptation Actions	Does the Unit conduct management actions that reduce the vulnerability of resources and places to climate change?	
8. Monitoring	Is monitoring being conducted to track climate change impacts and the effectiveness of adaptation activities?	
Mitigation and Sustainable Consumption		
9. Carbon Assessment and Stewardship	Does the Unit have a baseline assessment of carbon stocks and an assessment of the influence of disturbance and management activities on these stocks? Is the Unit integrating carbon stewardship with the management of other benefits being provided by the Unit?	
10. Sustainable Operations	Is progress being made toward achieving sustainable operations requirements to reduce the environmental footprint of the Agency?	

EcoAdapt



- Provides support, training, and assistance to make planning and management less vulnerable and more climate-informed



California Landscape Conservation Cooperative

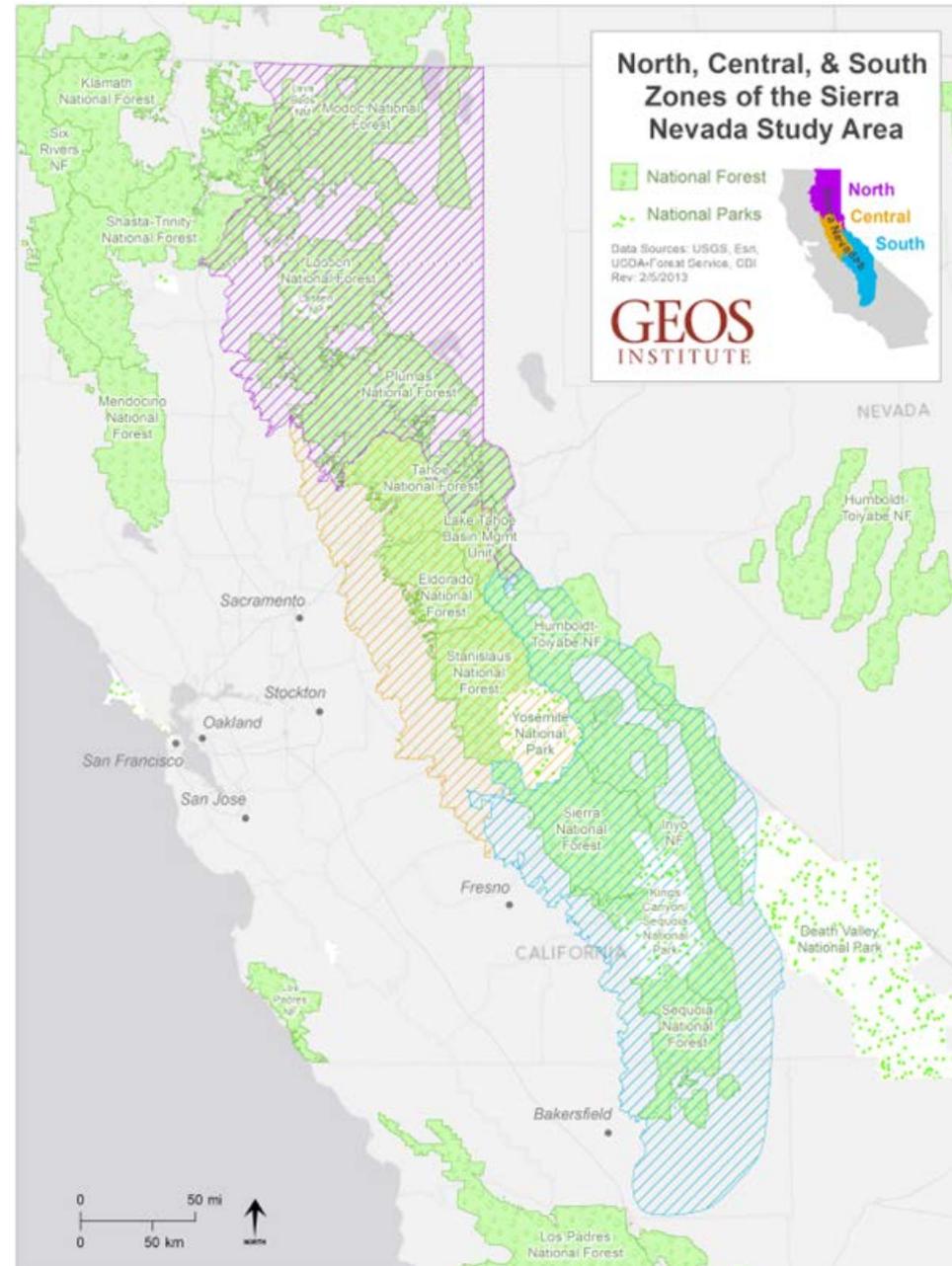


- A management-science partnership that facilitates complex, multi-sector conversations about prioritizing limited resources under rapidly changing ecological conditions



Project Details

- **Audience:** land managers
- **Scope:** Sierra Nevada
- **Scale:** north, central, south ecoregions
- **Vulnerability of:**
 - Ecosystems
 - Species
 - Ecosystem services
- **Adaptation strategies for:**
 - Ecosystems
 - Species



Project Components



Focal Resources –

Many issues to consider

- Different groups came up with different lists
- Question of whether to focus on species or ecosystems or ecosystem services
- List ranged from 5-65 resources
- Unlikely that we could cover everything, so we solicited further feedback on how to do the groupings
 - Similar lists for ecosystems
 - Varying lists for species

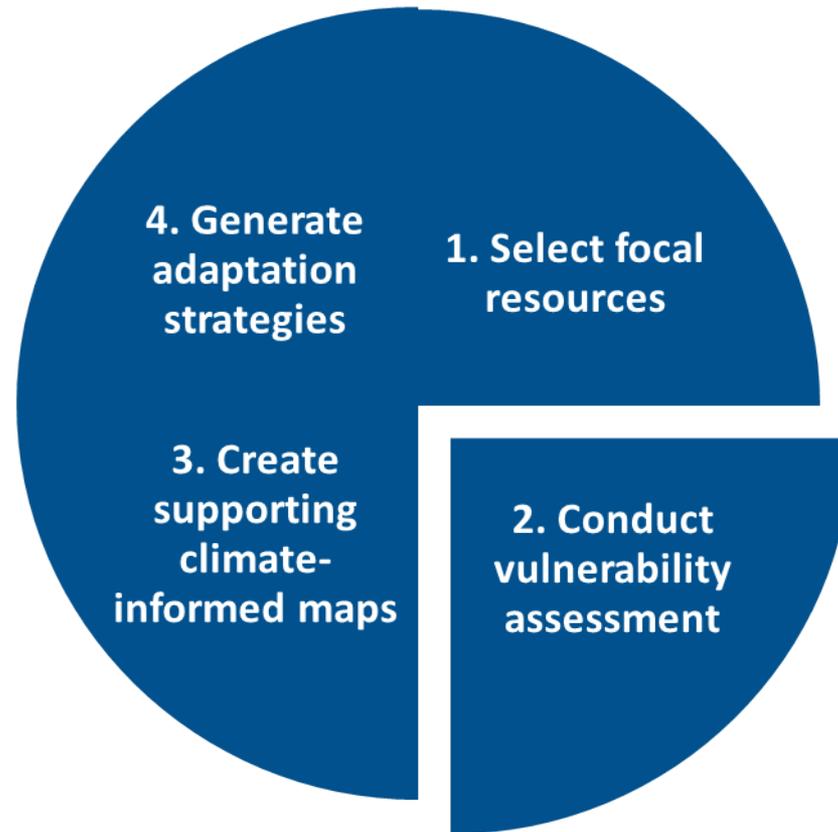
Focal Resources – Many issues to consider

- Considered coarse versus fine filter approach in selecting a list, especially given concordance with ecosystem list
- Species (fine filter) were associated with ecosystems (coarse filter)
- Issue of expert opinion availability with a larger list (as well as getting the work done)
- Ultimately groups selected fine filter species given their expertise and whether the species was captured by coarse filter evaluation

Focal Resources: Final List

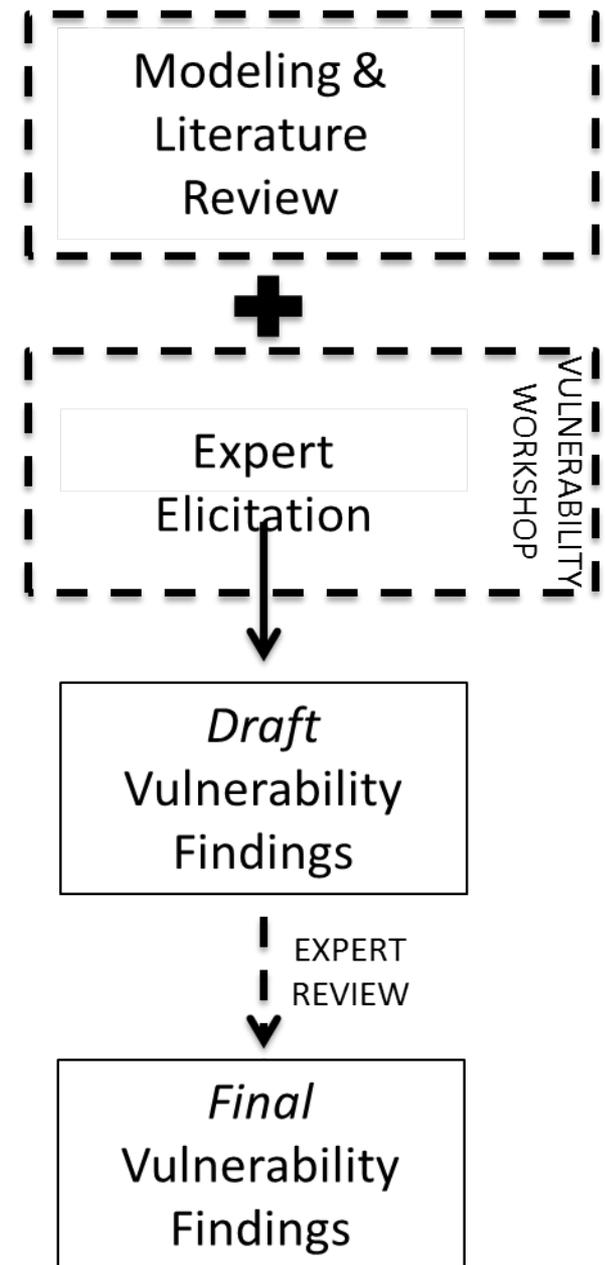
Coarse Filter (Ecosystem)	Fine Filter (Species)	Ecosystem Services
Alpine/Subalpine	Bristlecone pine Whitebark pine Bighorn sheep	Fire
Yellow Pine/Mixed Conifer	Fisher	Carbon storage
Wet Meadows	Willow flycatcher Aspen	Recreation
Red Fir	Red fir Marten	Timber/Forest products
Oak Woodlands	Blue oak Black oak	
Chaparral	Wood rat Mountain quail	
Sagebrush	Sage grouse	
Aquatic	Sierra Nevada yellow-legged frog Mountain yellow-legged frog	

Project Components



Vulnerability Assessment

- Process
 1. Collect background info
 2. Conduct workshop
 3. Assemble & synthesize info
 4. Review & revise
- Vulnerability findings
 - Expert elicitation + Literature
 - Peer-reviewed by topic experts



Dashed lines indicate stakeholder and/or expert collaboration

What Happens at a Vulnerability Assessment Workshop?



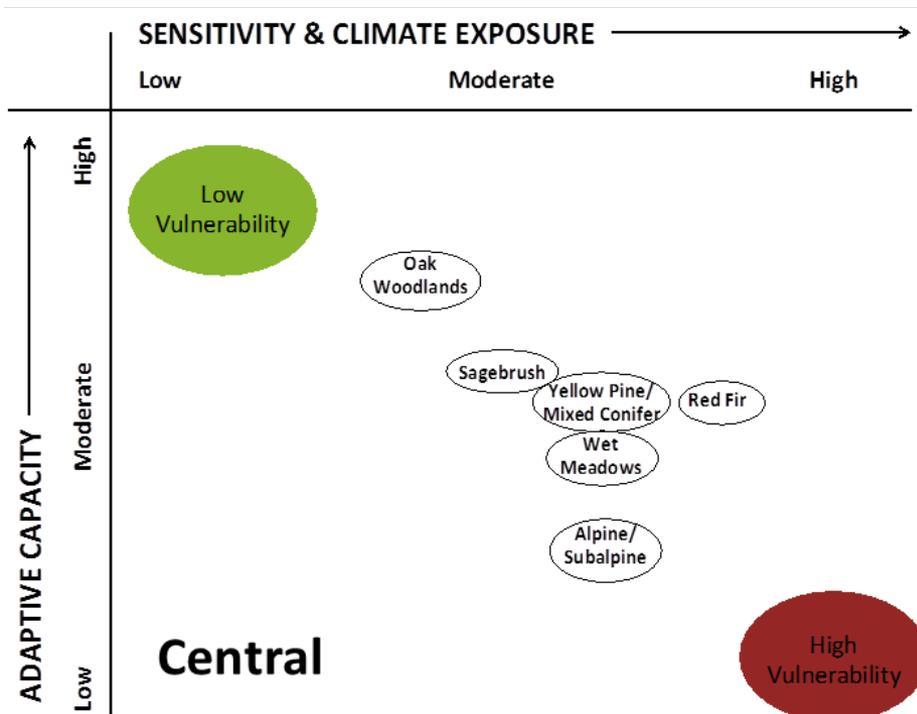
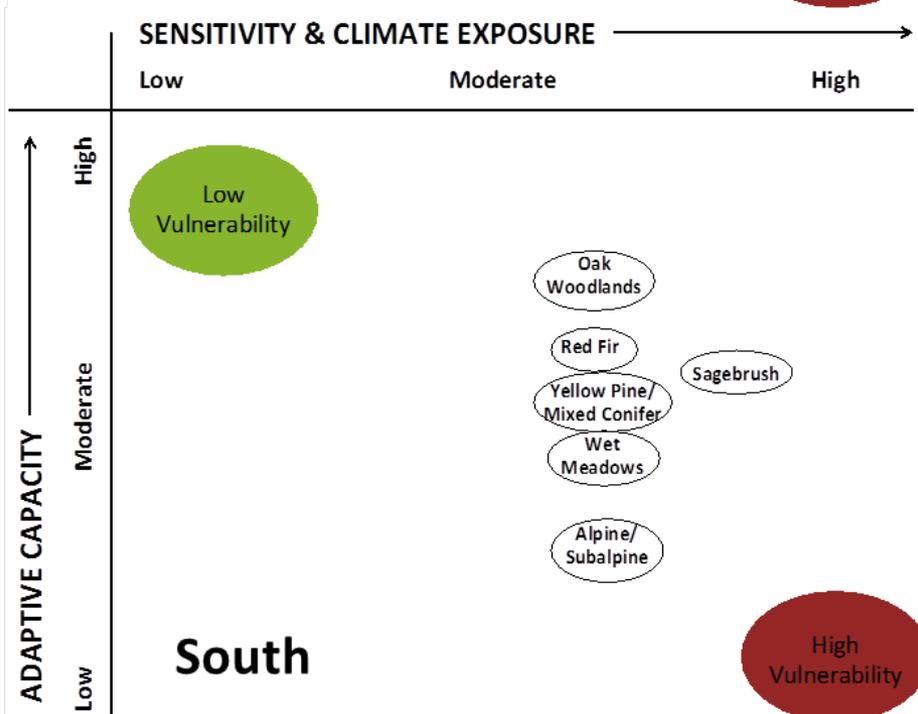
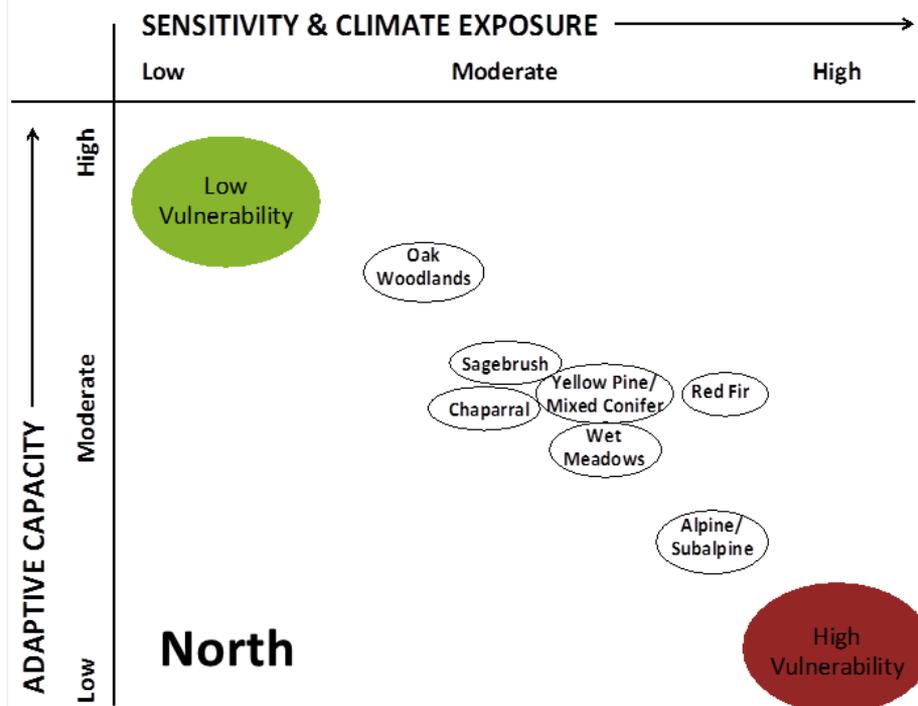
Vulnerability Example: Wet Meadows

- Sensitive to climate and climate-driven changes such as:
 - Altered precipitation
 - Decreased snowpack
 - Altered hydrology
- Sensitive to non-climate stressors such as:
 - Water diversions
 - Grazing
 - Recreational activities
 - Fire suppression
- Adaptive capacity influenced by:
 - Dependence on water availability
 - Fragmented distribution
 - Currently degraded state

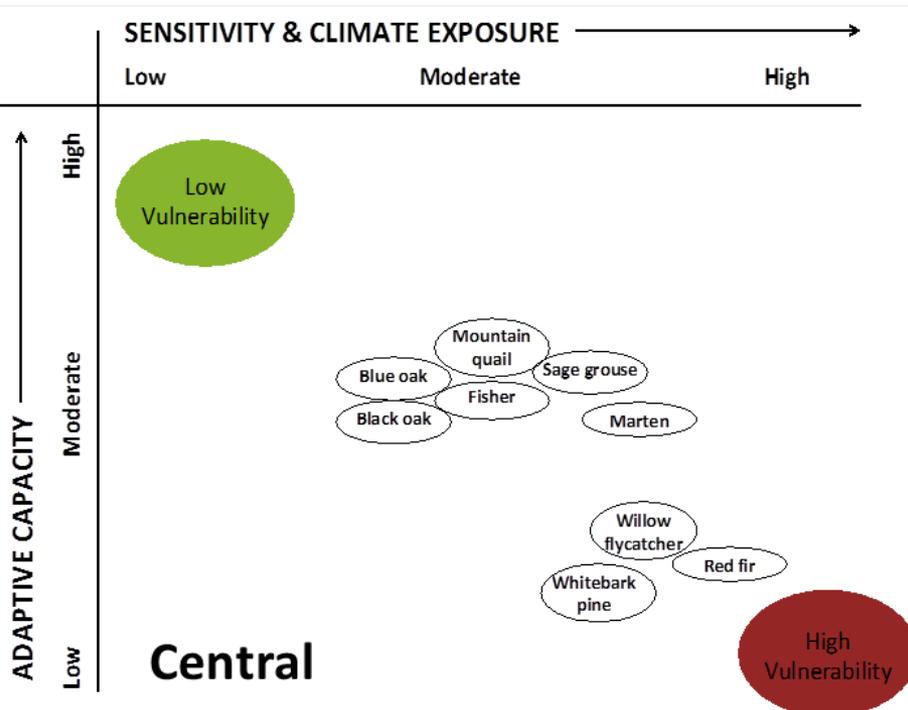
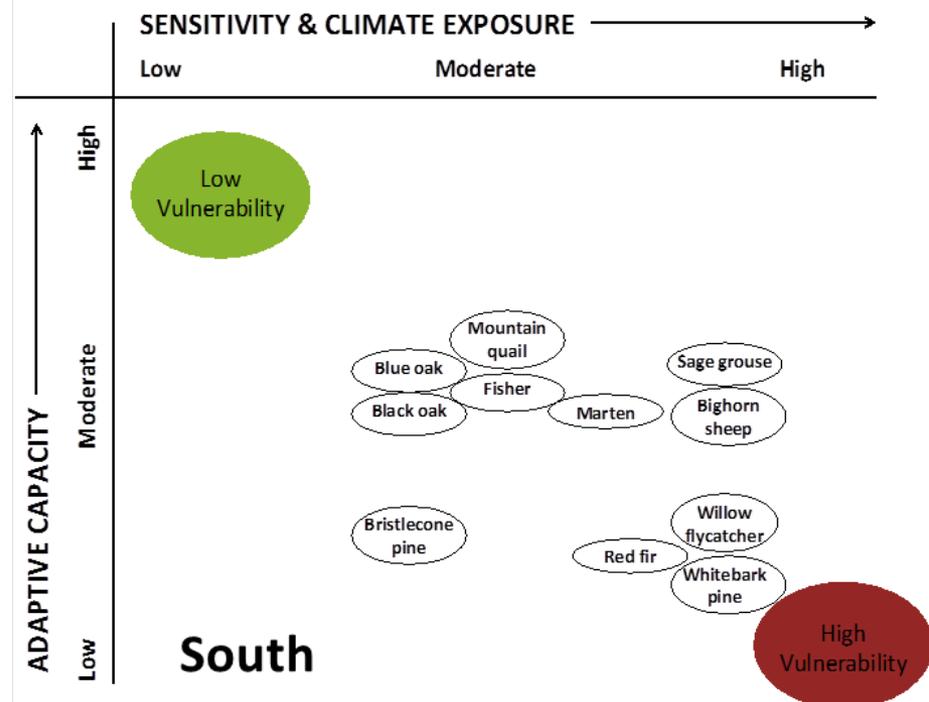
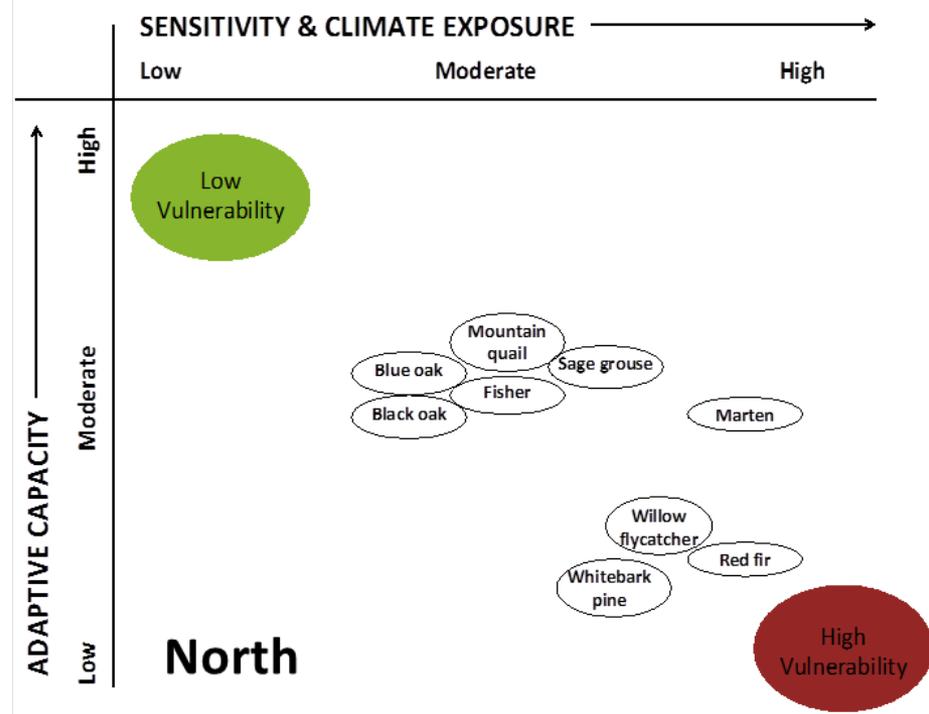
Vulnerability Example: Wet Meadows

- Future climate exposure:
 - Snowpack declines, particularly in northern SN
 - Increased rain:snow ratio and earlier timing of snowmelt
 - Increased frequency of extreme precipitation
 - Higher flow magnitudes in winter/spring and lower annual flows
 - Increased climatic water deficits, particularly in northern SN

Vulnerability Assessment – Summarized Results for Ecosystems



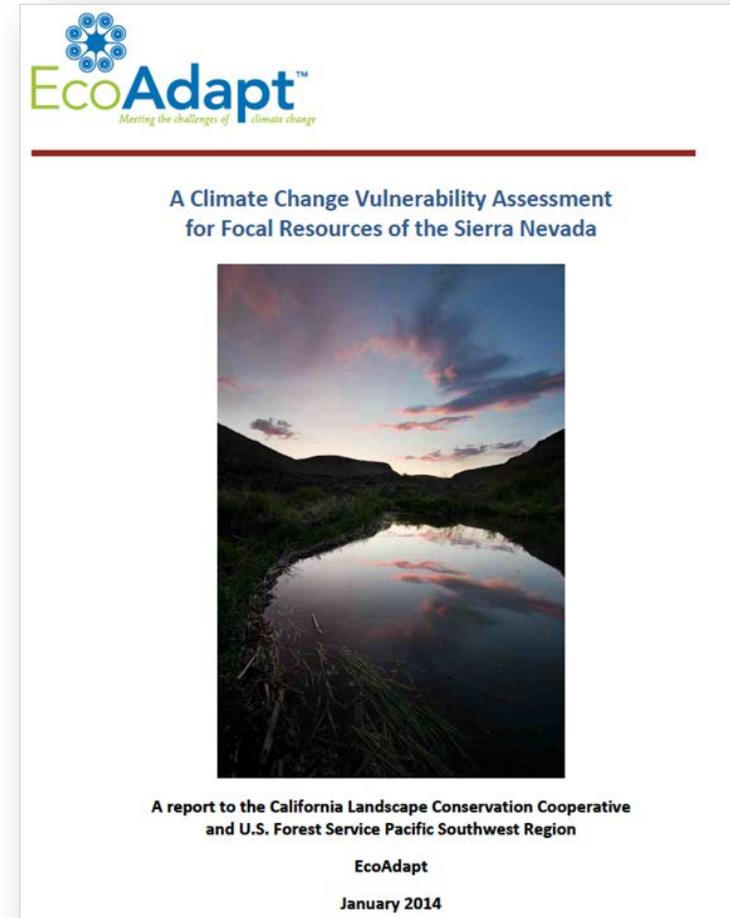
Vulnerability Assessment – Summarized Results for Species



Vulnerability Assessment

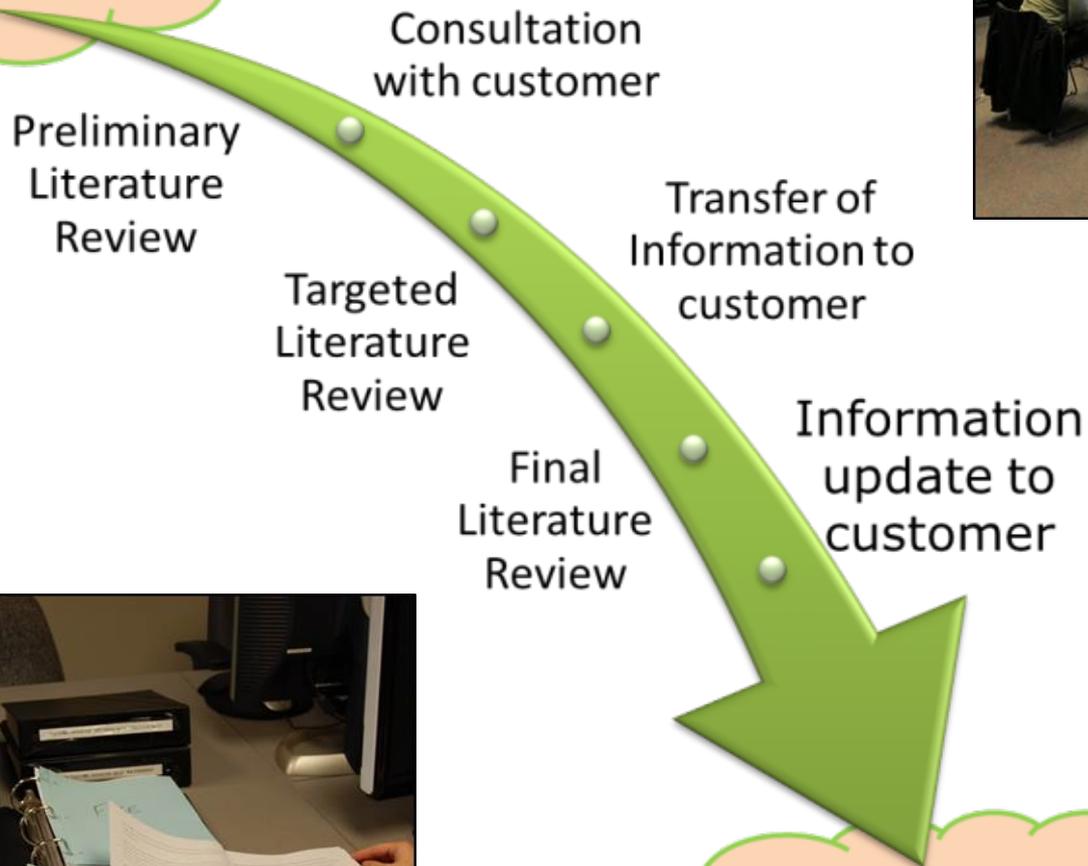
Products:

- Workshop support page
<http://ecoadapt.org/workshops/sierra-nevada-va-workshop>
- Final report: methodology & results
- Focal resource findings summarized as:
 1. Full syntheses (~8-20 pgs)
 2. *Briefings (~3-5 pgs)
- Dynamic resource via **TACCIMO**

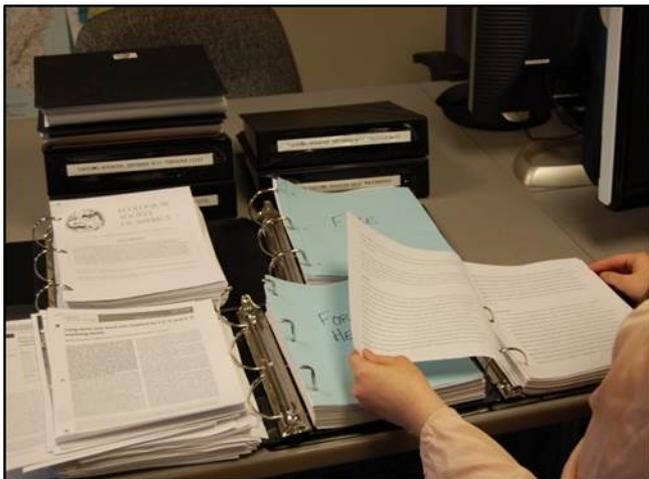


TACCIMO

**INFORMATION
DEVELOPMENT**



 **TACCIMO**
Science at your Fingertips



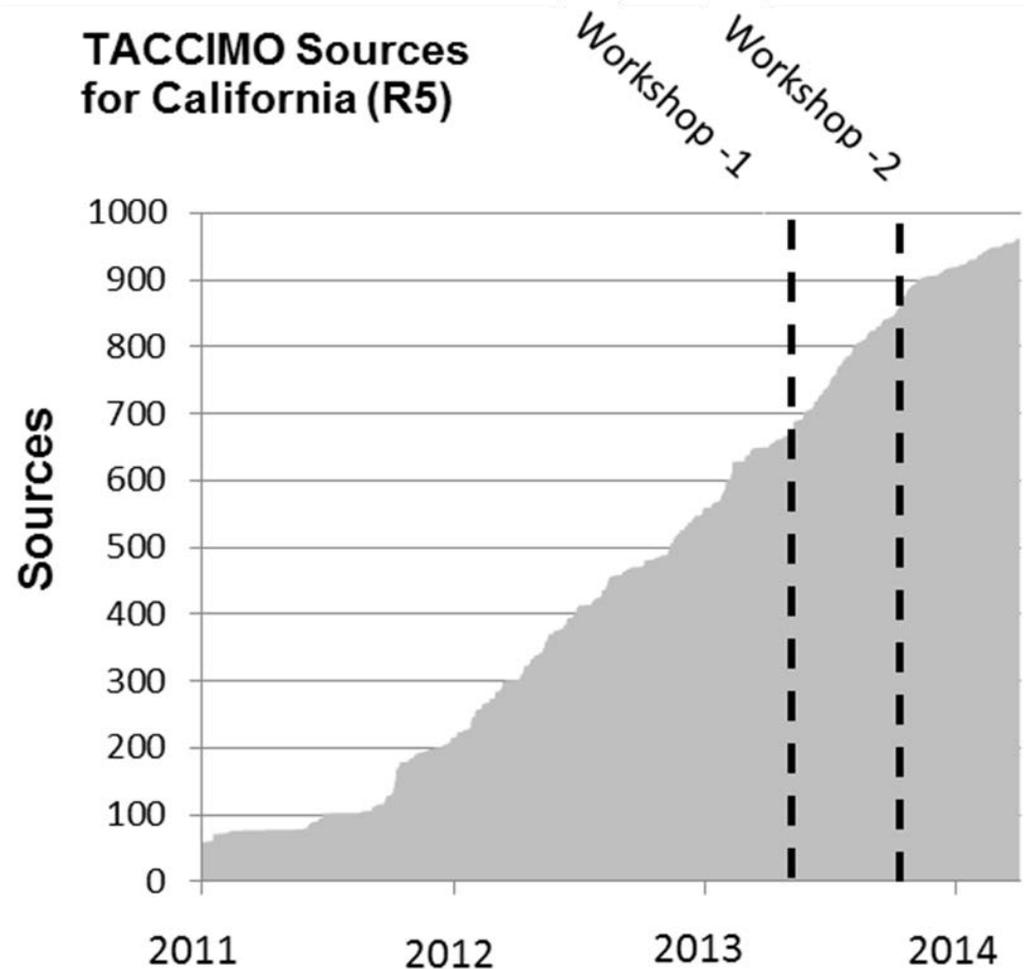
**INFORMATION
TRANSFER**

TACCIMO – Scientific Literature

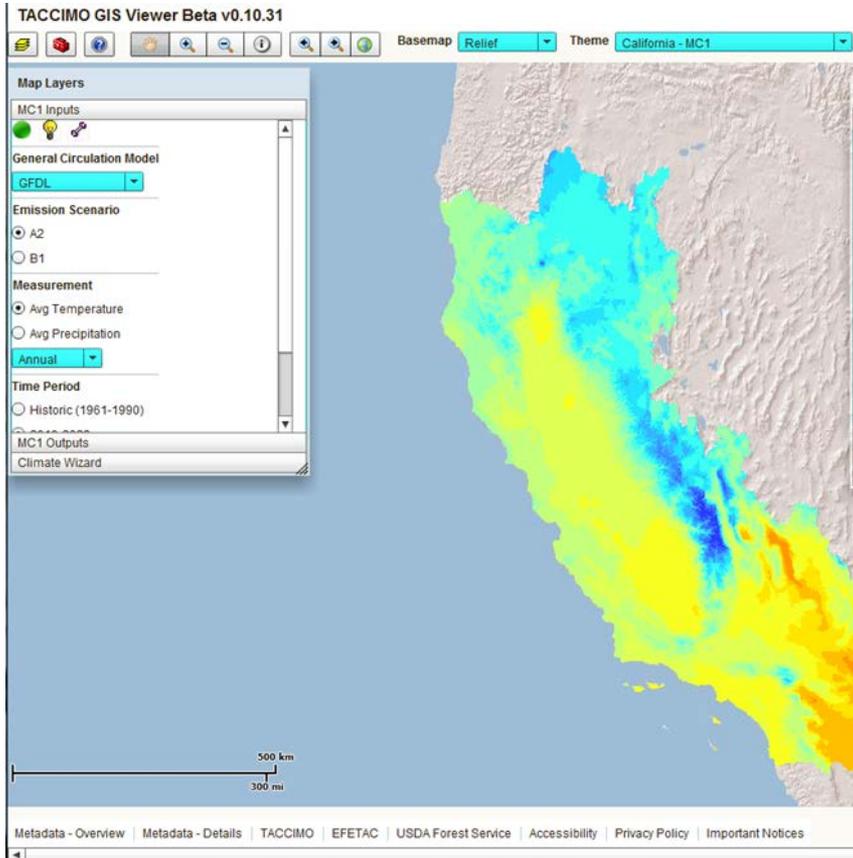
TACCIMO is a dynamic information resource:

– Grows over time based on expressed user needs

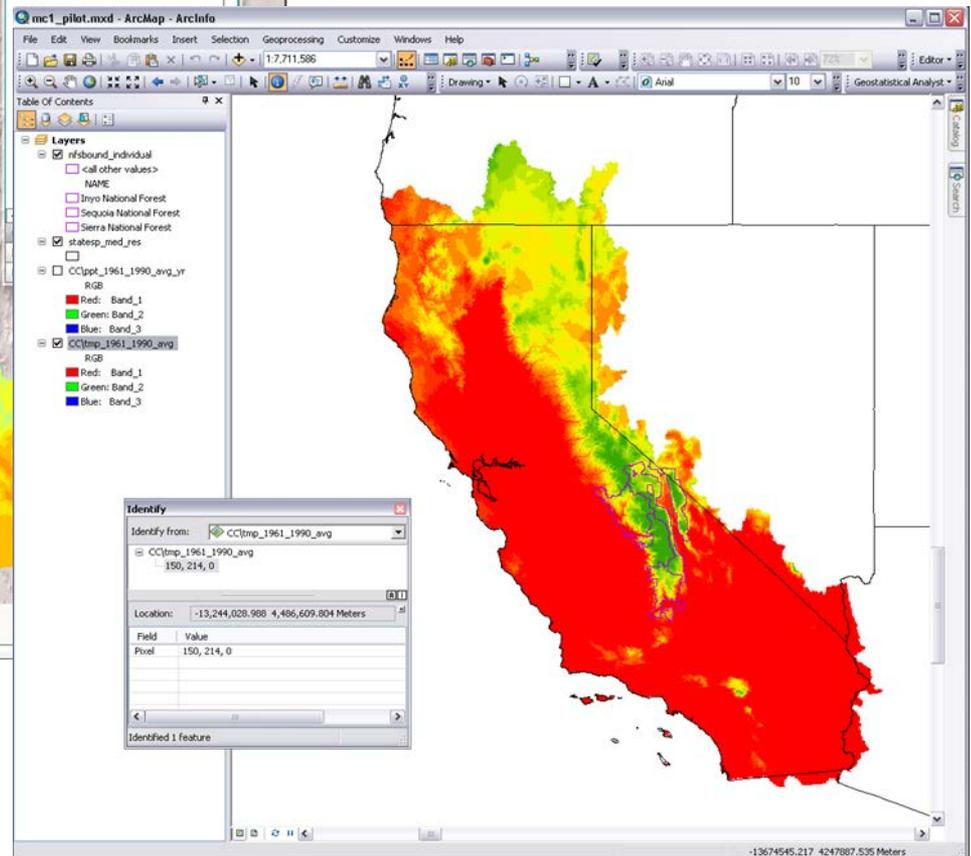
- 964 total sources
- 139 new sources since workshop-2



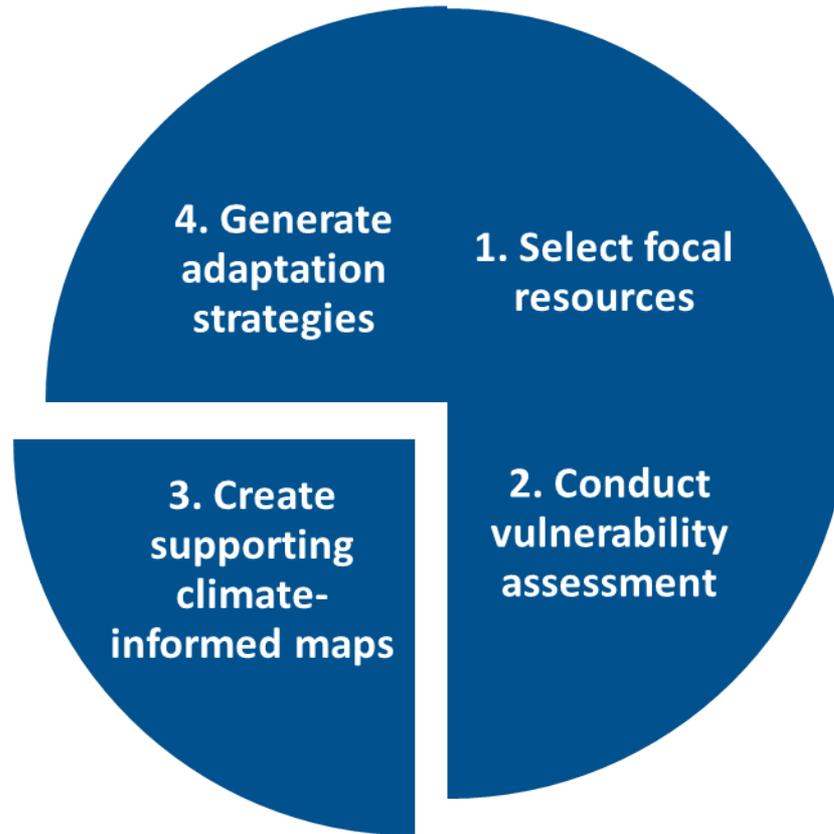
TACCIMO - Geospatial Web-Based GIS Viewer



ArcGIS



Project Components

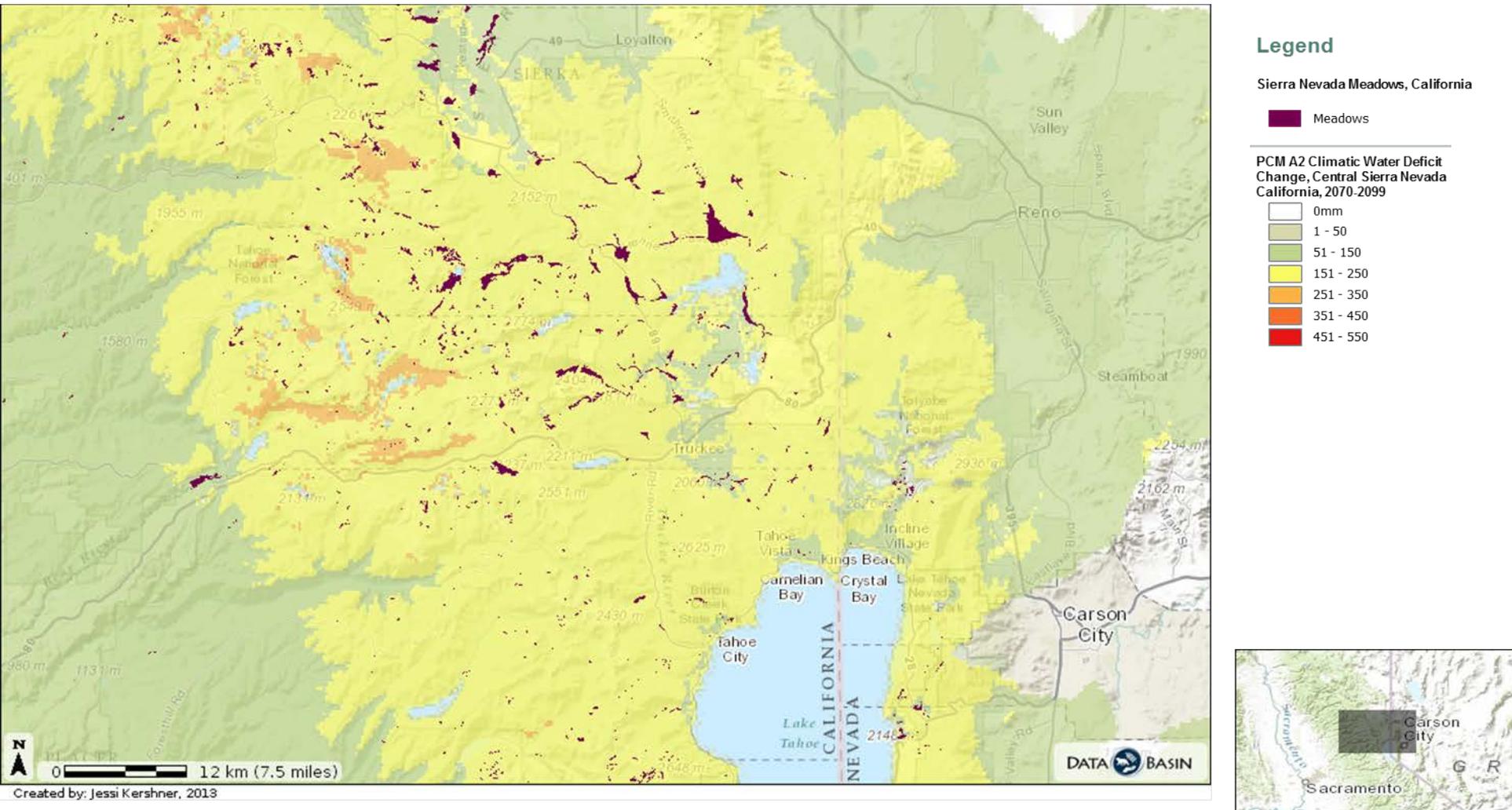


Climate-Informed Maps

- Information from vulnerability assessment used to identify key climate and non-climate spatial data
Data layers assembled on Data Basin
 - [EcoAdapt-CA LCC: Climate Adaptation Project for the Sierra Nevada](#)*
- Created climate-informed maps for resources
 - Users can download datasets and maps
 - Users can also create their own climate-informed maps
- Intended to help inform vulnerability assessment and facilitate adaptation planning for a resource
 - Maps can help identify:
 - Where and why resources are vulnerable
 - Magnitude of change they are likely to experience
 - What adaptation strategies may be appropriate given impacts

*<http://databasin.org/groups/e6cfbd4218f54b32b695fad7af8cce31>

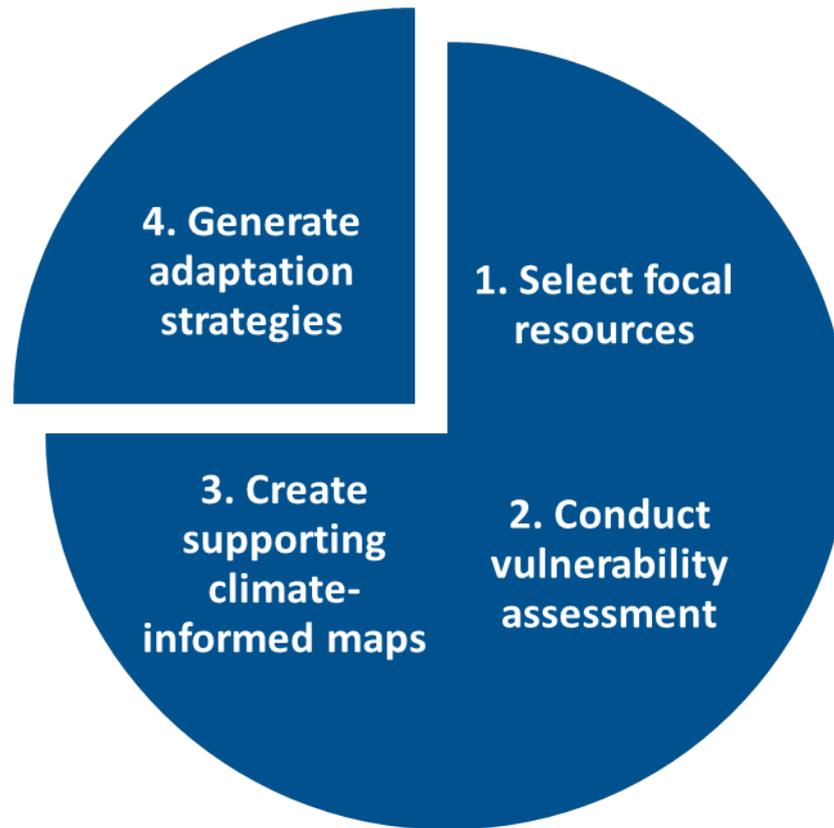
Climate-Informed Map Example: Wet Meadows and Soil Moisture



Climate-Informed Maps: On Data Basin

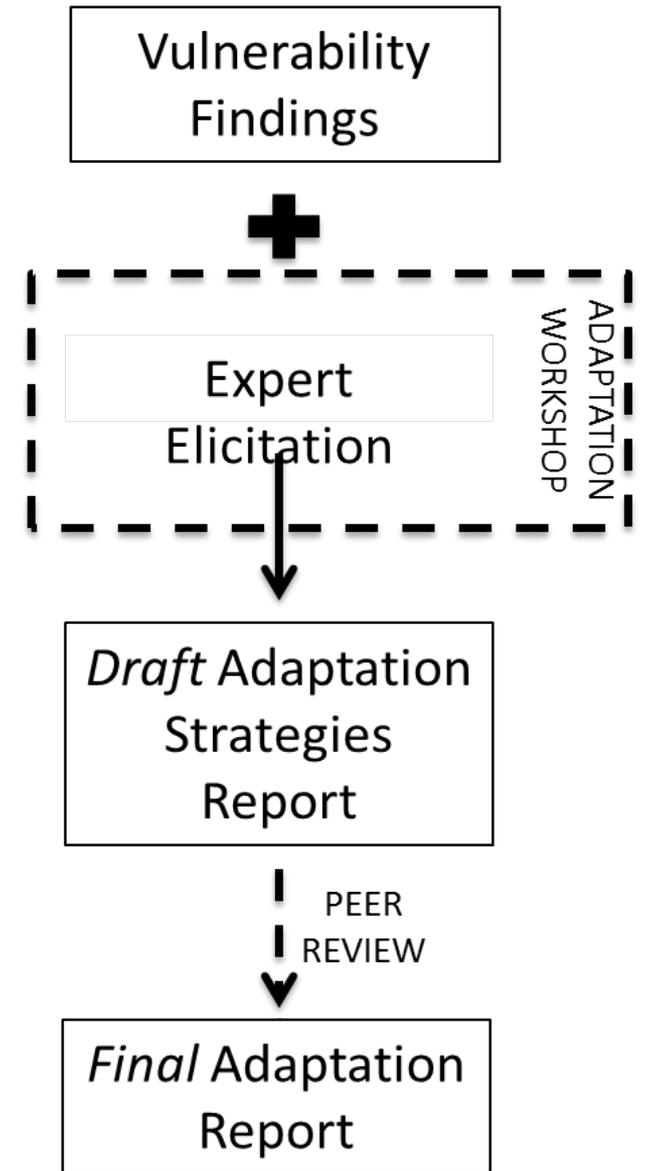
- Climate datasets include:
 - Temp
 - Precip
 - Hydrology (climatic water deficit, snowpack, runoff, recharge)
 - Wildfire
 - Vegetation change
 - 2010-2039; 2040-2069; 2070-2099
- Non-climate datasets include:
 - Resource distributions
 - Other stressors (e.g., grazing allotments, projected growth)

Project Components



Adaptation Strategies

- Process
 1. Assemble vulnerability info
 2. Conduct workshop
 3. Compile & synthesize info
 4. Review & revise
- Adaptation strategies
 - Expert elicitation + Literature
 - Draft report peer-reviewed



Dashed lines indicate stakeholder and/or expert collaboration

What Happens at an Adaptation Workshop?

- Focal resources:
 - Alpine/Subalpine
 - Yellow Pine/Mixed Conifer
 - Red Fir
 - Wet Meadows and Fens
 - Oak Woodlands
 - Mountain yellow-legged frogs
 - Sierra Nevada yellow-legged frogs
 - Marten



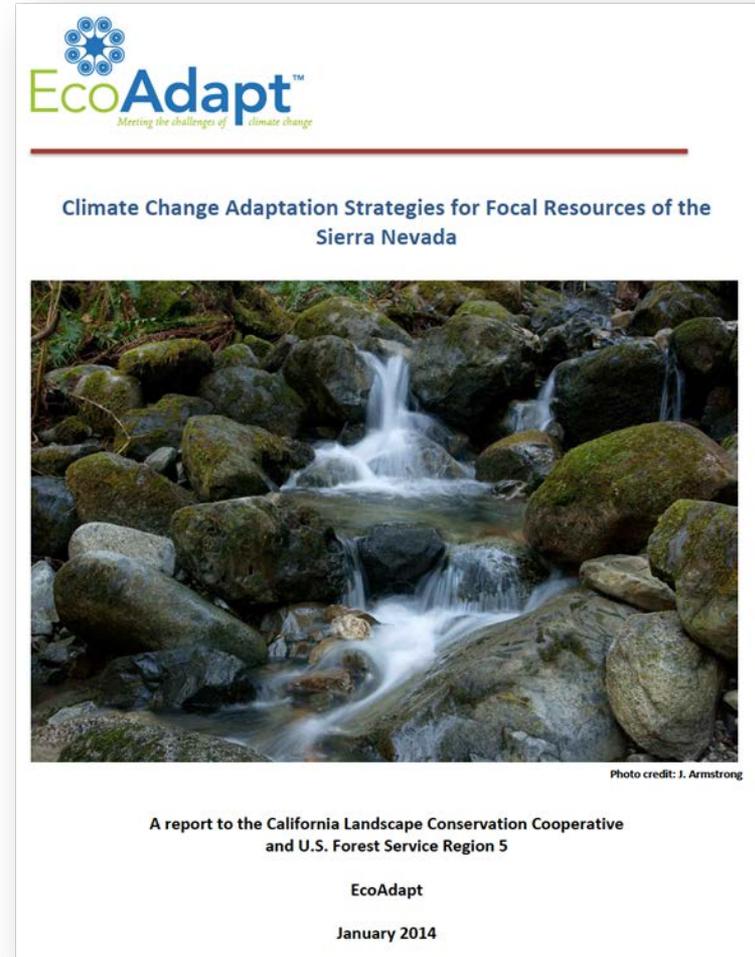
Adaptation Strategies Example: Wet Meadows

Adaptation approach	Strategic action	Rationale
<p>Restore floodplain function to enhance ecosystem integrity and resilience under climate change, in particular, limiting impacts from projected changes including increased drought, reduced soil moisture, increased flooding, runoff and/or sedimentation, and decreased snowpack and groundwater recharge</p>	<ul style="list-style-type: none"> • Plug and pond (redirects flow from incised channel to stable channel with broad floodplain) • Establish setbacks • Bank stabilization • Headcut stabilization (to stabilize upslope soils) • Restore soils and structure • Restore meanders • In-stream restoration 	<p>Knowledge, infrastructure and funding exist to continue to restore meadows in the next 10 years. However, the current pace and scale of restoration activities is insufficient. New approaches, additional funding, and greater stakeholder buy-in (e.g., Central Valley water users) are needed.</p>
<p>Reduce the negative impacts of grazing on achieving ecosystem objectives, as these impacts have the potential to amplify the effects of climate change</p>	<p>Grazing exclosures to minimize synergistic effects of grazing and climate impacts (e.g., decreased soil moisture, precipitation changes) on vegetation recruitment and growth as well as floodplain structure and soils</p>	<p>Cheap and beneficial.</p>
<p>Reduce negative impacts of recreation, roads, and trails to help wet meadows better cope with the effects of climate change</p>	<ul style="list-style-type: none"> • Assess and consider removing roads in sensitive meadow areas in light of projected climate impacts • Enhance route designation plans in light of projected climate impacts 	<p>Need to change standards and consider changing amount of roads around meadows and timing of use.</p>

Adaptation Strategies

Products:

- Workshop support page
<http://ecoadapt.org/workshops/sierra-nevada-adaptation-workshop>
- Final report



Broader Impacts – Internal and External

- Scorecard
- Bioregional Assessment (Forest Plan Revision)
- Information for early adopter forests (Forest Plan Revision)
- Region 1 (all forests/grasslands), Tongass NF, Gulf of Farallones National Marine Sanctuary
- Riparian Habitat Joint Venture
- SEKI revision of NPS Resource Stewardship Strategy
- California DFW State Wildlife Action Plan

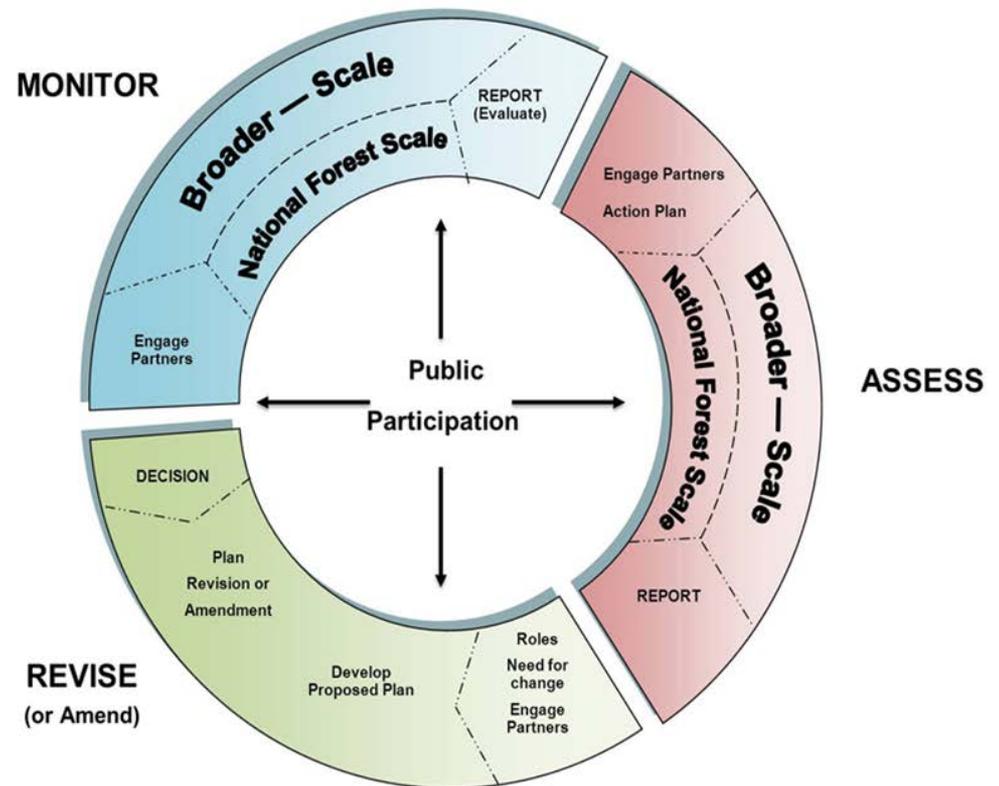
2013 Scorecard Results for Region 5

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- Element 6 (Assessing Vulnerability)**
 - 56% YES compared to 47% in FY12
- Element 7 (Adaptation Actions)**
 - 94% YES compared to 76% in FY12
- About the units that reported “NO”...

Informing Forest Plan Revision

- Assessment phase
- NEPA analysis for the Plans
- Further integration of climate change into forest management



Forest Plan revision process



Next Steps: 2014



Finalize first round of products – Early 2014

Stakeholder outreach

1. Targeted agency trainings*
 - Regionally based: North, Central, South SN & Sacramento
 - USFS, NPS, CDFW, USFWS
2. Tailored product development
 - Resource briefings
 - VA/AS process briefing
 - Communication products
3. Climate Change Refugia/Connectivity Workshop
4. Webinars for forest units
5. Solicit input for future product updates/revisions

Acknowledgements

Funders:

- California LCC
- Yale Mapping Framework

Partners:

- U.S. Forest Service
- Geos Institute
- Conservation Biology Institute
- TACCIMO



Thank You!

Questions and Feedback Welcome!

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