MANAGEMENT STRATEGY · ENVIRONMENT · FARMS AND GROUNDWATER

Functional environmental flows with reduced crop acreage

A management strategy in the COEQWAL scenario library

> This strategy combines functional minimum flow requirements at 17 locations throughout the Central Valley — tributaries plus the Delta — with reduced irrigated acreage across the Central Valley aimed at groundwater sustainability. These two actions are paired with the goal of moderating impacts to reservoir storage from the high water demands of the flow requirements with a lower overall agricultural demand.

This brief describes *"functional environmental flows with reduced crop acreage"*, one of 28 management strategies in the COEQWAL scenario library. Each strategy is simulated once under each of five hydroclimates; the references note at the end of this brief lists the model runs.

A variant of this strategy, Functional environmental flows with reduced crop acreage and reintroduction (https://coeqwal.org/documents/Strategy_Documentation/strategy_brief_functional-environmental-flows-with-reduced-crop-acreage-and-reintroduction.html), adds one action that is not a water management action: reintroduction of winter-run Chinook salmon to cold-water habitat upstream of Shasta Dam. The two strategies share the same CalSim 3 simulation; modeled results differ only for the winter-run salmon key outcome.

§2 WHAT THIS STRATEGY CHANGES

The strategy combines two changes. The first is the functional-flows requirement set: minimum flow requirements at 17 locations throughout the Central Valley, developed by the COEQWAL eflows team from natural-flow estimates, with selected seasonal components added and scaled according to expected water

availability. In this combination the requirement set includes the downstream main stems and Delta outflow, not only the tributaries. The second change is the use of a reduced irrigated agriculture footprint that reduces irrigation demand across the Central Valley. Reductions in irrigated agriculture were developed for the Reduced Crop Acreage scenarios to stabilize groundwater levels and are used without additional modifications here.

The second is a reduction in irrigated acreage across the Central Valley, set according to historical groundwater decline in each demand unit, with reduced acreage replaced by an unirrigated "native vegetation" land-cover type. Groundwater pumping is limited indirectly, through the reduced demand.

The goal of pairing the flow and groundwater management actions is to offset the high water demands of the functional-flows requirements with a lower overall system demand, to mitigate extreme reservoir drawdown.

§3 THE CONFIGURATION IN DETAIL

The table compares the eight operational fields that define this strategy against current operations — the strategy that represents existing operational rules, recent (2020) land use, and TUCPs. Rows that match current operations are shown in light gray; rows that differ are highlighted.

ASPECT	CURRENT OPERATIONS	THIS STRATEGY
TUCP actions	Active	Active
SGMA actions	None	Reduce irrigated acreage for the entire Central Valley
Land use	2020 LandIQ	2020 LandIQ with reduced agricultural acreage in selected areas across the Central Valley
Delta regulations	Standard	Standard
BiOps	2019 / 2020 ITP	2019 / 2020 ITP
Infrastructure	Standard	Standard
Flows	Standard	Functional flow requirements at 17 locations (tributaries plus Delta)
Allocation / priorities	Standard	Standard

§4 LINEAGE AND SOURCE

This configuration was created by the COEQWAL team by combining the functional-flows study with the reduced-acreage land use of the Central Valley groundwater strategy. It is built on the COEQWAL Current Operations scenario using DWR's adjusted historical hydrology. The CalSim model files for this strategy are referenced by the run IDs in the references note at the end of this brief.

§5 RELATED STRATEGIES

RELATED STRATEGIES — ENVIRONMENT

No flow requirements. Current operations without minimum flow requirements on Central Valley rivers.

Winter-run refuge flows. Sacramento River flow requirements and Shasta cold-water storage protection to support Sacramento River winter-run Chinook salmon life-cycle needs.

Winter-run refuge flows with reduced crop acreage. The winter-run refuge flows combined with reduced irrigated acreage across the Central Valley, reflecting groundwater management under SGMA.

Increase Delta outflows (65% unimpaired flow target). USBR Alternative 3 for the Long-Term Operation of the Central Valley Project, with Delta outflow requirements set to roughly 65% of unimpaired volume.

Increase Delta outflows (55% unimpaired flow target). USBR Alternative 3 for the Long-Term Operation of the Central Valley Project, with Delta outflow requirements set to roughly 55% of unimpaired volume.

Functional environmental flows. Functional minimum flow requirements on tributaries to the Sacramento and San Joaquin rivers, derived from natural-flow estimates.

RELATED STRATEGIES — FARMS AND GROUNDWATER

Groundwater pumping limits in the San Joaquin Valley. Monthly groundwater pumping limits for San Joaquin Valley demand units, set at levels estimated to minimize long-term groundwater storage decline.

Groundwater pumping limits via reduced crop acreage in the San Joaquin Valley. Reduced irrigated crop acreage in the San Joaquin Valley, lowering irrigation demands and indirectly limiting groundwater pumping.

Groundwater pumping limits in the Central Valley. Monthly groundwater pumping limits for demand units across the Central Valley, set at levels estimated to minimize long-term groundwater storage decline.

Groundwater pumping limits via reduced crop acreage in the Central Valley. Reduced irrigated crop acreage across the Central Valley, lowering irrigation demands and indirectly limiting groundwater pumping.

Winter-run refuge flows with reduced crop acreage. The winter-run refuge flows combined with reduced irrigated acreage across the Central Valley, reflecting groundwater management under SGMA.

§6 WHAT THIS DOESN'T SAY

This brief describes a scenario representation in CalSim, not a real-world policy proposal or implementation plan. The strategy as modeled may not capture all details necessary to support direct translation to actual operations. The brief does not predict, evaluate, or recommend any outcome — it describes what the scenario changes about CalSim's representation of the system. For what the model produces under this strategy, see the result briefs referenced in §7.

§7 SEE RESULTS FOR THIS STRATEGY

To see modeled outcomes under this strategy across all nine key outcomes at the reference hydroclimate, see the *Rivers, salmon and the Delta ecosystem* theme brief.

To see outcomes at a specific location of interest, see the relevant LOI briefs — particularly those for locations on the Sacramento and San Joaquin tributaries and for groundwater basins in the Central Valley.

Compare this strategy in the data explorer → (https://coeqwal.org/explore?strategy=s0032)

REFERENCES — MODEL RUNS

Each strategy is simulated once under each of five hydroclimates. The table lists the model run behind this strategy and the current-operations run it is compared against, for each hydroclimate, so any reader can trace this page to specific CalSim runs.

HYDROCLIMATE	THIS STRATEGY	CURRENT OPERATIONS
Historical hydroclimate (adjusted)	s0032	s0020
Moderate climate stress (EC-Earth3-Veg)	s0145	s0134
Moderate-high climate stress (cc50)	s0073	s0047
High climate stress (cc95)	s0093	s0056
Extreme climate stress (TaiESM1)	s0119	s0108