



Frequently Asked Questions

Sacramento Water Allocation Model (SacWAM)

What is SacWAM?

SacWAM is the State Water Resources Control Board's (State Water Board or Board) model to represent hydrology (flows, groundwater, reservoir operations, and regulatory requirements) 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 all the major water supply, diversions, 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 represents agricultural, refuge, and urban demands for the State Water Project and Central Valley Project (collectively Projects) with additional refinements to non-Project water districts in the Sacramento/Delta. 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. Since 2017, the model has been continually refined with feedback from stakeholders and consultants. The current version of the model (SacWAM version 2023.06.12) includes additional refinements to those earlier versions of the model.

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

SacWAM was developed on Stockholm Environment Institute's (SEI) 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.

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 the Department of Water Resources 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.

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.

What is new in SacWAM version 2023.06.12?

The model released today (SacWAM 2023.06.12) includes refinements to the previous version of the model that was released (SacWAM 2019.11.22). The updates include refinements to upper watershed hydropower operations, inclusion of the 2019 Biological Opinions and 2020 Incidental Take Permit, and additional functionality to represent the proposed voluntary agreements (VAs). 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.

Why is SacWAM version 2023.06.12 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 proposed VAs.

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. SacWAM results become inputs to several models used to evaluate environmental impacts and benefits (DSM2, HEC-5Q, models of instream and floodplain habitat, etc.).

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 timestep is the most efficient and accurate way to model the watershed. Although events on submonthly (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.

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 monthly time scales will allow for representation of features of hydrology and operations for planning purposes.

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 received the Hugo B. Fischer Award from the California Water and Environmental Modeling Forum in 2019 for their work on SacWAM and their contributions to modeling California water systems over the past two decades.

Where can I find more information regarding SacWAM?

For detailed technical information, please see the SacWAM documentation available on the [SacWAM webpage](#). If you have questions regarding SacWAM, contact staff at Bay-Delta@waterboards.ca.gov.

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