



TRANSFORMING WEATHER DATA INTO ACTIONABLE BUSINESS
INTELLIGENCE

October 2024

Table Of Contents

01 **About Weather Tools**

Why we exist and our mission to transform weather data into business intelligence.

02 **Services**

How we serve our client's needs through problem-centric innovation.

03 **Results**

Details of our reliability and accuracy over time.

05 **Next Steps**

How we envision partnering to amplify the impact of weather data in California.

06 **Our Team**

More about our expert team of meteorologists and data analysts.

07 **Our History**

The journey from an idea to impactful insights.

About

Weather Tools

At Weather Tools, we leverage cutting-edge meteorological science to deliver precise, actionable weather-related business intelligence, enabling organizations across various sectors to optimize operations and reduce risks.

Our Mission:

- Provide the most accurate and actionable precipitation and inflow forecasts for California (and beyond).
- Empower industries and communities to make informed decisions and optimize resources.
- Mitigate risks associated with water usage and climate variability.

Our Vision:

- Revolutionize global weather forecasting by leveraging hidden environmental indicators and advancing scientific understanding.
- Ensure sustainable water management for the benefit of humanity and the planet.



**Solution
Focused**



**Reliable
Insights**



**Meaningful
Impact**



**Proprietary
Technology**



**Tailored
Solutions**

Data-Driven Services



Private Network of Weather Stations

Data collected from 50+ weather stations throughout the Central Valley feeds our forecasting processes.



CAP Report (California Annual Precipitation Report)

An advanced statistical model delivers a precise year-ahead precipitation forecast.



CRAFT (California Reservoir Annual Forecast Tool)

The CAP forecast feeds into a regression model, which provides a forecast of expected water year inflow for 18 major CA reservoirs.



The Big Problem Is...



Unanticipated precipitation extremes cost California businesses billions annually. Critical operational decisions can't be based solely on short-term, 7-day forecasts. The most impactful planning requires months of lead time.



California lacks accurate inflow forecasts for the state's reservoirs. Seasonal precipitation outlooks provide vague wet/dry probabilities without actionable insights. In the absence of reliable inflow guidance, water managers are left to "wait and see," increasing the risk of costly mismanagement. There is a different way.



That's where Weather Tools comes in...

The CAP Report



The California Annual Precipitation (CAP) report forecasts total water year precipitation (rain & snow water equivalent) for California as a whole, including the state's Core Water Supply area.



CAP's statistical forecast technique confidently presents the forecast in early November.



The CAP forecast predicts WY precipitation in 20% ranges relative to normal (e.g. 20-40% above normal in 2022-23)



The CAP Report

Performance Record

- Our CAP forecast (rain and snow water equivalent) has an outstanding accuracy across the entire state of California, with a **flawless 7-year track record** and is expected to verify again in Water Year 2023-24.
- Within this broader success, the forecast has consistently verified (right) for California's Core Water Supply (CAP regions 2, 4, and 6), critical for water management.



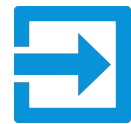
Water Year and Climate Pattern	CAP Forecast	Observed Core Water Supply Precipitation	CAP Correct?
2016/17 (Weak La Niña)	Exceptionally Wet > 40% Above Average	71.4% Above Normal	✓
2017/18 (Weak La Niña)	Significantly Below Normal 20% to 40% Below	20.4% Below Normal	✓
2018/19 (Weak El Niño)	Significantly Above Normal 20% to 40% Above	28.1% Above Normal	✓
2019/20 (Unclassified)	Significantly Below Normal 30% to 50% Below	40.1% Below Normal	✓
2020/21 (Moderate La Niña)	Exceptionally Dry > 40% Below Normal	54.6% Below Normal	✓
2021/22 (Weak La Niña)	Significantly Below Normal 20% to 40% Below	29.5% Below Normal	✓
2022/23 (Weak La Niña)	Significantly Above Normal 20% to 40% Above	34.4% Above Normal	✓

CRAFT

(California Reservoir Annual Forecast Tool)



Designed to support California's Forecast Informed Reservoir Operations (FIRO) Program.



Utilizes CAP model output as the primary input.



Regression model based on the past 23 years of reservoir inflow data and observed precipitation.



Model predicts a reservoir's water year inflow range (in MAF) **the first week of November.**



Currently available for 18 of California's major reservoirs.



CRAFT

Guidance is currently available for the following reservoirs:

- | | |
|-------------------------------|-----------------------------|
| 1. Trinity Lake | 10. New Melones Reservoir |
| 2. Lake Shasta | 11. Hetch Hetchy Reservoir |
| 3. Lake Oroville | 12. New Don Pedro Reservoir |
| 4. New Bullards Bar Reservoir | 13. Exchequer Reservoir |
| 5. Englebright Reservoir | 14. Millerton Lake |
| 6. Indian Valley Reservoir | 15. Pine Flat Reservoir |
| 7. Folsom Lake | 16. Lake Kaweah |
| 8. Pardee Reservoir | 17. Lake Success |
| 9. New Hogan Reservoir | 18. Lake Isabella |

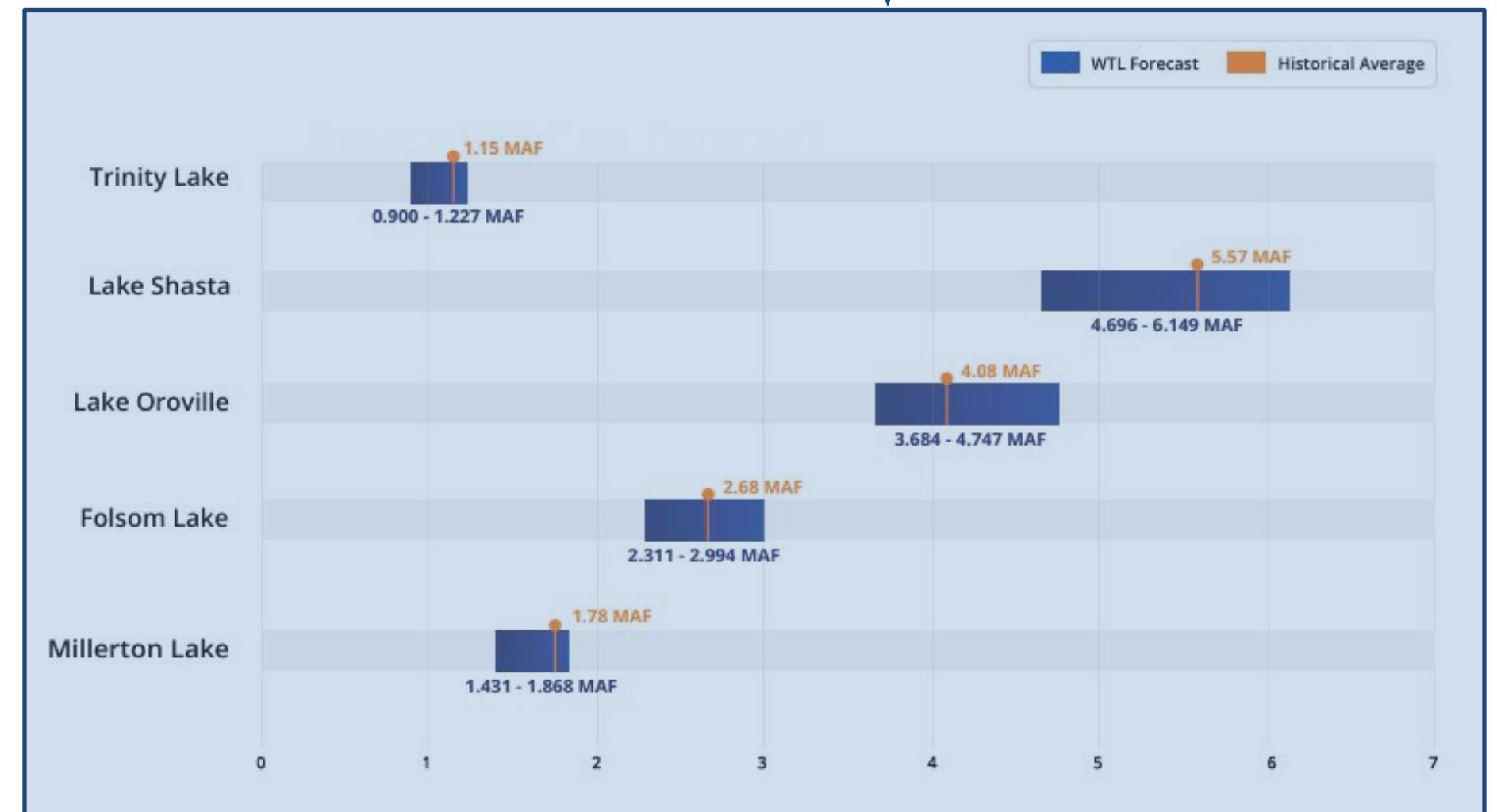
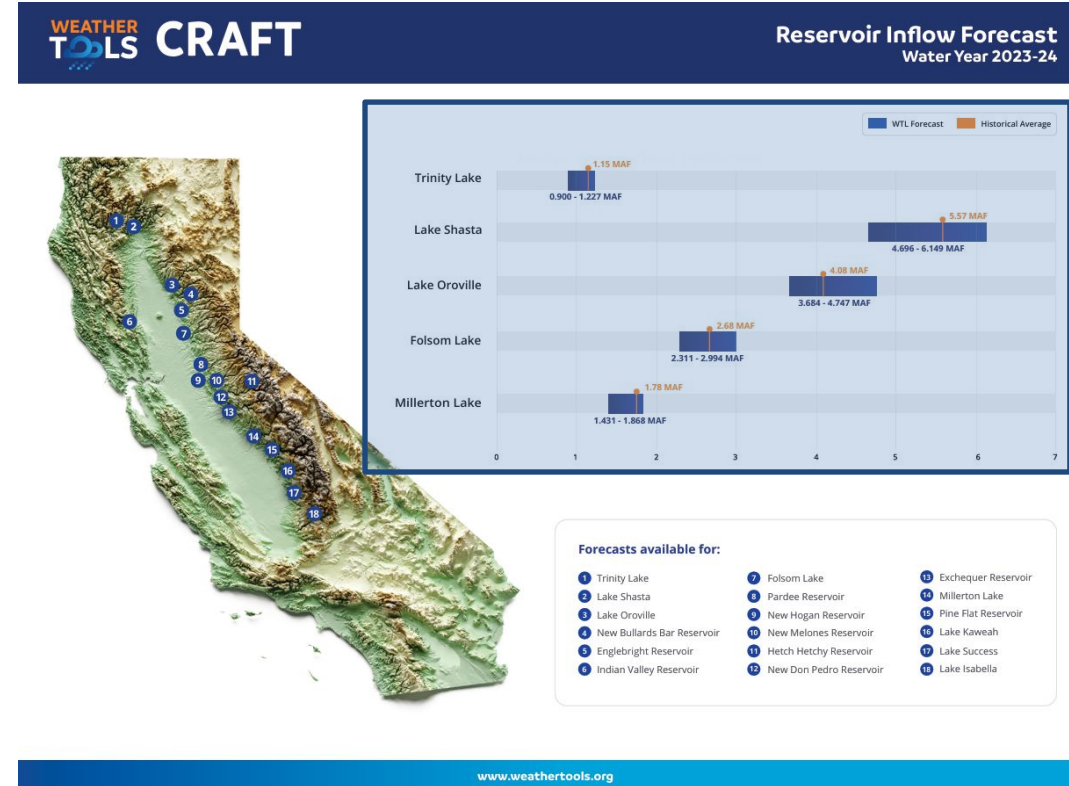


User-Defined CRAFT

Output

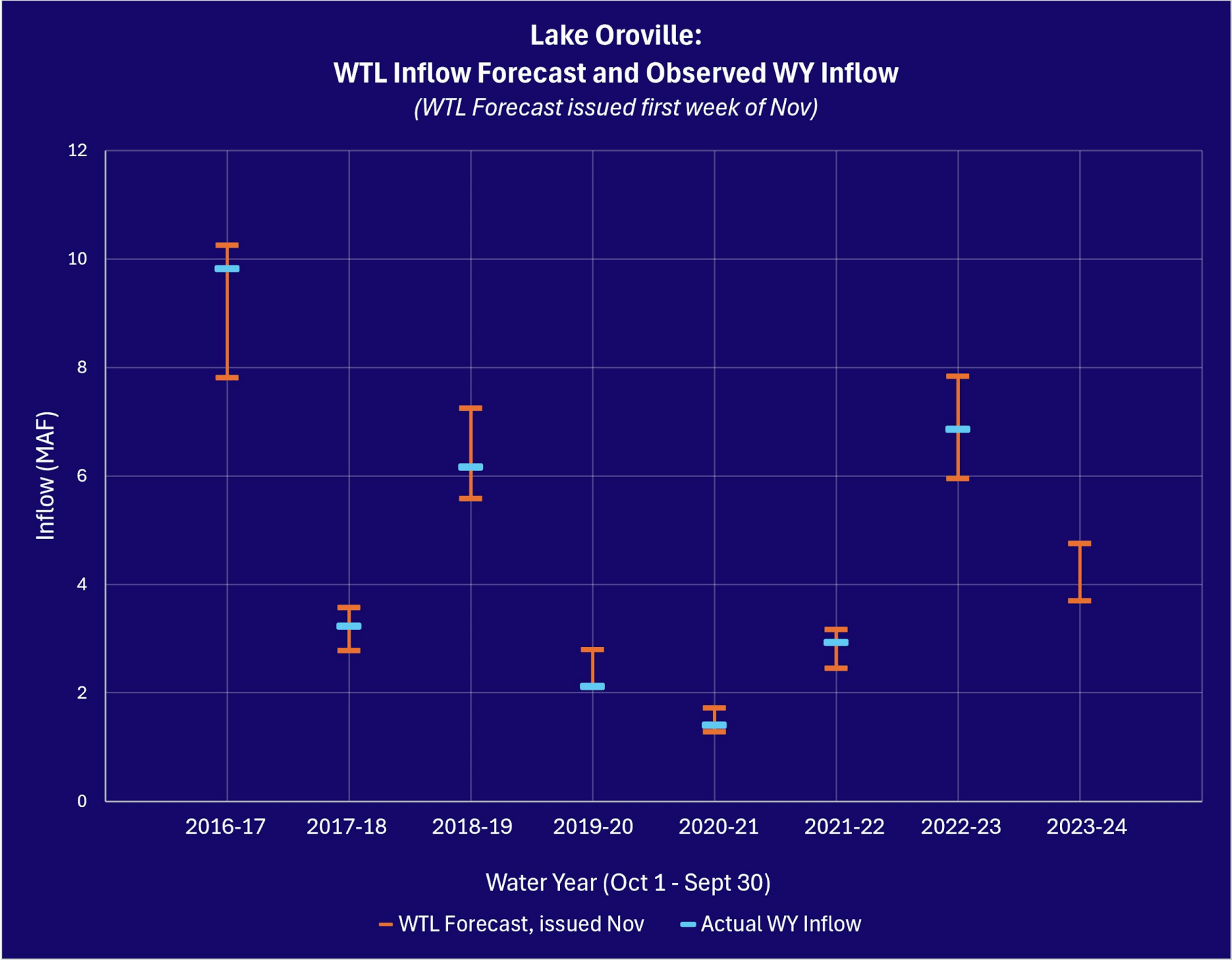
Tailored to your areas of interest

- Precise forecast range for the specific reservoirs selected by the subscriber
- Forecast range represents the total anticipated inflow for the entire water year
- Data (as shown right) was available to subscribers **the first week of November 2023**

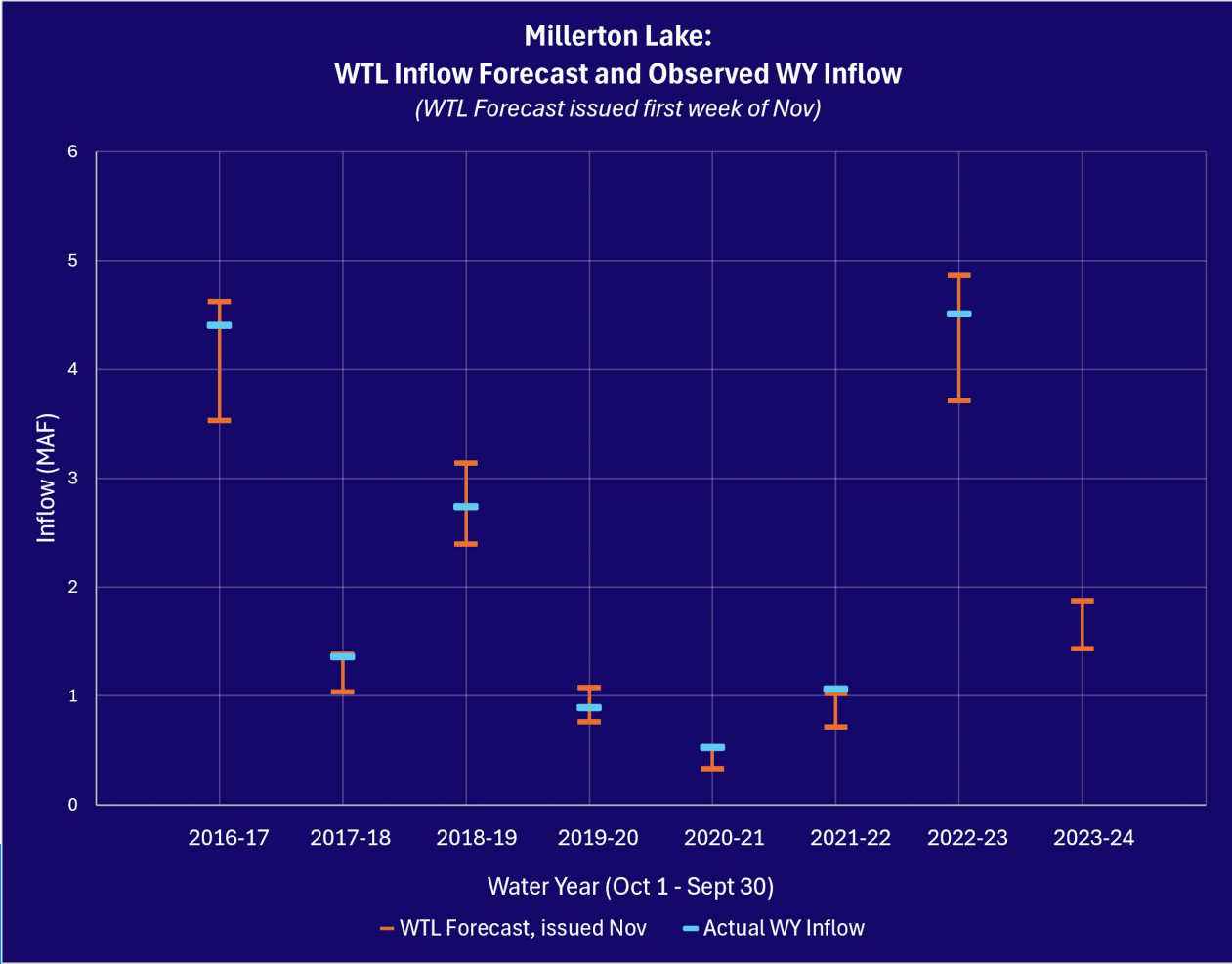
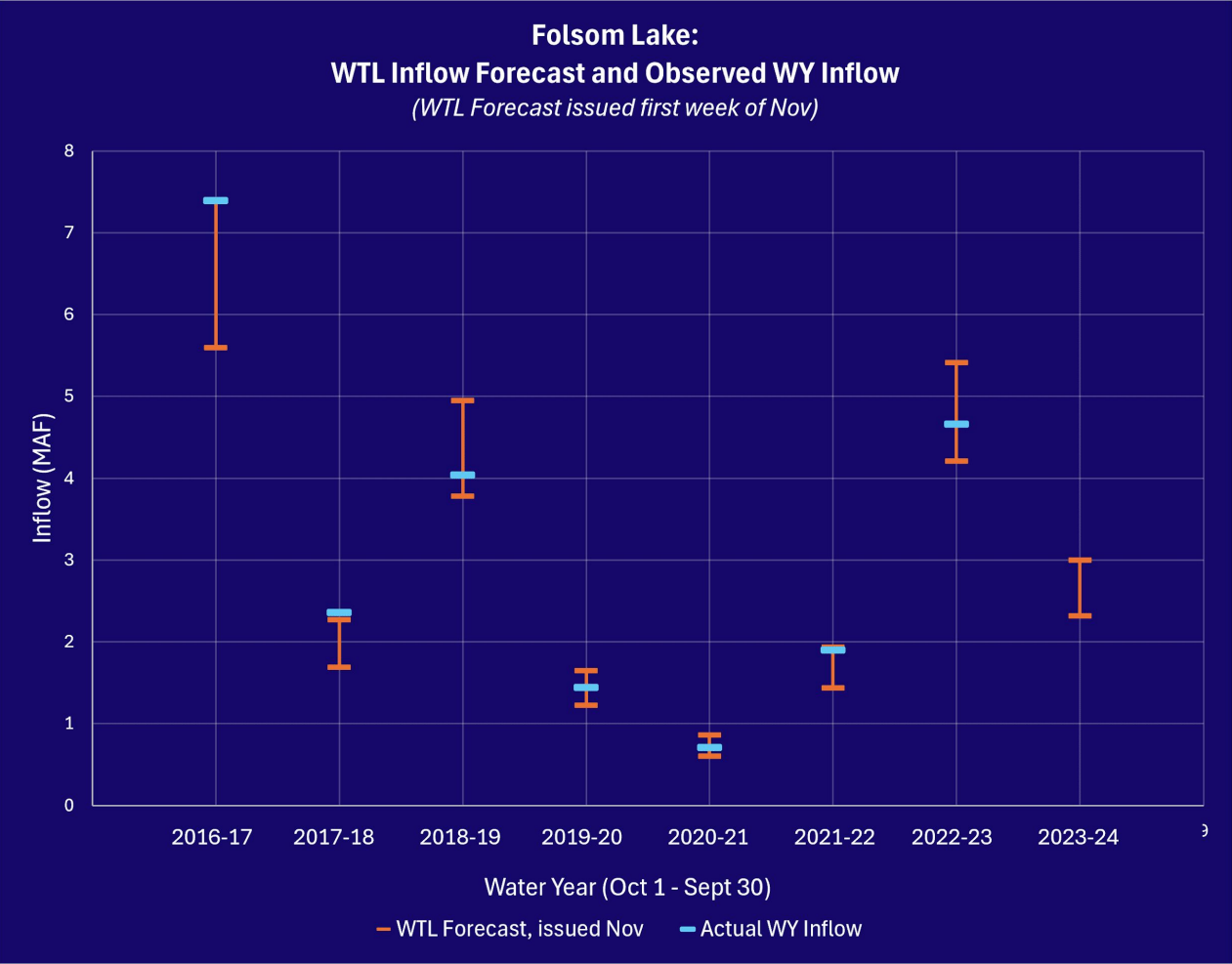
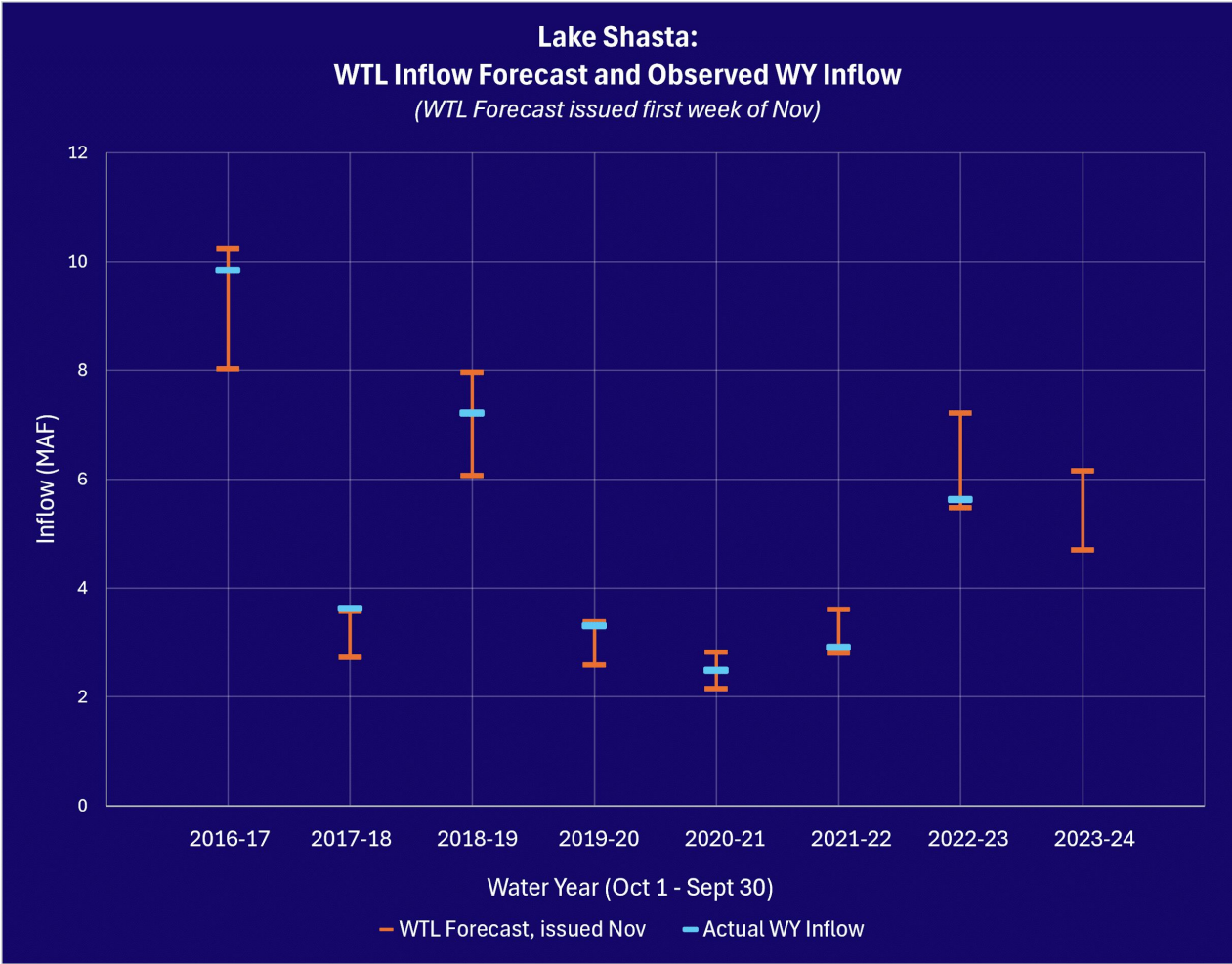
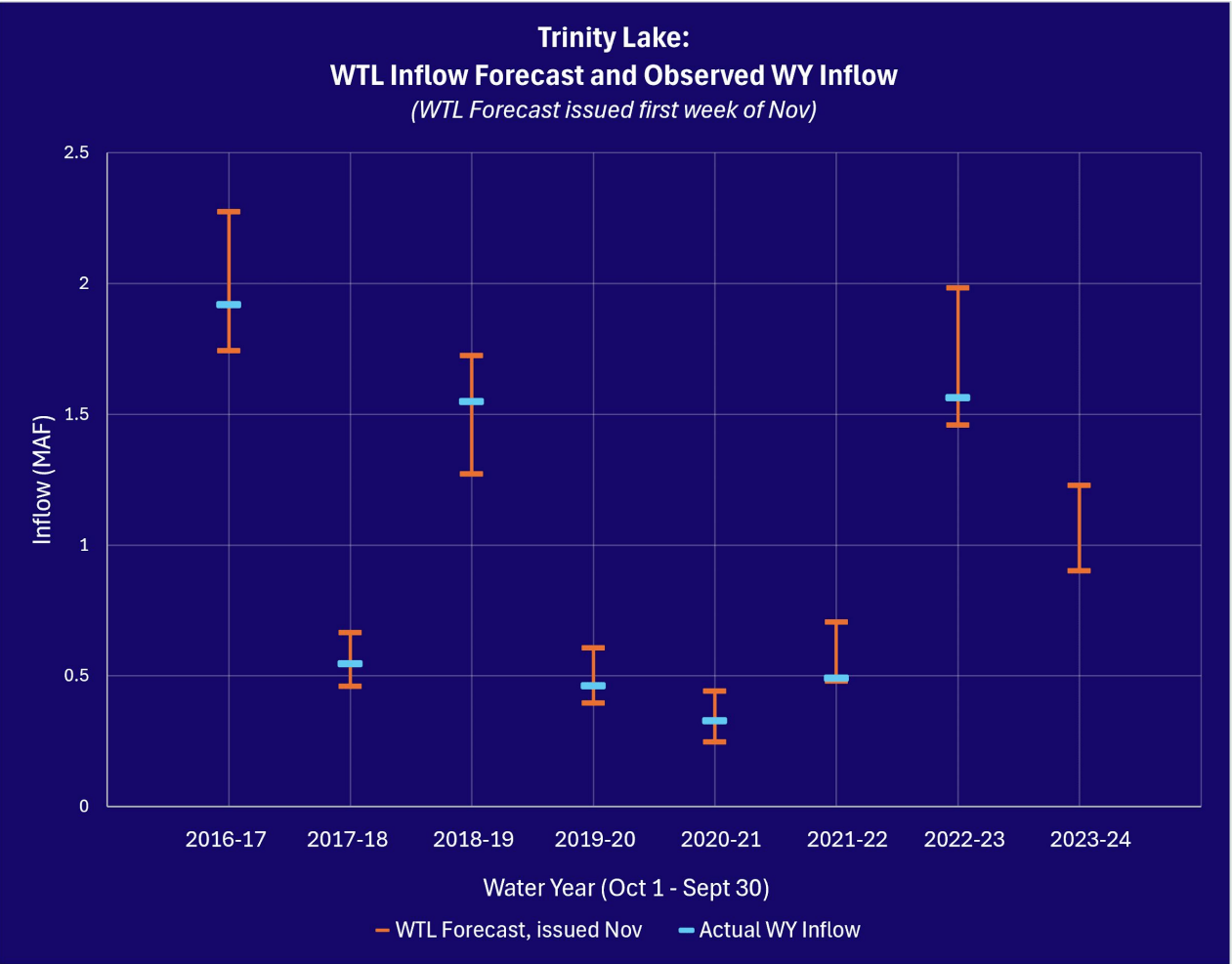


CRAFT Insights

Performance Record: Lake Oroville



For the past 8 years, our inflow forecasts have consistently delivered exceptional value, with observed inflows either falling within or closely aligning with our forecasted range



Our Precipitation & Inflow Forecasts Are Always...



Simple.

Issued in **early November** and **never** adjusted.



Straightforward.

Clearly defined range of expected water year precipitation & inflow.



Spot on.

Accurate forecasts for **8 straight years** and counting.

Trustworthy **weather insights** deliver actionable **business intelligence** across diverse industries and applications.



CAP Customer Spotlight

Tulare Irrigation District

Simple.

“The forecasts we usually deal with are two weeks out, maybe a month, and they adjust and fluctuate over time. The CAP forecast is given in November and it’s never going to change.”

Straightforward.

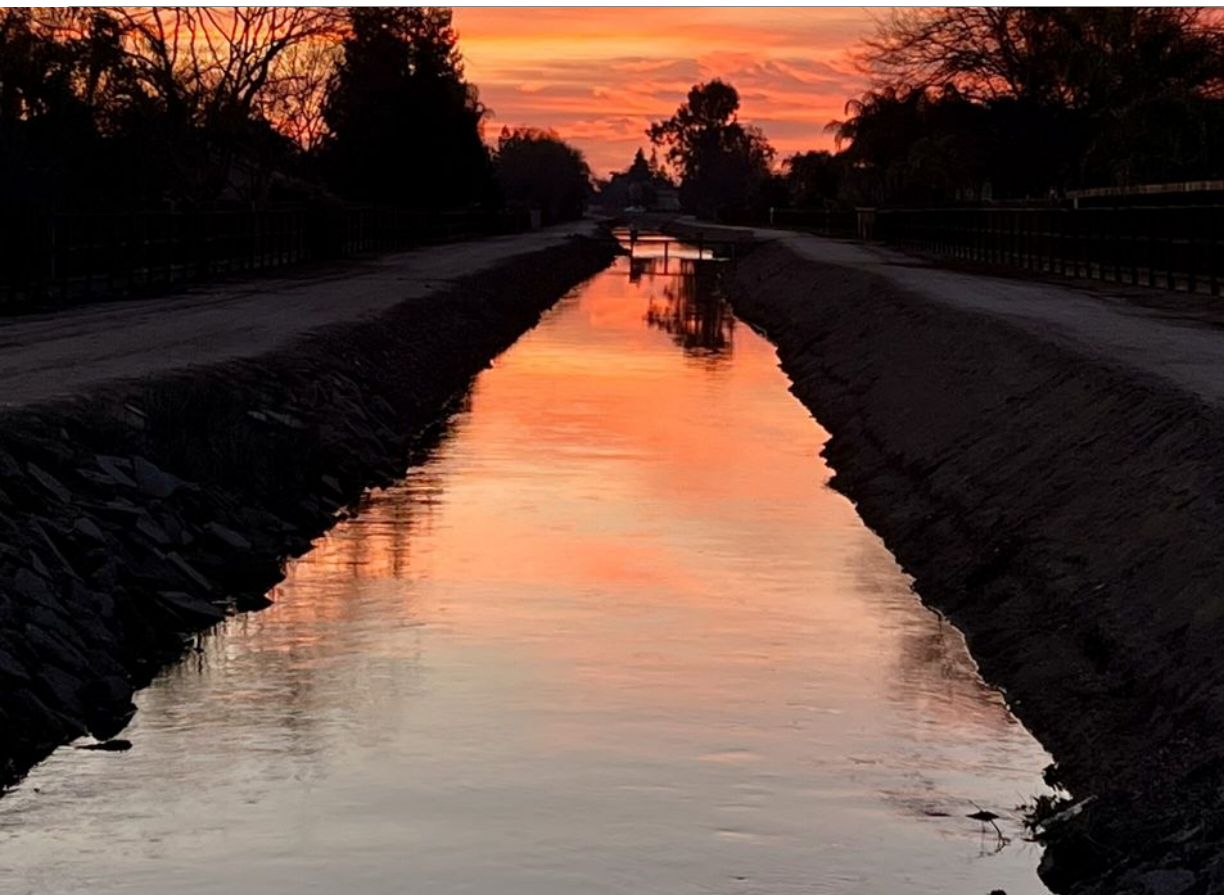
“Anyone in a business is going to strategize and set up a plan, right? If you have no data going into that plan, you have to be prepared for anything and everything. (Before CAP) we were in a vicious cycle of trying to use a forecast in the fall- reading the newspaper and talking to forecasters and they’re telling us it will be dry – and then it turns wet! CAP helps refine and narrow our efforts. The (operational) options are in front of me and I can narrow my focus and prepare for 4 rather than all 8, for example.”

Spot On.

“CAP’s biggest value is that it’s accurate. Knowing in the fall that I have an accurate precipitation forecast is invaluable.”



Aaron Fukada
General Manager, Tulare ID



CAP Impact In Action

Consider Water Year 2022-23

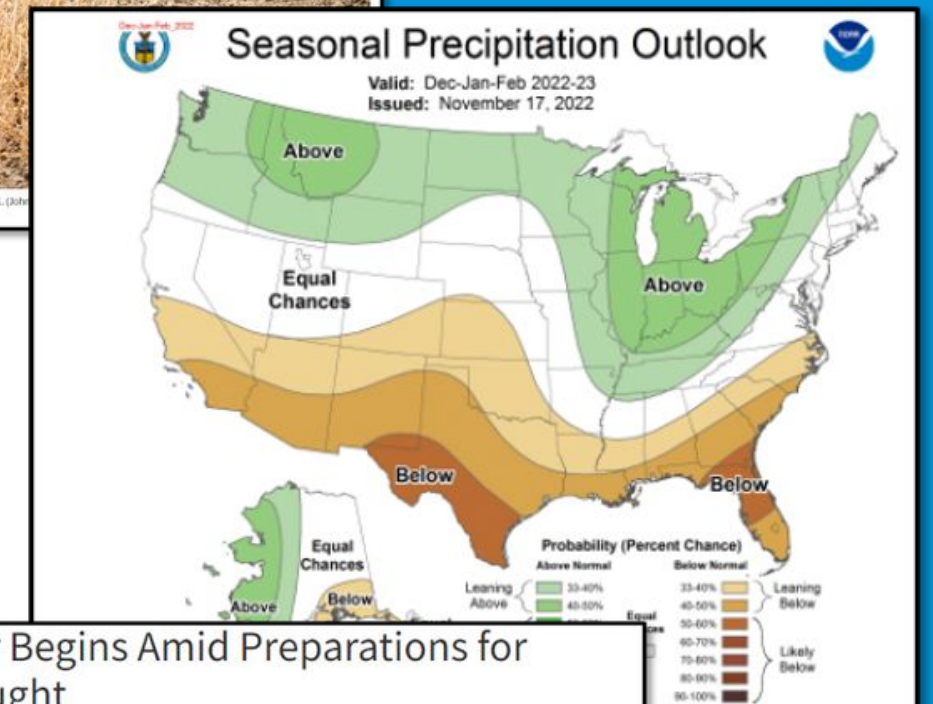
Coming off 3 years of drought

Climate Prediction Center seasonal outlook was vague, calling for:

- "Equal chances" of above/below/normal for NorCal
- Below normal for SoCal

La Niña-- assumed dry

Media headlines suggesting drought



New Water Year Begins Amid Preparations for Continued Drought

Published: Oct 03, 2022



Aerial photo of Lake Oroville on Aug. 4, 2022 at 41 percent of total capacity.

SACRAMENTO, Calif. – Conserving water has become a way of life in California, especially as projections forecast warmer, drier conditions. The State's new water year has begun and with it comes fresh concerns about a fourth year of extreme drought for the state.

California's water year runs from October 1 to September 30 and is the official 12-month timeframe used by water managers to compile and compare hydrologic records.

Water Year 2022 ended on Friday and featured continued extreme drought with historically dry months and a record-shattering heatwave. Now, the focus shifts to the months ahead with state officials preparing for a fourth dry year.

Over the past 12 months, California saw extreme swings between record-breaking storms and dry conditions driven by our changing climate. In October 2021, parts of Northern

California experienced the highest single-day rain totals ever, followed by a dry November and then a record snowfall in part

CAP Impact In Action

November '22 CAP Report

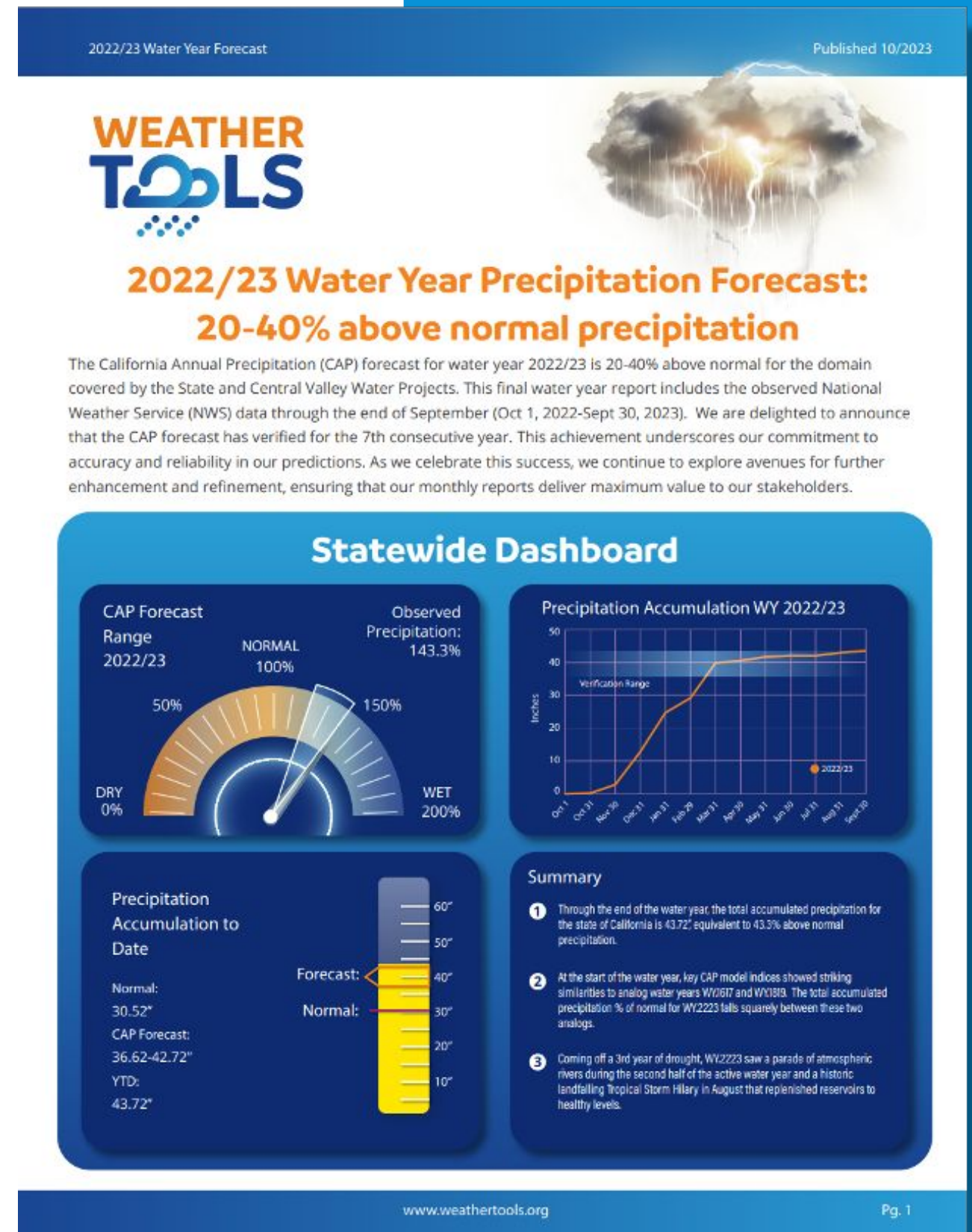
CAP Report calls for 20-40% Above Normal

Confidence in this early guidance allowed subscribers to optimize their operations, potentially saving significant resources.

Monthly updates provided additional context, alerting subscribers in the January 2023 progress report that the spring would likely be wet.

CAP forecast provided water year clarity- and stood out as the only forecast calling for a wet year.

Accurate weather data can create true
business intelligence.



Expanding Value Beyond Forecasting

Business Intelligence Core Capabilities

Our advanced Business Intelligence (BI) core is highly adaptable to meet diverse needs. It rapidly identifies and evaluates potential correlations and causations between various datasets and our own. These connections are then integrated into a forecast framework, enabling operational improvements for more informed decision-making across industries.



What are the key datasets in your industry?

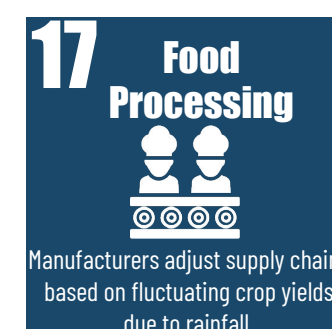
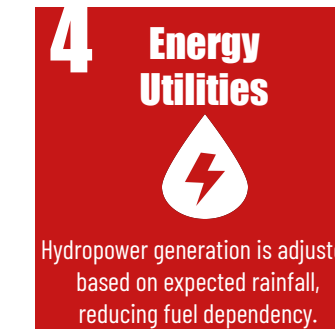
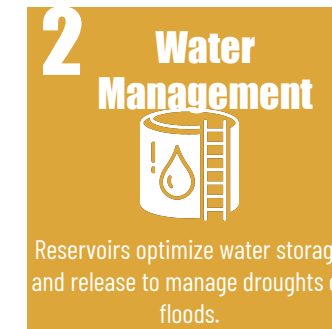


We can quickly assess the applicability of our BI core to your specific needs.



This process produced our inflow forecast product, and it can easily be applied to other critical datasets to deliver actionable insights.

We Believe Our Weather Data Creates Actionable Business



We are just beginning to understand the significant impact weather-related business intelligence has on our economy and society.

Next Steps:

Collaborating for California's Water Future

1. Schedule In-Person Meeting

- Coordinate a meeting to discuss tailored solutions for the upcoming water year.

2. Inside our Process

- To be transparent and build trust, provide additional information on our techniques, including their development and proven impact on resource management.



Our Team



Expertise:

With over 100 years of combined experience in meteorology, data science, and hydrology.



Diverse Perspectives:

Our team includes meteorologists, water managers, hydrologists, and rice farmers—bringing unique insights into California's water challenges.



Specialization:

We specialize in delivering advanced forecasting solutions tailored to the needs of water resource managers, helping to address both short-term and long-term water management issues.



Rob Doornbos
Founder



Kelly Doornbos
Partner



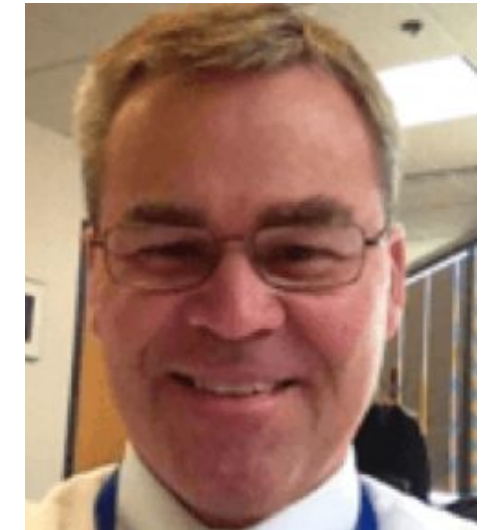
Jackie Miller
Manager, Data &
Product Services



Don Wright
Consultant,
Technical Sales



Thad Bettner
Consultant,
Technical Sales



Rob Hartman
Consultant,
Hydrology

Our History

Founded in 2013 by Rob Doornbos and based in Chico, CA, Weather Tools revolutionizes weather forecasting through cutting-edge technology and meteorological expertise. We've pioneered accurate, tailored forecasts coupling our proprietary network of weather stations with machine learning techniques. Today, we're a trusted leader, delivering actionable business intelligence that speaks into some of society's most vexing challenges. Join us and let's look at your operational problems from a completely different perspective.



2011

Concept begins with weather-based crop yield research.



2016

Research begins to answer, "will it be a wet or dry winter?"



2021

First public release of CAP product to select audience.



2023

Weather Tools CAP forecast verifies for a 7th consecutive year.



2013

Weather Tools founded & stations deployed to support daily forecast.



2020

Water year precipitation research tested over a 5-year window.



2022

Commercial-scale release of CAP in November 2022.



2024

CRAFT (California Reservoir Annual Forecast Tool) Developed.



Our Future



Our history has provided a very strong foundation, but the future holds even greater possibilities. Join us for the journey ahead as we push the boundaries of weather-related business intelligence and seek to create meaningful impact together.



www.weathertools.org



[linkedin.com/in/robdoornboswt](https://www.linkedin.com/in/robdoornboswt)

[linkedin.com/company/weathertools](https://www.linkedin.com/company/weathertools)

Contact Us

Rob Doornbos

Founder & CEO

Weather Tools, Inc.

rob@weathertools.org

Kelly Doornbos

Partner

Weather Tools, Inc.

ktd@weathertools.org

Thad Bettner

Consultant, Industry Sales

Weather Tools, Inc.

tbettner@waterecology.net

Don Wright

Consultant, Industry Sales

Weather Tools, Inc.

don@waterwrights.net

Jackie Miller

Manager, Data & Product Services

Weather Tools, Inc.

jackie@weathertools.org