MANAGEMENT STRATEGY · ENVIRONMENT · FARMS AND GROUNDWATER

Winter-run refuge flows with reduced crop acreage and reintroduction

A management strategy in the COEQWAL scenario library

> This strategy combines Central Valley-wide reductions in irrigated crop acreage with a set of flows on the Sacramento River meant to improve winter run chinook habitat conditions. The flow requirements target flows at two locations on the Sacramento River but are scaled back or deactivated to balance coldwater storage conditions in Shasta Reservoir. The aim in combining these two actions was to explore the benefit of offsetting reservoir releases the winter-run refuge flows require with a lower overall system demand.

This brief describes *"winter-run refuge flows with reduced crop acreage and reintroduction"*, 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.

Winter-run refuge flows with reduced crop acreage (https://coeqwal.org/documents/Strategy_Documentation/strategy_brief_winter-run-refuge-flows-with-reduced-crop-acreage.html) and reintroduction specifies the same water management actions as Winter-run refuge flows with reduced crop acreage. The two strategies share the same CalSim 3 simulation of the water system — the same model run, not a duplicate. They differ in one action that is not a water management action: reintroduction of winter-run Chinook salmon to cold-water habitat upstream of Shasta Dam. Reintroduction enters the modeling through the winter-run life cycle model, not through CalSim 3, so modeled results differ from Winter-run refuge flows with reduced crop acreage only for the winter-run salmon key outcome. Results for the other eight key outcomes are identical by construction.

§2 WHAT THIS STRATEGY CHANGES

The strategy combines two changes. The first is the reduction in irrigated acreage across the Central Valley. This reduction is the same as that used in the "Groundwater pumping limits via reduced crop acreage in the Central Valley" scenario. The second is a set of winter-run refuge flow actions that attempt to balance the benefits of elevated late winter and early spring flows on the Sacramento River for out-migration with the benefits of conserved coldwater storage in Shasta Reservoir for summer habitat. Flow targets are selected from a set of lookup options at two locations on the Sacramento River using a projection of Shasta storage each month January through March. If projected Shasta storage falls below certain thresholds, some reductions in CVP allocations are made while the flows are reduced or eliminated altogether. Due to the uncertainty of water supply within the CalSim3 simulation, these projected storage and flow adjustments may not always guarantee an optimal balance between the use of flows in the outmigration season and the conservation of storage for coldwater management season. An additional flow target is set on the San Joaquin River to enhance conditions on that system. There are no additional actions to adjust for storage impacts in the San Joaquin region.

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 aim in combining reduced acreage with the winter-run refuge flows was to explore the feasibility of offsetting the high reservoir-release demands of the winter-run refuge flows with a lower overall system demand.

§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	Limit irrigated acreage for entire Central Valley
Land use	2020 LandIQ	2020 LandIQ with reduced ag land use in select WBAs/DUs across the Central Valley to mitigate groundwater decline
Delta regulations	Standard	Standard
BiOps	2019 / 2020 ITP	2019 / 2020 ITP
Infrastructure	Standard	Standard
Flows	Standard	Functional flows requirements at 17 locations (tribs+Delta)
Allocation / priorities	Standard	Standard

§4 LINEAGE AND SOURCE

This scenario was created by the COEQWAL team by combining the winter-run refuge flows scenario with the reduced-acreage land use of the Central Valley groundwater scenario. The scenario uses DWR's adjusted historical hydrology and does not modify operating rules beyond the flow and demand adjustments. 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.

Functional environmental flows with reduced crop acreage. Functional flow requirements combined with reduced irrigated acreage across the Central Valley, reflecting groundwater management under SGMA.

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.

Functional environmental flows with reduced crop acreage. Functional flow requirements combined with reduced irrigated acreage across the Central Valley, reflecting groundwater management under SGMA.

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 River and for groundwater basins in the Central Valley.

Compare this strategy in the data explorer → (https://coeqwal.org/explore?strategy=s0033-R)

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. The identifier this brief carries for each hydroclimate ends in -R, which is the web platform's scenario identity for this strategy; the CalSim 3 run underneath it is the run for Winter-run refuge flows with reduced crop acreage, the same identifier without the suffix, s0033 under the historical hydroclimate.

HYDROCLIMATE	THIS STRATEGY	CURRENT OPERATIONS
Historical hydroclimate (adjusted)	s0033-R	s0020
Moderate climate stress (EC-Earth3-Veg)	s0146-R	s0134
Moderate-high climate stress (cc50)	s0074-R	s0047
High climate stress (cc95)	s0094-R	s0056
Extreme climate stress (TaiESM1)	s0120-R	s0108