INFORMATION ITEM

Lead Scientist Report

Summary

Snowpack is critical to California's water supply, but climate change is shrinking snowpack at lower elevations and causing it to melt earlier in the year. This creates a gap between when water is available and when it is needed, particularly for irrigation. Recent work by Dr. Areidy Beltran-Peña and colleagues (2025) highlights how a warming and more variable climate will increase both the magnitude and duration of these water gaps in California, posing growing risks for the state's major agricultural regions. While our relatively full reservoirs should help California meet upcoming seasonal water demands, these challenges are only expected to increase. As highlighted by recent work such as the extreme events edition of the State of Bay-Delta Science, the Independent Science Board's Emerging Climate Science Symposium, and the forthcoming 2026 update to the Delta Science Plan, forward-looking science to inform long-term planning and resilience is vital to water management in a future that no longer resembles the past.

California's shifting snowpack

Future implications of enhanced hydroclimate variability and reduced snowpack on California's water resources. Areidy Beltran-Peña *et al.* 2025. *Environmental Research: Water:* 1 025004. DOI 10.1088/3033-4942/ade7aa

Earlier this year, California's snowpack was dramatically reduced by an unprecedented March heatwave that left almost no snow at mid-elevations by April 1, the date when snowpack typically reaches its peak. Snowpack is critical to the state's water system, supplying a substantial portion of California's water and acting as a natural "water tower" that controls the timing of water supply by storing precipitation as snow and ice in winter months and releasing water as runoff or groundwater recharge in subsequent warm seasons.

What is science telling us?

Research shows that climate change is shrinking snowpack at lower elevations and shifting runoff earlier in the year, worsening "water gaps" between when water is available and when water is needed, particularly for agriculture. Declining snowmelt and more variable climate conditions could disrupt monthly irrigation water availability, posing growing risks for the state's major agricultural regions.

Recent work by Dr. Areidy Beltran-Peña and colleagues (2025) highlights how a warming and more variable climate is increasing both the magnitude and duration of these water gaps in California. Using the NCAR Earth System Model 2 and the USGS Integrated Water Use dataset (2000–2020), this study evaluated water supply and water demand across the Sierra Nevada under future expected warming scenarios. The study found that the proportion of precipitation falling as snow could decrease 33–58% across the Sierra, with peak snowpack occurring 4–6 weeks earlier than currently.

These shifts would lead to a widening and longer-lasting mismatch between water supply and demand, especially in the more southern Tulare Basin but also in the Sacramento and San Joaquin basins. With 3°C (5.4°F) of warming, which under certain scenarios could happen around the middle of the 21st Century, the projected water gap across these three critical agricultural basins could reach 10 million acre-feet. This is comparable in magnitude to the gap of around 9 million acre-feet identified in the California Water Plan for 2040.

What are we doing?

While our relatively full reservoirs this year should help us meet upcoming seasonal water demands, warming temperatures and changing precipitation patterns associated with climate change are expected to intensify challenges in the long-term. Recent Delta Science Program and Delta Independent Science Board activities have underscored the need for forward-looking science to inform planning. For example, the Delta Independent Science Board's Emerging Climate Science Symposium and the 2025 State of Bay-Delta Science special edition on climate change and extreme events (https://sbds.deltacouncil.ca.gov/) explored the implications of a more volatile climate and water system in California, calling for

improved forecasting and flexible management strategies such as forecast-informed reservoir operations (FIRO) and flood-managed aquifer recharge (FloodMAR).

The California Department of Water Resources is currently undergoing an update to its California Water Plan. The Water Plan uses multiple climate scenarios to evaluate the water system's performance under uncertain conditions and prioritizes adaptive management—an approach that allows for adjusting strategies and actions over time as conditions change or new information emerges. Similarly, the 2026 update to the Delta Science Plan focuses on strengthening monitoring, modeling, and decision-support tools to ensure science better informs water management in a future that no longer resembles the past.

Delta Science Program Activities

Blue Carbon Symposium

A one-day science symposium entitled "Accounting for Blue Carbon in the Bay-Delta: Science, Policy, and Practice" was held on March 5, 2026. This event, co-hosted by the UC Davis Coastal and Marine Sciences Institute and the Delta Stewardship Council's Delta Science Program, highlighted the significant opportunity to store large amounts of carbon in the Delta's peat soils. Presentations addressed the challenges of reversing carbon loss, greenhouse gas emissions, and land subsidence driven by soil drying and agricultural cultivation. Speakers also shared examples of wetland restoration and rice conversion projects in the Bay-Delta that exemplify the many benefits of rewetting these peat soils, such as creating wildlife habitat, mitigating flood risk, and contributing to the agricultural economy.

Additionally, the 10 speakers and approximately 100 attendees discussed the scientific, policy, and economic challenges of maintaining long-term managed wetlands or rice farms. Participants emphasized that more work is needed to effectively communicate the importance of land and water management in the Delta to meet California's greenhouse gas reduction and climate goals. They also highlighted the need to better convey the multiple additional benefits that climate-friendly management in the Delta can offer.

The following day, some attendees went on a field trip to Staten Island Preserve to see first-hand how rice cultivation and wetland restoration can contribute toward conservation-focused farming and land management. Jerred Dixon, the Director of Conservation Farms and Ranches, led approximately 20 participants on a tour of the preserve and shared his personal experiences of converting conventional agricultural lands to rice and wetlands in support of subsidence reversal, carbon sequestration, and waterfowl habitat.

Conference organizers are now exploring potential communication products that will summarize major takeaways from the symposium, recommend next steps, and communicate how nature-based solutions in the Delta stand out from other regions because of the many stacked benefits these projects can create.

The symposium recording is available here: https://marinescience.ucdavis.edu/events/blue-carbon.

2026 California Water and Environmental Modeling Forum (CWEMF) Annual Meeting

The Annual Meeting for the California Water and Environmental Modeling Forum (CWEMF) was held April 20–22, 2026, at the Lake Natoma Inn in Folsom, CA. The CWEMF Annual Meeting brings together modelers, researchers, and water resources professionals from across the region. This year, Delta Science Program staff organized a session on "Collaborative modeling in the Delta: exploring feasibility using three use cases," featuring presentations from Delta Lead Scientist Lisamarie Windham-Myers and Delta Science Program staff member Michelle Stern. In addition, the session highlighted three projects coordinated by the Delta Science Program over the last year. Together, these projects explored modeling approaches, identified existing resources that could be leveraged, and highlighted critical gaps in resources needed to predict harmful algal blooms, manage salinity, and restore food webs in the Delta. The overarching goal of this effort was to evaluate how a Collaboratory—an intentional community of modelers and modeling resources designed to support integrated modeling projects—could provide specific, actionable benefits for the Delta. Next, Delta Science Program staff will produce a white paper that synthesizes next steps for the three projects and identifies shared resource needs to build the foundation of the Delta Modeling Collaboratory.

Other speakers in the session included:

- Keith Bouma-Gregson (US Geological Survey) and Dave Senn (San Francisco Estuary Institute), who presented about their work "Developing modeling applications to support cyanobacterial harmful algal bloom management in the Sacramento-San Joaquin Delta, California"
- Josué Medellín-Azuara (UC Merced), who shared about "Managing salinity in the Delta: an integrated modeling-collaboratory approach for research on infrastructure and management solutions"
- Matt Young (US Geological Survey), who presented on "Managing tidal wetlands to optimize food webs in the Sacramento-San Joaquin Delta, California"

For more information on CWEMF and the Annual Meeting, see: https://cwemf.org/wp/.

Spring-Run Juvenile Production Estimate Peer Review

The Spring-Run Juvenile Production Estimate (SRJPE) Peer Review panel presented their initial findings at a public meeting in February and finished their report in April. The goal of this independent peer review was to review the scientific approach used to calculate the annual SRJPE (the estimated number of juvenile Spring-Run Chinook salmon entering the Delta as they migrate to the Pacific Ocean) and to provide recommendations to the California Department of Water Resources and the multi-agency team tasked with development of the SRJPE. The panel noted that the SRJPE modeling approach is an innovative and thoughtful approach that leans on historical data and informs future monitoring to strengthen the SRJPE. In their report, the panel provided recommendations to strengthen the SRJPE and to improve model uncertainty and bias. The final report and additional information about this peer review process can be found on the Council's website: https://deltacouncil.ca.gov/delta-science-program/spring-run-juvenile-production-estimate-independent-peer-review.

On Your Radar

Call for Abstracts: Bay-Delta Science Conference

The Call for Abstracts for the 2026 Bay-Delta Science Conference is now open! The conference theme is "The Opportunity of Change: Building and Being the Future Together," which calls on communities, knowledge holders, scientists, practitioners, leaders, and others invested in the Bay-Delta to recognize this moment of change and work together to shape the future. At this time, the planning team welcomes abstract submissions for organized sessions and workshops, as well as oral, poster, and art presentations. Particularly, the planning team invites proposals that use an alternative format to engage the audience and facilitate dialogue and discussion. Of special interest are collaborations between art and science, storytelling for policy and public engagement, and effective communication of uncertainty, risk, and change. The deadline to submit an abstract is May 29. The Bay-Delta Science Conference will be held in person at the SAFE Credit Union Convention Center in Sacramento, CA, from September 28–30, 2026. Learn more and submit an abstract on the conference website: https://www.baydeltascienceconference.com/.

Traditional Knowledge Roundtable series

On June 30, July 14, and July 28 the Delta Stewardship Council, the Shingle Springs Band of Miwok Indians, and California Indian Environmental Alliance will co-host a roundtable series exploring Traditional Knowledge, Tribal history, and collaborative approaches to stewardship in California's Sacramento-San Joaquin Delta and its watershed. The series will bring together Tribal Elders and leaders, agencies, and scientists to share experiences, discuss challenges, and explore practical approaches to interweaving Traditional Knowledge, management, and science. Events will be a mix of online and hybrid, with in-person gatherings in downtown Sacramento and virtual attendance via Zoom. For more information please see the Council's Tribal Engagement web page: https://deltacouncil.ca.gov/tribal-engagement.

DPIIC Restoration Subcommittee meeting and Delta Restoration Forum

On June 18 at Bogle Family Vineyards in Clarksburg the Delta Plan Interagency Implementation Committee's (DPIIC) Restoration Subcommittee will hold a meeting and following that the Delta Stewardship Council and the Delta Conservancy will co-host the fourth Delta Restoration Forum. The Subcommittee meeting will feature

presentations highlighting ecosystem restoration projects and related programs. The Forum will be open-house format, featuring restoration projects across the Sacramento-San Joaquin Delta and Suisun Marsh. Participants will network and share information on active and planned projects, funding programs, and opportunities for future work. Registration for the forum is now open, and more information can be found on the Council's events page: https://deltacouncil.ca.gov/events.

By the Numbers

Science Program staff will summarize current numbers related to Delta water and environmental management. The summary figures (Attachment 1) will inform the Council of recent counts, measurements, and monitoring data driving water and environmental management issues.

Fiscal Information

Not applicable.

List of Attachments

Attachment 1: By the Numbers

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A recording of the presentation will be available on the Delta Council's YouTube page at https://www.youtube.com/@DeltaCouncil.