

# COPING WITH DROUGHT IN CALIFORNIA'S RUSSIAN RIVER WATERSHED

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Center for Western Weather  
& Water Extremes

# Drought Definition

Drought is when natural water supplies do not meet demand.

But specific definitions depend on water supply and use.

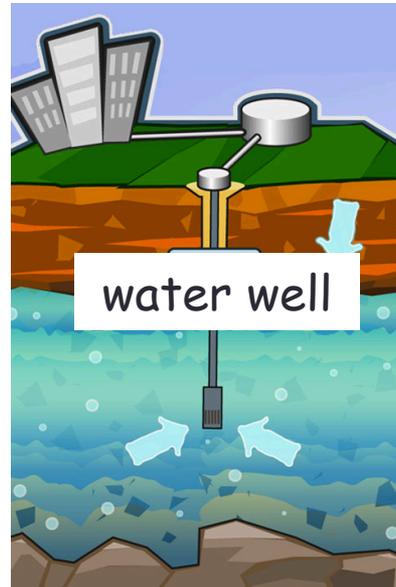
Ex: Lake Mendocino water levels (Upper River Basin)

Ground water levels (ground water users)

Soil moisture levels (agriculture)



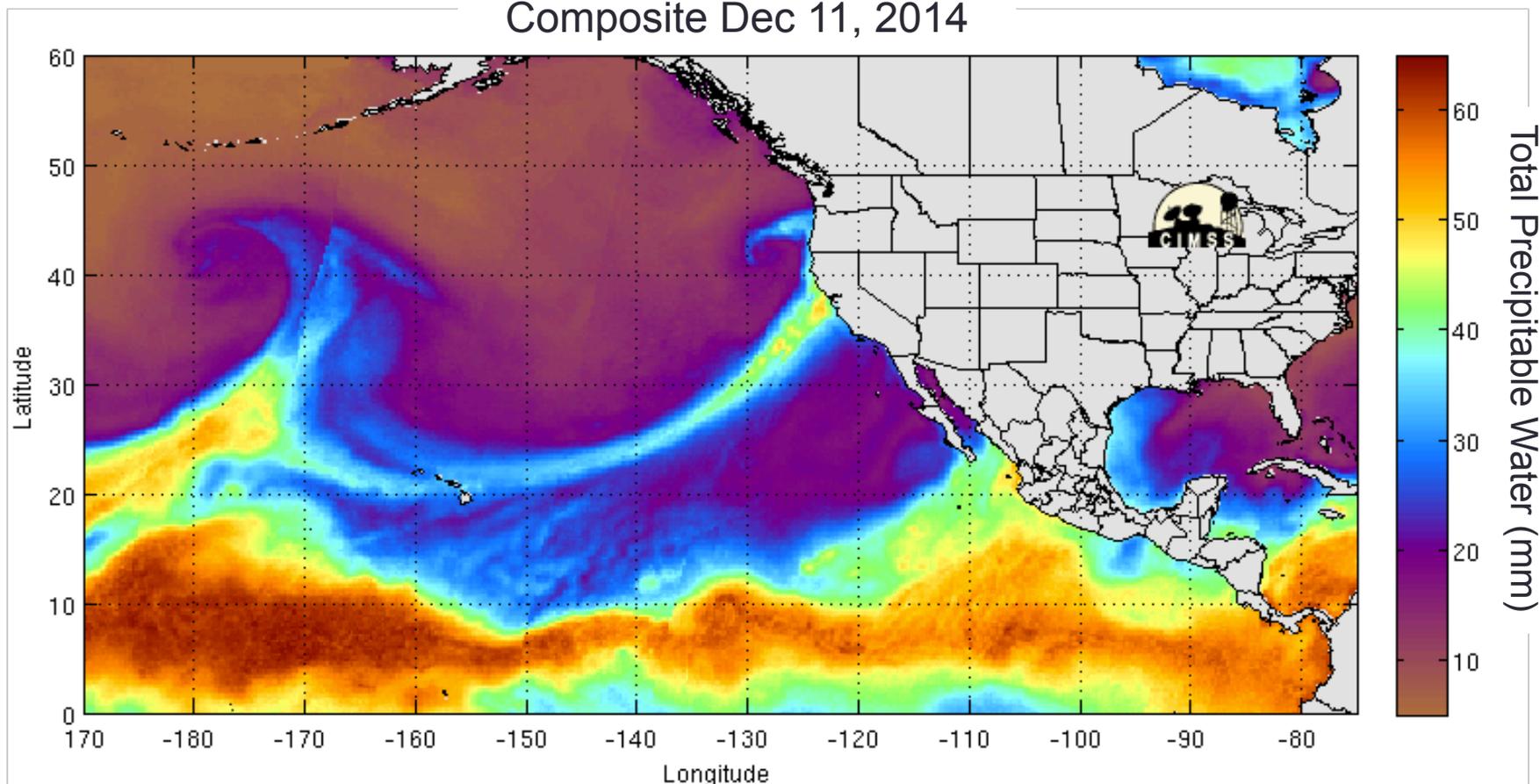
SCWA



LCWA

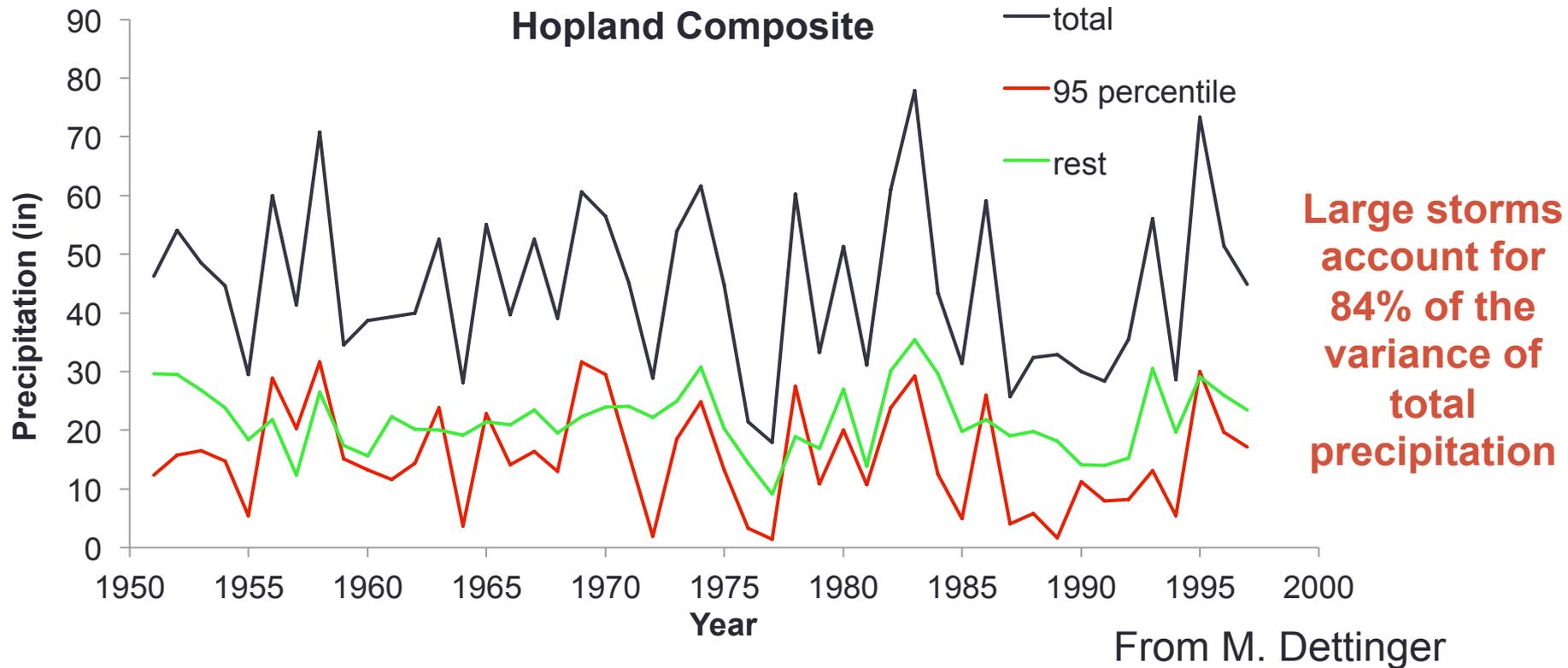
# Project Objective 1: ARs in the future

Composite Dec 11, 2014

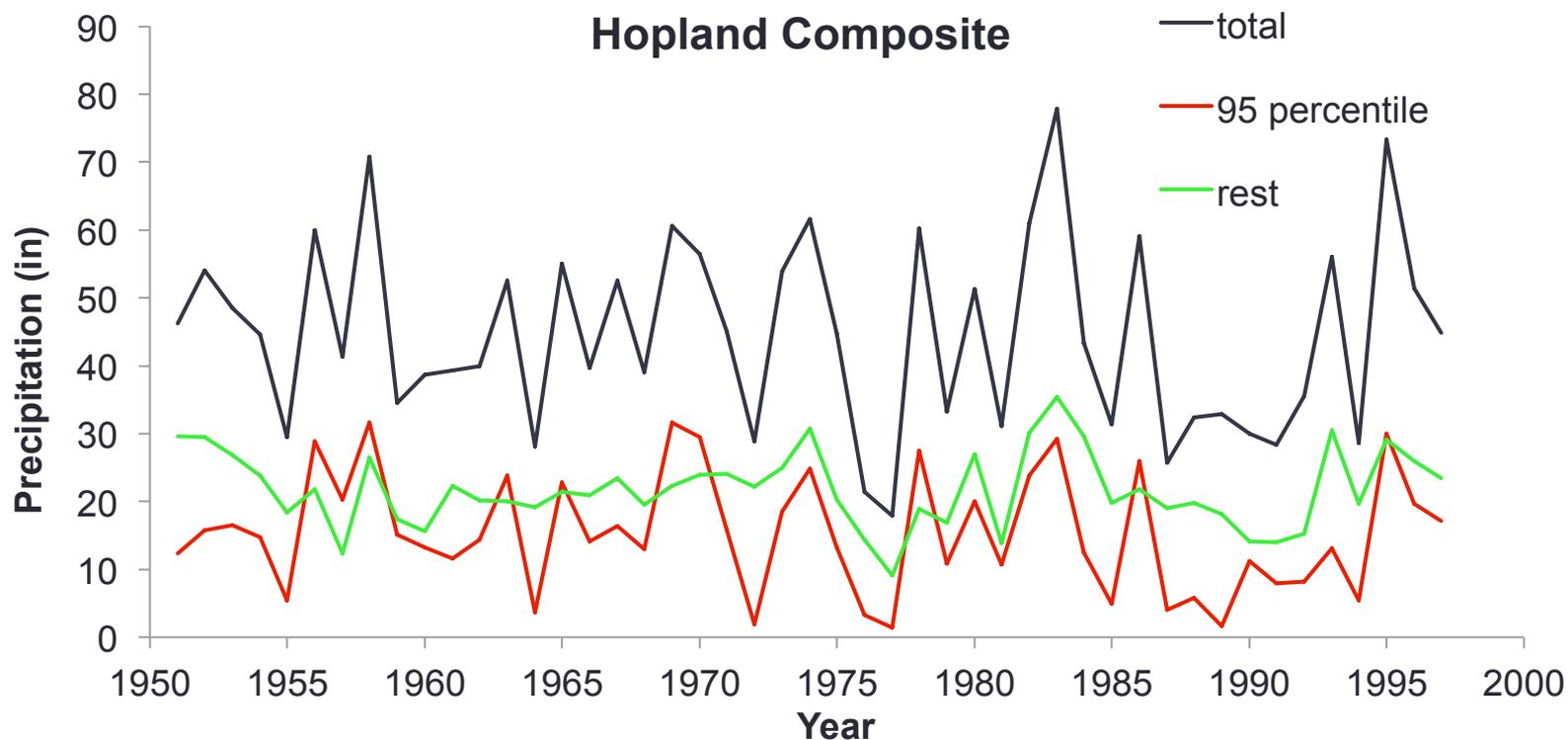


CIMSS

# Project Objective 1: ARs in the future



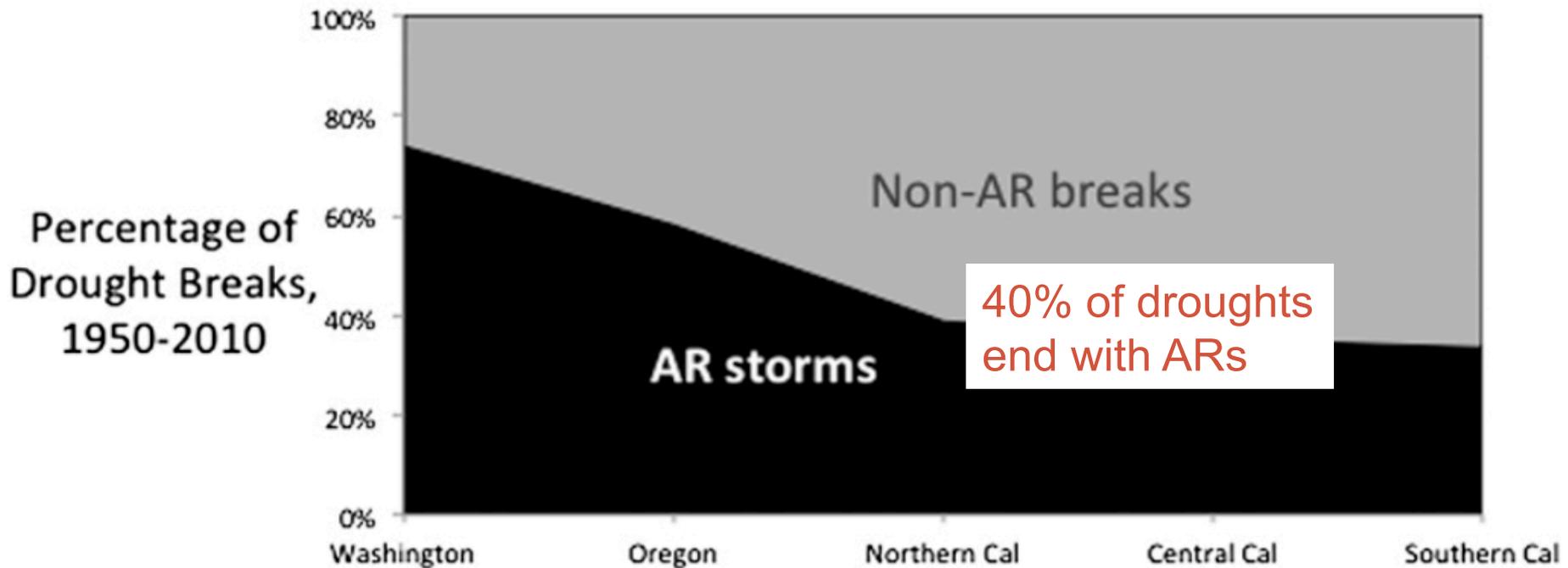
# Project Objective 1: ARs in the future



Use global climate models to examine the frequencies, intensity and seasonality of Atmospheric Rivers (ARs) in the future

# Project Objective 1: ARs in the future

AR as “drought-busters in the past”



Dettinger, 2013

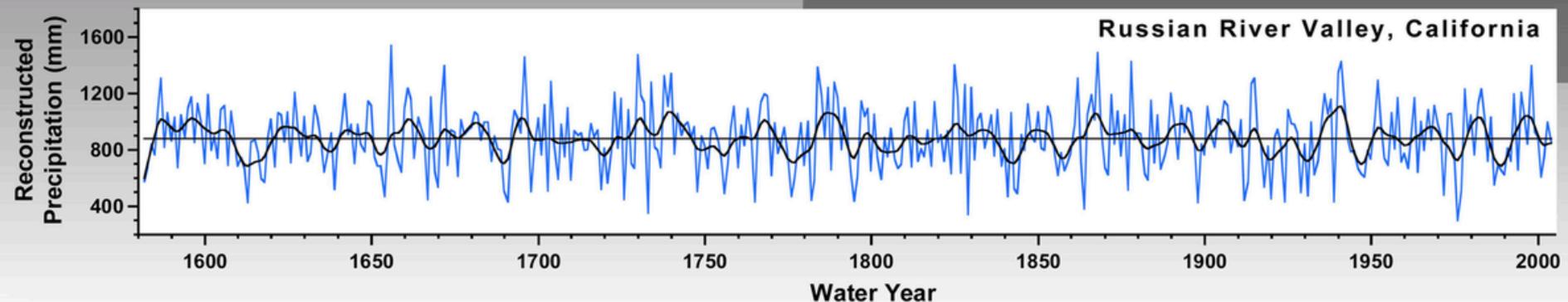
Use climate models to examine projected drought frequency and frequency of ARs as “drought busters”

# Project Objective 2: “mega-drought”

Develop a plausible, historically defensible, hydrological extreme drought for the Russian River Watershed

- “Historically defensible”
  - use tree ring data going back 423 years
  - historical climatological data since 1900

Griffin et al.



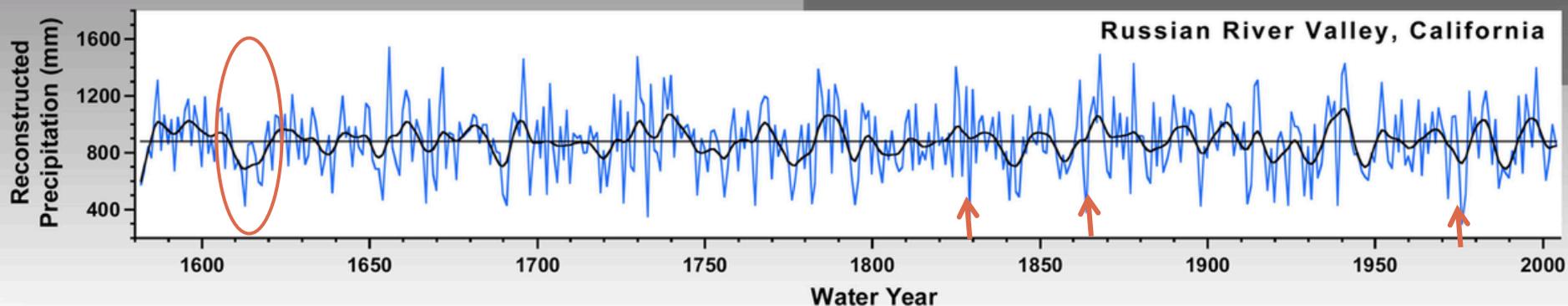
## Project Objective 2: “mega-drought”

Develop a plausible, historically defensible, hydrological extreme drought for the Russian River Watershed

- “Historically defensible”
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Reconstructed precipitation from tree rings for the Russian River

Griffin et al.



# Project Objective 2: “mega-drought”

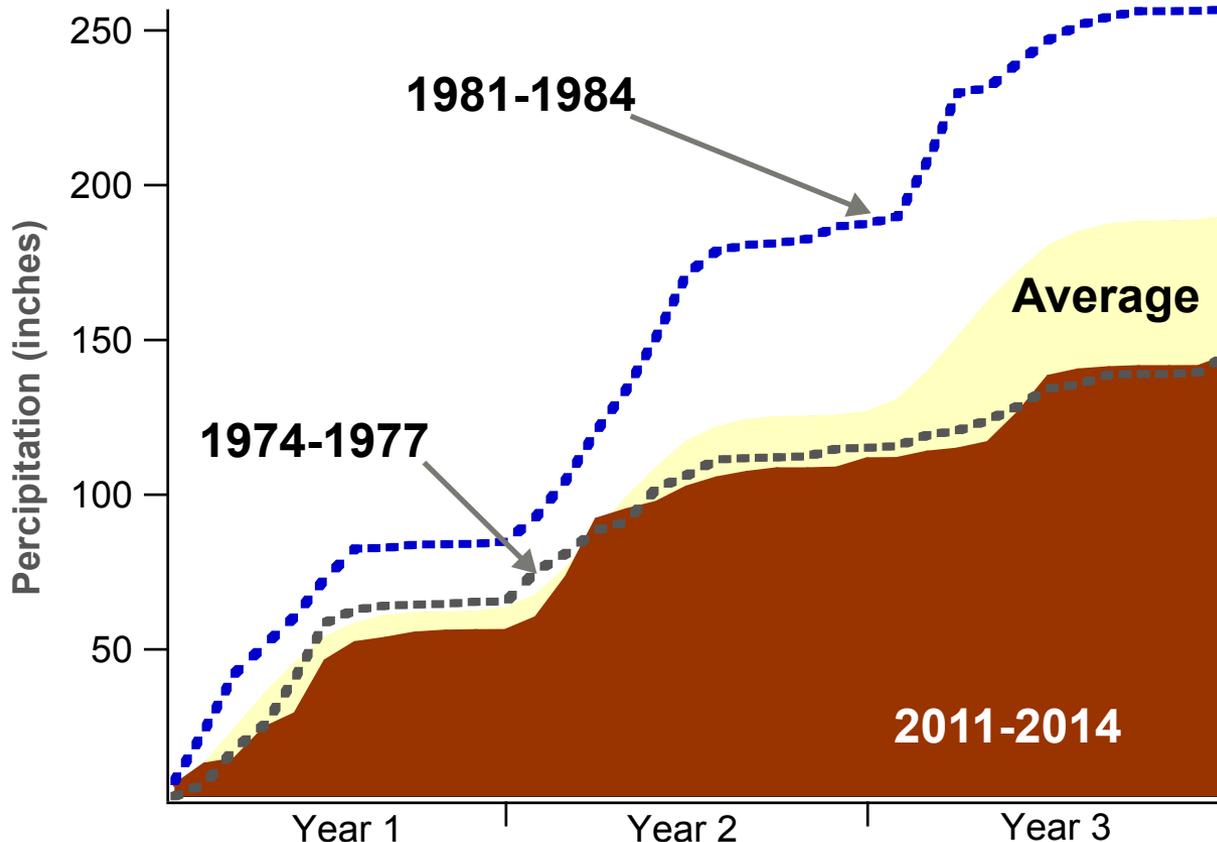
Develop a plausible, historically defensible, hydrological extreme drought for the Russian River Watershed

- “Historically defensible”
  - use tree ring data going back 423 years
  - historical climatological data since 1900
- **Input from Stakeholders**
  - acute & short vs. long & less severe
  - landscape drought (high temperatures increase evapotranspiration)
  - Output data that is most helpful?

# Project Objective 2: “mega-drought”

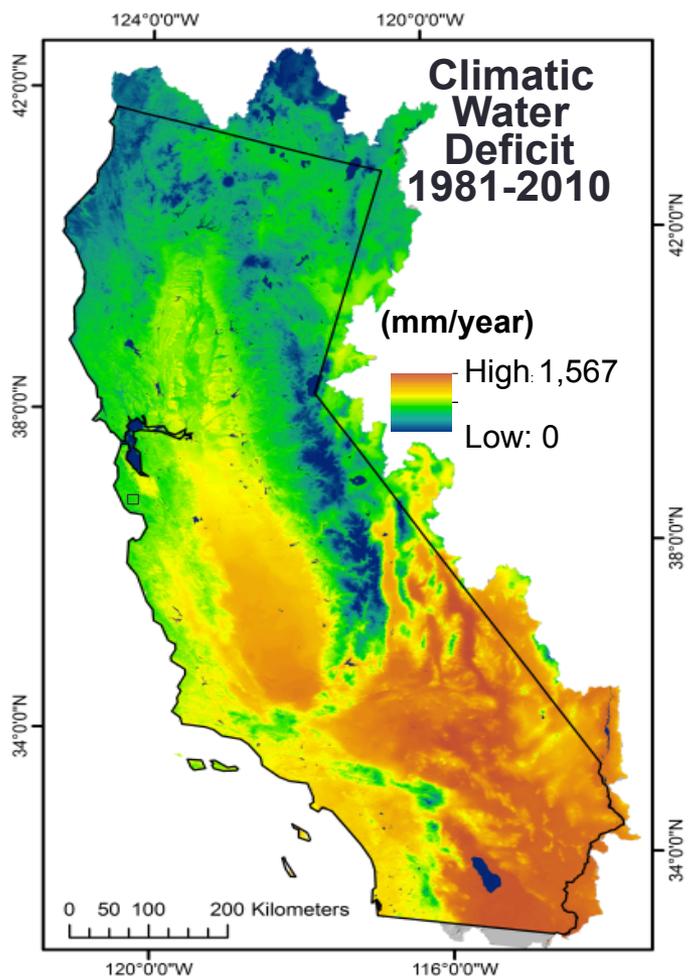
Acute vs. Longer

North Coast 3-yr Precip Accumulation



# Project Objective 2: “mega-drought”

Landscape drought: The influence of temperature



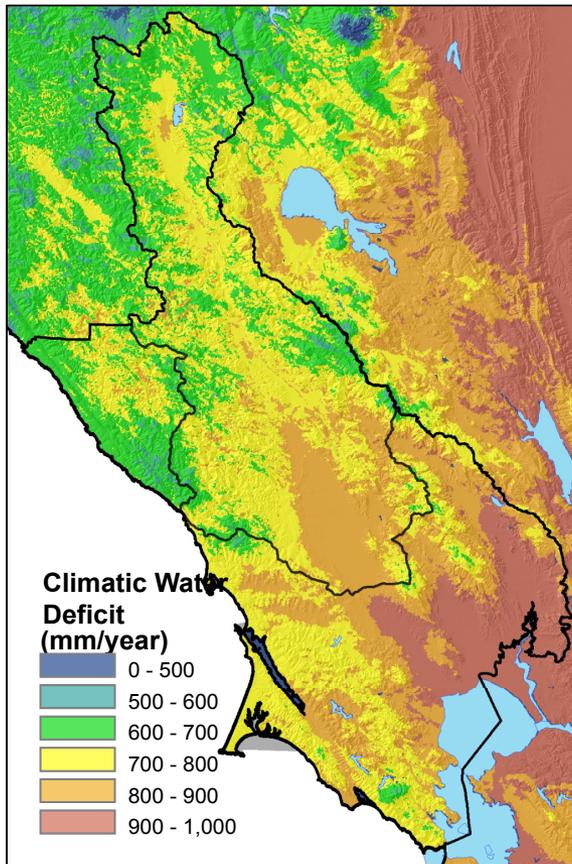
## Climate Water Deficit

- Amount of water that is needed for evaporation and transpiration minus the water available for evaporation and transpiration.
- High values means there is less water available for evapotranspiration than is required.
- Temperature dependent
- Indicator for wildfire risk, water need to fulfill agricultural demand, landscape drought

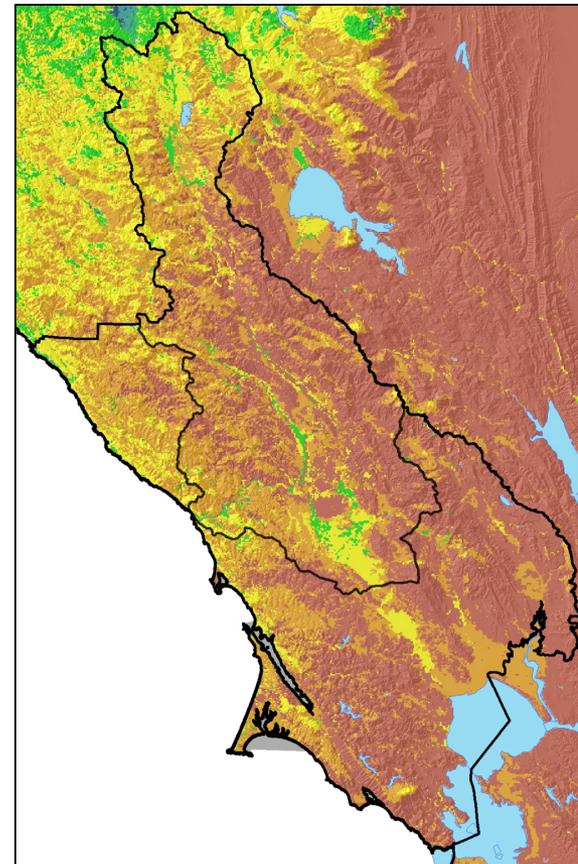
# Project Objective 2: “mega-drought”

Landscape drought: The influence of temperature

1977



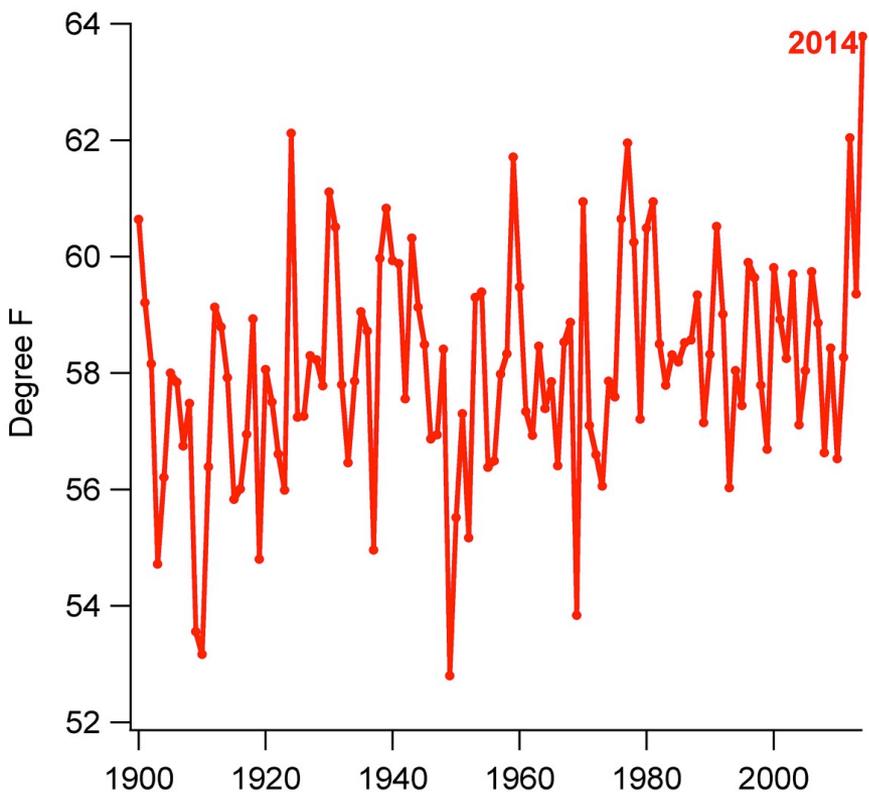
Jan 2014



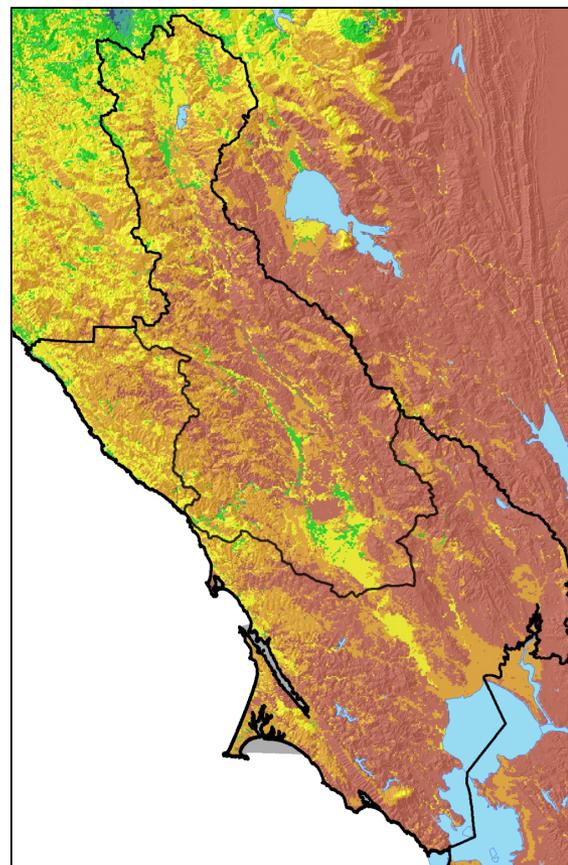
# Project Objective: “mega-drought”

Landscape drought: The influence of temperature

RR DJF max daily temp



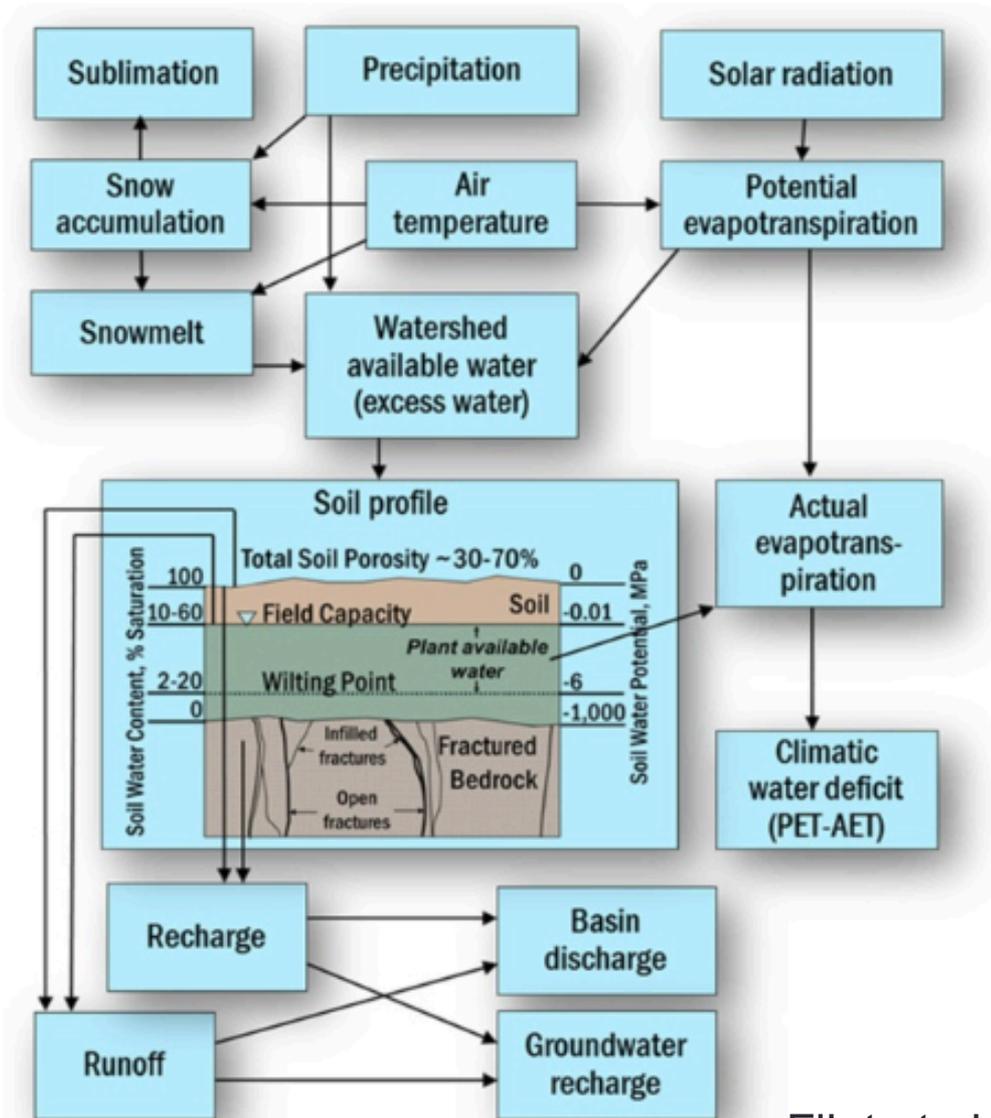
Jan 2014



# Project Objective 2: “mega-drought”

## Basin Characterization Model

- Inputs: solar radiation, precipitation, air temperature
- Outputs: evapotranspiration, climate water deficit, recharge, runoff, groundwater recharge, basin discharge, soil water content



# Project Objective 2: “mega-drought”

Input from YOU on the “mega-drought” scenario

- What mega-drought conditions would be most informative to your planning?
- What length of drought would be most informative?
- Should high temperatures be part of the drought?
- What output variables would be most useful?

# Project Objective 3: Drought Readiness in the RR

Relies on input from Russian River Stakeholders



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Relies on input from Russian River Stakeholders



## End Objective

To develop and document OPERATIONAL and ACTIONABLE measures that SCWA and other resource managers can take to respond to drought

## Project Objective 3: Drought Readiness in the RR

Types of information from you

- How do you define drought?
- What makes it challenging?
- What are impacts?
- What information would make getting through a drought easier?
- What strategies or plans do you currently have to mitigate impacts of drought?
- Are there other strategies that you would like to implement?

# Goals for this meeting

- Inform stakeholders about the project

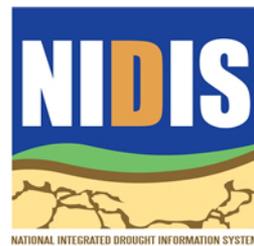
- Receive input on mega-drought scenario

- Receive input on drought definitions, impacts and informational tools



**More useful  
and applicable  
results and  
better informed  
drought  
mitigation  
measures**

Thank you!



# Drought Questions

- Does your municipality, agency or group have a definition of drought? If so, what is the definition of drought used?
- How do the effects of acute droughts (short and extremely dry) differ from those of more prolonged (several years, but not as dry) droughts? Is one type more challenging? If so, how?
- Do temperatures play a role in determining the impacts of drought on your municipality, agency or group?
- What are your greatest vulnerabilities to droughts?
- How does the status of a drought affect your decision making process?