Perspectives to advance science-informed decision-making

2025 State of Bay-Delta Science

Delta Science Program
DELTA STEWARDSHIP COUNCIL

What are we learning from the State of Bay-Delta Science 2025?

Extreme events like heatwaves, wildfires, droughts, and atmospheric rivers are becoming the new normal in the Sacramento-San Joaquin Delta (Delta). Climate change is adding pressure to the Delta's governance system, water supply, ecosystems, and people.

Infrastructure and resource management models were built around 20th-century conditions, but recent climate and weather events are pushing the boundaries of what these systems are designed to handle.

How is Delta science changing?

The Delta science community is seeing the ecosystem changing in many ways. This is prompting new studies on a range of possible futures, from extreme floods to the combined effects of multiple types of events.

Uncertainty in climate models and variability in climate conditions can make it difficult to predict future conditions, but new tools and practices that make use of vast amounts of data collected over decades by long-term monitoring programs offer promising opportunities for innovation and learning.

Perspectives

1. Coordinated monitoring is necessary to track changes over time and space.
2. Numerous modeling frameworks and techniques are available to advance climate change research.
3. Collaborative, open, and actionable science is essential for effective climate-change management.
4. Science communication is more effective when tailored to target audiences.
5. Effective climate governance can improve science-informed decision-making under climate uncertainty.

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Where are we heading?

To meet the challenges ahead, Delta scientists and decision-makers can leverage effective practices that are already in place, such as long-term monitoring programs, collaborative synthesis venues, science-informed decision-making processes, and tribal and community partnerships. New and sophisticated tools are constantly emerging that can harness the big data revolution and streamline flows of information to decision-makers and to early-warning detection systems. These assets have strengthened innovation and learning across the Delta.

Greater coordination across multiple science and policy venues requires additional resources. Open, collaborative, and actionable science principles and practices are the foundation upon which the Delta scientific system can build its capacity to anticipate and respond to new climate realities and to effectively communicate these realities to diverse audiences. Such avenues can help the Delta scientific system remain relevant to the challenges of natural resource management in the 21st century.

Three key takeaways

California's climate is projected to become increasingly variable in the 21st century.

Water infrastructure and resource management models were built for past conditions. New climate realities are testing their limits.

As climate change progresses, Delta ecosystems may be increasingly vulnerable to dramatic shifts in how they function.

About the State of Bay-Delta Science

The State of Bay-Delta Science is a synthesis and communication project coordinated by the Delta Science Program to summarize the scientific understanding, or "state of the science," of important topics in the Bay-Delta system. For more information, visit the SBDS website at https://sbds.deltacouncil.ca.gov.

This summary is based on the 2025 State of Bay-Delta Science article by Colombano et al. (2025).

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