









INTERCONNECTED SURFACE WATER GSP REQUIREMENTS AND GUIDANCE

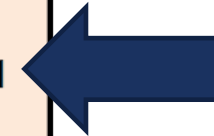
JOINT TECHNICAL ADVISORY COMMITTEES (TACs) MEETING
JANUARY 14, 2021



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SUSTAINABILITY INDICATORS

					
Chronic Lowering of Water Levels	Reduction of Groundwater in Storage	Degraded Water Quality	Seawater Intrusion	Inelastic Land Subsidence	Depletion of Inter-connected Surface Water

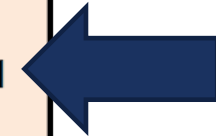


- Previous TAC discussions focused on first 5 sustainability indicators.
- Baseline model (December meeting) used to estimate future impacts.
- Review guidance for depletion of interconnected surface water (today).
- Coordinate with surface water rights holders (ongoing).



INTERCONNECTED SURFACE WATER UNDESIRABLE RESULTS

Chronic Lowering of Water Levels	Reduction of Groundwater in Storage	Degraded Water Quality	Seawater Intrusion	Inelastic Land Subsidence	Depletion of Inter-connected Surface Water









SGMA defines “undesirable results” for this indicator as follows:

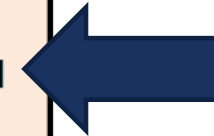
Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

CWC Section §10721(x)(6).



INTERCONNECTED SURFACE WATER DEFINITION

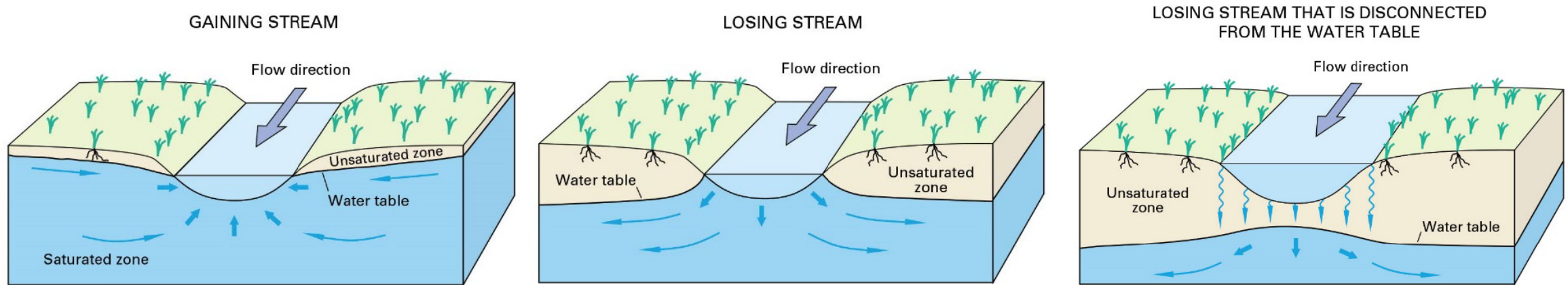
					
Chronic Lowering of Water Levels	Reduction of Groundwater in Storage	Degraded Water Quality	Seawater Intrusion	Inelastic Land Subsidence	Depletion of Inter-connected Surface Water



- Regulatory definition of Interconnected surface water: *surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted.*



INTERCONNECTED SURFACE WATER

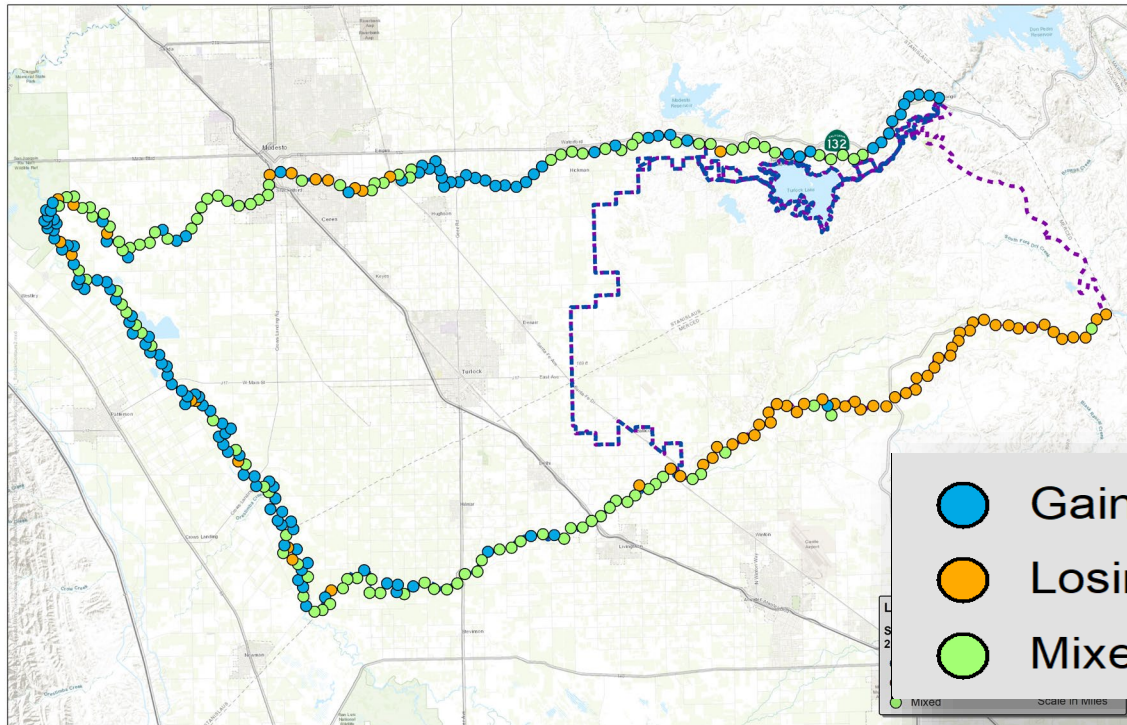


Source: UC Water

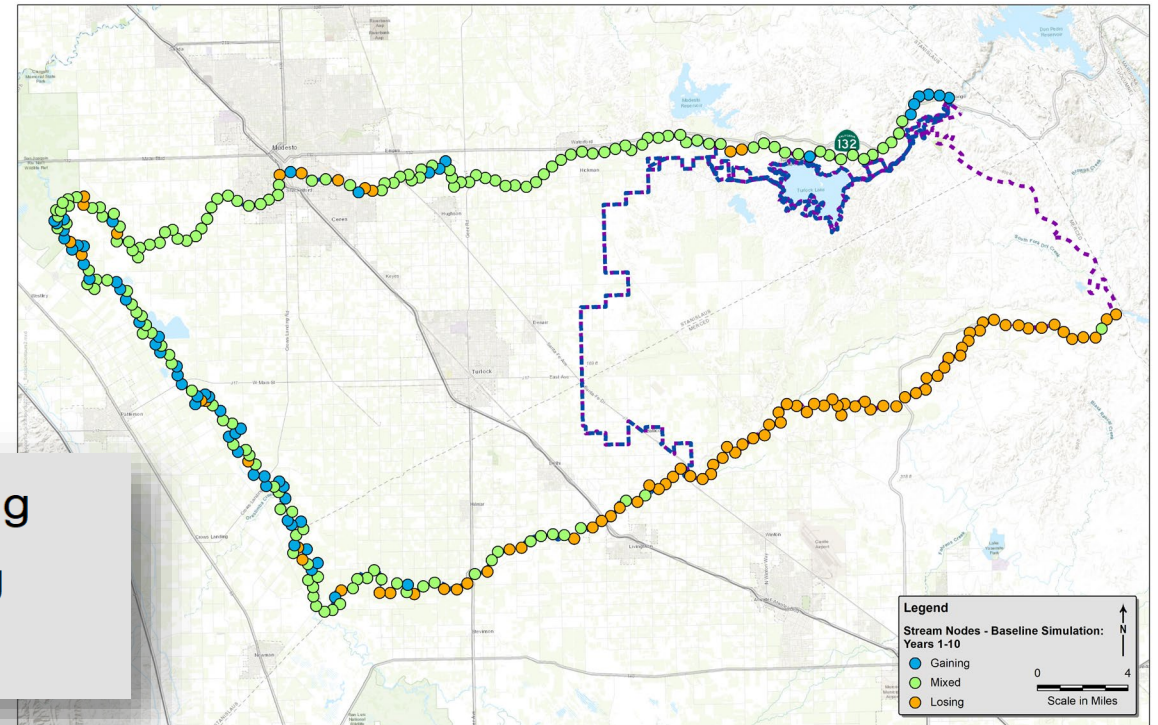
- Historical water budget – Tuolumne and San Joaquin rivers were net gaining streams; Merced was a slightly losing stream, on average.
- Projected future baseline suggests the Tuolumne will transition to a slightly losing stream and the Merced river loss will increase.
- Streamflow depletion provides a benefit to groundwater supply but can adversely impact surface water rights and ecosystems (e.g., GDEs).

STREAM-AQUIFER INTERACTION

Historical Simulation: Years 2006-2015



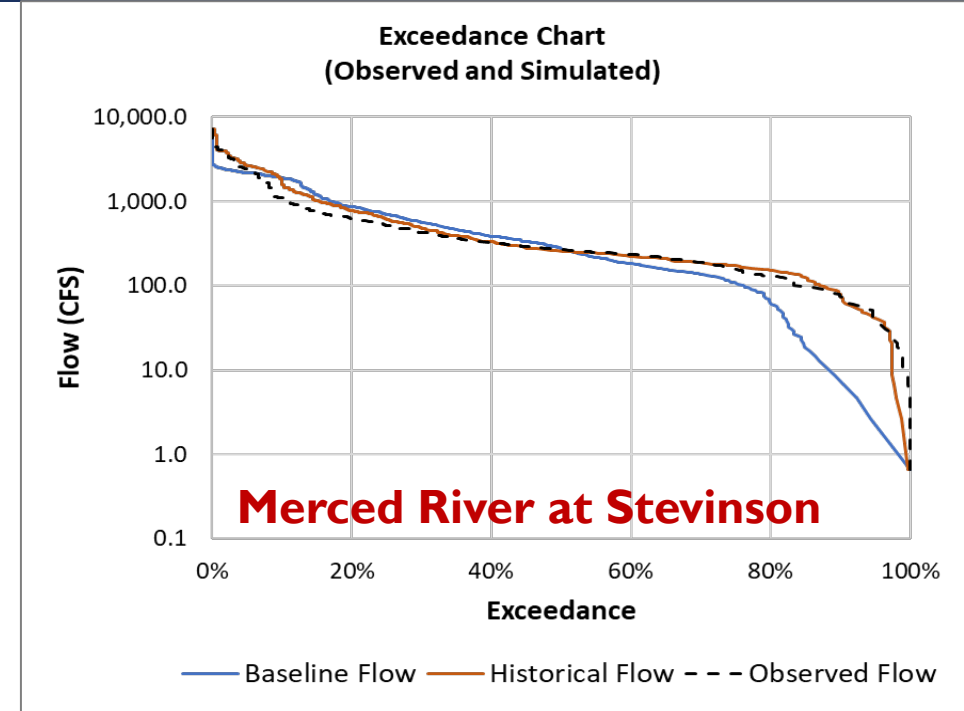
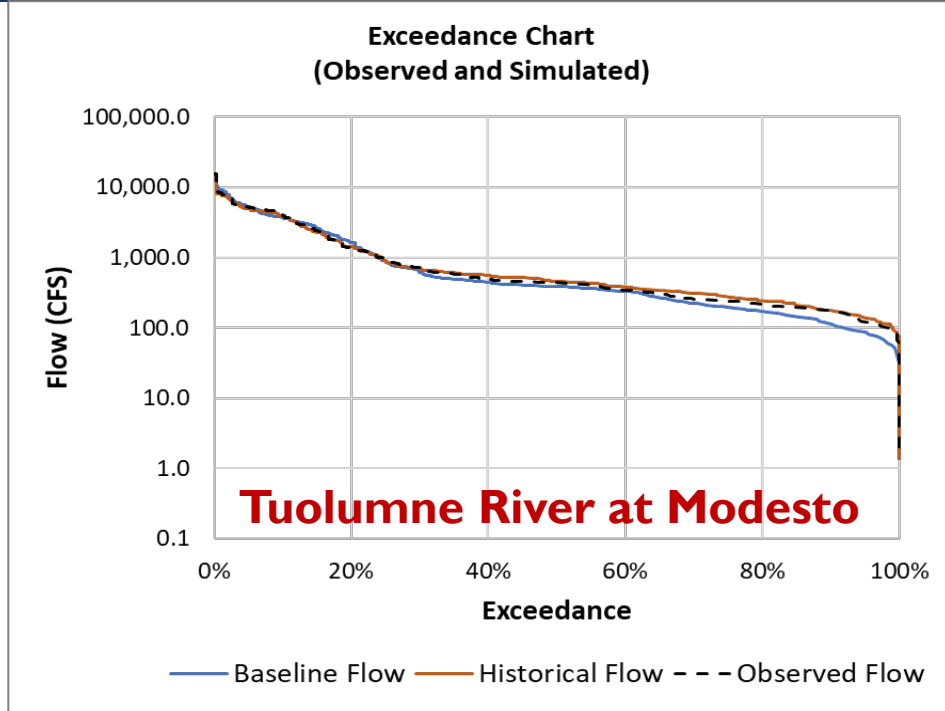
Baseline Simulation: Years 1-10



- Maps show points along each river course, with each point represented as a net gaining, losing, or a mixed condition, over long-term hydrologic conditions.
- Determination of losing/gaining at each point based on integrated SW-GW modeling.



FLOW DURATION CURVES BASELINE CONDITIONS



Modeling indicates that projected baseline flows in the Tuolumne and Merced are lower than historical flows – especially during low-flow conditions – due to groundwater recharge.

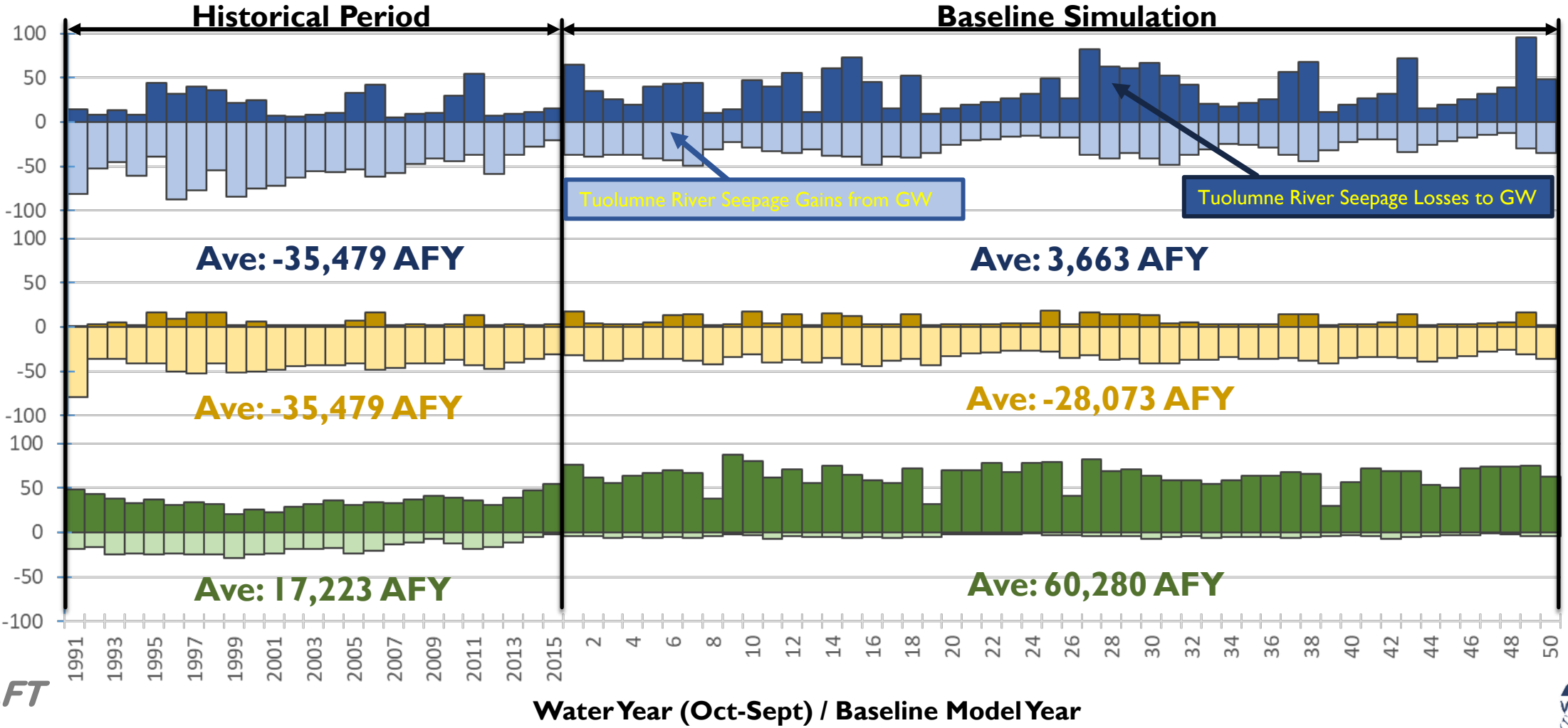


STREAM-AQUIFER INTERACTION TURLOCK SUBBASIN

Tuolumne River

San Joaquin River

Merced River



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Water Year (Oct-Sept) / Baseline Model Year



GROUNDWATER DEPENDENT ECOSYSTEMS (GDEs)

- Developed a multi-faceted approach for preliminary assessment of NCCAG vegetation and wetland areas.
- Focused on initial elimination of polygons unlikely to be GDEs.
 - Areas of consistently deep groundwater, considering fluctuations.
 - Use of TNC online Pulse tool to review changes to vegetative health and evaluate a possible correlation to precipitation.
 - Artificial or human-sourced water supply (i.e., canal spills, man-made ponds, wastewater treatment plant irrigation).
- Volunteer analysis by Ceres Public Works Superintendent, Karen Morgan; OSU graduate work in Natural Resources.

Summary of the “Natural Communities Commonly Associated with Groundwater” Dataset and Online Web Viewer

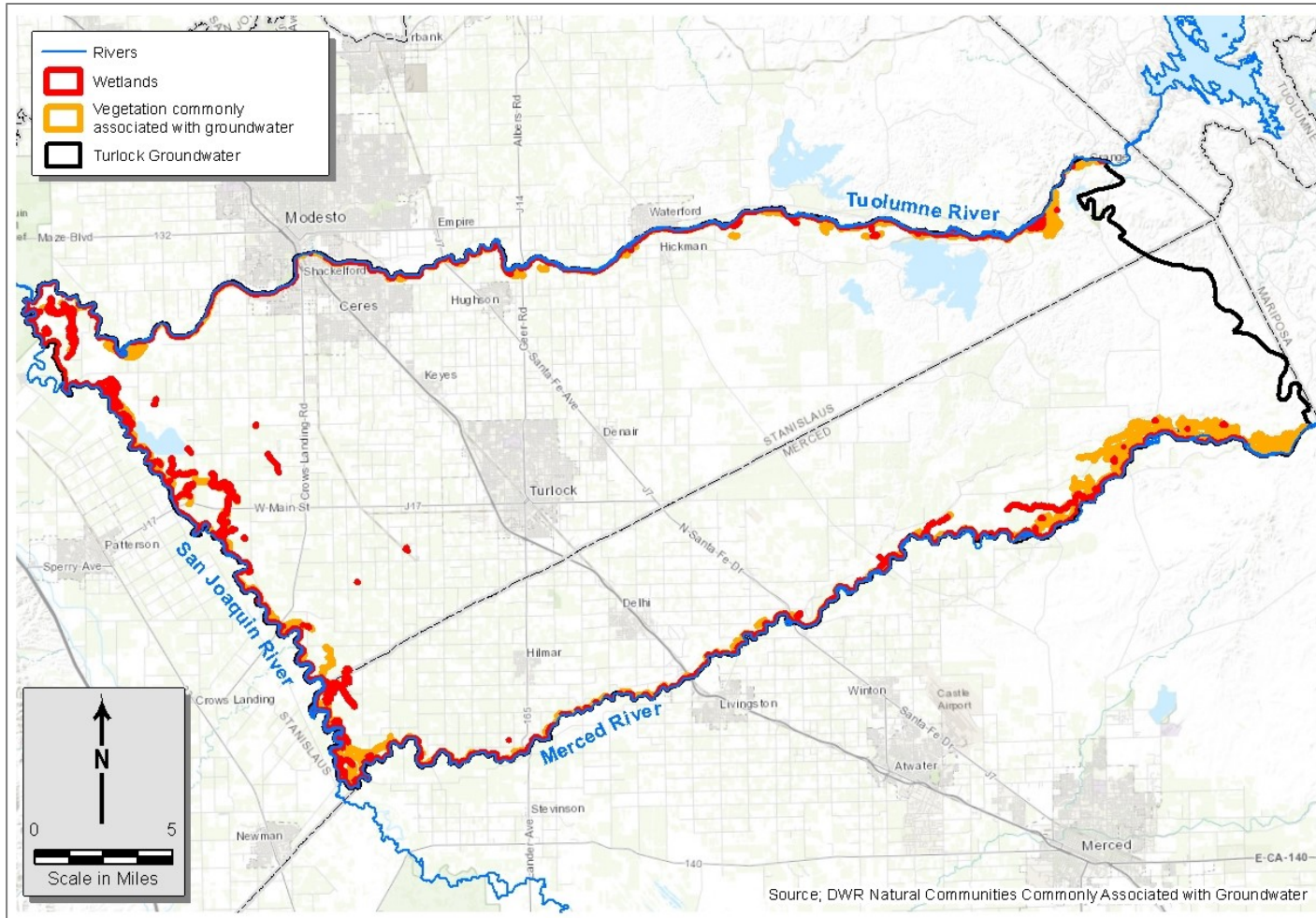


California Department of Water Resources
Sustainable Groundwater Management Program

April 2018

DWR NCCAG Dataset April 2018

VEGETATIVE AND WETLAND AREAS REMAINING AFTER ANALYSIS (POTENTIAL GDEs)



There are 1,108 currently-retained polygons, most along the river boundaries, which are likely dependent on groundwater at least some of the time.



INTERCONNECTED SURFACE WATER SUSTAINABLE MANAGEMENT CRITERIA

- Minimum Threshold (MT) shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on surface water beneficial uses and may lead to undesirable results.

MT supported by:

- Location, quantity, and timing of interconnected surface water depletions.
- Description of the groundwater and surface water model used to quantify surface water depletion... (§354.28 (c)(6)).

CALIFORNIA CODE OF REGULATIONS
TITLE 23. WATERS
DIVISION 2. DEPARTMENT OF WATER RESOURCES
CHAPTER 1.5. GROUNDWATER MANAGEMENT
SUBCHAPTER 2. GROUNDWATER SUSTAINABILITY PLANS

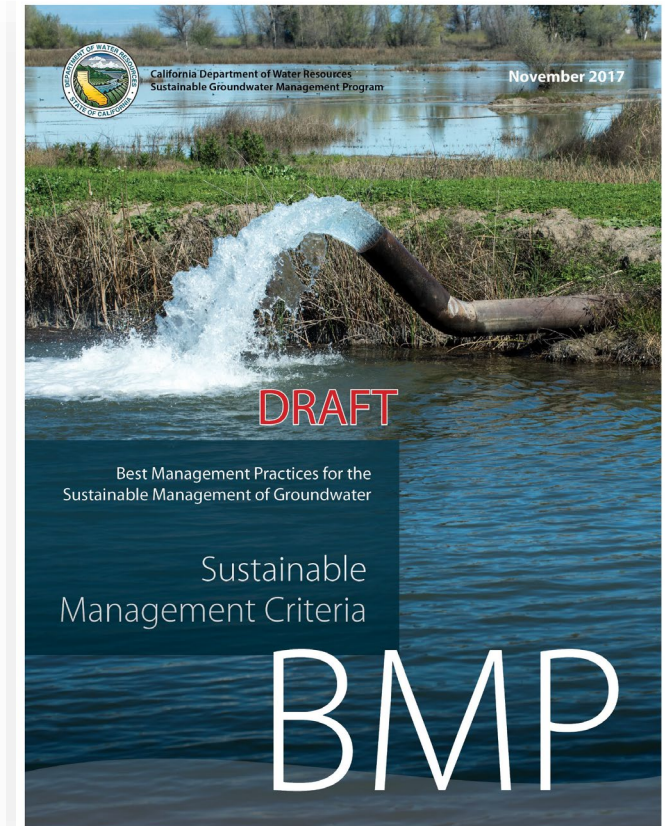
ARTICLE 1. Introductory Provisions



INTERCONNECTED SURFACE WATER SUSTAINABLE MANAGEMENT CRITERIA

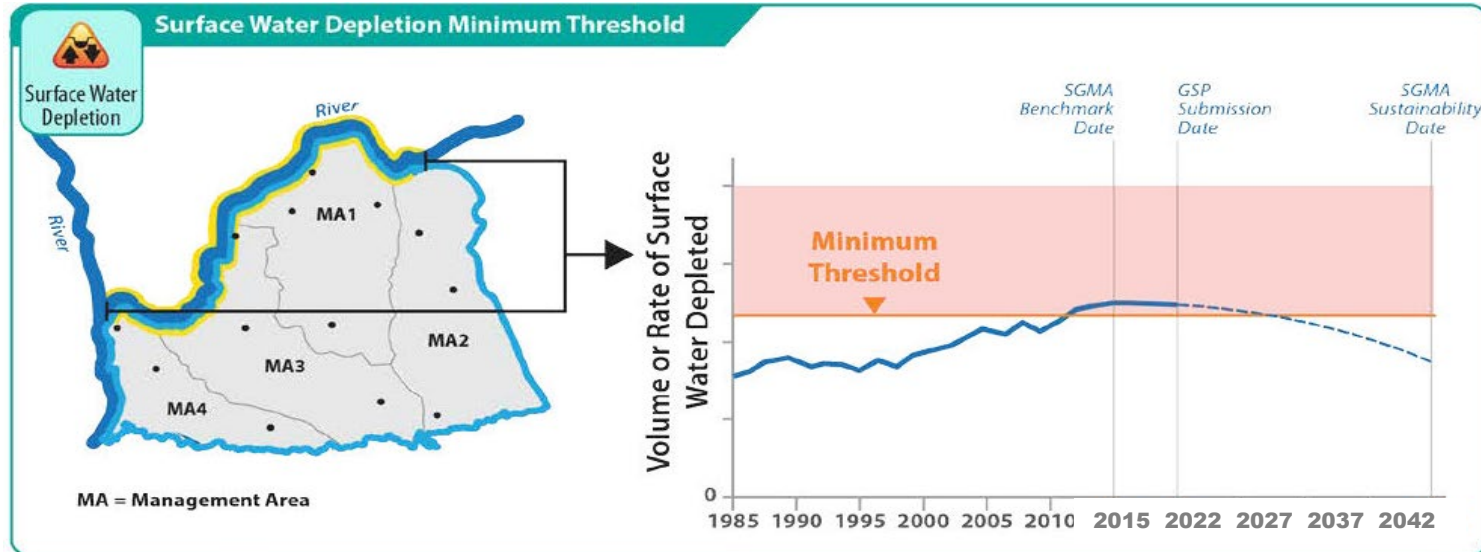
DWR BMP provides a list of considerations when selecting a minimum threshold (MT) for this indicator:

- What are the historical rates of stream depletion for different water year types?
- What is the uncertainty in streamflow depletion estimates from analytical and numerical tools?
- What is the proximity of pumping to streams?
- Where are GDEs in the Subbasin?
- What are the agricultural and municipal surface water needs in the Subbasin?
- What are the State or federally mandated flow requirements?





INTERCONNECTED SURFACE WATER SUSTAINABLE MANAGEMENT CRITERIA



DWR BMP Example:

Using a volume or
rate of surface water
depletion for MT.

- Two approaches for using water levels as a proxy to the volume or rate of depletion:
 - Identify groundwater elevation monitoring sites where a correlation between water level and volume/rate of depletion can be demonstrated.
 - Demonstrate that the MT for *chronic lowering of water levels* (sustainability indicator) is sufficiently protective of surface water.



MONITORING INTERCONNECTED SURFACE WATER

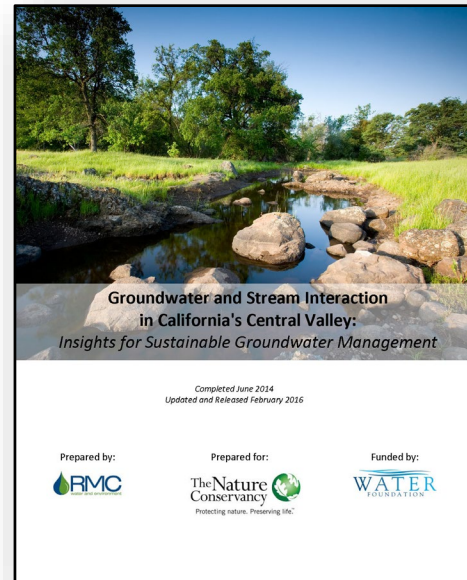
- GSP Monitoring networks must be developed to “monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions.” (§354.34(c)(6))
- The monitoring network shall be able to characterize the following:
 - Flow conditions including surface water discharge, surface water head, and baseflow contribution.
 - Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.
 - Temporal change due to variations in stream discharge and regional groundwater extraction.
 - Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.



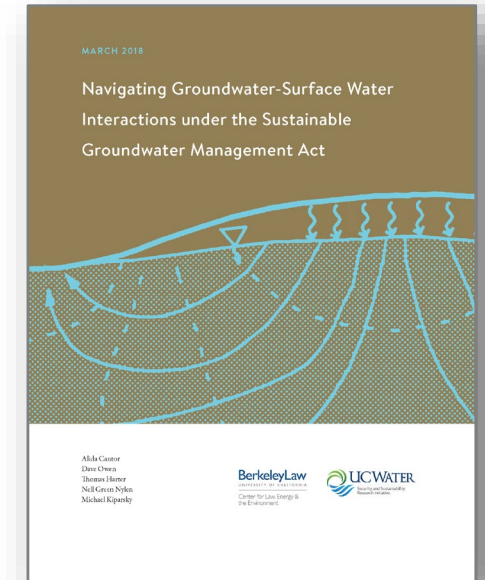


ADDITIONAL GUIDANCE ON INTERCONNECTED SURFACE WATER

- The Nature Conservancy (TNC) analysis of streamflow depletion in Central Valley including the Merced River.
- San Joaquin Basin – rivers transition from net-gaining to net-losing streams mid-1960s.
- Used C2VSim integrated surface water-groundwater model.
- Same model and lead modeler as on the Turlock Subbasin GSP.



- UC Berkeley Law and UC Water, 2018
- Tabulates intersections of SGMA with other laws associated with groundwater-surface water interactions
- Summarizes legal constraints and opportunities.
- Construct for collaboration between surface water rights holders, environmental surface water uses, and groundwater users.





USE OF THE BASELINE MODEL RESULTS

- Results of baseline modeling assume current conditions projected into the future without any additional management actions or projects to mitigate impacts.
- Allow an analysis of potential impacts to help frame the “undesirable results” definition.
- Used as a guide to determine appropriate projects or management actions; provide a target for sustainable management.





NEXT STEPS

- Coordinate with surface water rights holders on potential impacts.
- Define targets for preliminary analysis of sustainable yield.
- Select sustainable management criteria for sustainability indicators.
- Develop projects and management actions to address any potential undesirable results.
- Develop monitoring program for GSP and future analysis.



QUESTIONS?



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