



Interagency Ecological Program 2024 Work Plan Element San Francisco Bay Salinity and Temperature Monitoring

Project Manager and Affiliation

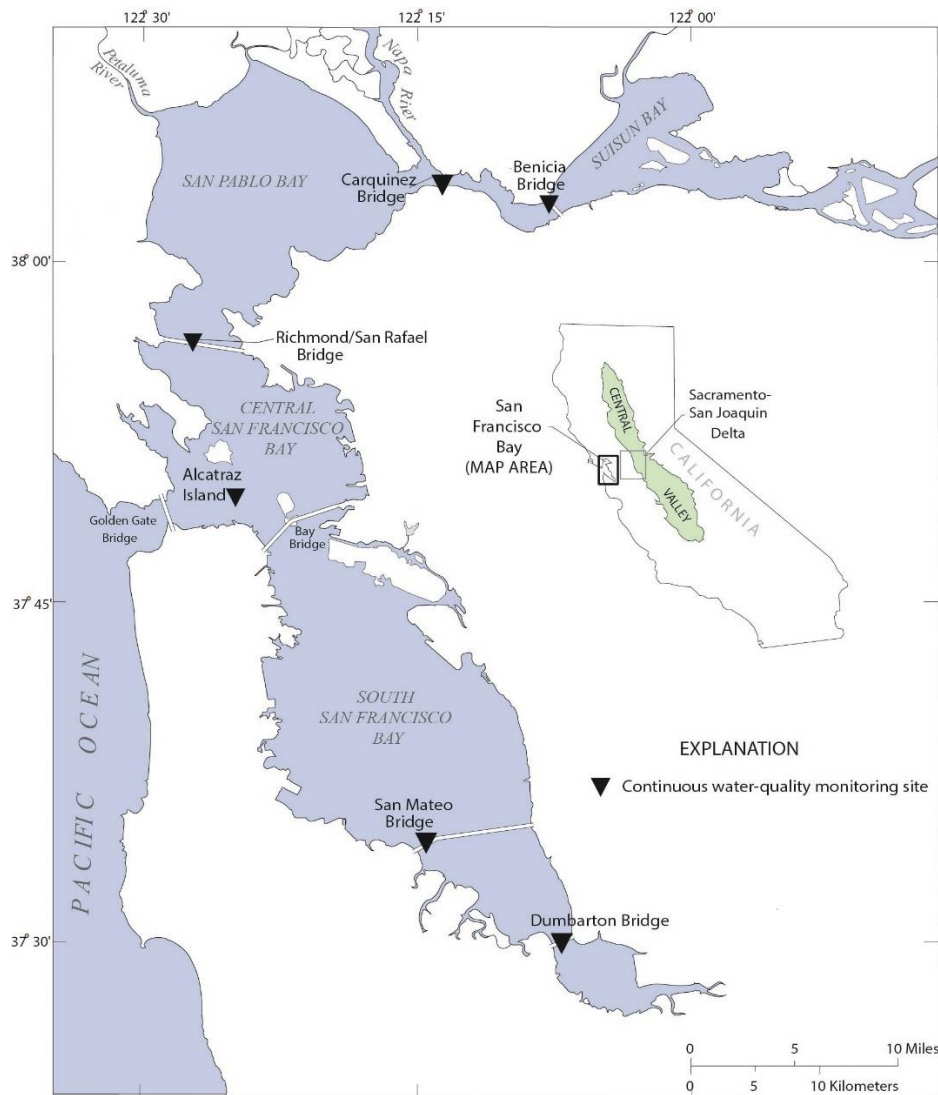
David Hart, USGS California Water Science Center, Sacramento

Principal Investigator and Affiliation

David Hart, USGS California Water Science Center, Sacramento

Annual Cost (thousands) and Funding Sources

\$367 DWR; \$26 USGS



Map of salinity and temperature stations in San Francisco Bay

Description

Collect specific conductivity and water temperature data (from which salinity can be computed) at six stations in the San Francisco Estuary (Benicia Bridge, Carquinez Bridge, Richmond Bridge, Alcatraz Island, San Mateo Bridge, and Dumbarton Bridge). Make provisional data available in near-real-time via USGS NWIS publicly available database. Review and finalize data.

Project Need

Water Rights Decision 1485: Order 10.

The collection of specific conductance and water temperature data as part of this project began in 1981 in south San Francisco Bay at the San Mateo Bridge by DWR. Currently, there are six operational salinity monitoring stations: Benicia Bridge, Carquinez Bridge, Richmond Bridge, Alcatraz Island, San Mateo Bridge, and Dumbarton Bridge. Time series of water temperature and specific conductance (salinity is calculated from conductivity and water temperature) are needed (1) to improve understanding of the hydrodynamics of the estuary (e.g., gravitational circulation), (2) for calibration of multi-dimensional flow and transport models of the Bay, (3) to better understand the distribution of physio-chemical habitat types throughout the Bay, and (4) to provide supporting data for numerous estuarine studies of the Bay and Delta.

A conservation benefit of this project is to provide data that improve understanding of the role of freshwater on estuary water quality. Freshwater is a critical resource and studying the effects of varying freshwater inflow on estuary water quality can help manage this resource efficiently.

Temperature and salinity are two key estuarine habitat variables. Understanding how these variables are distributed around the Bay leads to a better understanding of habitat types and distribution in the Bay. Additionally, understanding the distribution of salinity in the Bay allows us to better understand the transport processes that drive material transport and supply throughout the Bay. The data obtained will help inform decisions related to management of water resources in the Bay system.

Project Objectives

- Measure salinity (specific conductance) and temperature every 15 minutes at six stations in San Francisco Bay (listed geographically from south to north):
 - San Francisco Bay at Dumbarton Bridge
 - San Francisco Bay at San Mateo Bridge near Foster City
 - San Francisco Bay at Alcatraz
 - San Francisco Bay at Richmond Bridge
 - Carquinez Strait at Carquinez Bridge
 - Suisun Bay at Benicia Bridge
- Provide supporting data for numerous estuarine studies of the Bay and Delta
- Provide supporting data for calibration of multi-dimensional flow and transport models

Schedule of Milestones

- 1981: DWR began data collection

- 1989: DWR transferred data collection to USGS
- 2008: USGS provides data online and periodically writes summary fact sheets and IEP Newsletter articles
- 2015: USGS documents maximum values of salinity and temperature over period-of-record during drought conditions.
- 2017: USGS documents maximum values of salinity and temperature again over period-of-record during drought conditions.

Project Products and Publications

- Buchanan, P., Downing-Kunz, M., Schoellhamer, D., Shellenbarger, G., and Weidich, K., 2014, Continuous water quality and suspended-sediment transport monitoring in the San Francisco Bay, California, water years 2011-2013: Interagency Ecological Program Newsletter, v. 27, no. 4, p. 22-25.
- Buchanan, P.A., Downing-Kunz, M.A., Schoellhamer, D.H., and Livsey, D.N., 2018, [Continuous water-quality and suspended-sediment transport monitoring in the San Francisco Bay, California, water years 2014–15](https://doi.org/10.3133/fs20183013): U.S. Geological Survey Fact Sheet 2018–3013, 5 p., <https://doi.org/10.3133/fs20183013>.
- Palm, D.L., Einhell, D.C., Davila Olivera, S.M., 2022, [Continuous water-quality and suspended-sediment transport monitoring in San Francisco Bay, California, water years 2020–21](https://doi.org/10.3133/fs20223087): U.S. Geological Survey Fact Sheet 2022–3087, 4 p., <https://doi.org/10.3133/fs20223087>.
- Downing-Kunz, M.A., Work, P.A., and Shellenbarger, G.G., 2015, Record-high specific conductance and temperature in San Francisco Bay during water year 2014 (ver. 1.1, December 28, 2015): U.S. Geological Survey Open-File Report 2015–1213, 4 p.
- Work, P.A., Downing-Kunz, M.A., and Livsey, D., 2017, [Record-high specific conductance and water temperature in San Francisco Bay during water year 2015](https://doi.org/10.3133/ofr20171022): U.S. Geological Survey Open-File Report 2017–1022, 4 p., <https://doi.org/10.3133/ofr20171022>.
- Work, P.A., and Downing-Kunz, M.A., 2018. State of the Network: Long-Term, High-Frequency Flow and Water-Quality Data in the San Francisco Estuary, California. Contribution to IEP Newsletter Dec 2018, v4.
- Shellenbarger, G.G. and Schoellhamer, D.H., 2011, Continuous salinity and temperature data from San Francisco Bay, California, 1982-2002: trends and the salinity-freshwater inflow relationship: Journal of Coastal Research, v. 27, no. 6, p. 1191-1201.