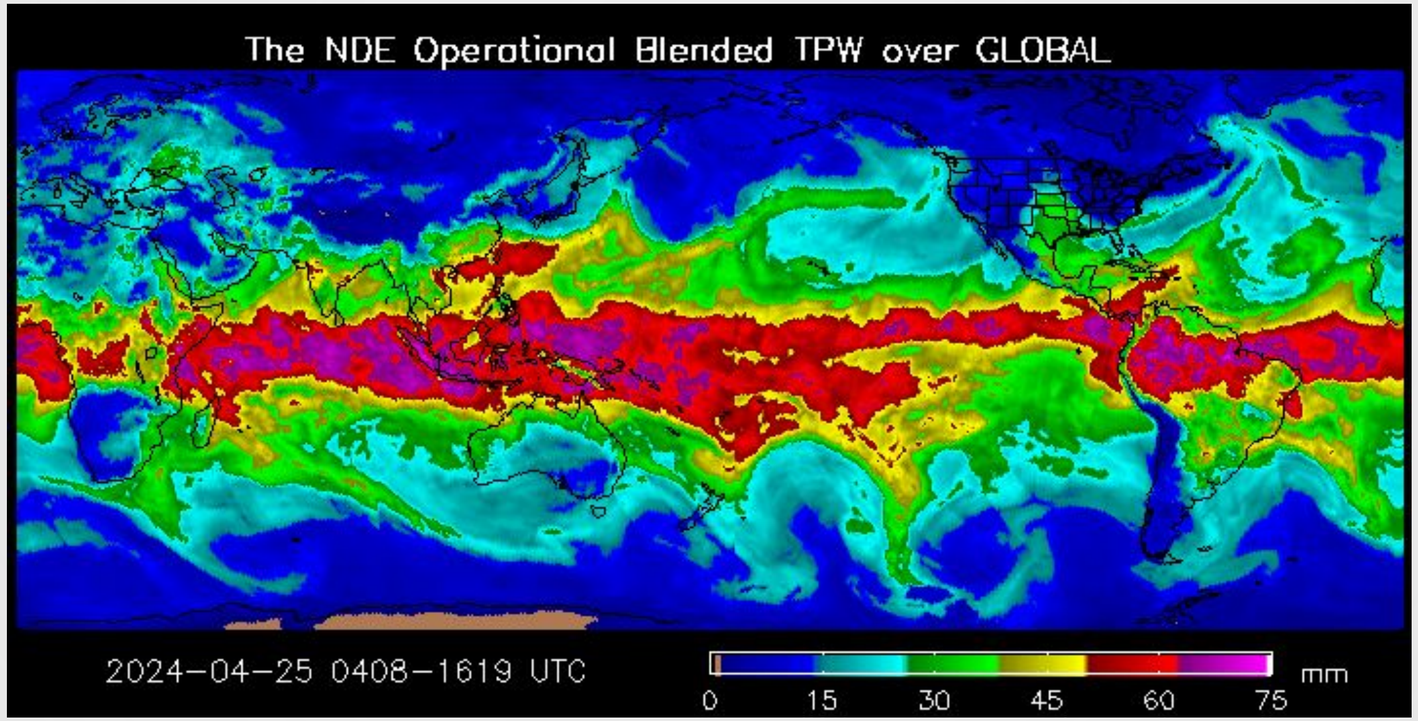
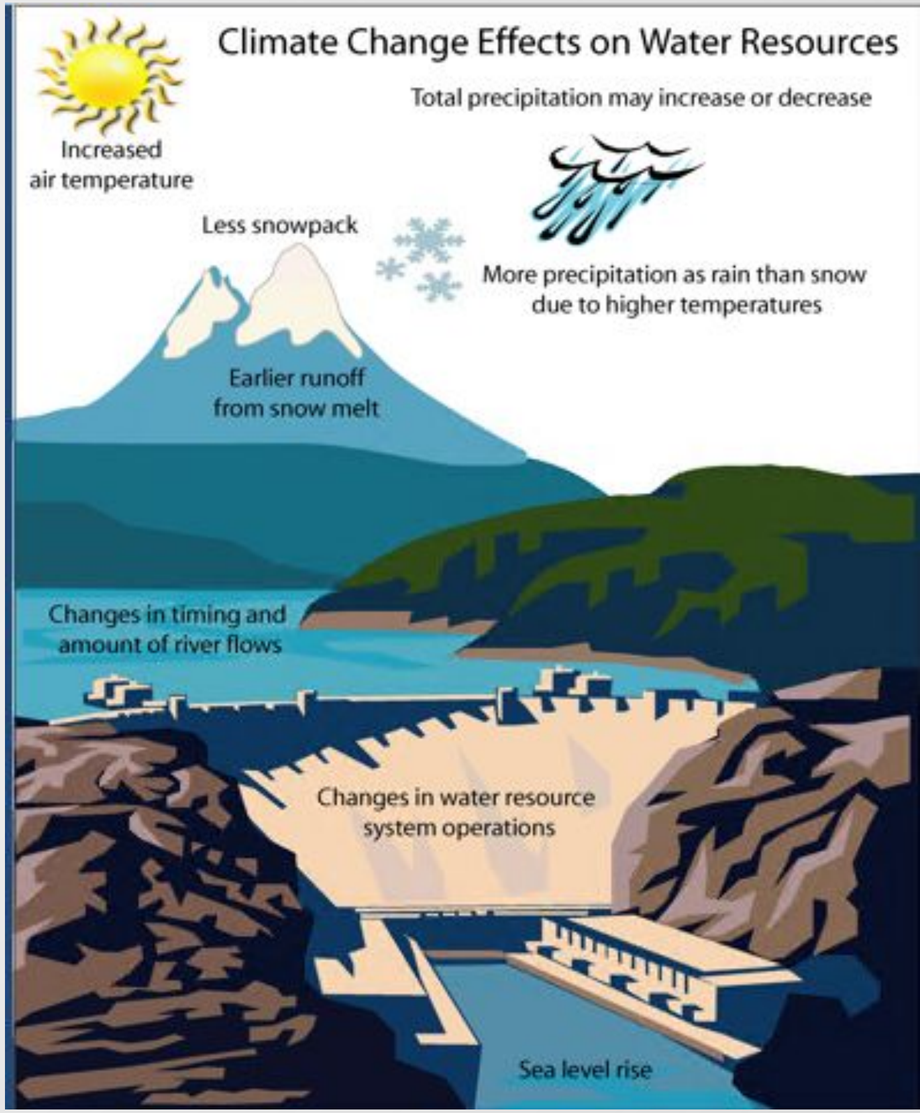
California Insights into Earth Observations Supporting Climate Resilient Water Management



WWAO Annual Meeting May 1, 2024

Talk Overview

- Describing the State of the Watershed
- Tracking and Reporting Change
- Climate Resilient Water Management



CALIFORNIA DEPARTMENT OF WATER RESOURCES

Seasonal Water Management

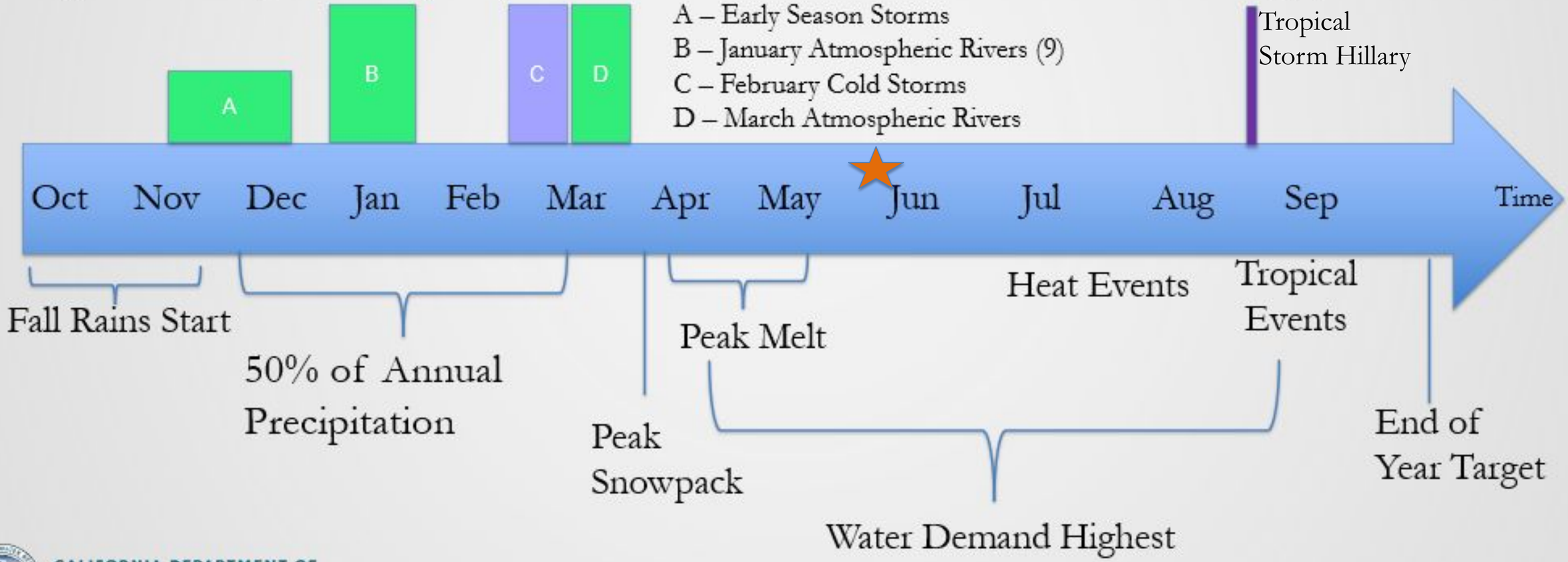
- Fall rains offset summer dryness
- Mitigate winter flooding/restore spent storage
- Snowmelt foundation of summer supply
- Storage supports flows until fall rains return

Building a Water Year 2023

Oct-Mar: 153% of Average Statewide – 6th wettest

Oct-Mar: 199% of Average San Joaquin Climate Division – wettest

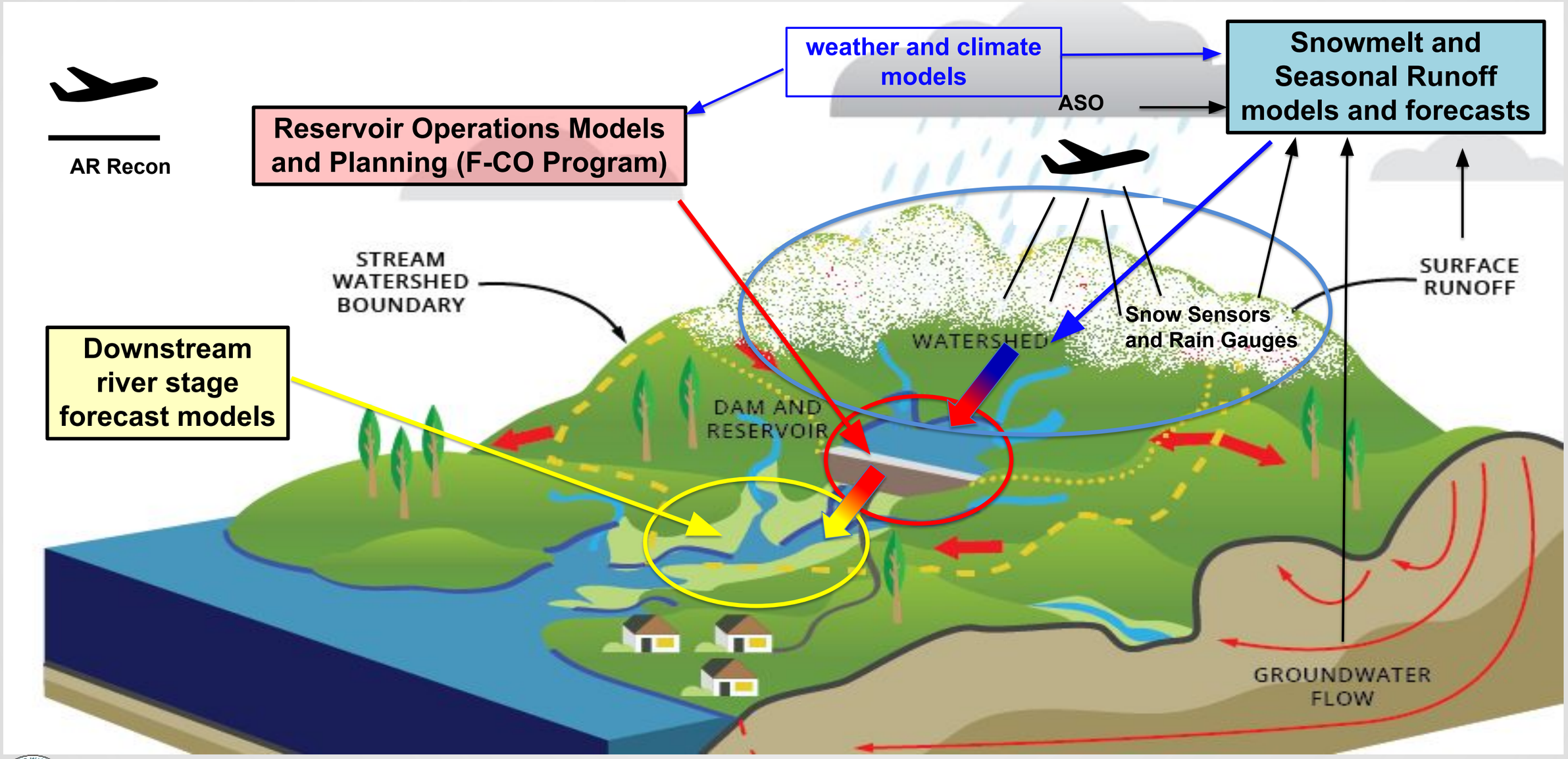
April 1 Snowpack: Only 4th year since 1950 with more than 200% of average; 1st since 1983



CALIFORNIA DEPARTMENT OF WATER RESOURCES

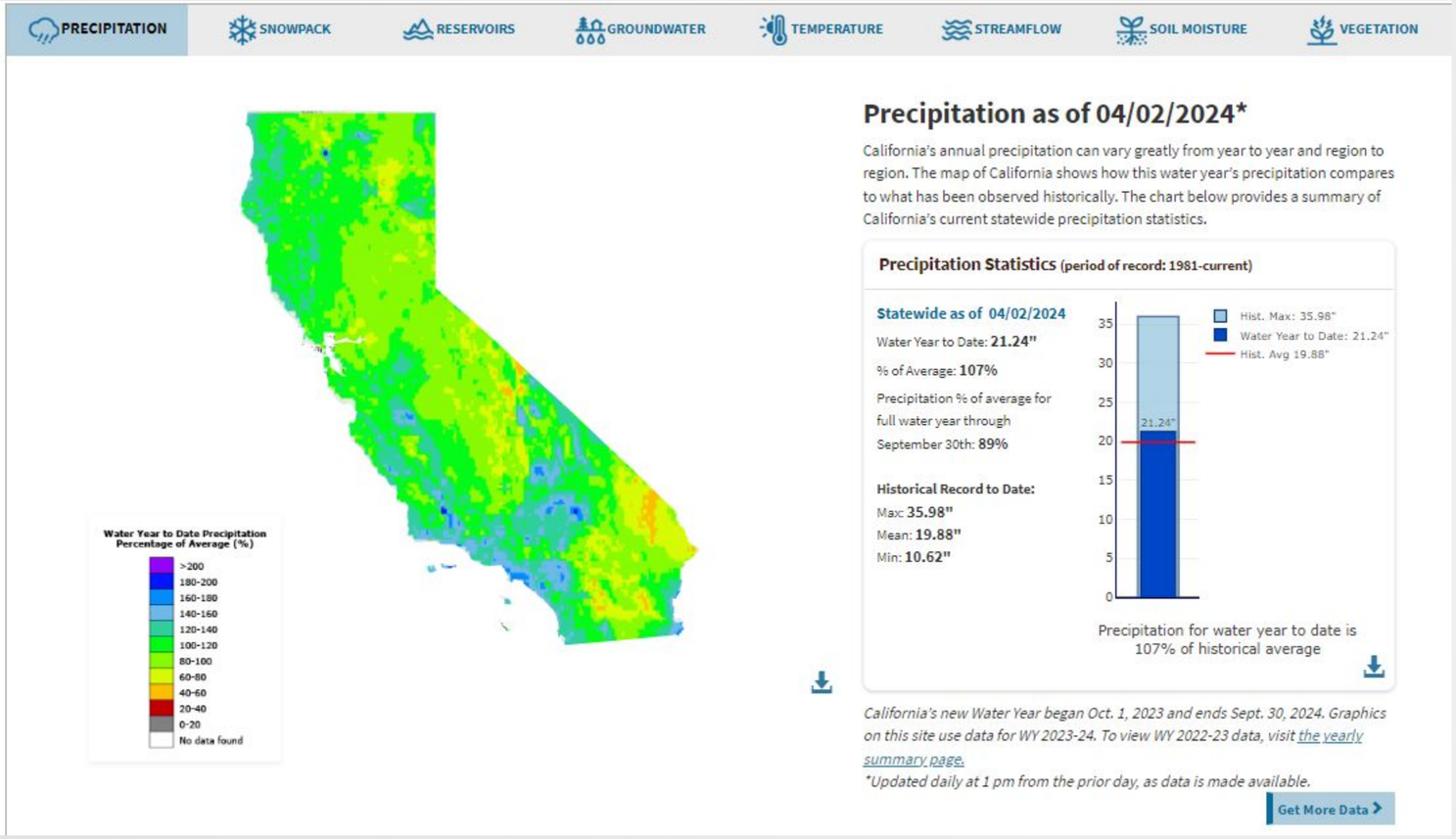
★ Peak Snowmelt 2023

Key Collaborations in Monitoring and Forecasting WY2023



CALIFORNIA DEPARTMENT OF WATER RESOURCES

California Water Watch



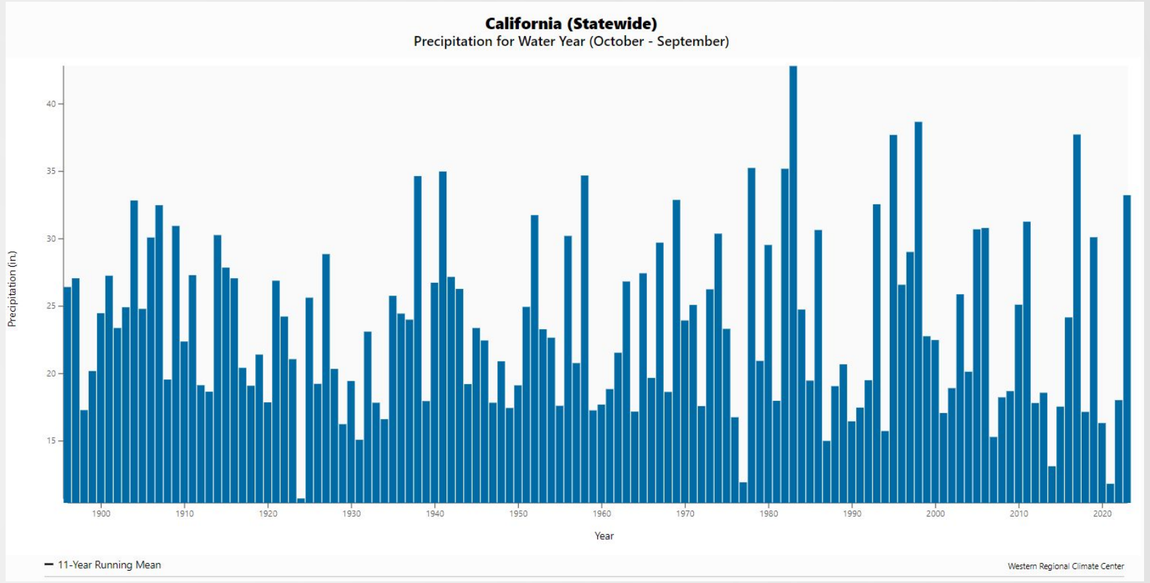
California Water Watch
https://cww.water.ca.gov

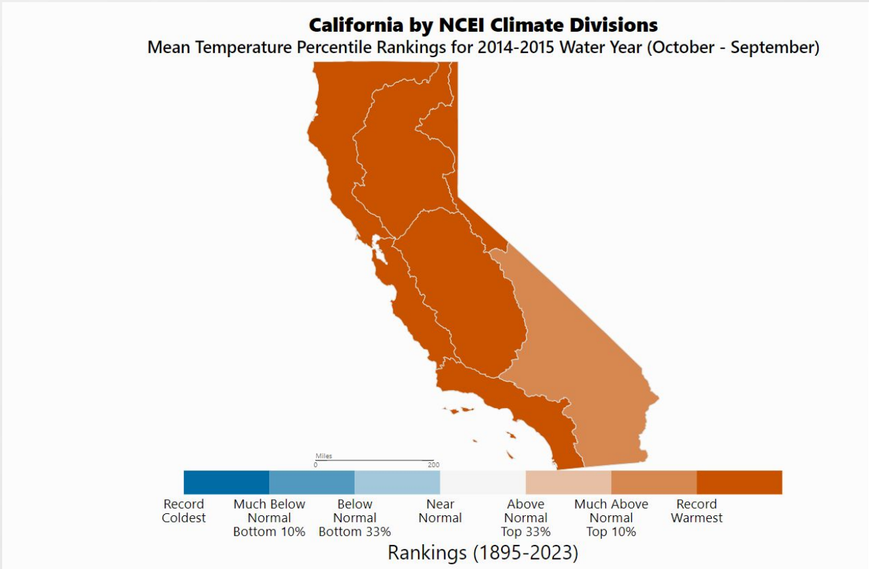
- Provides current conditions of key water metrics:
  - Precipitation
  - Temperature
  - Snowpack
  - Runoff
  - Reservoirs
  - Groundwater
  - Soil Moisture
  - Vegetation

CALIFORNIA DEPARTMENT OF
WATER RESOURCES

California Climate Tracker

- Product of Western Region Climate Center
- Tracks Precipitation and Temperature
- Monthly with Period of Record back to October 1896

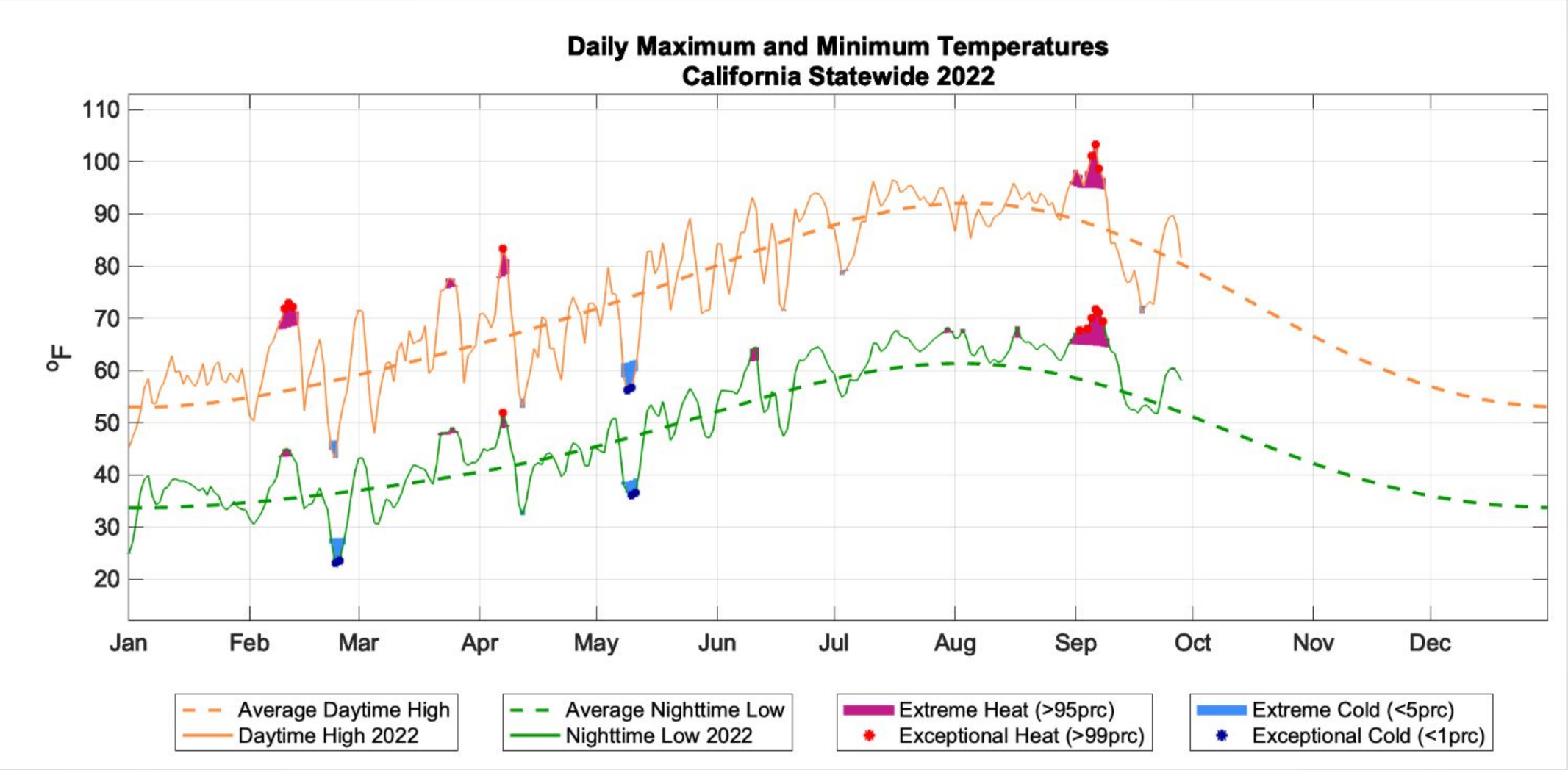




WRCC - State Climate Tracker Home (dri.edu)

CALIFORNIA DEPARTMENT OF WATER RESOURCES

Extreme Heat and Cold in 2022



CALIFORNIA DEPARTMENT OF WATER RESOURCES

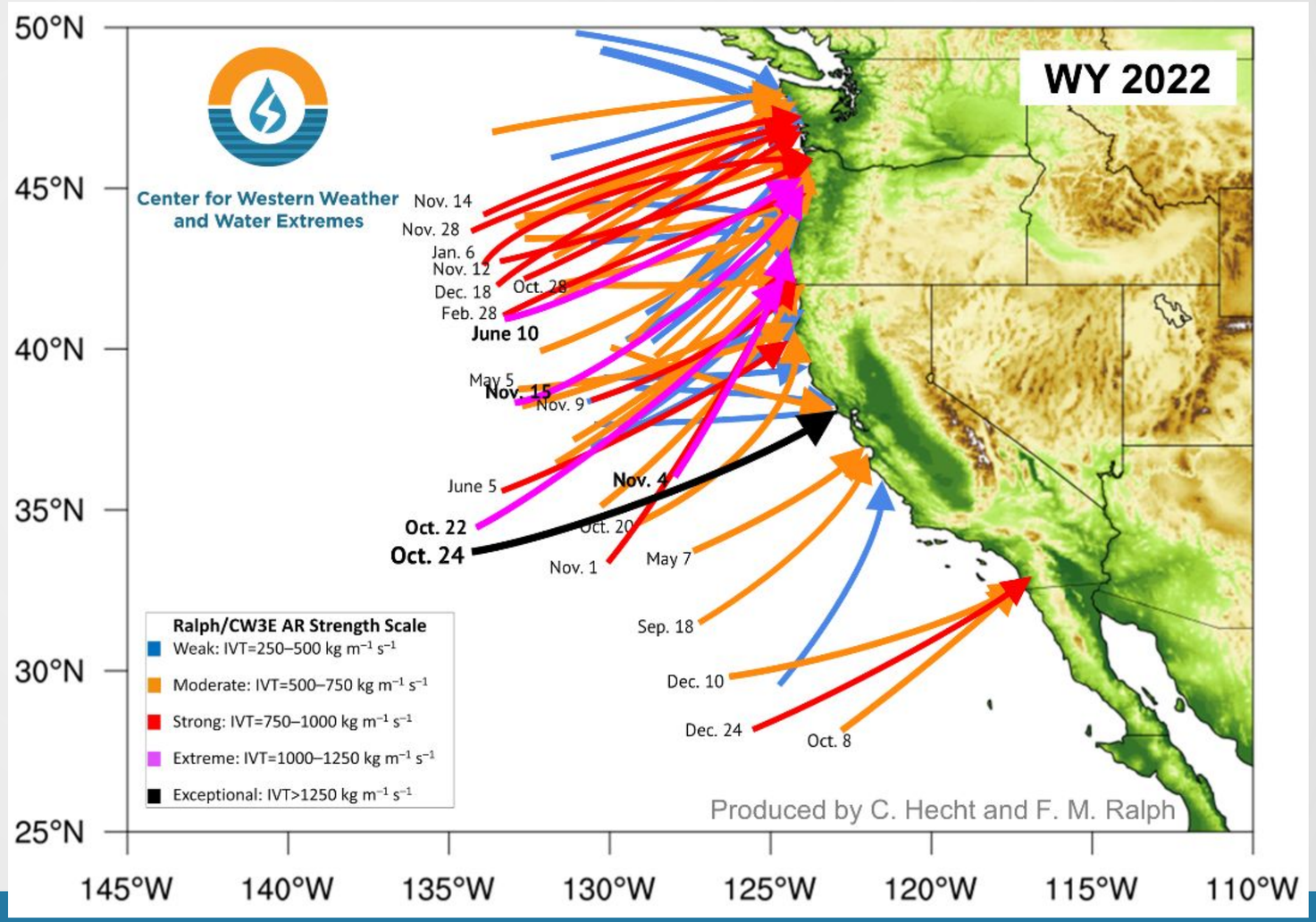
Credit: Kristen Guirguis, Scripps Institution of Oceanography

Water Year 2022 Landfalling Atmospheric Rivers

AR Strength	AR Count
Weak	20
Moderate	25
Strong	11
Extreme	4
Exceptional	1

Regions Impacted by Each AR	
State/Region	AR Conditions
Washington	53
Oregon	56
Northern CA	42
Central CA	23
Southern CA	17

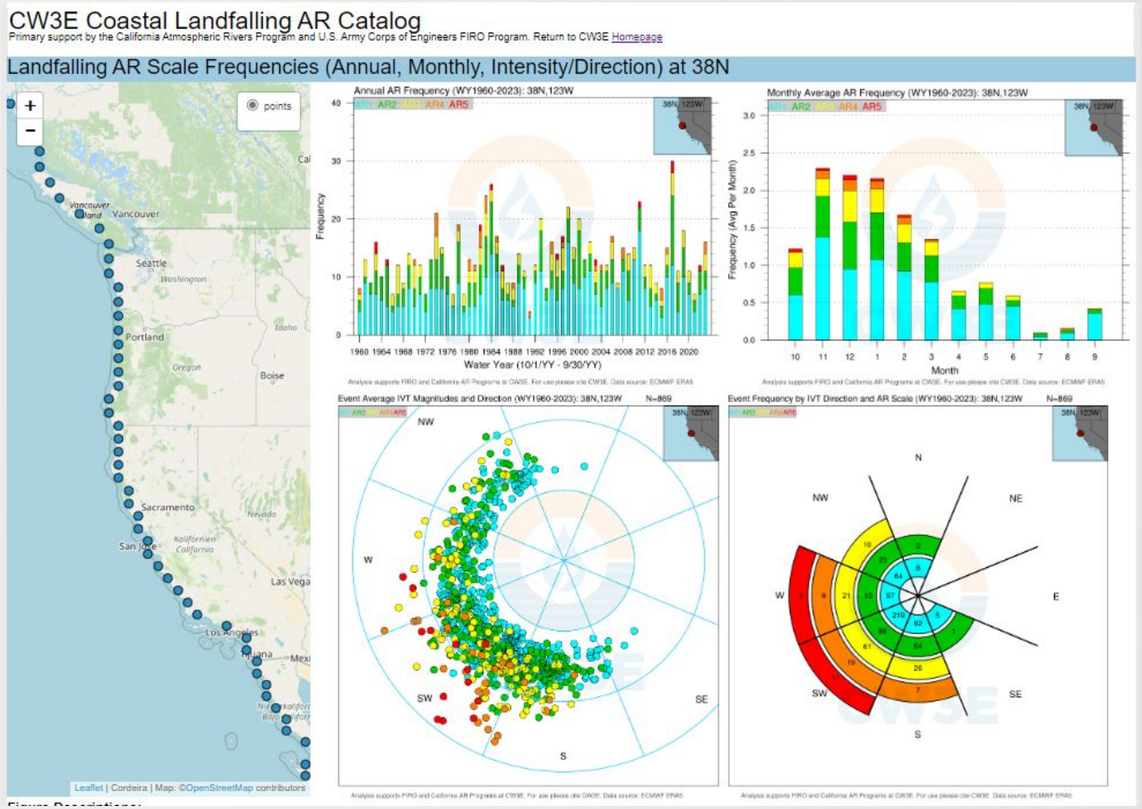
61 atmospheric rivers have made landfall over the U.S. West Coast during Water Year 2022



*Arrows are placed on the map where each AR was strongest over the coast

The CW3E Atmospheric River Catalog

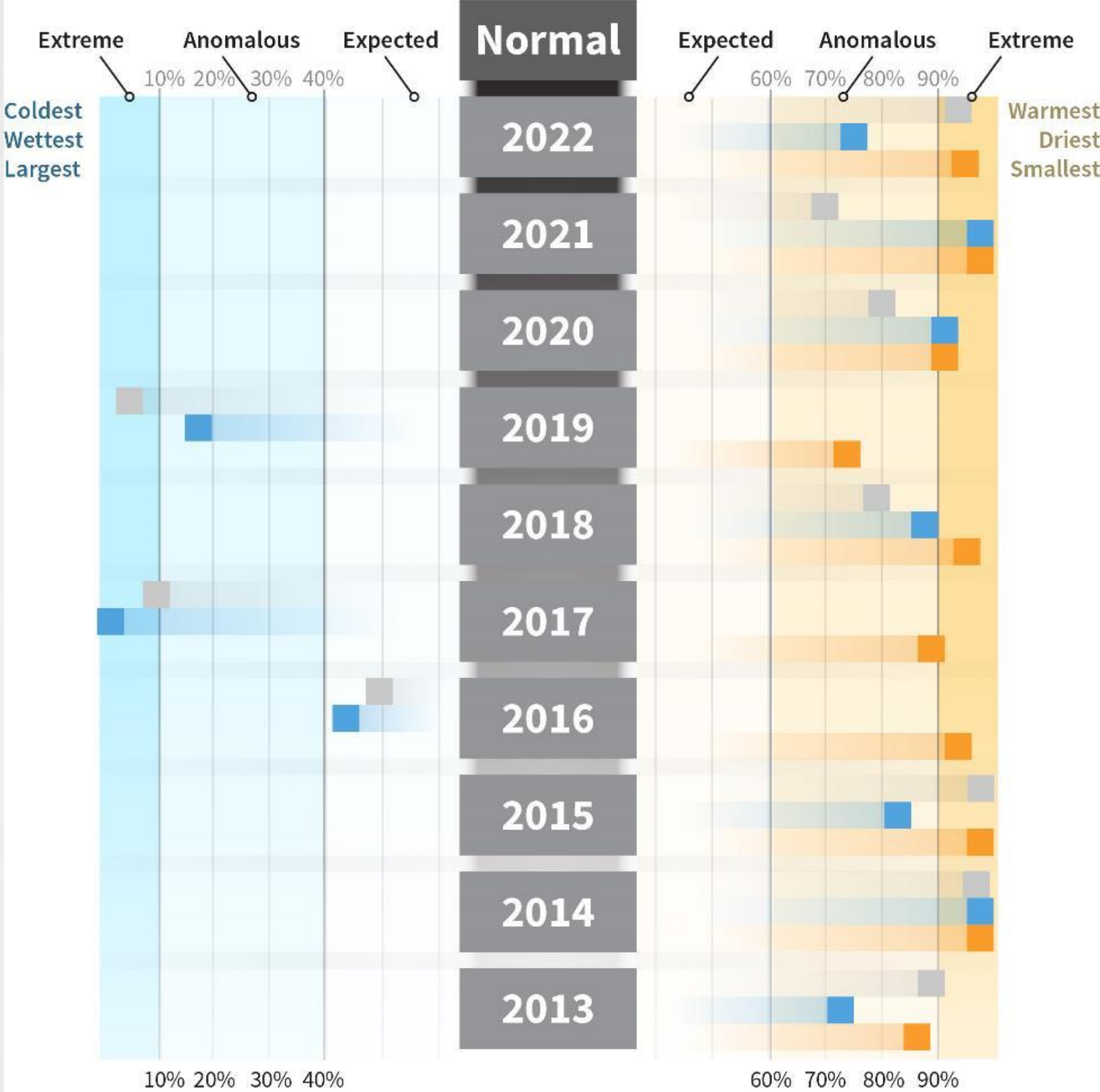
- Provides latitude-based histories of atmospheric river landfalls
- Annual event time series
- Monthly distribution
- Directional distribution
- AR Scale informaton



CALIFORNIA DEPARTMENT OF
WATER RESOURCES

A Decade of Extremes

- WY2023 added to extremes narrative
  - Dry to Wet shift
  - Multiple Extremes
  - New Records
- New opportunities for adaptation



Temperature	Precipitation	Snowpack
2 Anomalous	1 Expected	1 Expected
8 Extreme	6 Anomalous	4 Anomalous
	3 Extreme	5 Extreme

CALIFORNIA DEPARTMENT OF WATER RESOURCES

Building the Water Year

- Fall (October/November)
  - Precipitation Onset
  - Temperature Anomaly
  - Soil Moisture State with Snowpack Initiation
- Winter (December/January/February)
  - Wet/Dry
  - Notable Anomalies
- Spring (March/April/May)
  - Late-Season Bailout or Early Shutoff?
  - Peak Snowpack Timing and Magnitude
- Summer (June/July/August/September)
  - Drying Pace and Scale
  - Heat Events
  - Tropical Activity
- Multi-Year Prediction – What about next year?

Climate Change: How much different will the next decade be?

Towards an Integrated Observing System

- We have ground-based, airborne, and satellite data to track watershed conditions.
- Can we make use of the suite of observations to create daily and sub-daily gridded fields to describe the state of the watershed?
- Is AI an appropriate avenue to fill in missing data in blended gridded field?