Appendix O

Alternatives Evaluation for Chronic Lowering of Groundwater Levels Minimum Threshold Approaches

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California Code of Regulations Title 23 Division 2 Chapter 1.5, Subchapter 2 Article 5 sections 354.26 and 354.28 identify that minimum thresholds (MTs) are interconnected with undesirable results (URs).

> ***§ 354.26***
> *(C) The Agency may need to **evaluate multiple minimum thresholds to determine whether an undesirable result is occurring** in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.*

> ***§ 354.28***
> *(A) Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site […] The numeric value used to define minimum thresholds shall **represent a point in the basin that, if exceeded, may cause undesirable results** as described in Section 354.26.*

Process: Calculate the numeric groundwater level MT value at each representative monitoring well through an equation that quantifies each of the required MT elements, then verify the MT value will not result in undesirable results through a well impacts and "depletion of supply" analysis.

Approach:

- Groundwater Sustainability Agencies (GSAs) and the Technical Working Group (TWG) conceptualized numerous potential MT methods including methods adopted in neighboring, approved subbasins.
- GSAs defined URs as 15 dewatered drinking water wells per year (cumulative max of 255 wells by 2040, assuming the maximum 15 wells go dry each year, which is unlikely).
- Based on technical analyses including well impacts, gradients, margin of operational flexibility, etc. the TWG assessed these potential MT methods.
- Tested each MT method against well impacts / UR definition / other regulatory considerations.
- Refined MT methods, as applicable, to address GSA concerns, regionalize, and avoid URs.

- Re-tested methods against well impacts / UR definition / other regulatory considerations to select revised MT method.

Table 1 below summarizes the various alternative MT methods screened throughout this iterative Revised Plan development process and the GSAs determination on the MT method.

Table 1. Alternative Methods Assessed for Minimum Threshold Calculation

Method	Brief Description	GSAs Determination
Simplified SOKR	Lower of either Fall 2015 minus 25% of the range or Fall 2015 minus regional trend extended to 2030	Well impacts within URs definition, provides operational flexibility, results in reasonable gradients and "glide path" to allow for corrective measures.
HM Well Screen	Water levels at 1/3 of the screen interval of the shallowest well within the same PLSS section as the RMW	Well impacts within URs definition, but extreme variation in results (more than 100 ft difference at adjacent RMWs, some MTs >200 ft above 2015 water levels, some >800 ft below 2015 water levels); unreasonable gradients; and insufficient operational flexibility (some MTs >100 ft above MOs).
SWSD Hybrid	MO minus 50% of the range; where MO is calculated by the recent drought low with a variable length trend continuation based on percent projected overdraft reduction	Well impacts exceed UR definition and result in unreasonable gradients.
"Kings" Method	MO minus 1.25 times difference between 2015-2012 water levels; where MO is calculated by a trend continuation based on percent projected overdraft reduction	Insufficient historical data available to sufficiently calculate MTs across all RMWs.
Pre-SGMA Water Level	MT selected based on a certain pre-SGMA year (e.g., 2014)	Insufficient historical data available to sufficiently calculate MTs across all RMWs.

Method	Brief Description	GSAs Determination
SOKR Algorithm	Lower of either historical low minus 25% of the range, or recent low minus the lower of 25% range or a 10-yr trend continuation	Provides operational flexibility, reasonable gradients, but well impacts exceed UR definition.
Recent Drought Low	Lowest Spring/Fall between 2013-2016 or 2021-2022	Well impacts within proposed URs definition, but results in limited operational flexibility and insufficient “glide path” to allow for corrective measures.
Recent Drought Low with Trend Continuation	Lowest Spring/Fall between 2013-2016 or 2021-2022 with 5-yr trend continuation	Well impacts within proposed URs definition, but results in limited operational flexibility and insufficient “glide path” to allow for corrective measures.
W&C Method	1994-2014 groundwater low minus 20% of the range	Variable results and insufficient historical data available to sufficiently calculate MTs across all RMWs.
Modified Kings	Depth ranging between 25-ft and 100-ft below MO; where MO is calculated by a trend continuation based on percent projected overdraft reduction	Variable results and insufficient historical data available to sufficiently calculate MTs across all RMWs.
2022 GSPs	Various methodologies	Inconsistent methodologies and well impacts exceed UR definition.