

# Review of Water Supply Reliability Estimation

## Summary Sheet



**Delta  
Independent  
Science Board**

DELTA STEWARDSHIP COUNCIL

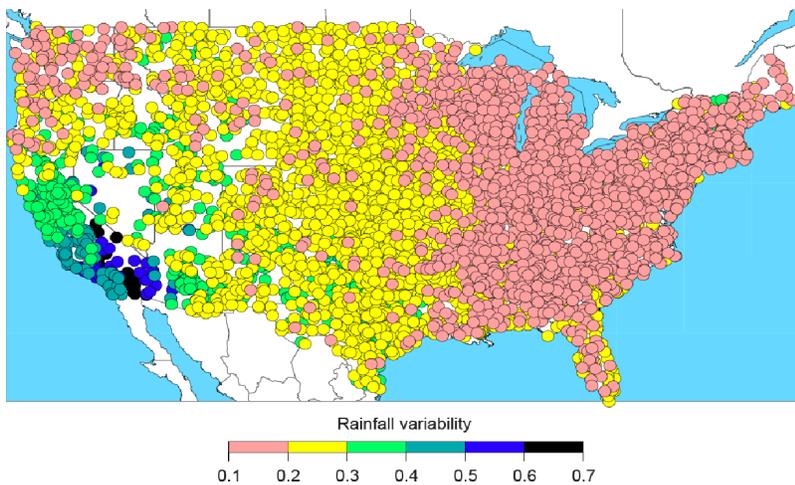
### Background

The Delta Reform Act 2009 charges the Delta Independent Science Board (Delta ISB) with periodically reviewing the science employed in Delta policy and management. The Delta ISB has released 10 such reports, addressing different scientific themes, in the last 10 years.

“Water supply reliability” is a coequal goal of the State of California for the Delta under the Delta Reform Act. The Delta is California’s largest single water supply source. This review focuses on the science of water supply reliability estimation for a variety of human and environmental purposes. California’s water system (and Delta water management) involves many water sources across the state, surface and groundwater storage, water conservation, regulations and agreements, and changing climate, economic, and ecosystem conditions pose important challenges.

Given California’s highly variable hydrology and complex water system, estimating water supply reliability quantitatively is difficult, but essential for effective water policy, negotiations, and management. Such assessments are needed to compare the relative desirability and likely impacts of alternative policies, plans, and operations, given short-term uncertainties and long-term uncertainties in climate, sea level, ecosystems, and water demands and regulations.

This review involved panel discussions, a workshop, a survey, expert interviews, extensive review of the literature, and public comments, resulting in a 192 page full final report.



**Figure 1. California has the nation's most variable annual precipitation.** Annual coefficient of variation for precipitation stations in the continental US. (Coefficient of variation = standard deviation/average) (Dettinger 2011)

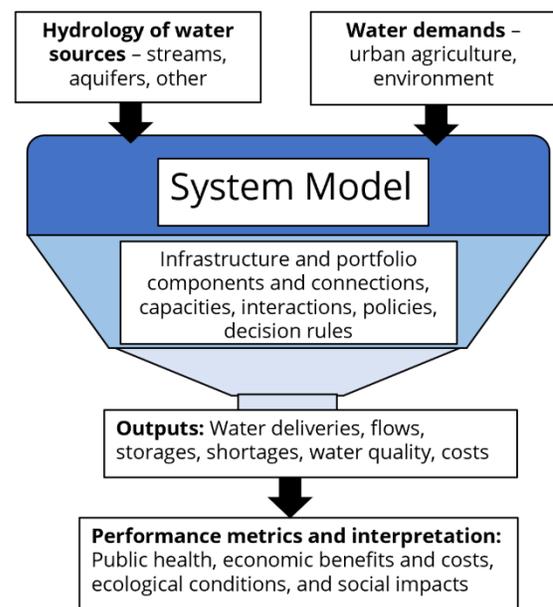
## Major Findings

### **Water supply reliability estimation serves human and ecosystem success.**

Many suppliers and regulators already use formal reliability analyses to improve water operations, planning, and policy decisions. Improved water supply reliability analyses are indispensable to adaptively managing water supplies in complex systems with many changing conditions and disruptions from extreme events.

**Improving water supply reliability requires better representation of changes in climate, ecosystems, regulations, demands, and extreme events.** A portfolio approach that integrates management of both demands and supplies has helped California. Probabilistic approaches to estimate water supply reliability can capture the variability of changing conditions, which supports balanced water management portfolios. Non-probabilistic approaches can help explore water management solutions.

**Clear communication and integration of reliability analyses into decision-making can better structure deliberations on performance and trade-offs.** It is important to communicate the results to decision-makers, stakeholders, and the public. Estimates from water supply reliability estimates are sensitive to underlying assumptions that may affect management recommendations.



These assumptions should be explicitly stated to managers and stakeholders. Agency expertise in water supply reliability estimation should be developed and encouraged to keep pace with scientific developments.

## Practice Recommendations

1. Water supply reliability analyses in California should reflect portfolio-based water management to improve cost-effectiveness and equity in water management among diverse entities.
2. More assessments of water system reliability should include public health, economic, ecological, and social performance.
3. More formal quality control and documentation of supply analyses should be encouraged and sometimes required for water supply reliability studies.
4. A common State water accounting system should be developed to improve analysis quality, comparability, and communication for technical and nontechnical audiences.
5. The next generation of state-sponsored water supply system models for reliability estimation should be built, updated, and evaluated by a consortium of state and federal agencies and external experts.

## Research Recommendations

6. Specific performance metrics and analysis methods for environmental water supply reliability should be developed and employed to better inform policies that support the Delta's co-equal goals.
7. Estimation methodology should be updated to reflect accumulated and expected climate change effects, combined with uncertainty analysis.
8. Investment in research and education should increase to improve water supply reliability estimation science and practice and maintain expertise in government agencies.

## Learn More:

The [full report](https://deltacouncil.ca.gov/pdf/isb/products/2022-06-16-isb-water-supply-reliability-review.pdf) can be found at <https://deltacouncil.ca.gov/pdf/isb/products/2022-06-16-isb-water-supply-reliability-review.pdf>. If you have any questions, please email [disb@deltacouncil.ca.gov](mailto:disb@deltacouncil.ca.gov).