

MANAGEMENT STRATEGY · FARMS AND GROUNDWATER

Groundwater pumping limits in the Central Valley

A management strategy in the COEQWAL scenario library

This strategy adds limits on groundwater pumping for demand units across the Central Valley, set at levels estimated to minimize long-term groundwater storage decline. Everything else matches current operations.

This brief describes *a scenario that directly limits groundwater pumping in the Central Valley*, 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.

§2 WHAT THIS STRATEGY CHANGES

The strategy assigns limits on groundwater pumping in demand units across the Central Valley portion of the CalSim3 domain. The limits are spatially variable and are set according to estimates of the pumping reduction needed to minimize groundwater storage decline over the full 100-year simulation period under a baseline historical simulation. The reductions are implemented via adjusted maximum pumping limits set in lookup tables referenced in the CalSim3 model code. The reductions apply as a fraction of applied water demand for each month and demand unit.

When surface deliveries and the pumping limit together fall short of a demand unit's applied water demand, the remainder appears as a shortage for that unit in that timestep. For example, if a unit's pumping limit is 60% of an applied water

demand of 10 TAF, and surface-water deliveries total 3 TAF, groundwater pumping can supply at most 6 TAF and the remaining 1 TAF is recorded as a shortage.

An underlying assumption for CalSim3 simulations is that all irrigation demands are met in every timestep. This assumption has implications for the direct use of the soil-water budget information generated by the CalSimHydro pre-processing model. Because limiting pumping outside that demand calculation violates the assumption, deep percolation from applied irrigation water is adjusted within the CalSim3 simulation to reflect the shortages the pumping limits create, using empirical relationships between deep percolation and applied water in summer months derived from the Current Operations scenario.

The configuration is meant to mimic, in part, groundwater management actions that may occur under the Sustainable Groundwater Management Act (SGMA). It should not be read as a direct or detailed implementation of that process as it exists now or as it may evolve.

§ 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 groundwater pumping for the entire Central Valley
Land use	2020 LandIQ	2020 LandIQ
Delta regulations	Standard	Standard
BiOps	2019 / 2020 ITP	2019 / 2020 ITP
Infrastructure	Standard	Standard
Flows	Standard	Standard
Allocation / priorities	Standard	Standard

§ 4 LINEAGE AND SOURCE

This strategy was developed by the COEQWAL team using the COEQWAL Current Operations scenario as the base. The change is the addition of groundwater pumping limits for Central Valley demand units, with associated adjustments to weighting, shortage terms, and irrigation water-budget corrections. 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 — 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 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 *Farms and groundwater* theme brief.

To see outcomes at a specific location of interest, see the relevant LOI briefs — particularly those for groundwater and agricultural locations across the Central Valley.

Compare this strategy in the data explorer → (<https://coeqwal.org/explore?strategy=s0027>)

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)	s0027	s0020
Moderate climate stress (EC-Earth3-Veg)	s0140	s0134
Moderate-high climate stress (cc50)	s0062	s0047
High climate stress (cc95)	s0063	s0056
Extreme climate stress (TaiESM1)	s0114	s0108

COEQWAL · Collaboratory for Equity in Water Allocation

RunID s0027_CVgwLimit_2020LU_wTUCP_v0.2 Web platform ID 2.3 Brief v0.1 (generated draft)

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