



Building Climate and Community Resilience in the Sierra Nevada

Stacy Corless, Kaeleigh Reynolds



Carol Blanchette



Agenda

- Eastern Sierra Background
- Key findings from the Sierra Nevada Climate Vulnerability Assessment
- Adaptation Strategies
- Case Study
- World Cafe Activity

The 27-million-acre Sierra Nevada and Cascade region is home to:



75%
of the state's
drinking water

50%
of the state's
forest carbon

60%
of the state's
animal species

50 Million
visitors per year
fueling a vibrant
recreation economy

**... and countless rural
towns and communities.**

The Value of Ecosystem Services

Many efforts to quantify the value of natural resources to the state's economy exist. Some examples of how the Sierra factors in with water include:

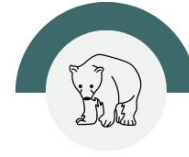
- The City/County of San Francisco tops U.S. counties in economic value created per unit of water consumed, produces \$1.3 million in economic value for every acre-foot of water consumed (source: Bay Area Council)
- The City of Los Angeles will get 80 percent of its water supply from the Eastern Sierra this year. The 464 billion gallons of water that come from the Inyo National Forest has an estimated value of \$15.3 billion to LA's ratepayers (source: Inyo National Forest)

Benefits of Healthy Forests

Ecosystem Services offered by healthy forests provide immense economic, social, and ecosystem value.



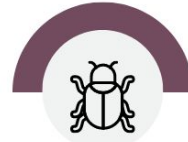
WATER QUALITY & SUPPLY



FISH & WILDLIFE HABITAT



REDUCED WILDFIRE RISK



RESILIENCE TO STRESSORS



AIR QUALITY



CARBON SEQUESTRATION



RECREATIONAL VALUE



STRONG COMMUNITIES



SPIRITUAL VALUE

Ecosystem Services in the Eastern Sierra

Ecosystem Service	Total Value / Year		
	Low	Average	High
Air Quality Regulation	\$416.3	\$479.6	\$559.1
Biological Control	\$68.0	\$85.0	\$126.1
Carbon Sequestration	\$146.7	\$314.1	\$493.2
Carbon Storage	\$19,382.6	\$40,438.2	\$64,688.8
Erosion Prevention	\$0.4	\$87.1	\$291.5
Pollination	\$90.5	\$271.4	\$452.3
Recreation and Tourism ^a	\$2,066.7		
Waste Treatment	\$180.9	\$4,217.8	\$19,774.2
Water Quality	\$14,595.7	\$37,658.0	\$89,561.7
Water Regulation	\$6,611.0	\$9,732.20	\$12,853.4
Total	\$43,558.7	\$95,350.0	\$190,866.9
Notes:			
a. Recreation and Tourism only includes a single value because this value was calculated differently. Please see the "Recreation and Tourism Section" section for additional detail.			

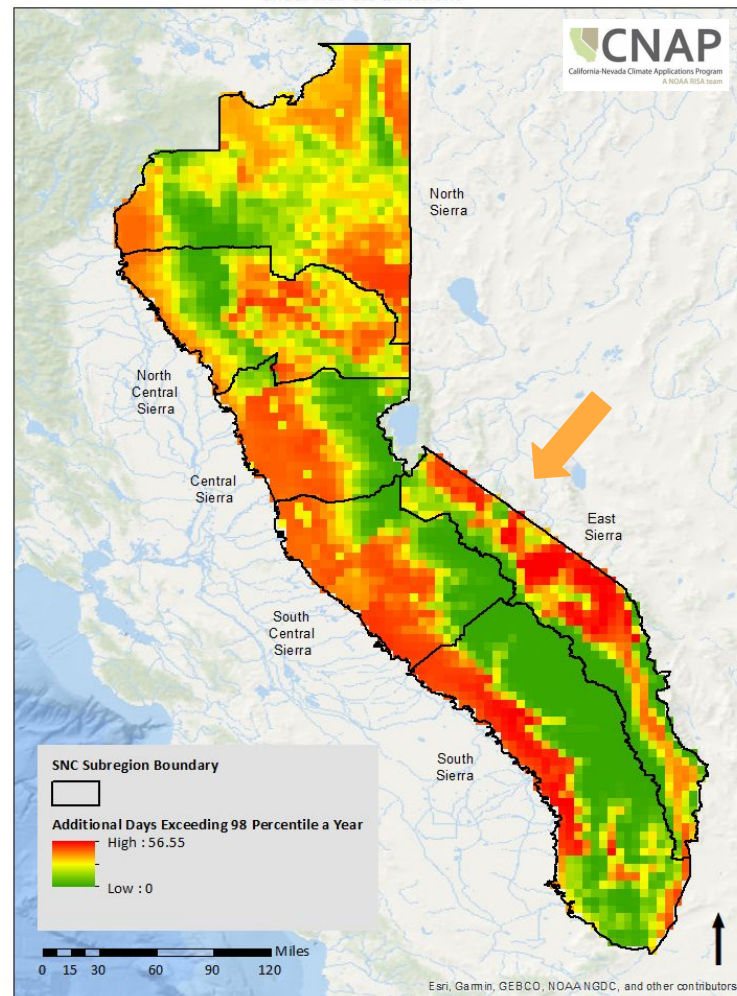
Change in Number of Heat Days per Year, 2036 - 2065

SNC Sub Region	Average Range of Change Across the Sub Region <i>Range Includes Diverse Topographic Changes</i>	Average Change Across the Sub Region <i>Average Includes Diverse Topographic Changes</i>
North Sierra	Will increase 1-48 days a year	On average will increase 27 days a year
North Central Sierra	Will increase 1-50 days a year	On average will increase 27 days a year
Central Sierra	Will increase 1-48 days a year	On average will increase 26 days a year
East Sierra	Will increase 0-56 days a year	On average will increase 28 days a year
South Central Sierra	Will increase 0-49 days a year	On average will increase 27 days a year
South Sierra	Will increase 0-55 days a year	On average will increase 17 days a year

County	Average Increase in Days <i>Average Includes Diverse Topographic Changes</i>
Alpine	27.5
Amador	28.1
Butte	20.2
Calaveras	30.6
El Dorado	30.0
Fresno	13.7
Inyo	17.6
Kern	17.1
Lassen	28.2
Madera	21.8
Mariposa	31.3
Modoc	31.7
Mono	36.7
Nevada	28.3
Placer	22.4
Plumas	32.4
Shasta	20.9
Sierra	27.9
Tehama	22.9
Tulare	19.1
Tuolumne	24.5
Yuba	22.7

Change in Number of Heat Days a Year 2036 - 2065

under RCP 8.5 Emissions



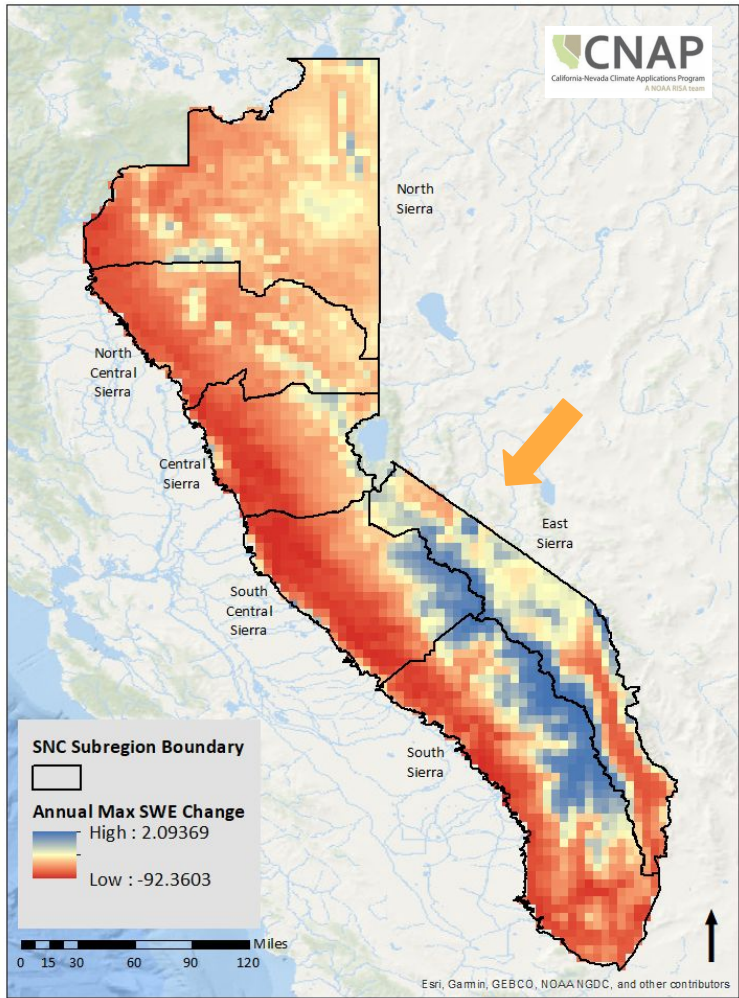
Annual Maximum SWE Change, 2036–2065

Annual Maximum SWE Change 2036 - 2065 under RCP 8.5 Emissions

Change in Annual Max SWE 2036-2065

Subregion	Change Across the Subregion <i>Subregions Include Diverse Topographic Changes</i>	Average Change Across the Subregion <i>Average Includes Diverse Topographic Changes</i>
North Sierra	Will decrease 18.9%–89.3%	On average will decrease 58.58%
North Central Sierra	Will decrease 31.6%–88.6%	On average will decrease 65.3%
Central Sierra	Will decrease 23.25%–90.9%	On average will decrease 69.7%
East Sierra	Will decrease 2.05%–83.5%	On average will decrease 43.2%
South Central Sierra	Could decrease 92.4%, but could increase 0.4%	On average will decrease 63.7%
South Sierra	Could decrease 92.2% but could increase 2.1%	On average will decrease 54.5%

County	Average Change in Percent <i>Average Includes Diverse Topographic Changes</i>
Alpine	-40.4
Amador	-77.1
Butte	-76.4
Calaveras	-78.0
El Dorado	-72.5
Fresno	-41.2
Inyo	-53.4
Kern	-77.1
Lassen	-55.5
Madera	-58.2
Mariposa	-68.0
Modoc	-56.2
Mono	-35.9
Nevada	-67.0
Placer	-64.8
Plumas	-60.2
Shasta	-68.1
Sierra	-56.2
Tehama	-74.8
Tulare	-48.7
Tuolumne	-50.9
Yuba	-79.7



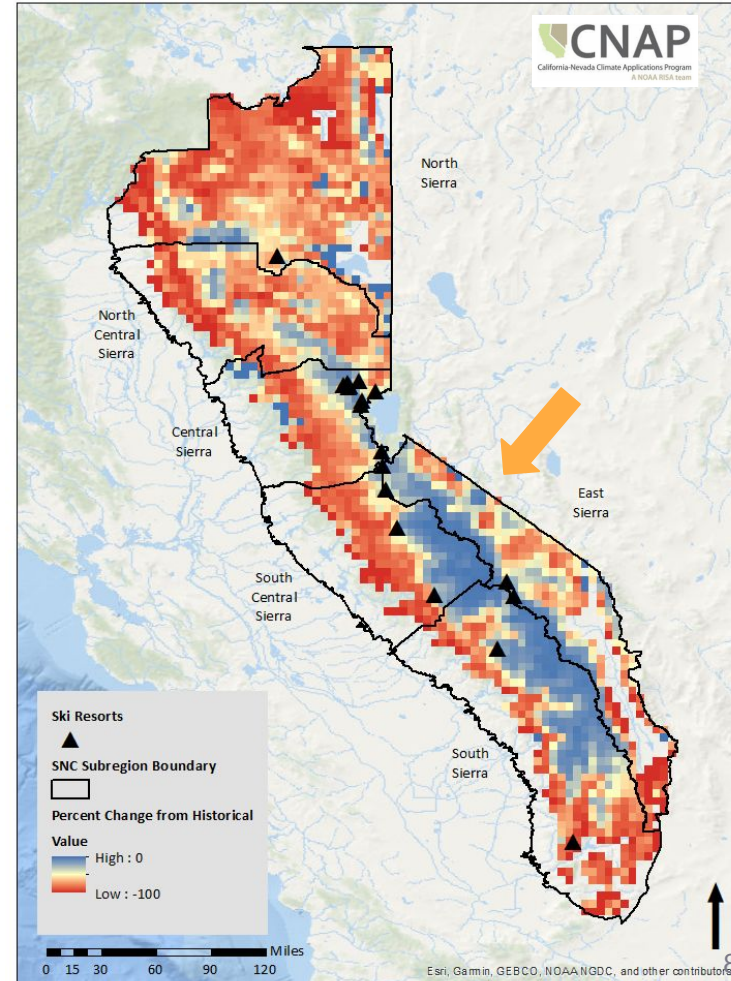
Change in Jan 1 Snow Cover, 2036 - 2065

January 1 Snow Cover 2036-2065

Subregion	Change Across the Subregion <i>Subregions Include Diverse Topographic Changes</i>	Average Change Across the Subregion <i>Average Includes Diverse Topographic Changes</i>
North Sierra	Will decrease 0%–100%	On average will decrease 68.3%
North Central Sierra	Will decrease 11.5%–100%	On average will decrease 62.6%
Central Sierra	Will decrease 0%–100%	On average will decrease 57%
East Sierra	Will decrease 0%–100%	On average will decrease 46.1%
South Central Sierra	Will decrease 1%–100%	On average will decrease 52.2%
South Sierra	Will decrease 0%–100%	On average will decrease 47%

County	Average Change in Percent <i>Average Includes Diverse Topographic Changes</i>
Alpine	-31.9
Amador	-65.3
Butte	-77.2
Calaveras	-75.6
El Dorado	-65.1
Fresno	-29.1
Inyo	-60.2
Kern	-84.6
Lassen	-62.7
Madera	-44.6
Mariposa	-53.7
Modoc	-76.0
Mono	-42.2
Nevada	-55.0
Placer	-53.0
Plumas	-60.5
Shasta	-68.9
Sierra	-53.7
Tehama	-71.1
Tulare	-45.2
Tuolumne	-44.9
Yuba	-31.2

Change in Snow Cover on January 1 2036 - 2065 under RCP 8.5 Emissions

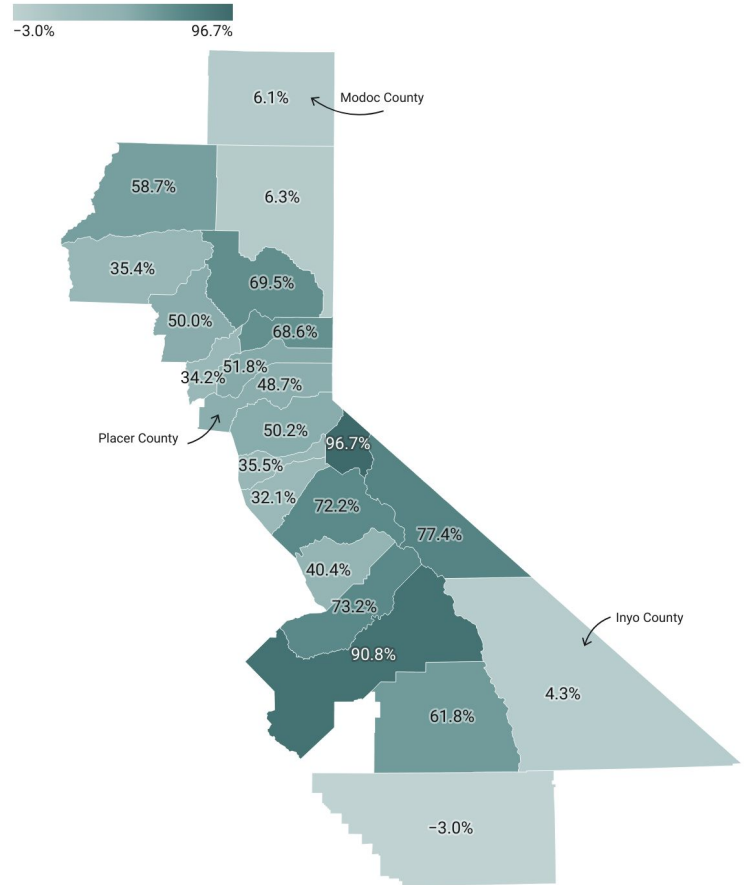


Change in Acreage Burned, 2036 - 2065



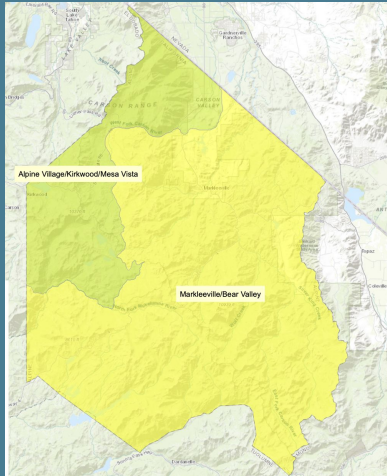
Percent Change in Acreage Burned

Percent Change in acreage burned by wildfire from Modeled Historical (1961-1990) to Modeled Mid-Century (2035-2069) under RCP 8.5.



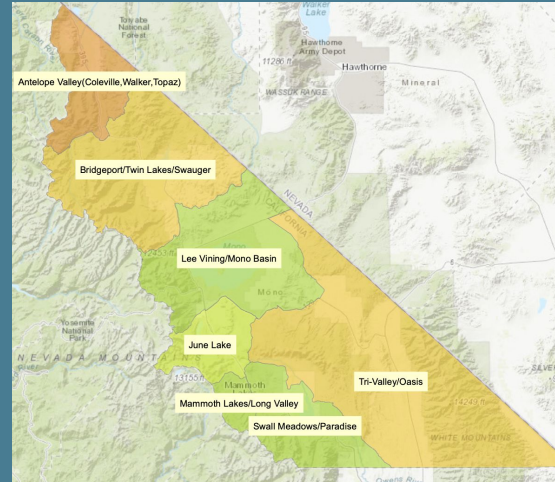
Community Capacity

Alpine County



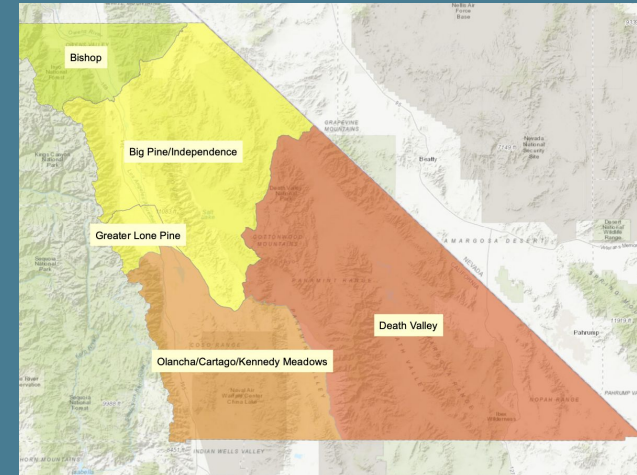
- Avg capacity is 3.2 / 5
- Low population makes consensus and decision making difficult
- Lack of infrastructure and services

Mono County



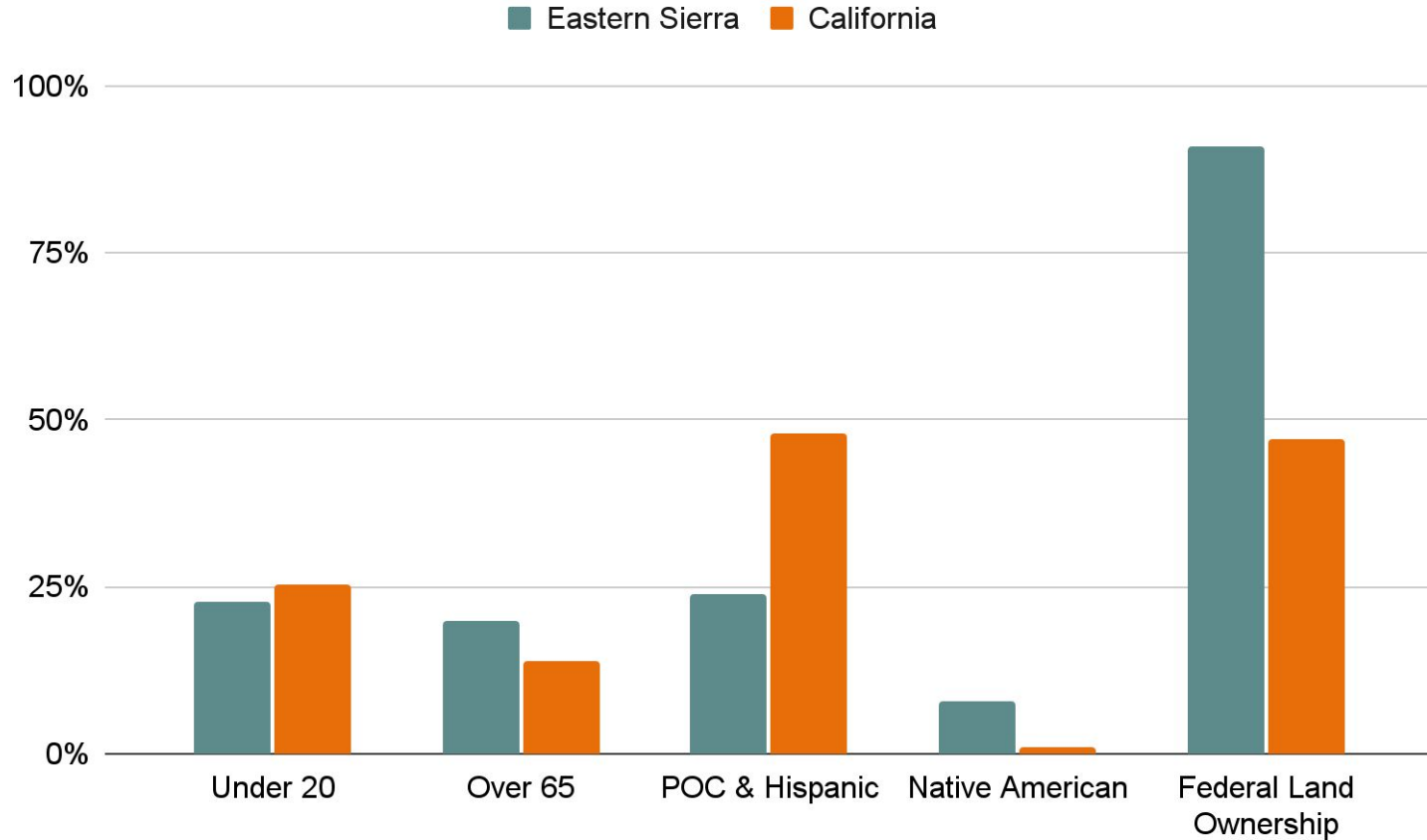
- Avg capacity is 3.2 / 5
- Higher capacity = wealthier regions
- Lower capacity = more rural regions

Inyo County



- Avg capacity is 2.6 / 5
- Overall capacity related to workforce shortages
- More cohesion with tribes would increase capacity

Communities in the Eastern Sierra



Thank you.



Follow up info:

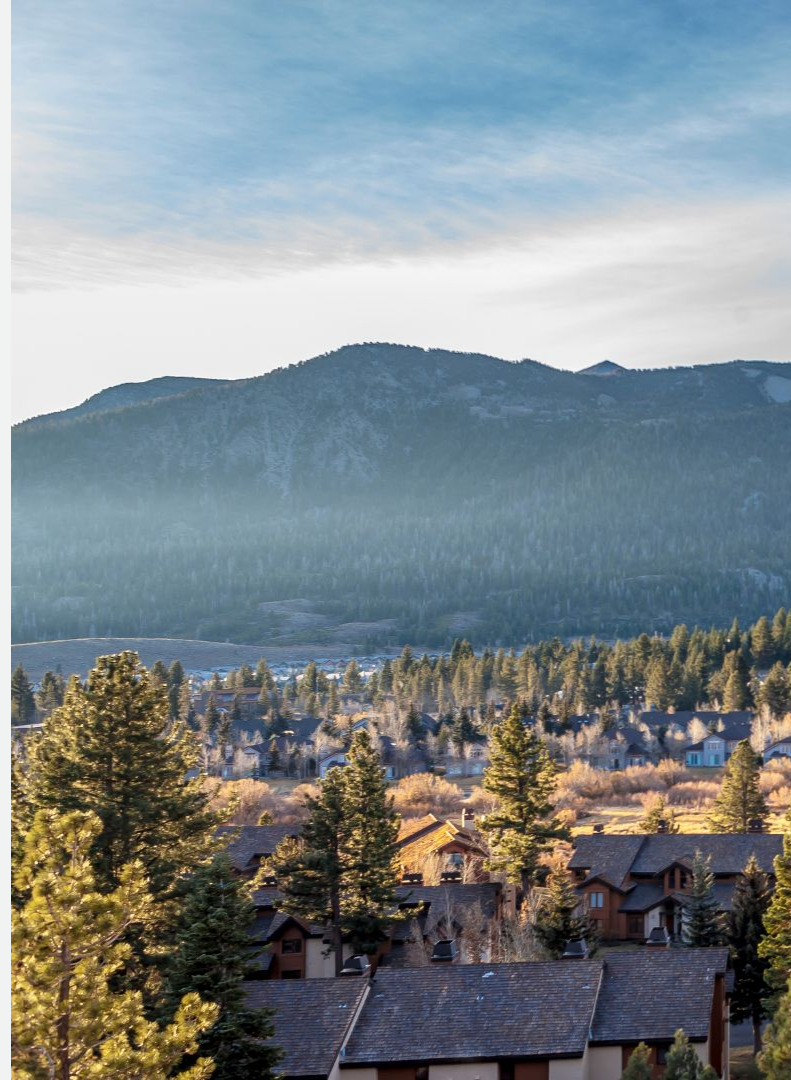
Stacy Corless

Email: scorless@sierrabusiness.org

Kaeleigh Reynolds

Email: kreynolds@sierrabusiness.org

Website: <https://www.sierrabusiness.org>



Community-based Strategies for Climate Adaptation

Carol Blanchette
UC Santa Barbara
Director, Valentine Eastern Sierra Reserves



UC SANTA BARBARA



UCSB Valentine Eastern Sierra Reserves

SNARL

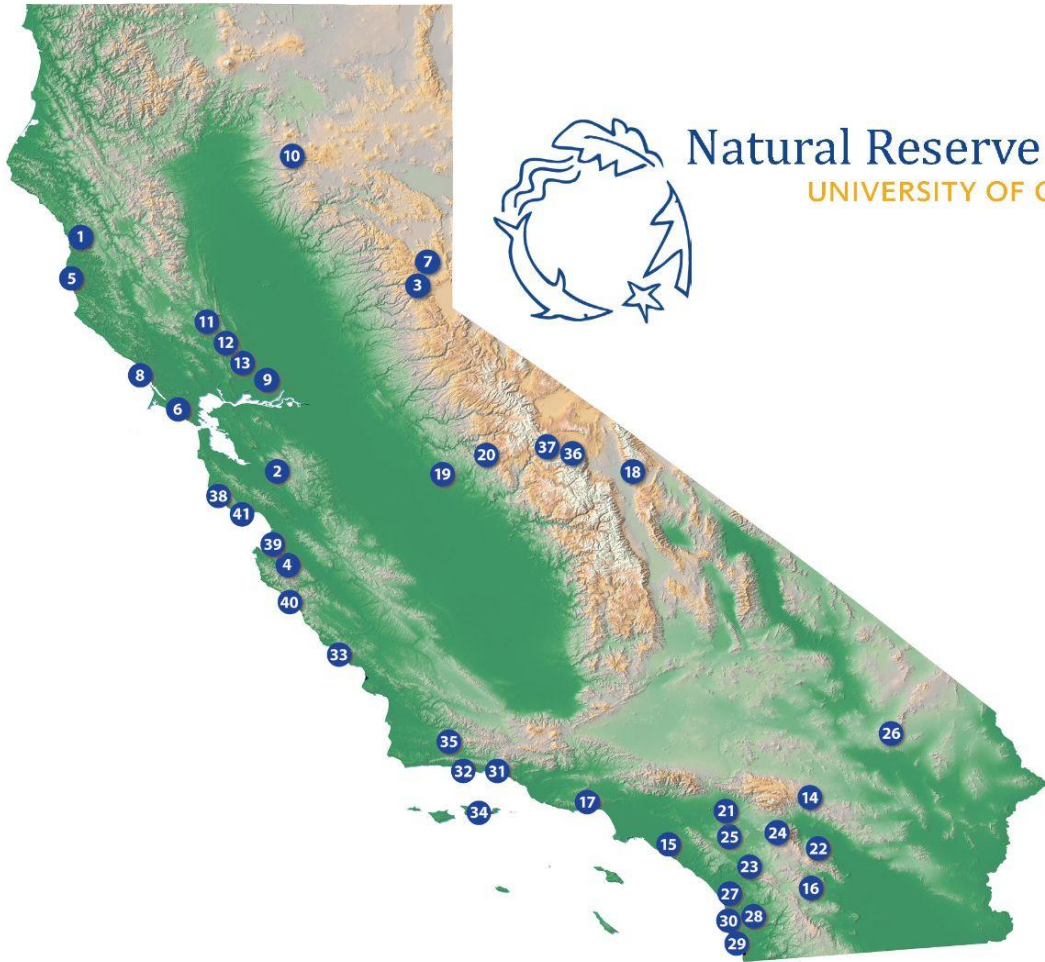


Valentine Camp



UC SANTA BARBARA





Natural Reserve System

UNIVERSITY OF CALIFORNIA



Climate Threats in Sierra

1. Warming
2. Snowpack Decline
3. Snowmelt timing
4. Forest health
5. Wildfire



Research



Education



Importance of Outdoor Education

1. Academic performance increases when children learn outdoors.
2. Outdoor learning improves child development.
3. It's beneficial to kids' health.
4. Going outside is good for the brain.
5. Outdoor activities give children unique practical experiences.



Public Service



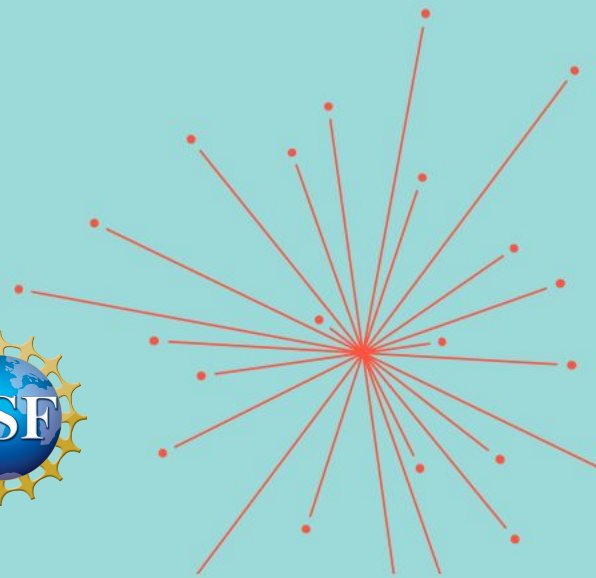
**The
Lawrence**
Hall of
Science
UNIVERSITY OF CALIFORNIA, BERKELEY



JUSTICE
OUTSIDE

INFORMING 
CHANGE

Working Towards Racial Equity
in Environmental & Outdoor Science
Organizations – 2-year Workshop Series



Climate change and Racial Equity

- People of color in the U.S. are disproportionately impacted by climate change.
- People of color bear the brunt of impacts from climate change, such as higher risk of heat deaths and asthma, home displacement from floods and storms, and the destruction of their culture and livelihoods from changes to ecosystems.
- People of color express stronger belief in anthropogenic climate change and are more concerned than white people.
- People of color overwhelmingly support government action on climate change.
- Latinos say that the number one reason they do not contact their elected officials about climate change is “nobody ever asked me to.”





Education as Climate Adaptation Strategy

Education can encourage people to **change their attitudes and behavior**; it also helps them to make **informed decisions**. Education empowers all people, but especially **motivates the young to take action**. Education can contribute to climate action through proactive education systems and **equipping learners with the knowledge and skills** to overcome these challenges.



Building science-community collaborations to strengthen community resilience in the Eastern Sierra Nevada

- Community resilience can promote climate resilience through informal STEM learning.
- Based in Collective decision-making and co-design that stems from community experience
- Collaboration with Paiute tribe, Inyo National Forest, Toiyabe Indian Health clinics, Whitebark Institute, UCSB-VESR



Planning Collaborative Wildland Fire Science and Management in the Payahuunadü / Owens Valley & Eastern Sierra Regions of California

- California is home to 110 Federally recognized Tribes who reside on 100 reservations, many in areas at severe risk of wildfire threat.
- If forest restoration is to rely on fire as a tool for forest health, the perspectives of Tribal Nations need to be included in new approaches to wildland fire science research and management.
- Collaborate on an action framework combining Indigenous knowledge systems, natural and social sciences, to assess wildfire causes, effects, and management techniques.





World Cafe Activity!

Set up Instructions

- Make groups of equal size around a table
- Choose a notetaker for your table

Activity Instructions

- Discuss a question, notetake records key points for 5 min
- Each group shares out
- Notetaker stays at the table, everyone else finds a new table for the next question

World Cafe Discussion Question 1

- What are examples of existing programs or program ideas that can leverage outdoor education as an adaptation strategy?

World Cafe Discussion Question 2

- What are ways to bridge the rural-urban divide and grow awareness around the essential ecosystem services provided by rural regions?

World Cafe Discussion Question 3

- How can we engage disinvested communities to build climate and community resilience?