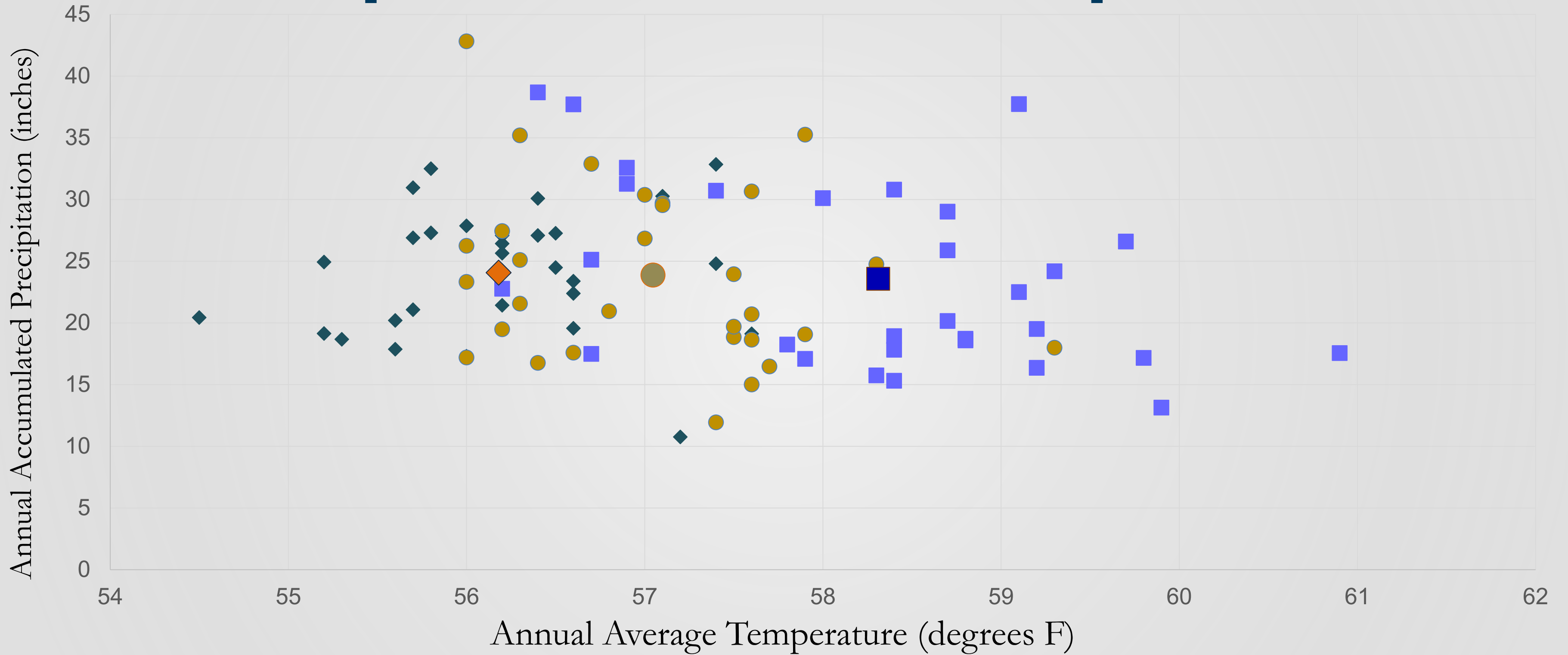


Characterizing Extremes in a Changing Climate

CEPSYM, June 27, 2023

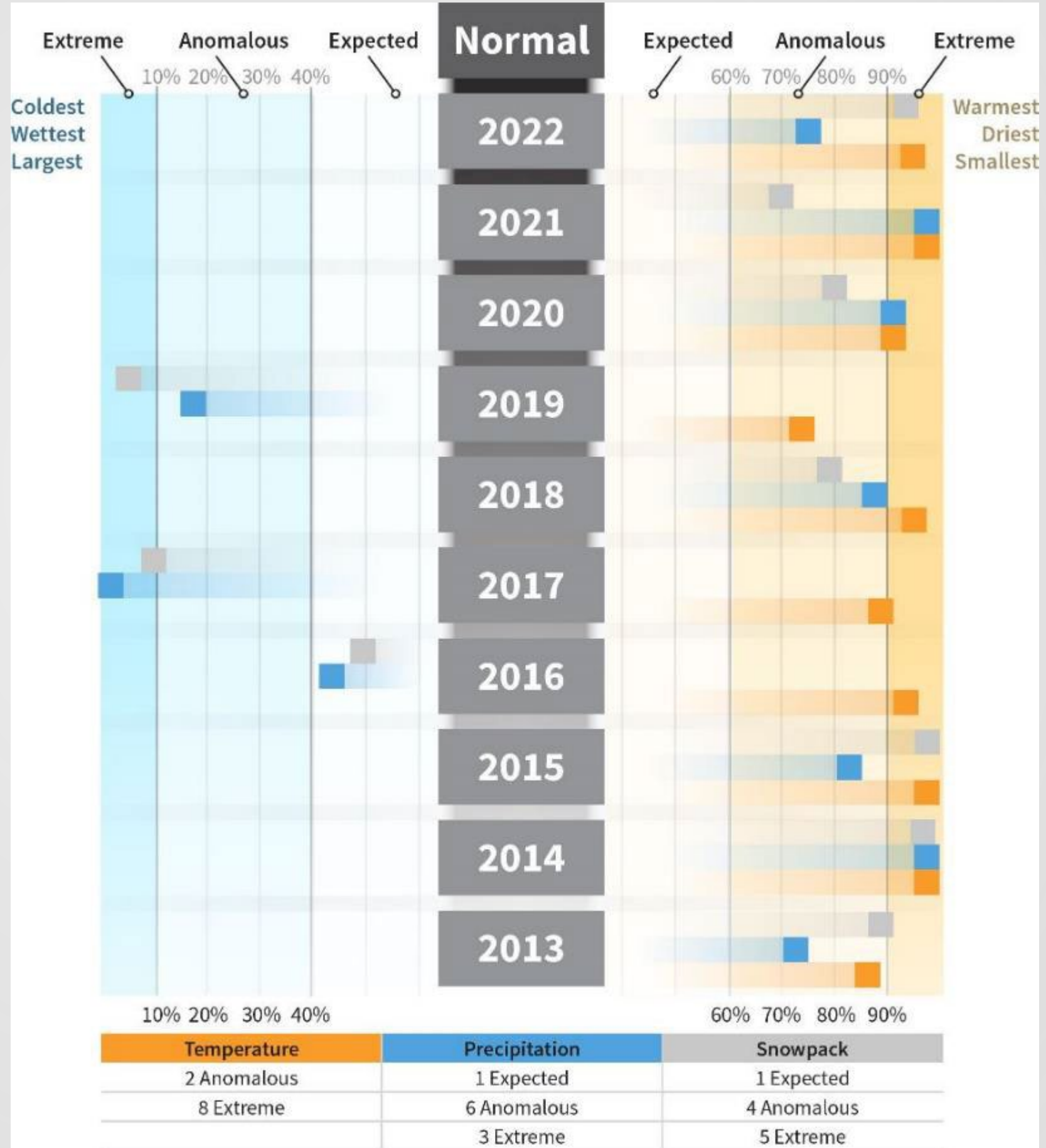
Michael L. Anderson, State Climatologist

CA Temperature and Precipitation

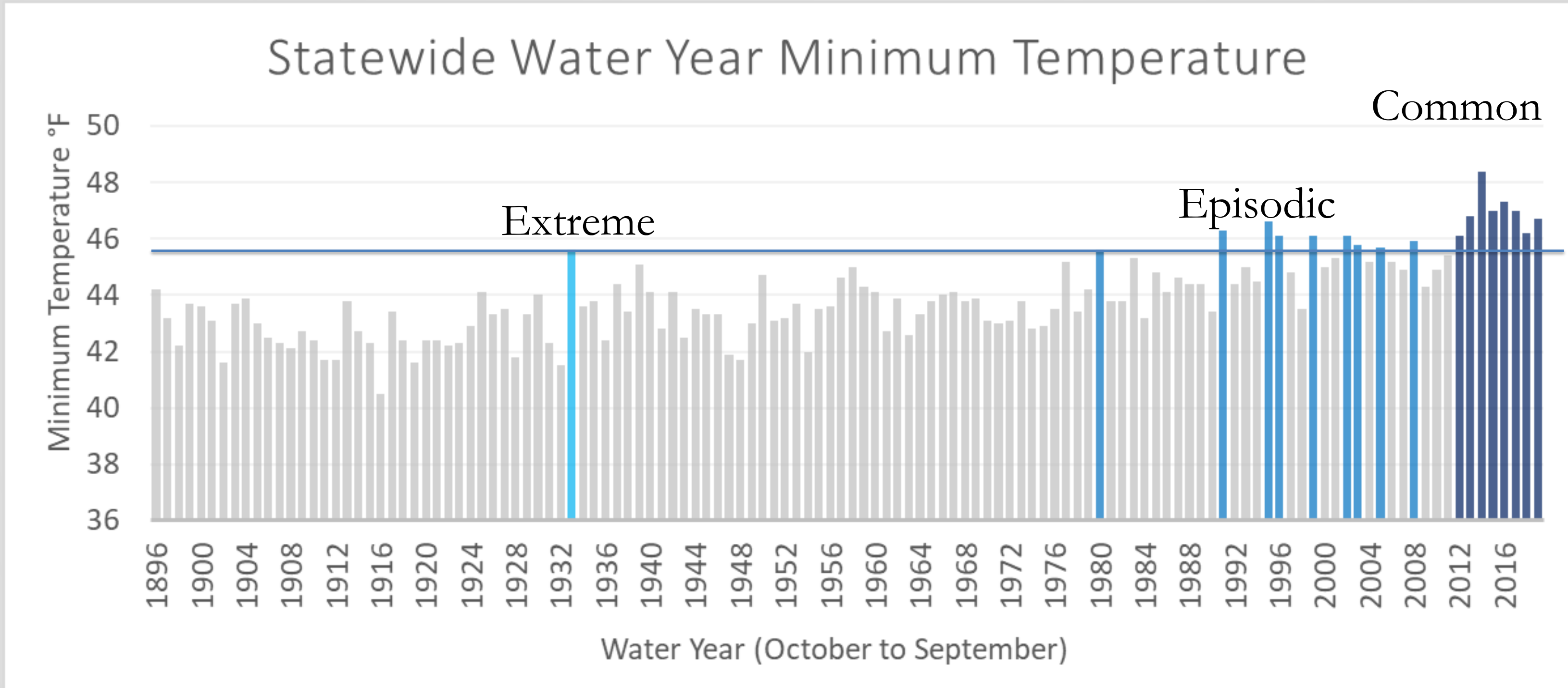


What Type of Year?

- Different strategies for different conditions:
 - Expected
 - Anomalous
 - Extreme
- Reference Frame and frequency of category important



From Extreme to Common

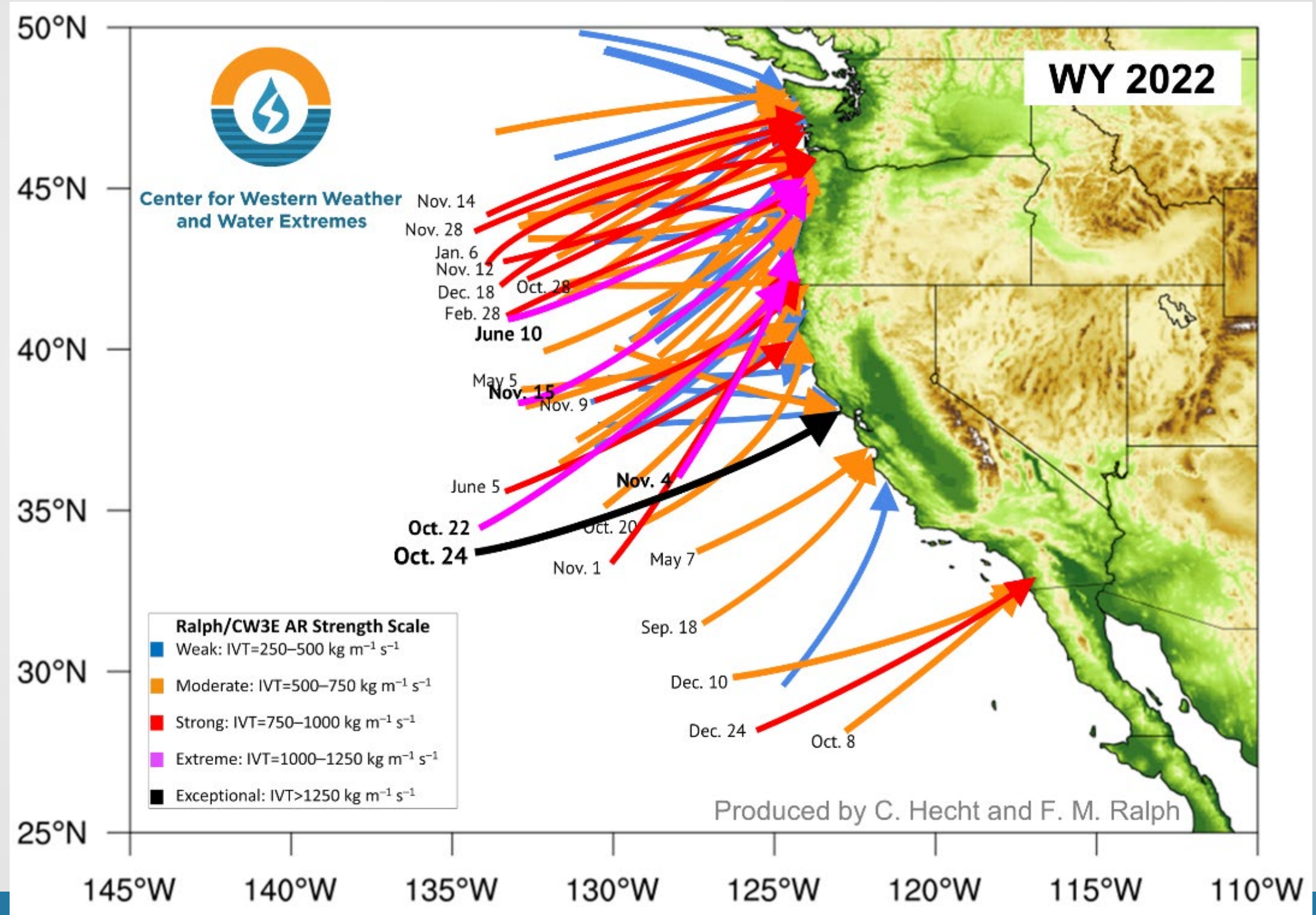


Water Year 2022 Landfalling Atmospheric Rivers

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

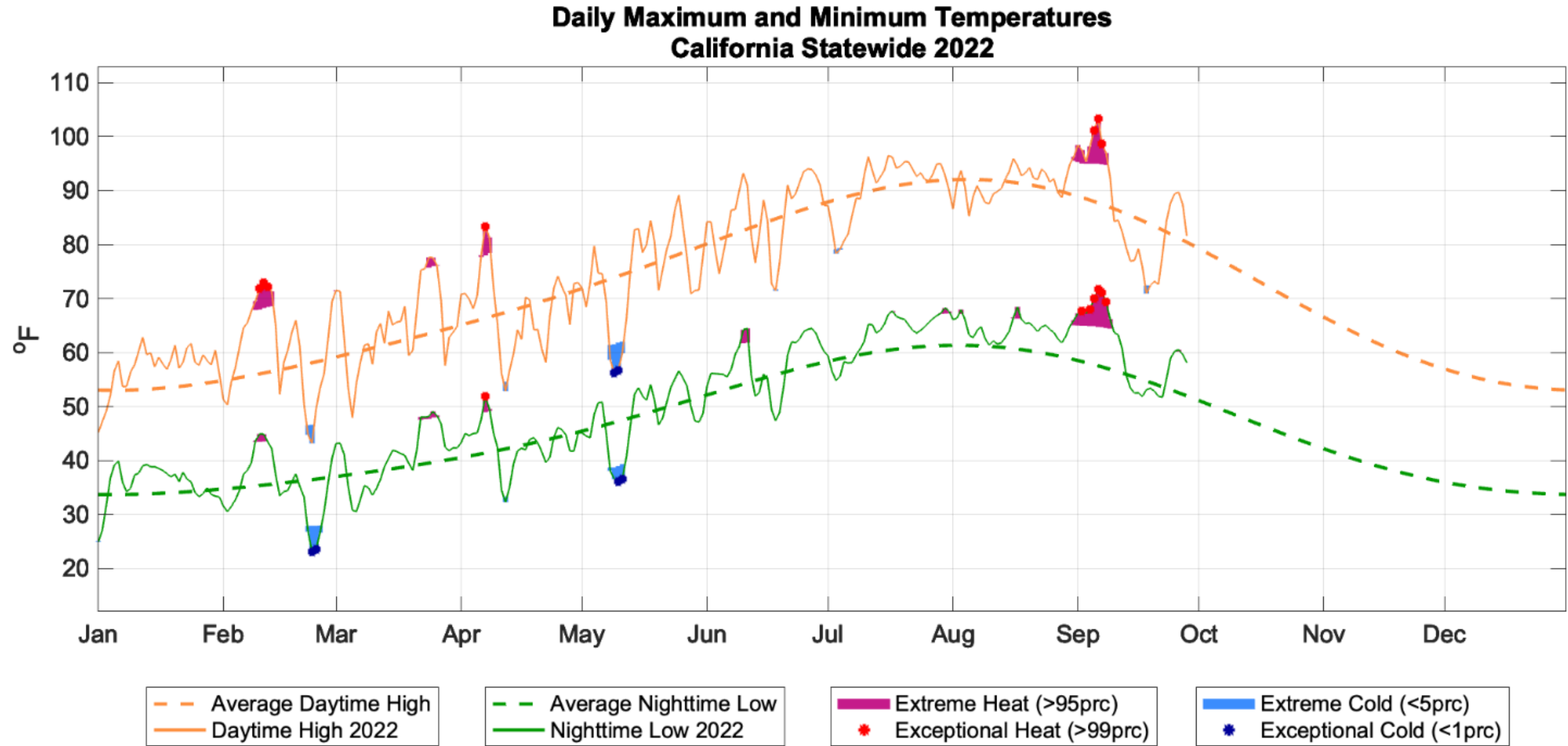
Regions Impacted by Each AR	
State/Region	AR Conditions
Washington	53
Oregon	56
Northern CA	42
Central CA	23
Southern CA	17

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

Extreme Heat and Cold in 2022



Characterizing and Tracking Extremes

- Metric – How is the extreme event identified?
- Monitoring – How do we observe and track extreme events and change?
- Consequence – What are extreme event impacts?



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?



Closing Thoughts

- Events can be identified as extreme by exceeding a threshold or by consequence.
- Important to understand how a warming world influences processes driving extremes to make them more frequent or more extreme and what associated consequences are expected.
- Make sure monitoring is sufficient to identify extreme event drivers and to detect change.

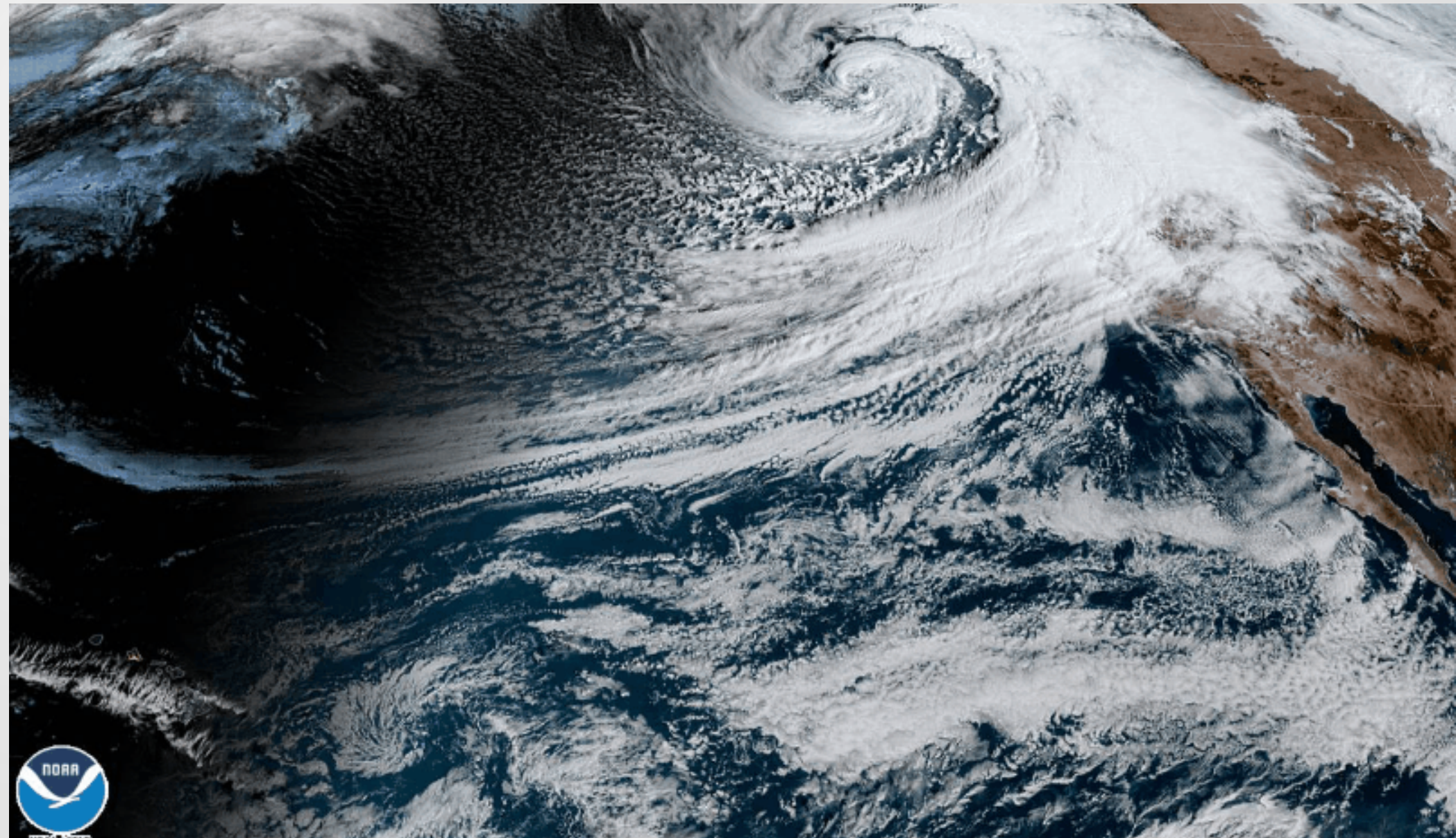


Questions?

- Email: Michael.L.Anderson@water.ca.gov



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WATER RESOURCES



24 Oct 2021 16:56Z NOAA/NESDIS/STAR GOES-West GEOCOLOR