SUSTAINABLE MANAGEMENT CRITERIA CONCEPTS AND APPLICATIONS IN OTHER SUBBASINS

TECHNICAL ADVISORY COMMITTEE (TAC) MEETING

NOVEMBER 13, 2019

PRESENTATION OUTLINE

- Review of Sustainable Management Criteria Terms
  - Sustainability Indicator
  - Minimum Thresholds and Measurable Objectives
- Examples of Sustainable Management Criteria in Other Subbasins GSPs:
  - Delta-Mendota Subbasin
  - Eastern San Joaquin Subbasin
  - Kern County Subbasin
- Considerations for Modesto Subbasin

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MODESTO SUSTAINABILITY INDICATORS

Chronic Lowering of Water Levels

Reduction of Groundwater in Storage

Degradation of Water Quality caused by management actions

Land subsidence affecting land use

Depletion of Interconnected Surface Water affecting beneficial use

If a sustainability indicator is determined to be significant and unreasonable , then it is an Undesirable Result

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UNDESIRABLE RESULTS CONSIDERATIONS AND DEFINITIONS

Chronic Lowering of Water Levels

- considers beneficial uses of wells
- depth to water that affects the beneficial use of and access to groundwater
- affects other sustainability indicators (e.g., storage, subsidence)

Reduction of Groundwater in Storage

- Relates to groundwater depletion
- Also relates to a balanced water budget (elimination of overdraft)

Degradation of Water Quality *caused by management actions*

- No mandate or authority to duplicate other regulatory programs
- Consider migration of contaminant plumes, if any
- Efficiencies in incorporating other monitoring data (e.g., ILRP, DDW, RWQCB)

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EXAMPLE
DEFINITIONS OF UNDESIRABLE RESULTS

Land subsidence

- Impacts to land use
- Impacts to critical infrastructure

Depletion of Interconnected Surface Water affecting beneficial use

- Consider lowering of water levels that would induce recharge
- Identification and consideration of groundwater dependent ecosystems (GDEs)
- DWR/TNC guidance and mapping of Natural Communities Commonly Associated with Groundwater (NCCAG)

Analysis of Each Sustainability Indicator in the GSP

- Were undesirable results occurring as of January 1, 2015?
- Are undesirable results occurring now?

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METRICS FOR MONITORING UNDESIRABLE RESULTS

Water levels

Volume, % of GW in storage, water budgets, water levels as a proxy

MCLs, WQOs, if related to depth can use water levels as a proxy

Rate of Subsidence, water levels as a proxy

Rate of surface water depletion, possible water levels as a proxy

Emphasizes the importance of the water level network

Use metrics to set the Minimum Thresholds

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SUSTAINABLE MANAGEMENT CRITERIA

- Minimum Thresholds (MTs)
  - Numerical value that, if exceeded, could result in undesirable results
  - Can add qualifiers to the undesirable results (UR) definition, such as numbers/percentage of wells, space, time
  - UR Definition example – If 40% of wells in certain Management Area fall below MTs for 2 consecutive years, then undesirable results are occurring
- Measurable Objectives (MOs)
  - Provides a reasonable margin of operational flexibility
  - Indication that the basin is remaining above the MT and avoiding undesirable results
  - Same metrics as MTs (i.e., water levels, % of storage, rate of subsidence)

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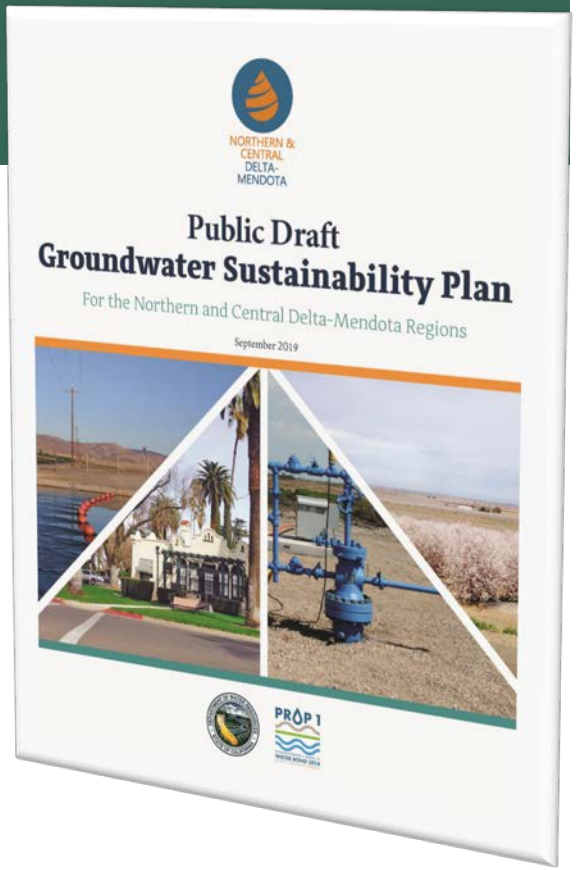
SMC EXAMPLES FROM ADJACENT SUBBASINS
DELTA MENDOTA SUBBASIN
(NORTHERN & CENTRAL GSP REGIONS)



- Sustainability Issues
  - Historical and current inelastic land subsidence impacts on the Delta-Mendota Canal, the California Aqueduct, and other local canals reducing freeboard and capacity
  - Overdraft conditions for historical and projected water budgets – develop projects and management actions to eliminate deficits
  - Elevated TDS, nitrate, and boron locally; water quality issues primarily "non-point sources or naturally-occurring constituents

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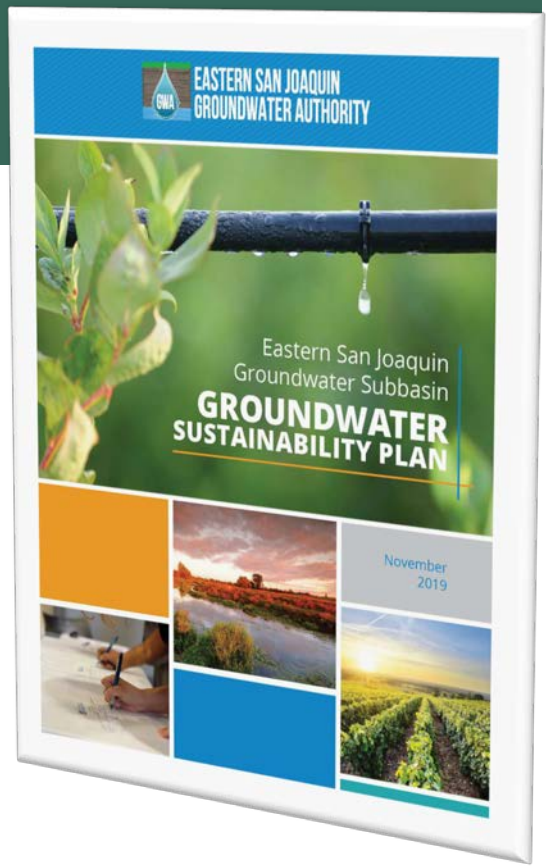
SMC EXAMPLES FROM ADJACENT SUBBASINS EASTERN SAN JOAQUIN SUBBASIN



- Sustainability Issues
  - Groundwater elevation declines; rate of decline reduced over the last two decades – Projected overdraft 78,000 AFY
  - Salinity contamination at depth in western Subbasin
  - Small southwestern area of potential land subsidence where pumping occurs beneath the Corcoran Clay
  - Rivers hydraulically connected to groundwater; groundwater levels maintained to protect against significant and unreasonable stream depletion

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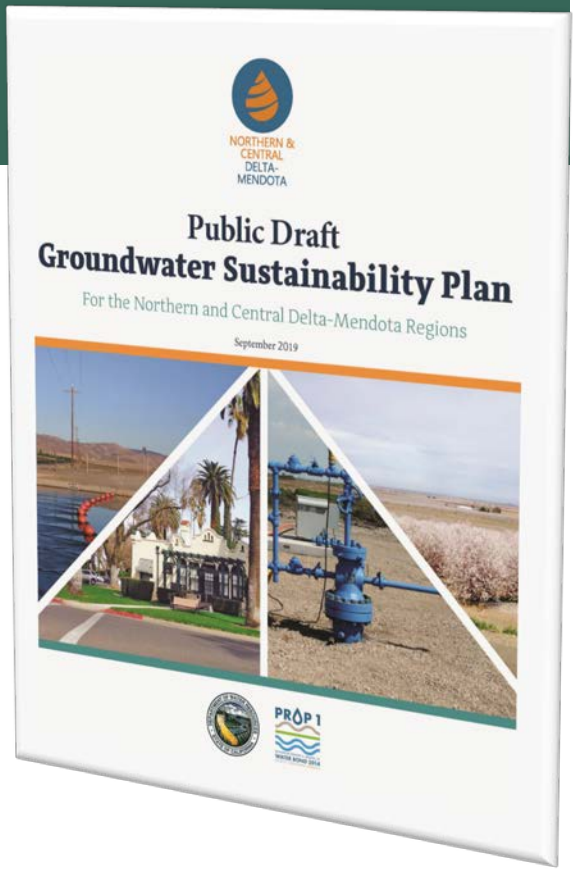

Chronic Lowering of Water Levels

- Undesirable results occur when significant and unreasonable change in water levels impacts beneficial users of groundwater
  - Dewatering of shallow wells, higher pumping costs, need to modify wells for groundwater access
- MTs
  - Historical low water level for Upper Aquifer
  - 95% of historical low water level for Lower Aquifer

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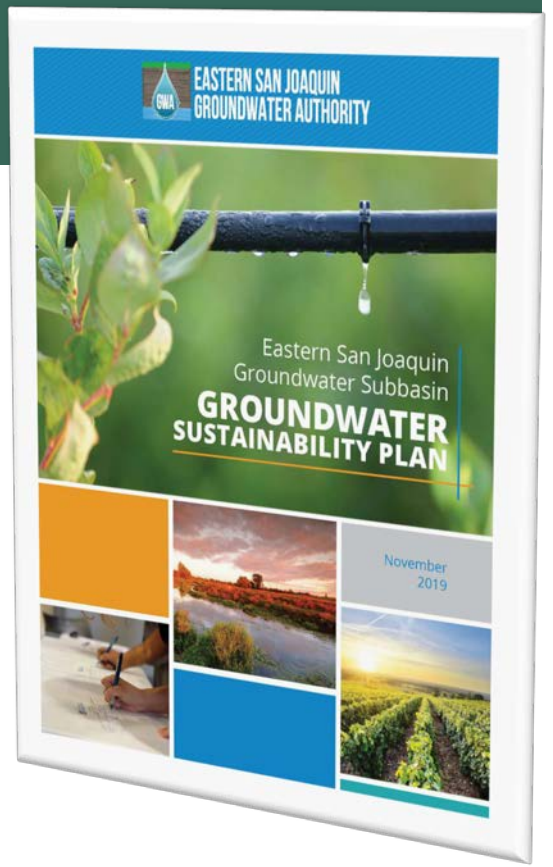

Chronic Lowering of Water Levels

- Considers historical drought levels and domestic well depths
- MTs – shallower of:
  - historical drought low (1992 or 2015-2016) with a buffer of the historical fluctuation, or
  - 10th percentile of domestic well depth (protects 90% of domestic wells

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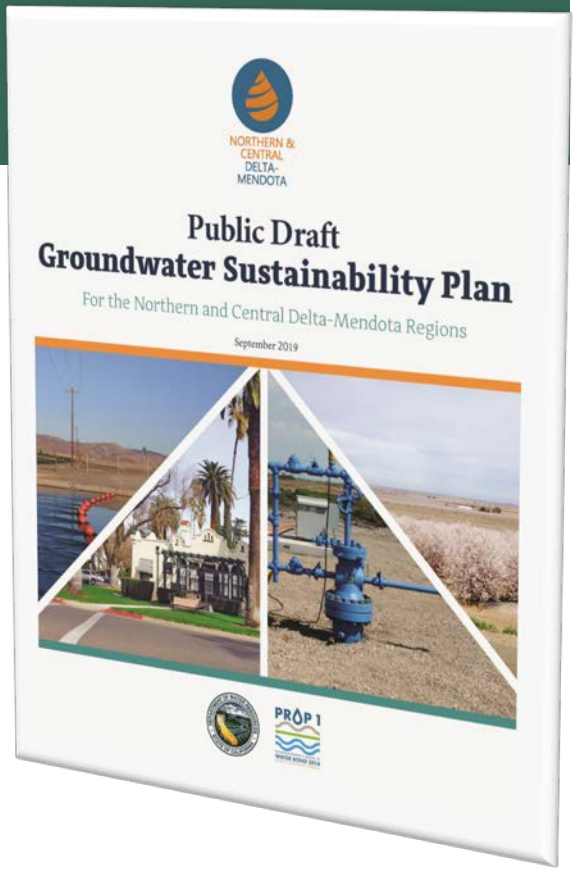

Reduction of Groundwater in Storage

- Undesirable results occur when significant and unreasonable decrease in storage impacts beneficial users of groundwater
  - Similar definition as for chronic lowering of water levels
- MTs
  - Same values as used for Chronic Lowering of Water Levels

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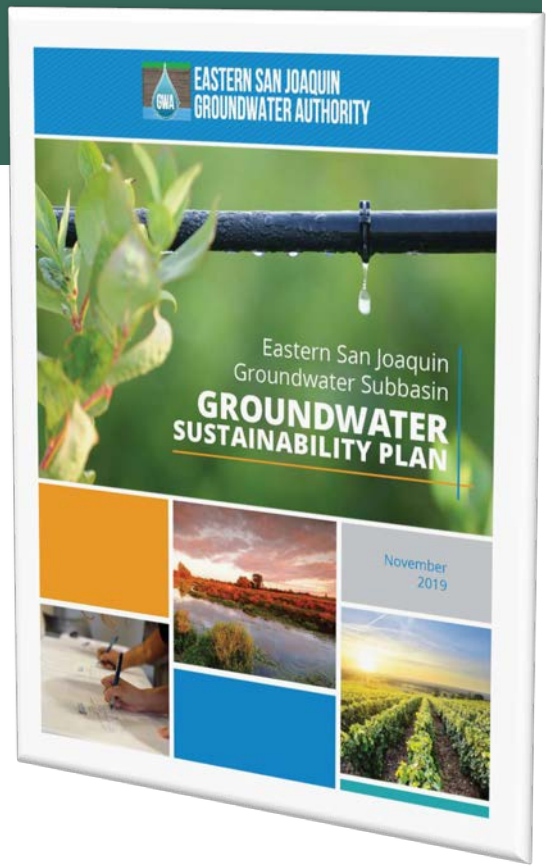

Reduction of Groundwater in Storage

- Undesirable results relate to the ability of wells to economically access groundwater
- Also relates to sustainability of GDEs along streams
- MTs - Same values as used for Chronic Lowering of Water Levels

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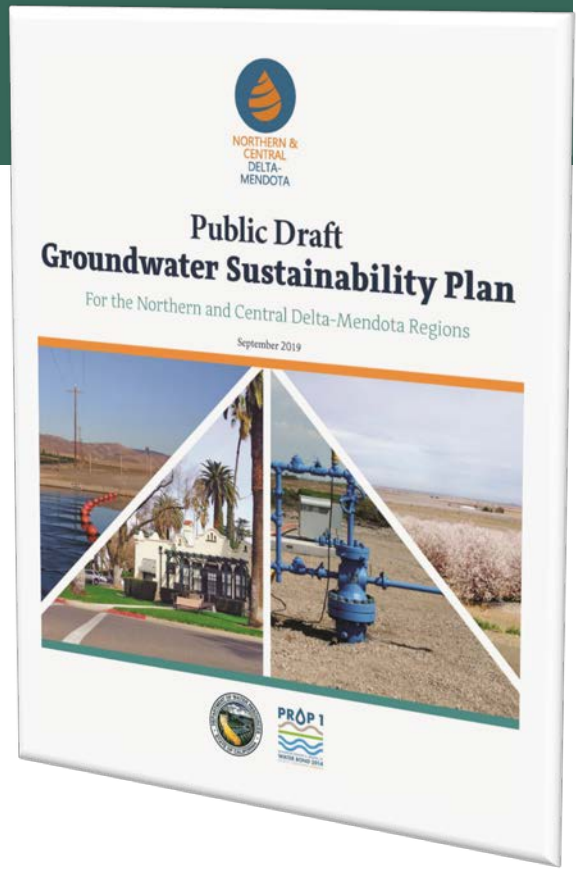

Degraded Groundwater Quality

- Undesirable results occur when quality exceeds MCLs or WQOs for TDS, nitrate, or boron over 3 consecutive sampling events in non-drought years
- Also considers additional degradation where current groundwater quality already exceeds MCLS/WQOs
- Recharge projects compared to assimilative capacity
- MTs – Secondary MCL for TDS, Primary MCL for nitrate, WQO for boron; >20 percent of assimilative capacity for recharge projects

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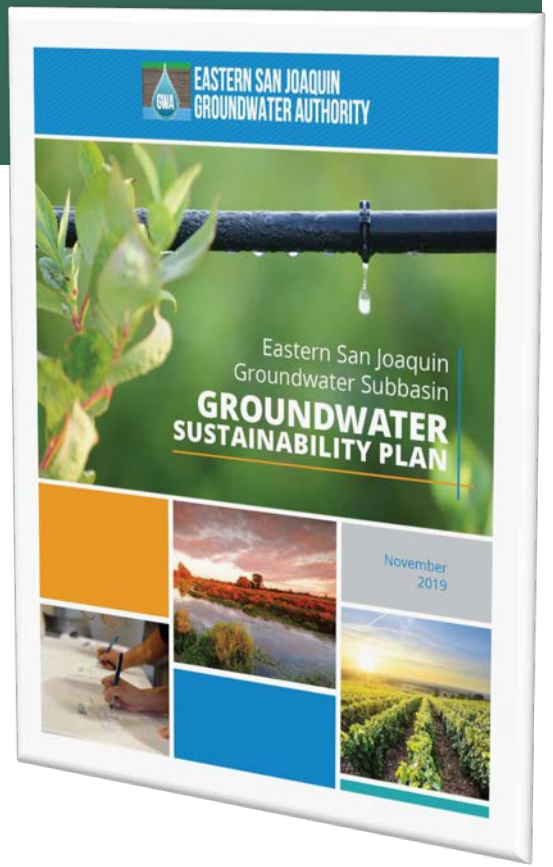

Degraded Groundwater Quality

- Salinity
  - Historical water quality concern
  - use TDS as a proxy
  - MTs – 1,000 mg/L in identified wells
- Arsenic
  - Naturally occurring
  - Not caused by unsustainable groundwater extractions
  - No thresholds set

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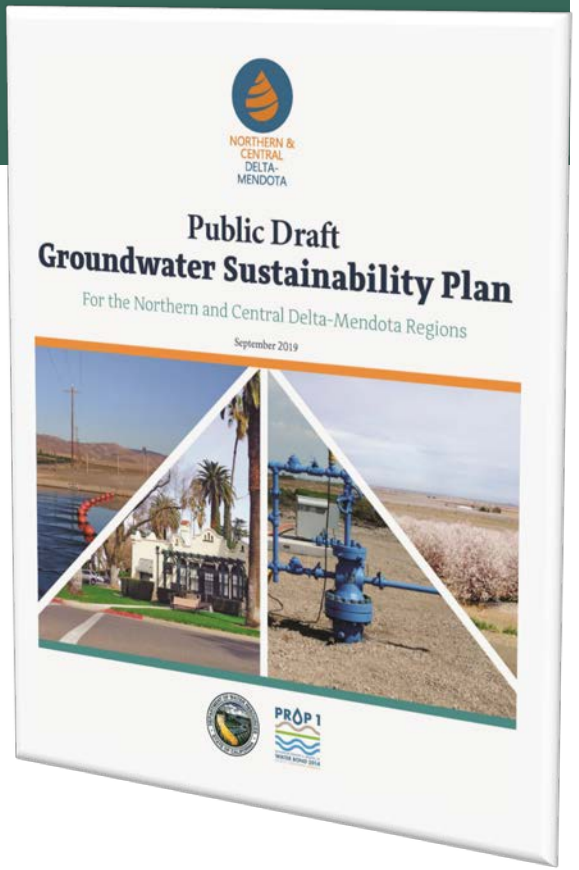

Inelastic Land Subsidence

- Changes in ground surface elevation that cause damage to critical infrastructure such as significant and unreasonable reductions of conveyance capacity, personal property damage, impacts to natural resources, or create conditions that threaten public health and safety
- MTs – different for various management areas (MAs) and related primarily to canal capacity; e.g., 4 feet below current land surface

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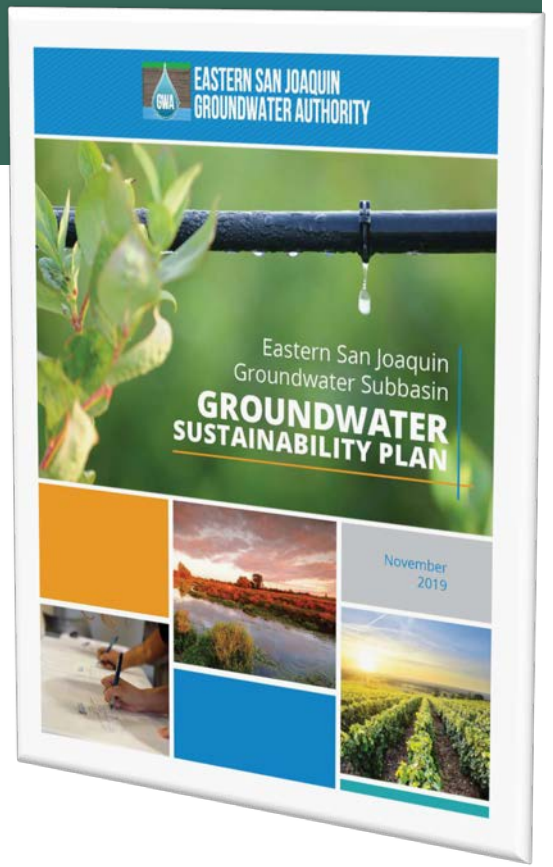

Inelastic Land Subsidence

- Lack of potential for widespread problems
- MTs - Same values as used for Chronic Lowering of Water Levels

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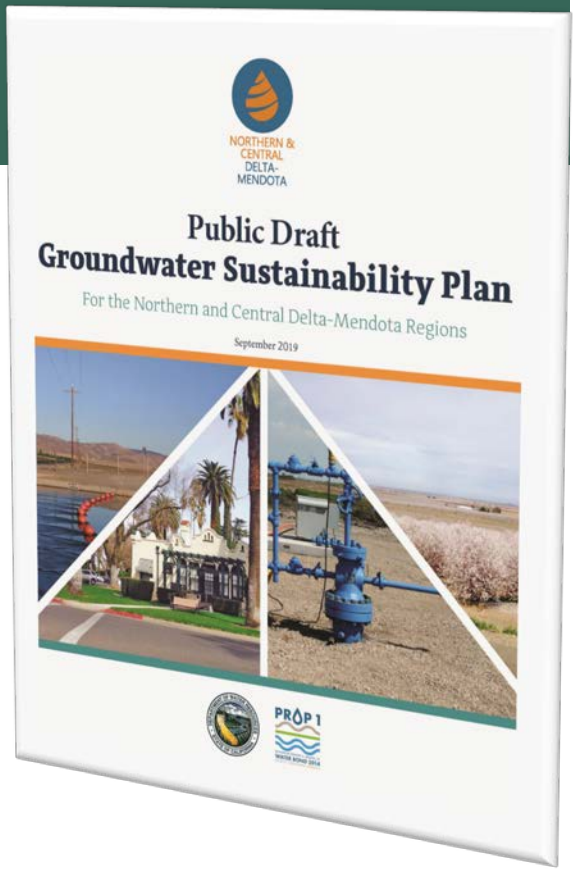

Interconnected Surface Water

- Depletions that have significant and unreasonable impacts on beneficial uses of surface water
- MTs – no numerical metric quantified; collect and analyze data over next 5 years

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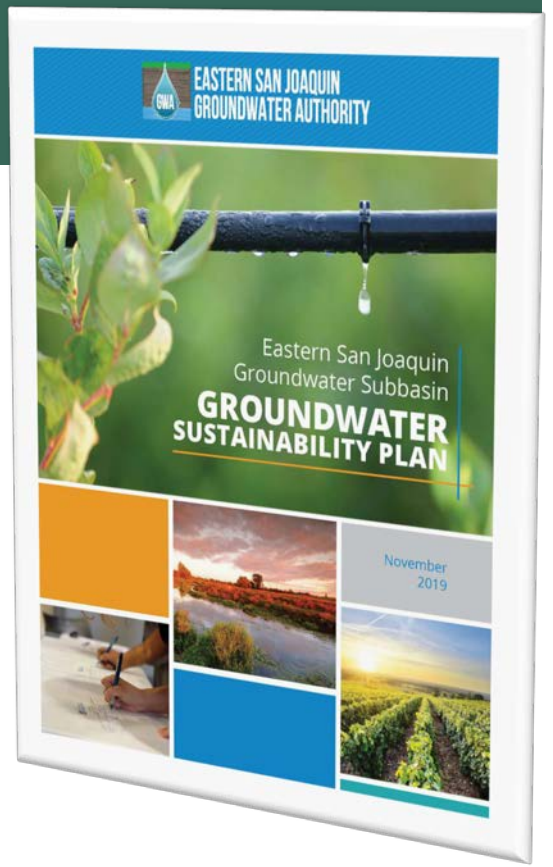

Interconnected Surface Water

- Undesirable results – associated level of additional depletions
- MTs - Same values as used for Chronic Lowering of Water Levels

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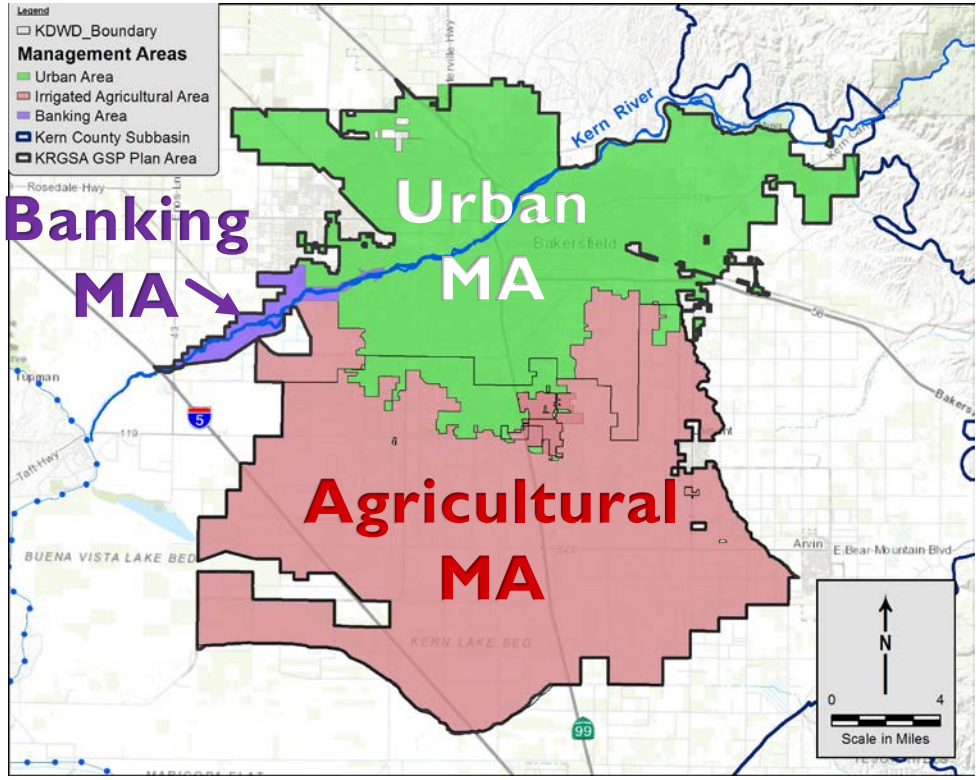
MANAGEMENT AREAS (MA) FOR DIFFERENT SUSTAINABLE MANAGEMENT CRITERIA

Example from Kern River GSA (Kern Co.)

- Management Areas based on land and well use: Urban, Agricultural, Banking
- Allows separate areas of:
  - Municipal well issues (arsenic and low WLs)
  - Land subsidence (in south)
  - Banking recovery wells (require more flexibility in water level fluctuations)



Kern River GSA is approximately the same size as the Modesto Subbasin

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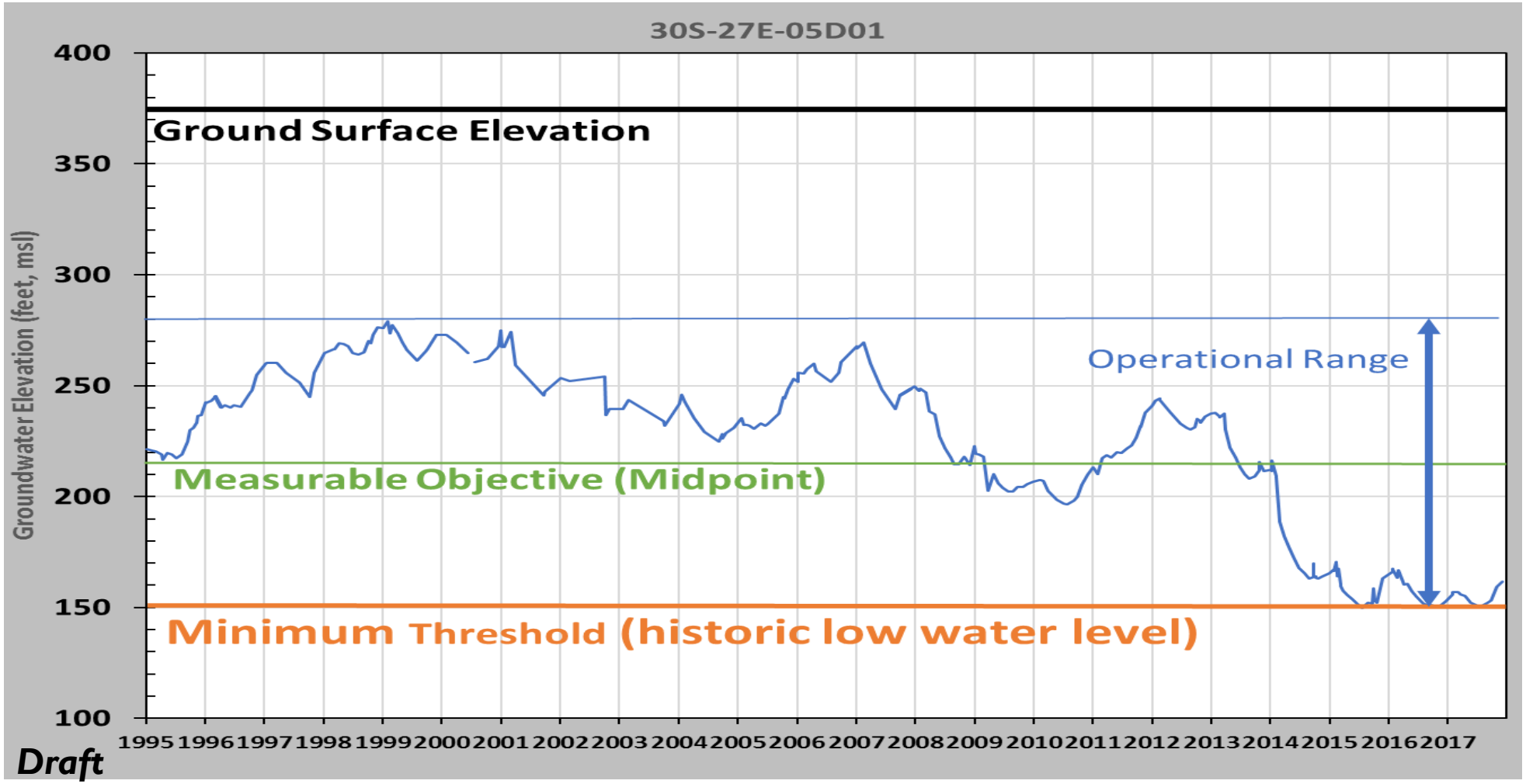
KERN EXAMPLE
ASSIGNMENT OF MT, MO, AND OPERATIONAL RANGE OF STORAGE



Select for each well in the GSP Monitoring Network

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CONSIDERATIONS FOR MODESTO SUBBASIN

Consider beneficial uses of wells; problems during the recent drought? Historic low levels? Areas of dry domestic wells (159 wells – most <100 feet and >50 years old; County assisted with storage tanks/new wells)

Water budgets from model – mitigate any deficits; range of operational storage

Coordinate with other WQ programs; Are WQ issues related to management activities? Incorporate BMPs for nitrate and salts rather than WQOs?

Subsidence not currently a problem; ID areas for future susceptibility? Possible management action/policy for pumping below the Corcoran Clay?

Interconnected Surface Water and GDEs –gaining and losing reaches on rivers from the model

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QUESTIONS?

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