INCORPORATING CLIMATE CHANGE INFORMATION INTO STREAM RESTORATION PLANNING

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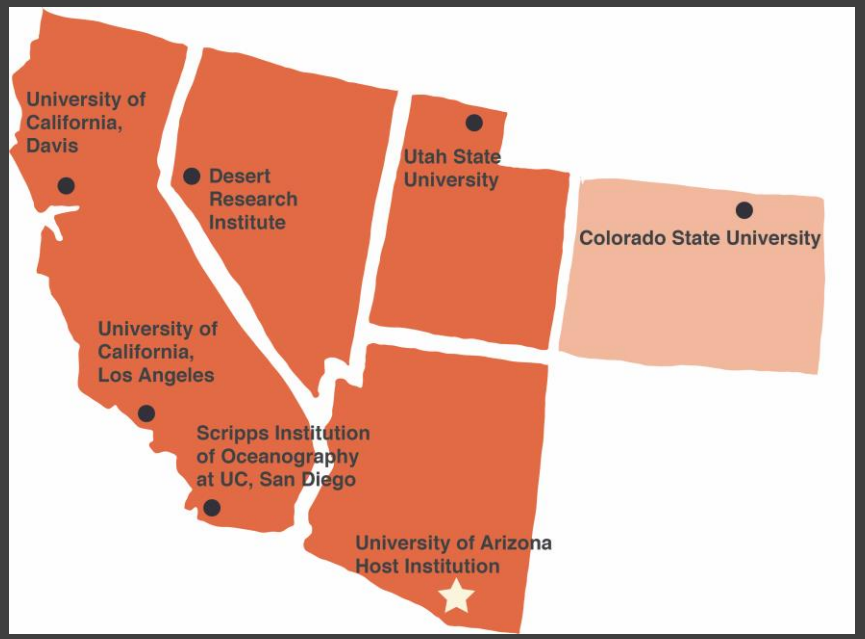
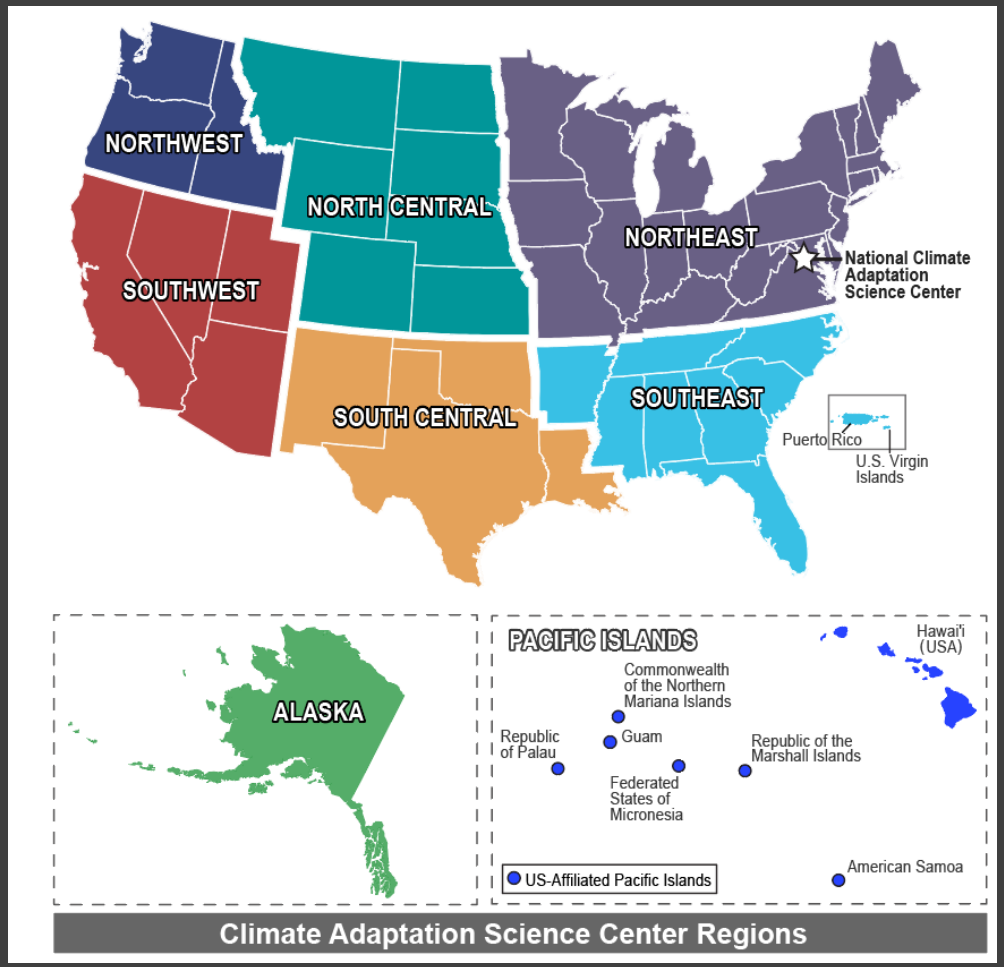
SW CLIMATE ADAPTATION SCIENCE CENTER





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USGS science for a changing world

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RENEWING OUR RIVERS: A GUIDEBOOK TO DRYLAND STREAM CORRIDOR RESTORATION

Labor of Love

RENEWING OUR RIVERS: A GUIDEBOOK TO DRYLAND STREAM CORRIDOR RESTORATION

- Chapters:
  - Planning your stream restoration project
  - Assessing the hydrologic and physical conditions of a drainage basin
  - Adapting your stream restoration project to climate change
  - Quantifying and securing environmental flow
  - Implementing your stream restoration plan
  - Monitoring
  - Achieving greater impact and ensuring your stream restoration effort continues to grow

ADAPTING YOUR STREAM RESTORATION PROJECT TO CLIMATE CHANGE

- Megan Friggens (US Forest Service Rocky Mountain Research Station)
- Gregg Garfin (University of Arizona)
- Rebeca González Villela (Instituto Mexicano de Tecnología del Agua)
- Sue Harvison (3 Bar Ranch)
- Katharine Hayhoe (Texas Tech University)
- Sharon J. Lite (Environment Consultant)
- Martín José Montero Martíne (Instituto Mexicano de Tecnología del Agua)
- John Nielsen-Gammon (Texas A&M)
- Jeff Renfrow (Rio Bravo Restoration)
- David Rissik (National Climate Change Adaptation Research Facility, AU)
- Julio Sergio Santan Sepúlveda (Instituto Mexicano de Tecnología del Agua)
- Bart Wickel (Stockholm Environment Institute)
- Mark Briggs (RiversEdge West)

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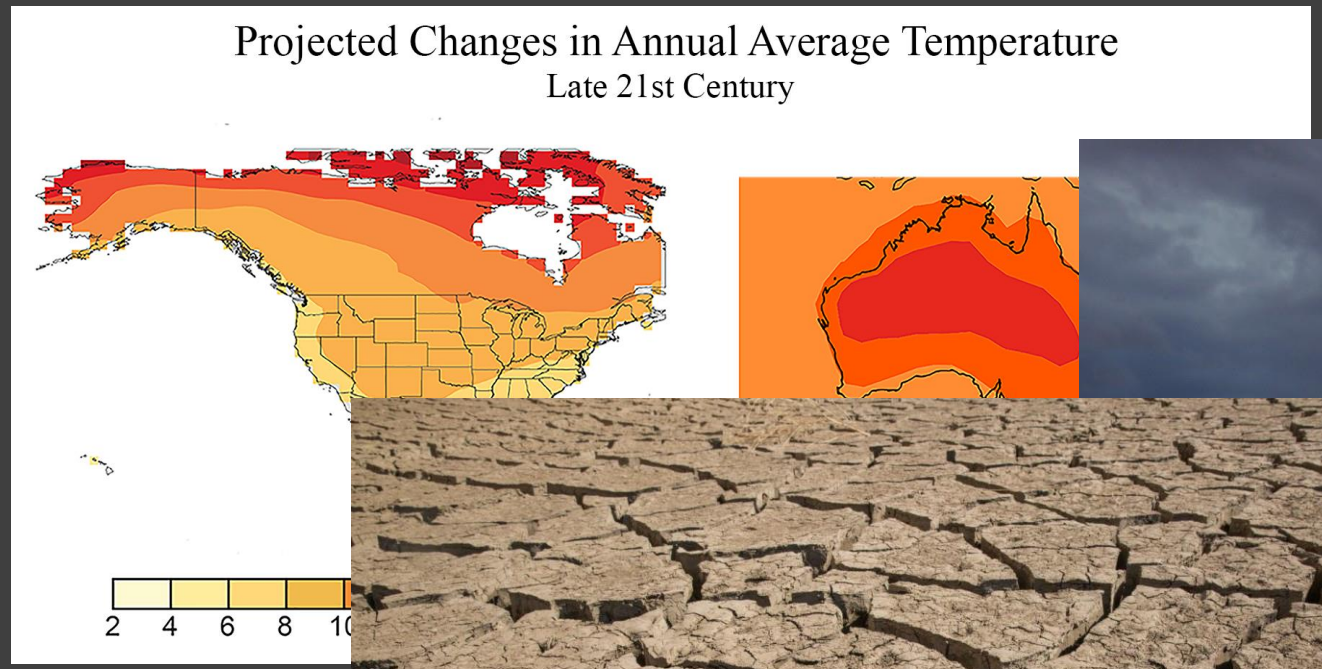
ADAPTING YOUR STREAM RESTORATION PROJECT TO CLIMATE CHANGE

- Why and how the climate is changing, and its impact on stream hydrology
- Sources of climate data and projections
- Strategies for applying climate information to the sub-basin scale
- Assessing vulnerability
- Climate adaptation and strategies for strengthening the climate adaptive capacity of restoration actions

Why and how the climate is changing, and its impact on stream hydrology



U.S. Climate Science Spec
Explorer

Photo Credit: A. Melton

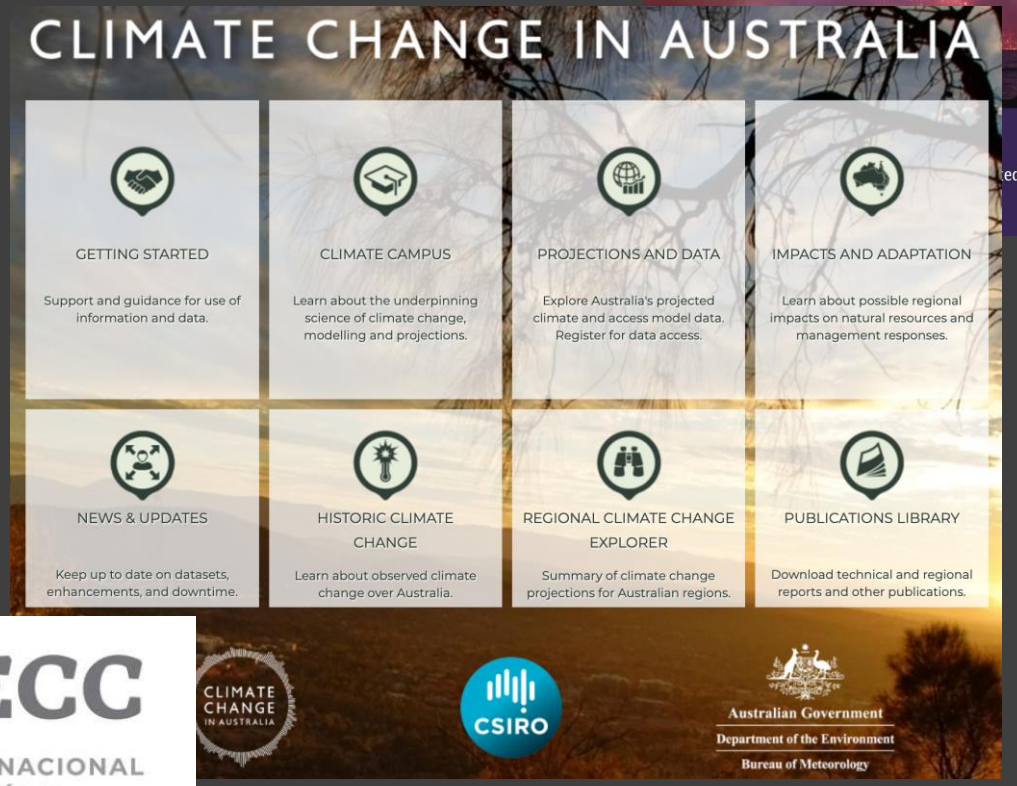
Why and how the climate is changing, and its impact on stream hydrology

- Flooding
- Drought
- Earlier snowmelt and runoff
- Decreased runoff
- Higher likelihood that non-native aquatic species will invade, since invasives tend to be more tolerant to higher water temperatures
- Possible change in riparian vegetation, from native trees to shrubs
- Reduction in groundwater
- Increased occurrence and size of wildfires -> increased sediment yields and reduced water quality from post-fire floods
- Saltwater intrusion, high storms surges, and coastal retreat

Photo Credit: Michael Ryan, NPS

SOURCES OF CLIMATE DATA

- National weather services and other government agencies
- Universities
- Tools and assessments
- Climate service providers (e.g., CASCs)



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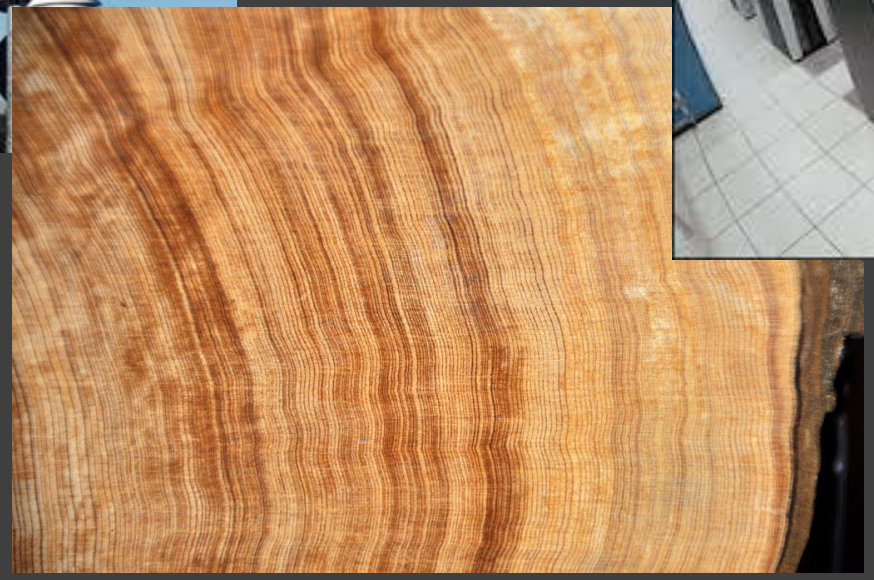
STRATEGIES FOR APPLYING LARGE-SCALE CLIMATE INFORMATION TO THE SUB-BASIN SCALE



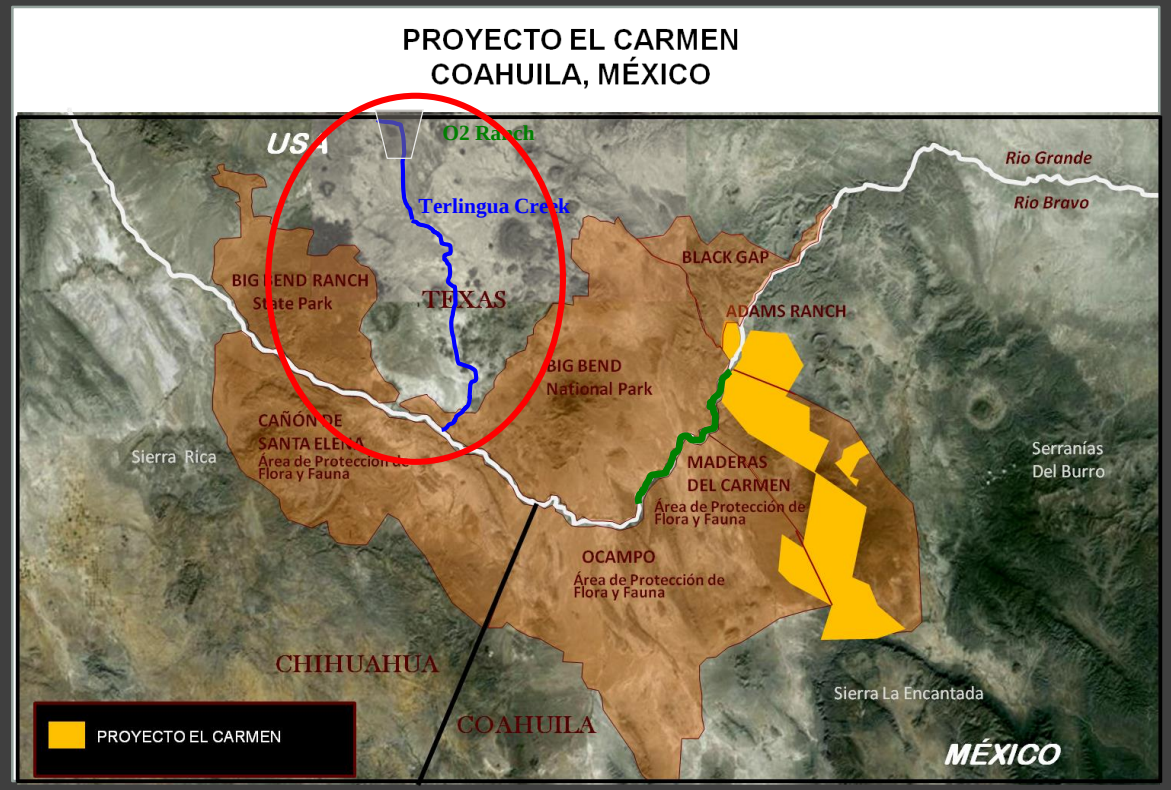
Analogs → Time
Analogs → Space

ASSESSING VULNERABILITY

Vulnerability = Exposure + Sensitivity + Adaptive Capacity

How likely is it that climate change will prevent your restoration objectives from being achieved?

CASE STUDY – TERLINGUA CREEK



Marie Landis, Big Bend National Park

- Collaboration between 3 Bar Ranch, TX Parks and Wildlife Department, and others
- Does the elevation of the zone of soil saturation at planting sites drop to levels that are likely to not permit the establishment of obligate riparian trees?
- Climate
  - Testing year was neither abnormally wet nor dry
  - Future temperatures = 3-5°F increase over the next 50 years
  - Future longer droughts that are more frequent and severe

CASE STUDY – TERLINGUA CREEK

- Conclusions
  - Obligate riparian trees are highly sensitive to the impacts of climate change on water availability
  - Greater exposure to deleterious conditions in the future
  - Low adaptive capacity of obligate riparian trees

Objective is vulnerable to climate change

Photo Credit: Jeff Renfrow

1. ALTER YOUR RESTORATION OBJECTIVES

Photo Credit: Jeff Renfrow

- Change the time frame
- Change location
- Change desired outcomes

2. ALTER YOUR RESTORATION TACTICS

- Alter on-the-ground restoration tactics
  - Change the emphasis from restoration to protection
- Improve management and protect streamflow
- Reduce or eliminate stressors

Photo Credit: Mark Briggs

3. PUSH THE PAUSE BUTTON

More case studies: Collaborative Conservation and Adaptation Strategy Toolbox, or CCAST

TAKEAWAYS

- Restoration projects that are climate-adapted are more likely to be successful in the long-term
- Assessing the vulnerability of your stream to the impacts of climate change is a key first step
- Don't be afraid to pause implementation if needed, and to change objectives or tactics, to have a better chance of long-term success

Photo credit: Michael Hammer

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