



# SacWAM Frequently Asked Questions

## 1. What is SacWAM?

SacWAM is the State Water Resource Control Board's (State Water Board's) model to represent hydrology (flows) in the Sacramento River and the Delta and associated tributaries (including the Delta eastside tributaries of the Cosumnes, Mokelumne, and Calaveras rivers) (Sacramento/Delta). SacWAM simulates the major water supply and flood control infrastructure in this region with a spatial extent from the upper watersheds of the Sierra Nevada through the Delta and Suisun Bay. SacWAM simulates water supply in a manner that is similar to the CalSim models used by the Department of Water Resources (DWR) and the United States Bureau of Reclamation for operations of the State Water Project and Central Valley Project (collectively Projects) with additional refinements to non-Project components of the system compared to the current version of CalSim used for analyses (CalSim II). The State Water Board originally released the model in the fall of 2016 for public and peer review. Based on that review the State Water Board released an updated version of the model in the fall of 2017. The current version of the model (SacWAM version 1.2) includes additional refinements to those earlier versions of the model.

## 2. What modeling platform does SacWAM use and why was it chosen?

SacWAM was developed on Stockholm Environment Institute's (SEI's) widely accepted Water Evaluation and Planning (WEAP) platform. WEAP has been applied in water assessments in dozens of countries, including the United States, Mexico, Brazil, Germany, Ghana, Burkina Faso, Kenya, South Africa, Mozambique, Egypt, Israel, Oman, Central Asia, India, Sri Lanka, Nepal, China, South Korea, and Thailand. The Board chose this platform for its technical capabilities, user-friendly graphical user interface, and powerful scenario comparison abilities.

## 3. What are the assumptions the SacWAM model is based on?

SacWAM simulates hydrology and water project operations on a monthly timestep using historical unimpaired hydrology from the period 1922-2015. The physical schematic and unimpaired inflow time series were initially developed by DWR in connection with updates to its CalSim model. The State Water Board developed the operational logic for SacWAM using several prior modeling efforts, including the Central Valley Water Evaluation and Planning WEAP model developed for the 2013 California Water Plan and models developed by local water districts for their own operational and planning needs.

## 4. Why did the State Water Board develop SacWAM?

The State Water Board developed SacWAM to support its efforts to develop and implement Sacramento/Delta updates to the Bay-Delta Water Quality Control Plan (Bay-Delta Plan). In order to evaluate potential new flow and water quality objectives throughout the entire watershed, the Board needed a model that represents operations of all major water infrastructure within the watershed. The models that were available before the development of SacWAM focused on Project operations, but the Board needed a way to evaluate all of the tributaries in the watershed, not just those operated by the Projects.

**5. What is new in SacWAM version 1.2?**

The model released today (SacWAM 1.2) includes refinements to the previous version of the model that was released (SacWAM 1.05). The updates include refinements to upper watershed hydropower operations, Project water diversions in the southern Delta, water supply allocations and diversions in several watersheds, unimpaired upper watershed inflows, and other minor changes. The model released today includes improvements to the model's representation of current conditions in the watershed and increases the model's flexibility in modeling alternative flow and water project operations.

**6. Why is SacWAM version 1.2 being released today?**

The current release of SacWAM is intended to help establish a foundation for evaluation of alternatives for the Bay-Delta Plan update, including potential Voluntary Agreements (VAs).

**7. Will the State Water Board release SacWAM model results of the VAs and the State Water Board staff proposal for Sacramento/Delta updates to the Bay-Delta Plan outlined in the July 2018 Framework?**

The State Water Board will work collaboratively with parties to the VAs to model the VA proposals, and will release final model results for VA scenarios and the July 2018 Framework proposal in the coming months.

**8. Does SacWAM model flow and habitat?**

SacWAM models flows. Those modeled flows can then be used as inputs to other models to evaluate other changes to physical and biological attributes of habitat.

**9. Why does SacWAM use a monthly time step instead of a daily time step?**

All modeling efforts involve compromises regarding the variables and how much detail to include. A monthly time step is generally accepted as appropriate for environmental flow and water supply planning purposes, and a daily timestep model in a watershed as extensive and complex as the Bay-Delta is not feasible. A monthly time step is appropriate to model a variable climate. In California, where hydrology varies dramatically year-to-year, and the observed record includes long stretches of both relatively dry and relatively wet years, the monthly time-step is the most efficient and accurate way to model the watershed. Although events on sub-monthly (e.g. daily or weekly) time scales are important to physical and biological processes, larger seasonal patterns dominate hydrologic variability and the life history adaptations of aquatic species.

**10. Is it possible to incorporate into SacWAM information from models that use a daily time scale?**

Yes. Flow and management events that occur on daily and weekly time scales can be rolled up into the monthly time scales using basic arithmetic. Translating daily timestep information into a monthly time scales will allow for representation of features of hydrology and operations for planning purposes.

## 11. Who developed SacWAM?

SacWAM was developed collaboratively by SEI, Stantec, and State Water Board staff. Dr. Charles Young of SEI and Dr. Andy Draper of Stantec recently received the Hugo B. Fischer Award from the California Water and Environmental Modeling Forum for their work on SacWAM and their contributions to modeling California water systems over the past two decades.

## 12. What is next for SacWAM?

Immediately following release of version 1.2 of SacWAM, the State Water Board plans to work with water supply managers to make some additional refinements to the existing regulatory conditions scenario to reflect recent changes to existing water supply operations that will be needed to assess possible voluntary agreements, including incorporation of recent changes to the Projects' Coordinated Operations Agreement and other changes. The State Water Board will also work closely with water project operators and other appropriate parties to develop accurate representations of possible changes to the Bay-Delta Plan, including possible voluntary agreements.

## 13. Where can I find more information regarding SacWAM?

For detailed technical information, please see the SacWAM documentation, available for download at:

[https://www.waterboards.ca.gov/waterrights/water\\_issues/programs/bay\\_delta/sacwam/sacwam\\_documentation.html](https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/sacwam/sacwam_documentation.html). If you have questions regarding SacWAM, you can contact Scott Ligare at [Scott.Ligare@waterboards.ca.gov](mailto:Scott.Ligare@waterboards.ca.gov) or Matt Holland at [Matthew.Holland@waterboards.ca.gov](mailto:Matthew.Holland@waterboards.ca.gov).

