

# Sustainable Recreation and Tourism Initiative Climate Adaptation and Resilience Assessment

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Mammoth Lakes Town Council & Planning and  
Economic Development Commission



# Project Team

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# The Climate Threat

- Climate change is already having major impacts in the Eastern Sierra region.
- Impacts are expected to become more frequent and more severe.
- Changing conditions threaten numerous aspects of the region, including the recreation and tourism industry.



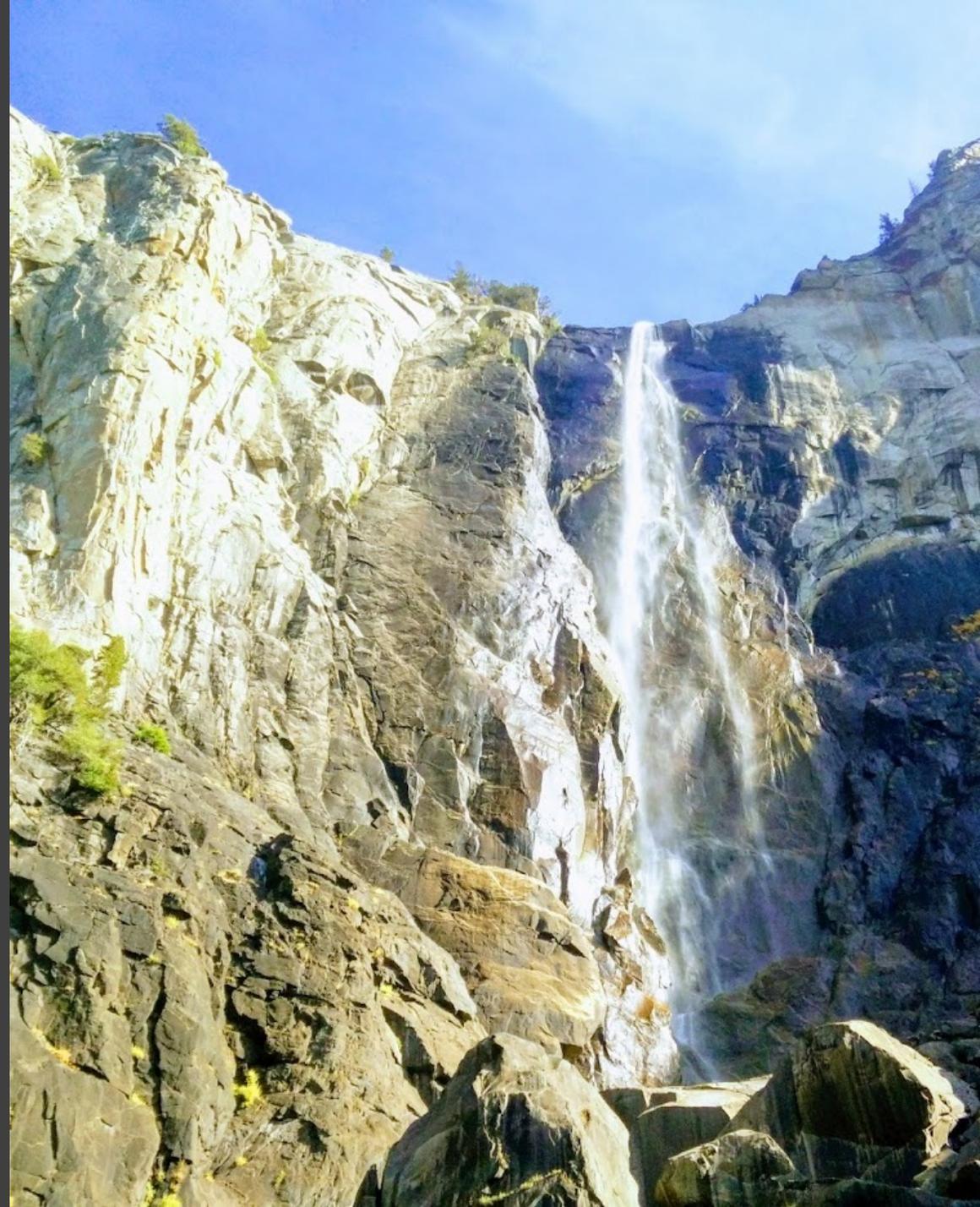
# Local Impacts

- Potential for property damage or destruction, injury or loss of life, and other impacts in the town.
- Damage or destruction of visitor-serving buildings and infrastructure in the region.
- Economic harm from loss of local and regional visitors and recreation activities.



# Project Goals

- Identify climate change vulnerabilities in the region.
- Understand the benefits of the regional ecosystem and how climate change threatens them.
- Consider projects to improve regional resilience.



# Expanding Nature-Based Solutions

The State of California is expanding nature-based solutions and is committed to the goals to protect 30 percent of the state's land and coastal waters by 2030 and enlisting California's vast network of natural and working lands in the fight against climate change.



✓ Natural and Working Lands Climate Smart Strategy

✓ 30x30 Initiative

✓ California Biodiversity Collaborative

✓ CA Nature

# A Changing Climate | Vulnerability in California's Eastern Sierra

Evaluates the impacts of climate change hazards on recreation and tourism.

- What are the risks to the region?
- Who and what is most vulnerable?
- What are the impacts to the regional economy?
- Looks at risks to separate management units.



# Project Area

Inyo, Mono, and  
Alpine Counties

City of Bishop and  
Town of Mammoth  
Lakes

Humboldt-Toiyabe, El  
Dorado, Lake Tahoe  
Basin Management  
Unit, Stanislaus, and  
Inyo National Forests

Bureau of Land  
Management lands

Death Valley,  
Sequoia and Kings  
Canyon, and  
Yosemite National  
Parks

Devils Postpile  
National Monument

Manzanar National  
Historic Site

California state parks

LADWP lands

# Project Components

## Baseline Natural Capital Assessment

What is the economic benefit from local ecosystems?

How do ecosystems support recreation and other key services?

## Climate Change Vulnerability Assessment

What are the climate change risks?

Who and what is most vulnerable?

## Climate Change Natural Capital Assessment

How does climate change affect ecosystem benefits?

What is the potential economic loss from hazards?

## Project Evaluation

What projects can help increase community resilience?

How can potential projects be evaluated for resilience benefits?

# Climate Vulnerability Assessment

- Analyzes 136 populations and assets associated with recreation and tourism for harm.
- Identifies vulnerabilities for 10 distinct hazards.
- Threat assessed separately by location and management unit.

**V1:** Minimal Vulnerability



**V2:** Low Vulnerability

**V3:** Moderate Vulnerability

**V4:** High Vulnerability

**V5:** Severe Vulnerability

# Vulnerability Assessment Sources

- Federal studies
  - U.S. Forest Service, National Park Service, Dept. of the Interior, Global Change Research Program, CDC, FEMA, US Geological Survey.
- State resources
  - State Parks, Adaptation Planning Guide, Caltrans, Energy Commission, Geologic Survey, Dept. of Public Health, Division of Dam Safety, Office of Emergency Services, Office of Planning and Research, CAL FIRE, Cal-Adapt.
- Local data
  - General plans, hazard mitigation plans, Resilient Mammoth Lakes.

# Recreational activities



Backcountry skiing



Bicycling



Camping, backpacking, and primitive camping



Cross-country skiing



Downhill skiing



Driving for pleasure



Fishing



Gathering forest products



Hiking/walking



Horseback riding



Hunting



Motorized trail activities



Other snow activities



Picnicking



Rock climbing



Viewing natural features and wildlife



Visiting historic sites and nature centers



Water-based activities



Wellness

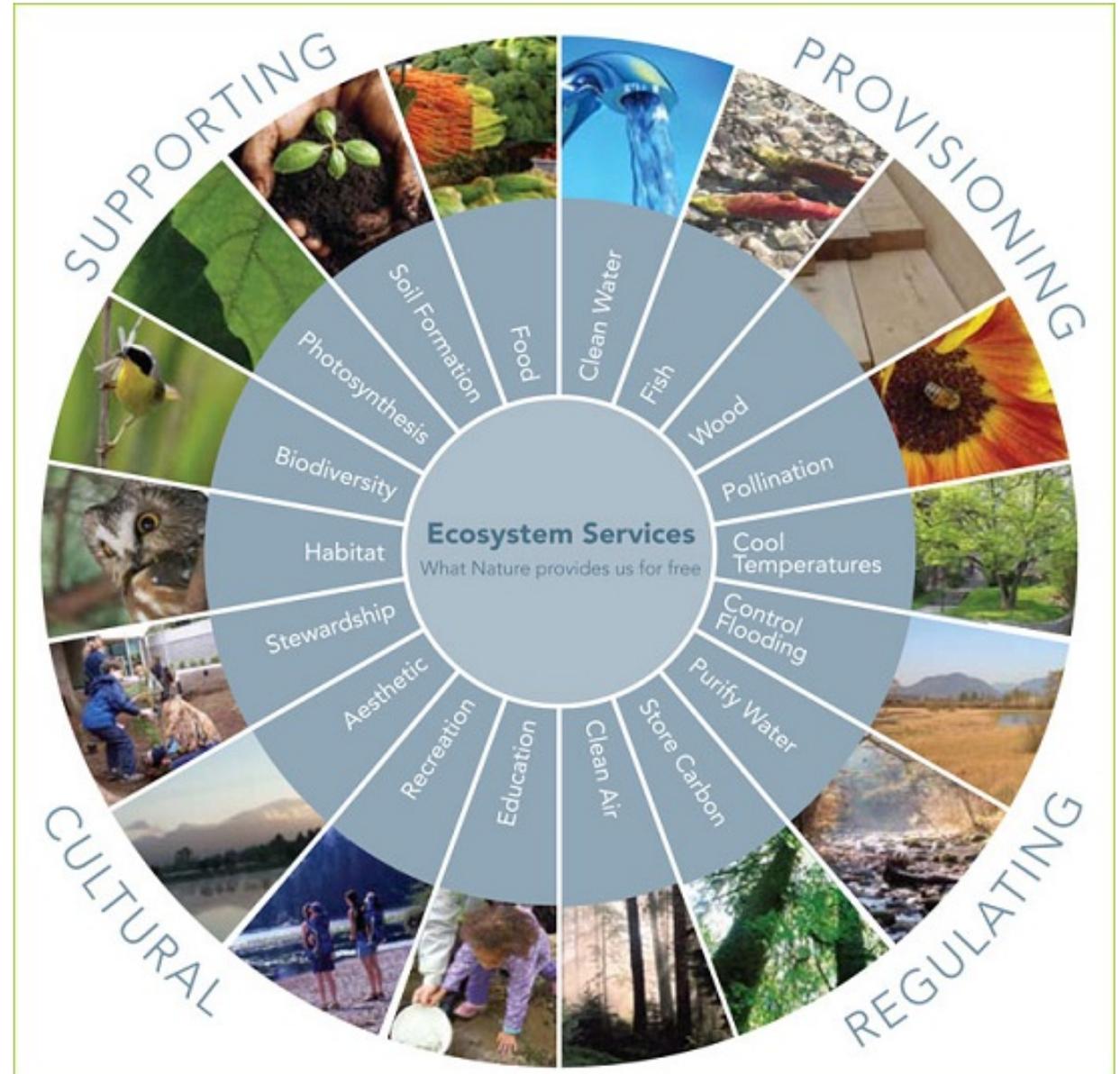
# Key Regional Findings

- Health risk to tribal communities and other frontline groups.
- Economic harm to recreation and tourism workers.
- Potential for infrastructure damage, especially energy and water/wastewater.
- Risk of damage to campgrounds, lodging, homes, and administrative centers.
- Widespread potential for recreation disruption.
- Substantial risk of ecosystem harm, especially forests and wetland/aquatic habitat.



# Natural Capital Assessment: Overview

- Provides understanding of the climate vulnerabilities and economic values supplied by **ecosystem services** within the Study Area.
- Ecosystem services are the benefits that humans receive from ecosystems.



# Natural Capital Assessment: Methods

- Inventory of ecosystem services within Study Area
  - CALVEG land cover types.
  - Identify crosswalk of landcover types and ecosystem services.
- Monetization process
  - Benefit transfer techniques to assign value.
  - Recreation: Visitation and spending data from the National Park Service and U.S. Forest Service.

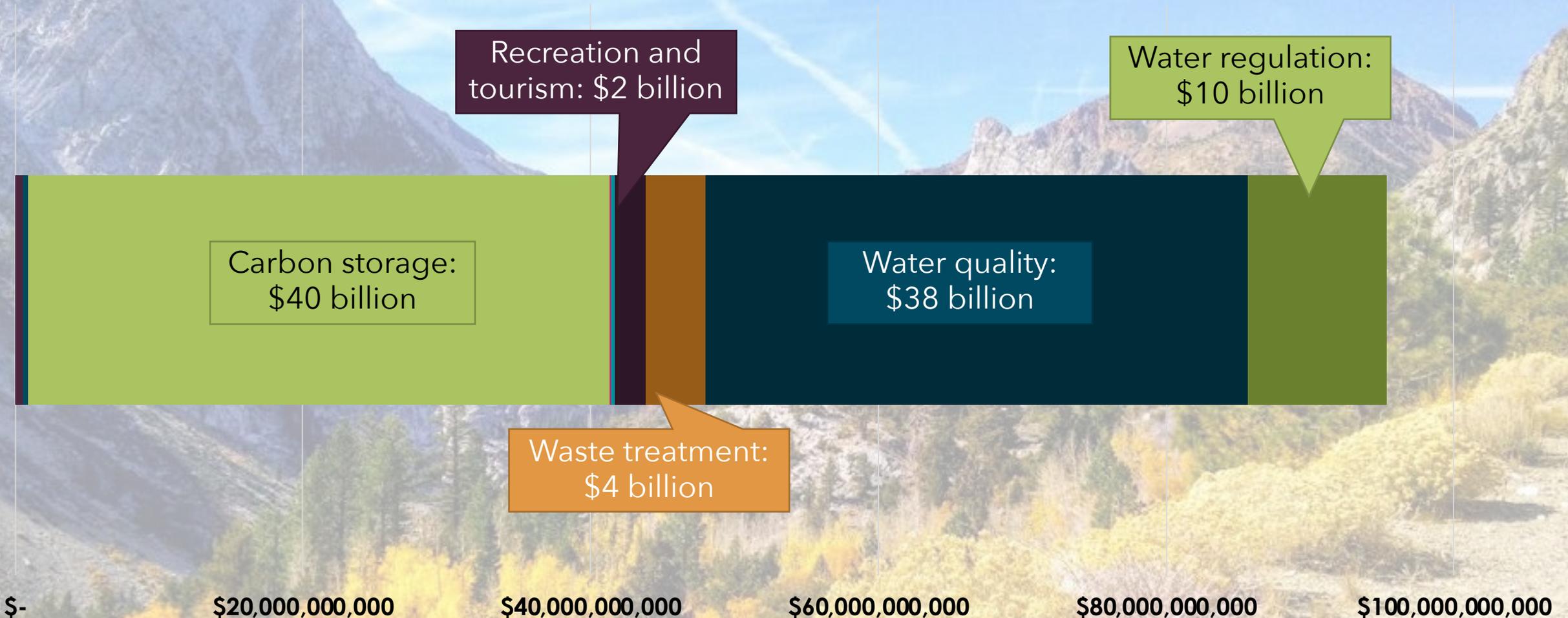


# Natural Capital Assessment: Results

- Ecosystem services provide approximately \$43.6 to \$190.9 billion in benefits, with an average value of \$95.4 billion, annually.
- Largest value from carbon storage and water resources.
- Desert shrubland and coniferous forest provide largest benefits.



# Natural Capital Assessment: Results

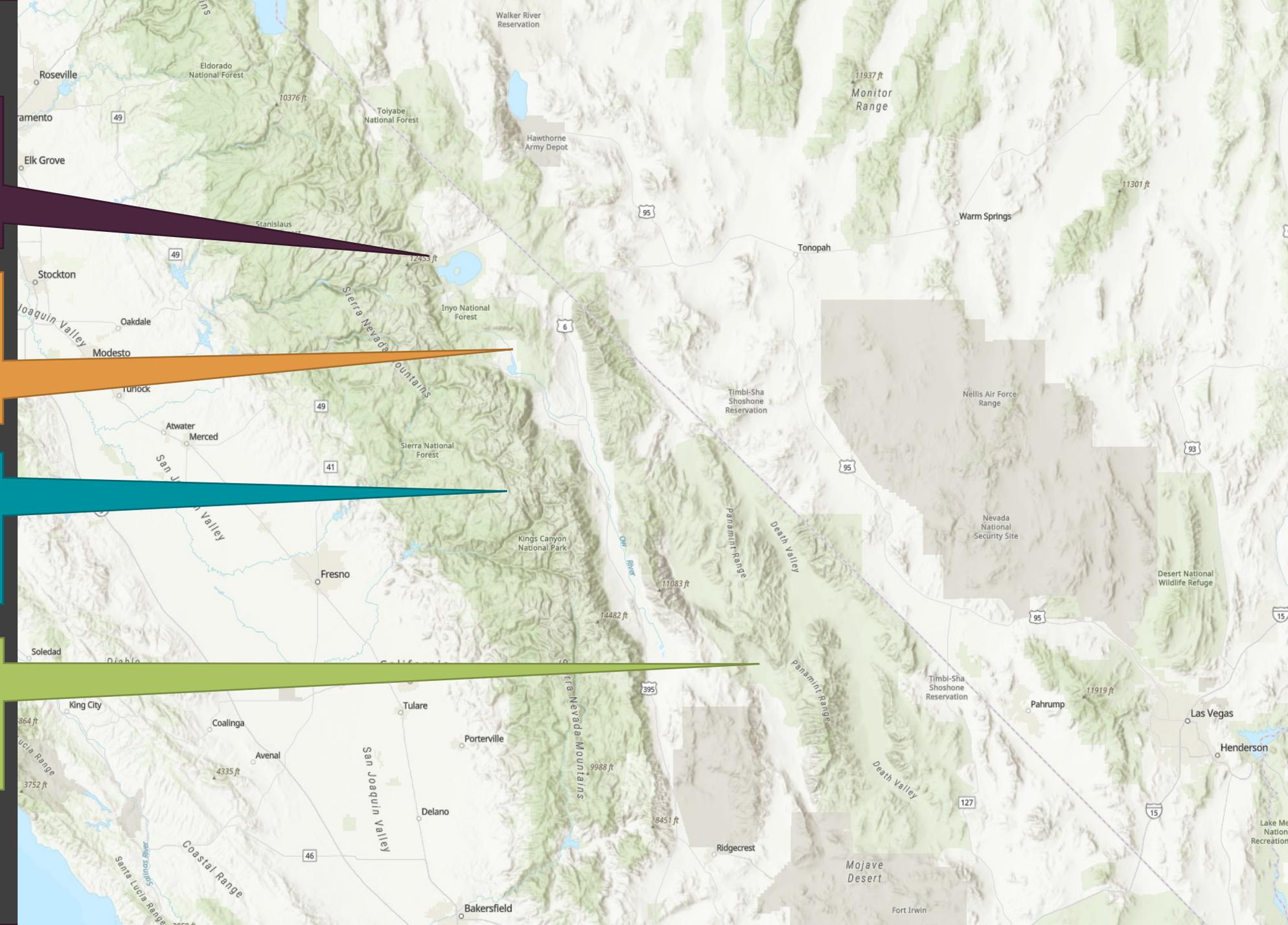


Wetlands:  
\$5 billion

Shrubland:  
\$33 billion

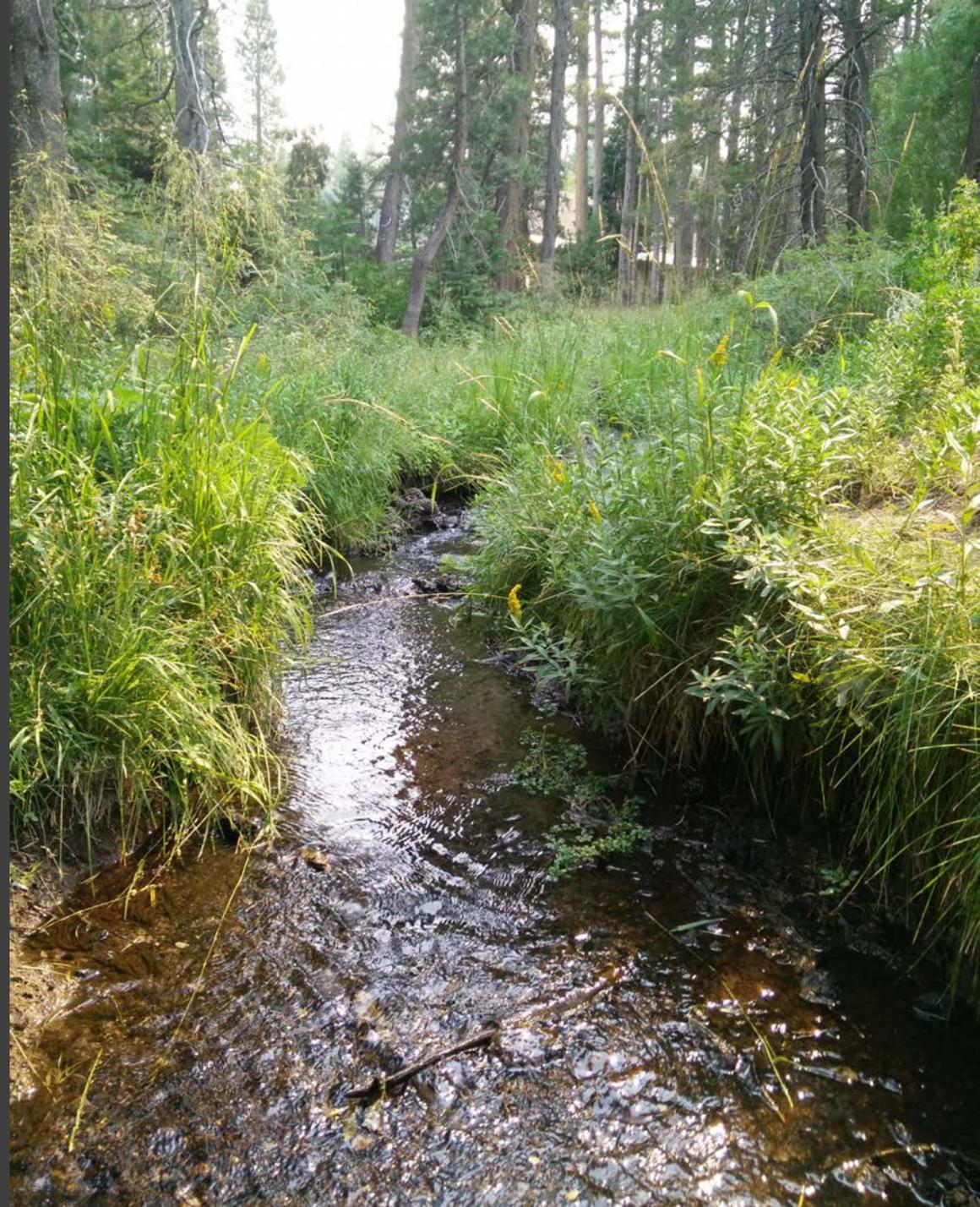
Conifer forests:  
\$44 billion

Desert shrub:  
\$5 billion



# Natural Capital Assessment: Climate Vulnerability

- Evaluated how ecosystem services are at risk from a variety of climate hazards.
- Identifies potential loss of ecosystem services based on projected climate change effects.



# Natural Capital Assessment: Drought Vulnerability

- Drought – water limitations and snow-related recreation.
  - Roughly \$19.4 to \$114.6 billion in annual ecosystem services value is at risk from the climate impacts of drought.
  - 75%+ of ski resort revenues at risk as a result of snowpack losses.



# Natural Capital Assessment: Wildfire Vulnerability

- Wildfire – potential increase in frequency and intensity.
  - Avg of 79,300 acres burned in the last 5 years, resulting in damages ranging from \$423 million to \$1.9 billion.
  - \$40.9 to \$163.4 billion in ecosystem services at risk from large wildfires.



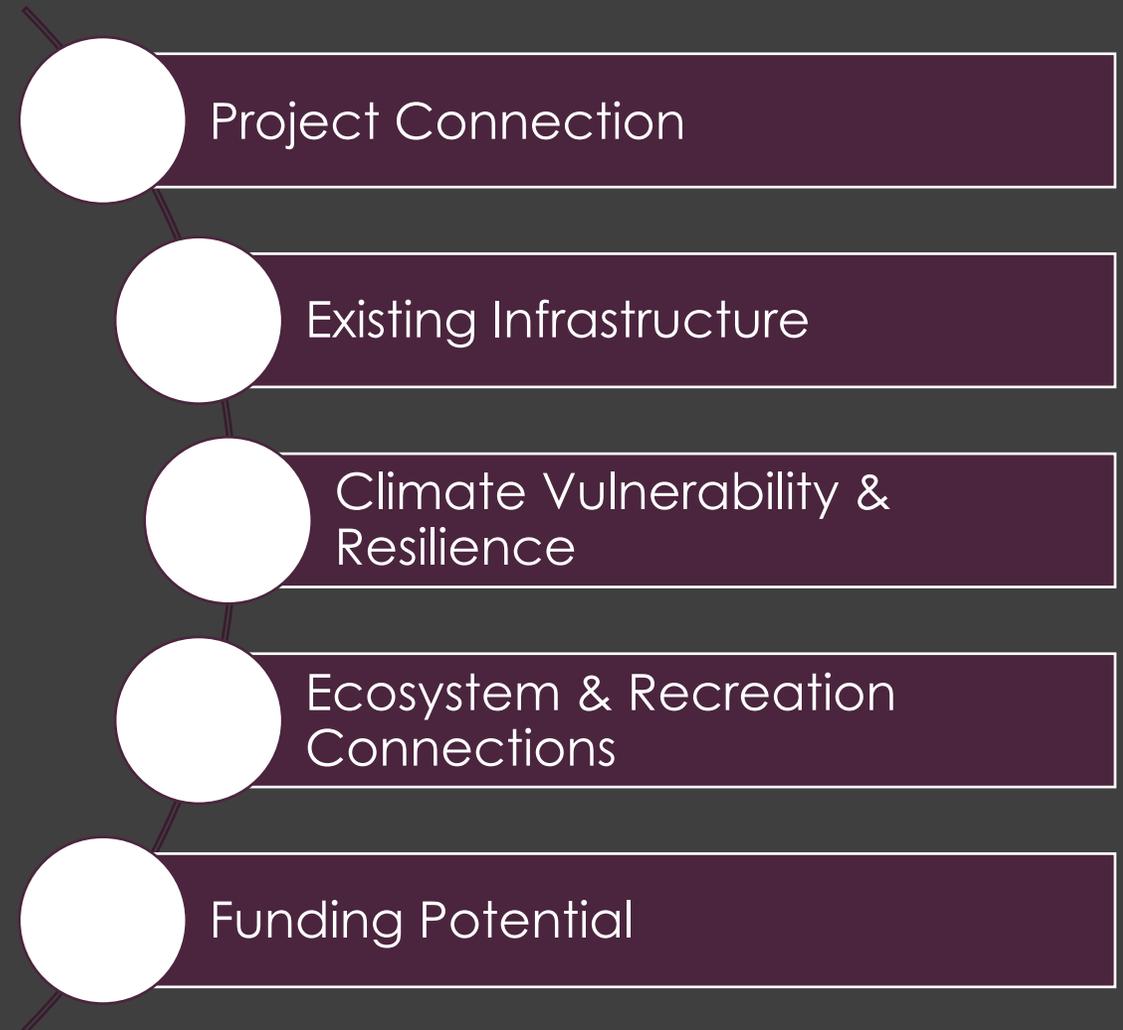
# Project Evaluation

- Close to 200 proposals for recreation-related projects in the region.
- Which ones should be prioritized?
- SRTI has created a set of scoring criteria.
  - Stewardship and resource protection
  - Access
  - Other benefits



# Additional Scoring Needs

- Need to respond to vulnerabilities.
  - Emphasize increased resilience for the most vulnerable people and assets.
- Consider available funding sources.
- Does it advance other community goals?



# Expanded Scoring Criteria, Part 1

Short summary	Project Selection Criteria																
	Project Connection			Climate Vulnerability													
	Local Land	State Land	Federal Land	Existing Infrastructure	AQ (Smoke/Ash)	Drought	Extreme Heat Warm Nights	Flooding	Forestry Pests and Diseases	Human Health Hazards	Landslides and Debris Flows	Severe Weather	Severe Winter Weather	Wildfire	Critical Vulnerability Score	Resilience Features	
Y/N	Y/N	Y/N	Y/N													Y/N	
More porta potties in popular climbing/bouldering areas	Y	N		N		0	0	0	0	0	0	0	0	0	0	0	Y
Add signage on dumpsters that are frequently used by visitors to remind visitors to use the dumpster properly										0	0	0		0	0		N
In tandem with other projects, this project will plan, a complete network of trails, which is beneficial, for trail improvement and to establish a network										0	1	1			3		Y
Plan, fund and implement wildlife and soft-surface trail crossings of hwy 395 to reduce wildlife migration mortality and traffic accidents and to enhance connectivity between Mammoth and Long Valley.	Y	N	Y	N	0	0	2										
This project will inspect all Eastern Sierra developed day use recreation facilities and repair and replace as needed all infrastructure and equipment to make them adequate for recreation use.	Y	Y	Y	Y	2	0	0										

Does the project affect federal, state, and/or local land?

Does the project affect existing infrastructure?

Does the project protect highly or severely vulnerable populations or assets against climate change?



# Recommended Actions

- Reviewed and evaluated proposed projects under expanded scoring criteria.
- Identified five project categories that help advance resilience.
- Criteria can be used to further refine categories or evaluate new projects.



# Top Project Categories, Part 1

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## SRTI Climate: Funding- Ready Projects

Projects with specific locations and infrastructure needs.

65 projects, set to be enacted over the next 1 to 5 years.

Includes fuel reduction, evacuation mapping, recreation area upgrades, and trail and bike improvements.

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## SRTI Climate: Asset Inventory

Comprehensive inventory of assets and their status for all jurisdictions in the SRTI Study Area.

Focus on physical, natural, and cultural assets.

Identifies condition, age, location, and other critical status details.

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# Top Project Categories, Part 2

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## SRTI Climate: Gap Assessment

Builds on Asset Inventory to identify needed improvements, based on demand for recreation and tourism activity.

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Considers how the changing climate will affect asset performance.

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## SRTI Climate: Sustainable Infrastructure Master Plan

Will identify the major projects, programs, and initiatives in the region to boost resilience and respond to gap assessment needs.

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Includes infrastructure upgrades, utility undergrounding, Digital 395 expansion, and others.

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## SRTI Climate: Sustainable Recreation Education Programs

Expanded educational opportunities for topics such as sustainable recreation, tribal history and culture, and climate adaptation.

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Includes residents, workers, and visitors, with tailored content for each.

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# Conclusion/Next Steps

- “A Changing Climate | Vulnerability in California’s Eastern Sierra” will be available by Friday of this week
- Recommended Actions will be considered for funding and implementation by the SRTI

