




SUSTAINABLE MANAGEMENT CRITERIA CHRONIC LOWERING OF GROUNDWATER LEVELS







JOINT TECHNICAL ADVISORY COMMITTEES (TACs) MEETING
JANUARY 28, 2021



DRAFT

SUSTAINABILITY INDICATORS



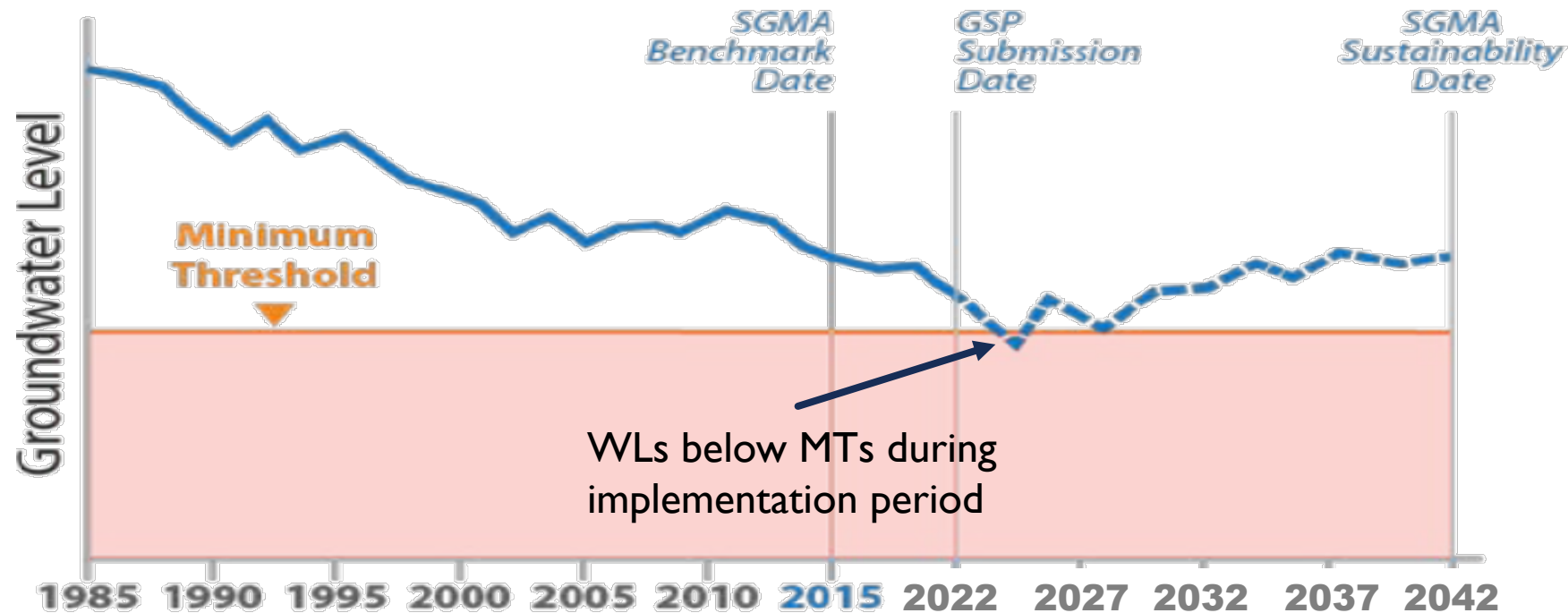
					
Chronic Lowering of Water Levels	Reduction of Groundwater in Storage	Degraded Water Quality	Seawater Intrusion	Inelastic Land Subsidence	Depletion of Inter-connected Surface Water

- Chronic Lowering of Groundwater is an undesirable result when a significant and unreasonable depletion of supply would occur if continued over the planning and implementation horizon.
- Also leads to overdraft conditions and affects beneficial uses of wells.
- Define Undesirable Results for the Subbasin and select a minimum threshold (MT).



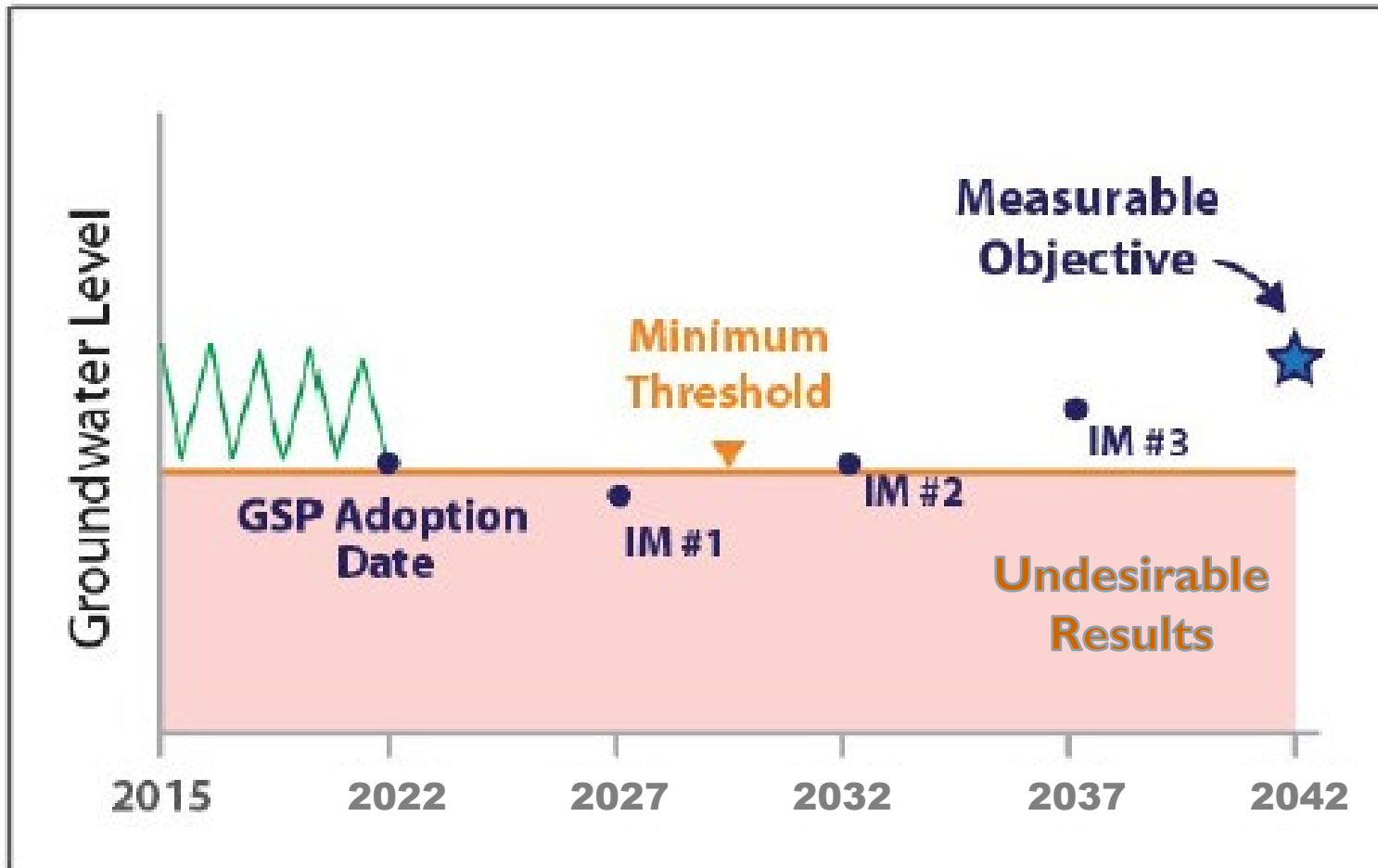
MINIMUM THRESHOLD CONSIDERATIONS

- Minimum Threshold (MT) defines the undesirable result
- SGMA allows 20 years to avoid undesirable results and achieve sustainability
- Water levels may fall below the MT in the initial implementation period





INTERIM MEASURES AND MEASURABLE OBJECTIVES



- Use **Interim Milestones** as a measure for meeting MTs during the Implementation Period
- **Measurable Objective** is an operational target to avoid MT exceedances (and undesirable results)



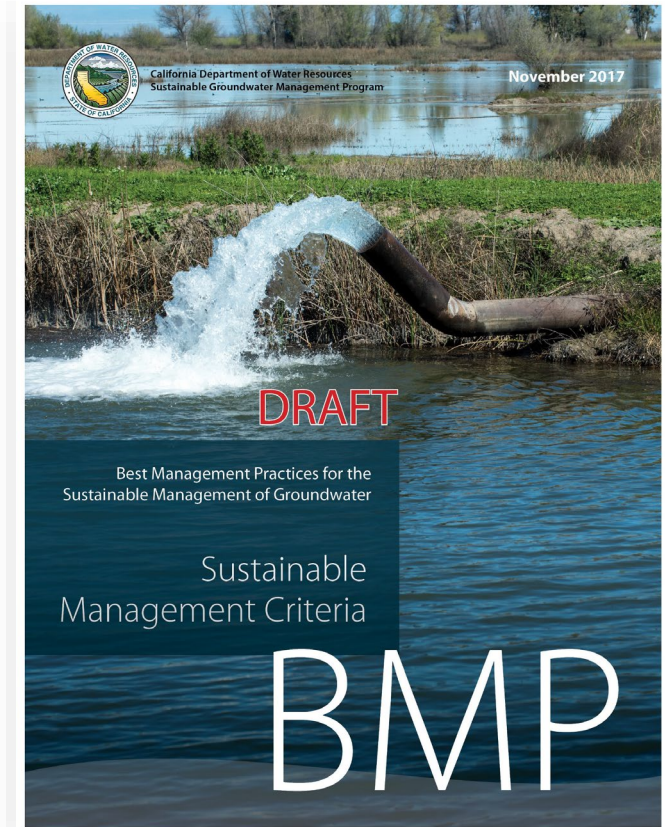
MT REQUIREMENTS AND CONSIDERATIONS CHRONIC LOWERING OF GROUNDWATER LEVELS

GSP regulations require that MTs be supported by:

- Rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin
- Potential effects on other sustainability indicators

DWR BMP considerations:

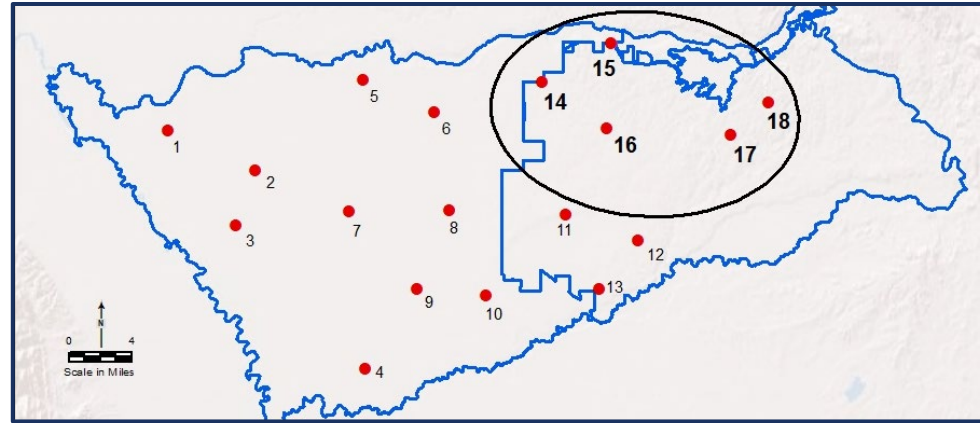
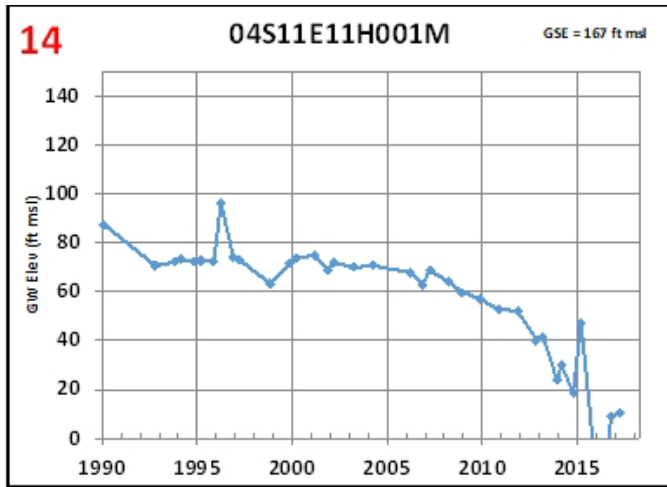
- What are the depths and screen intervals of water supply wells?
- What are the adjacent basin's minimum thresholds for groundwater elevations?
- Where are the potential impacts of changing groundwater elevations on GDEs in the Subbasin?
- Which principal aquifer is being evaluated?



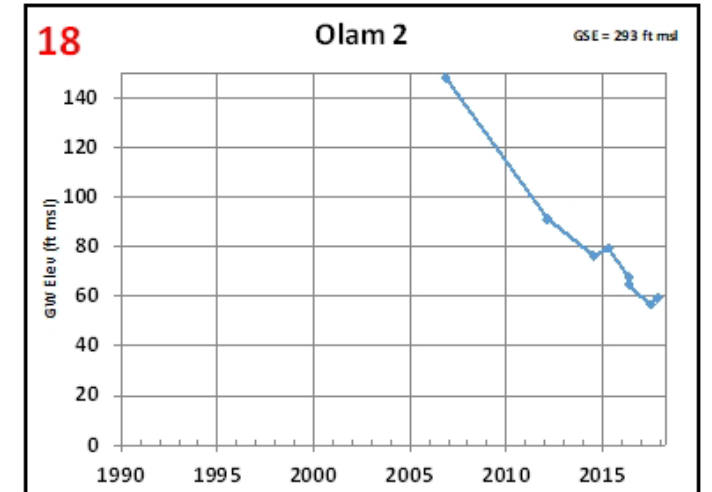
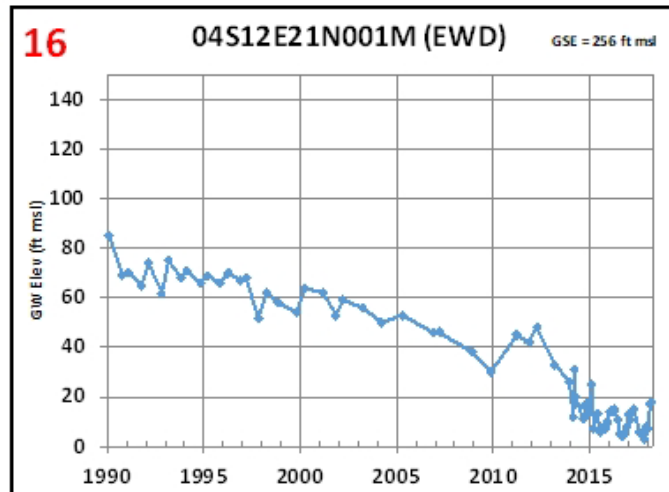
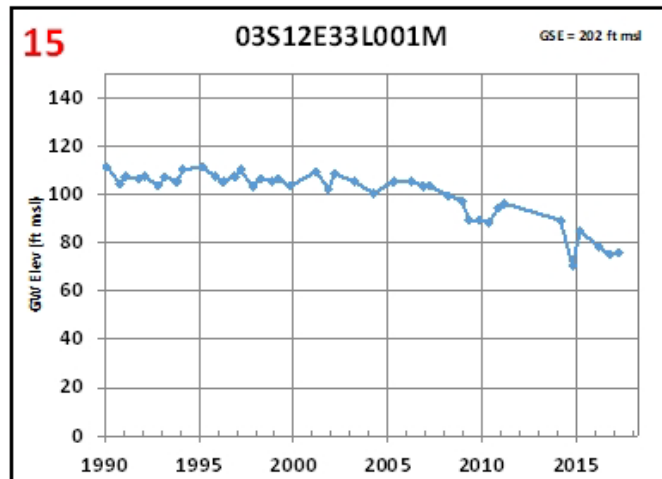
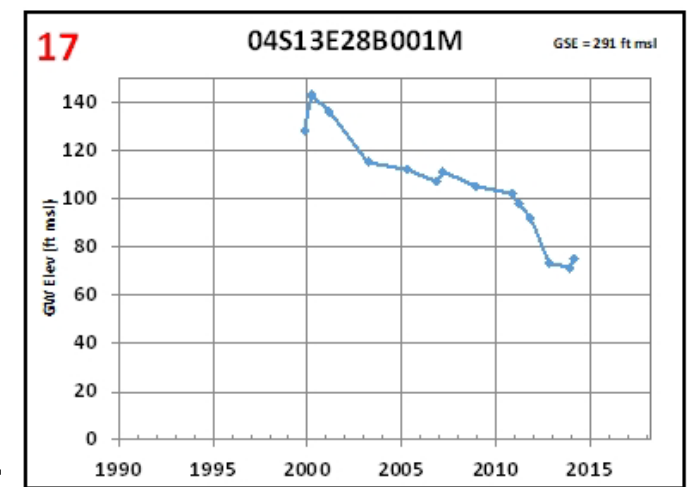


REPRESENTATIVE HYDROGRAPHS

EASTERN SUBBASIN – CONSIDER RATE OF DECLINE



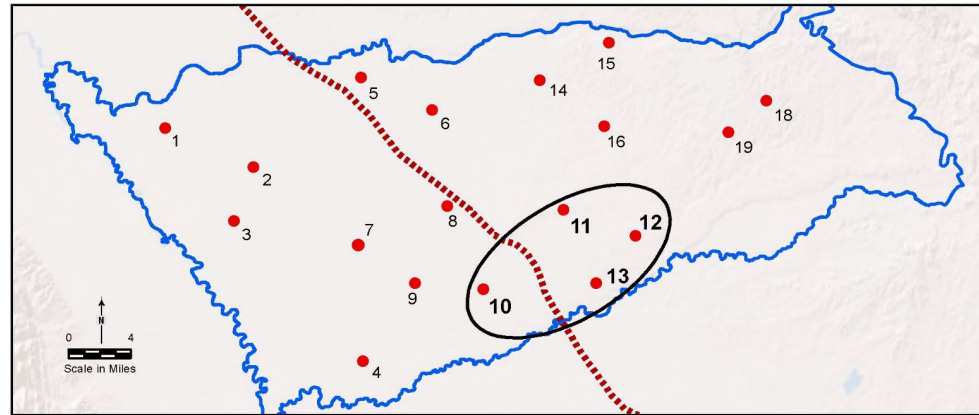
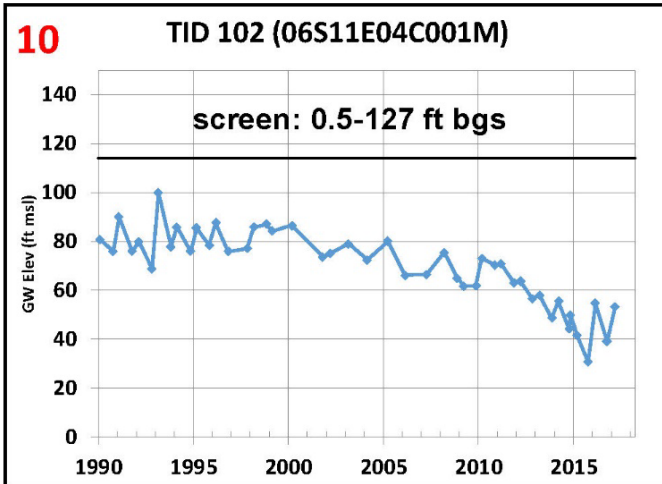
20' to >40' decline during recent drought



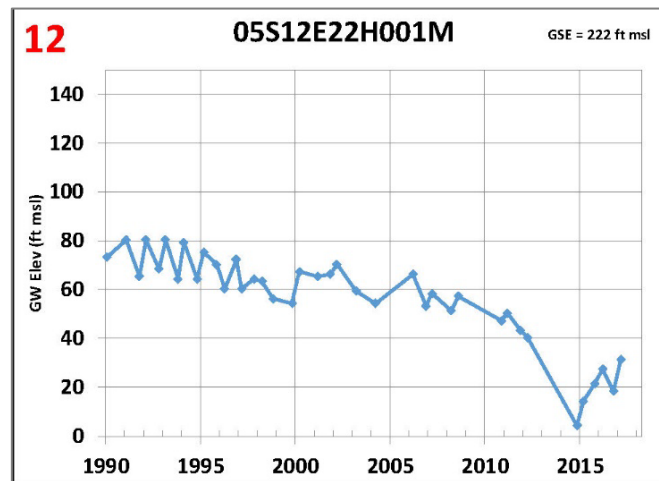
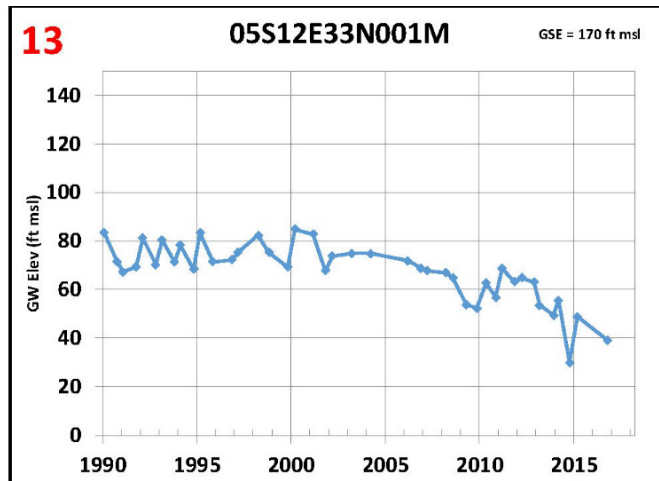
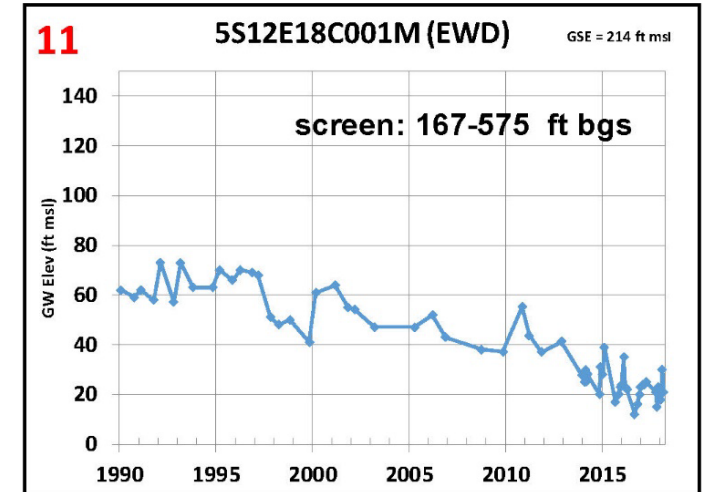


REPRESENTATIVE HYDROGRAPHS

EASTERN SUBBASIN – CONSIDER RATE OF DECLINE

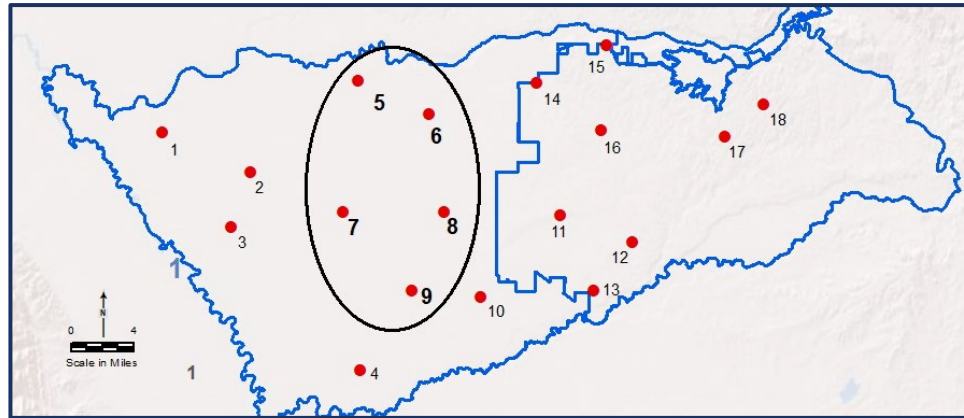
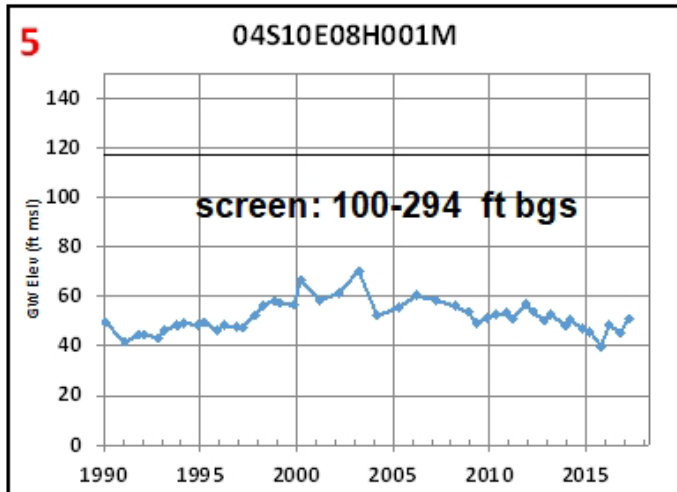


>20' decline during recent drought

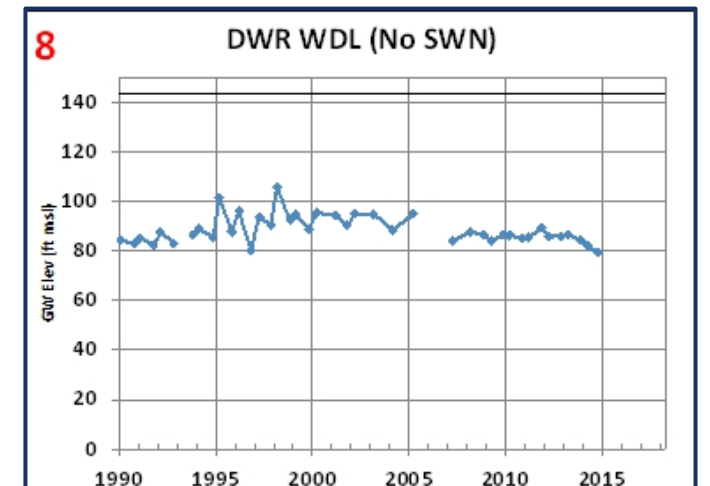
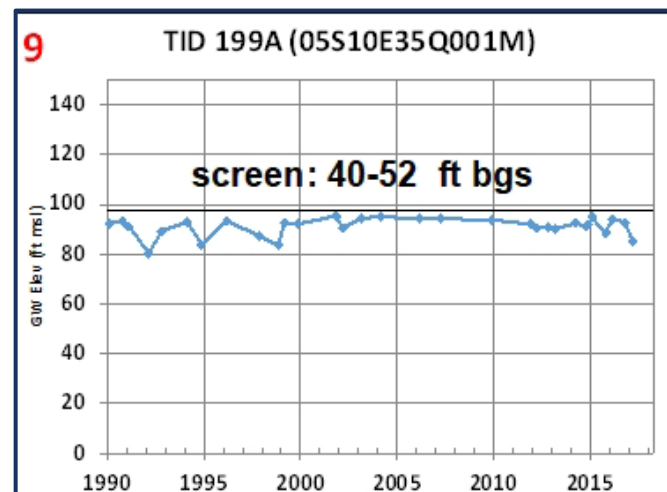
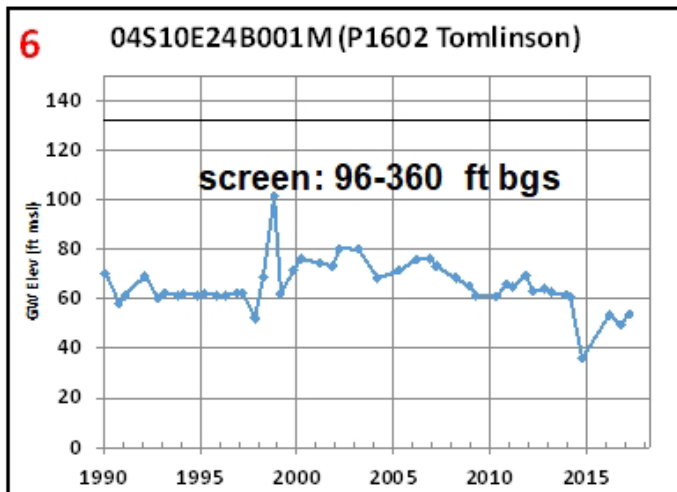
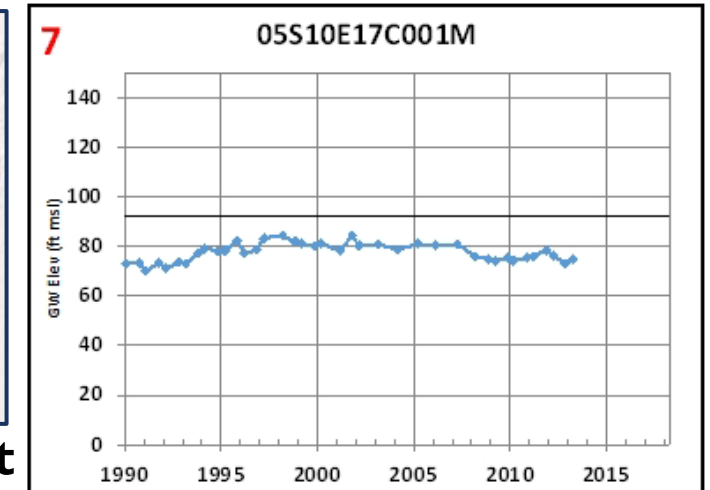




REPRESENTATIVE HYDROGRAPHS - WESTERN SUBBASIN LOWER RATE OF DECLINE

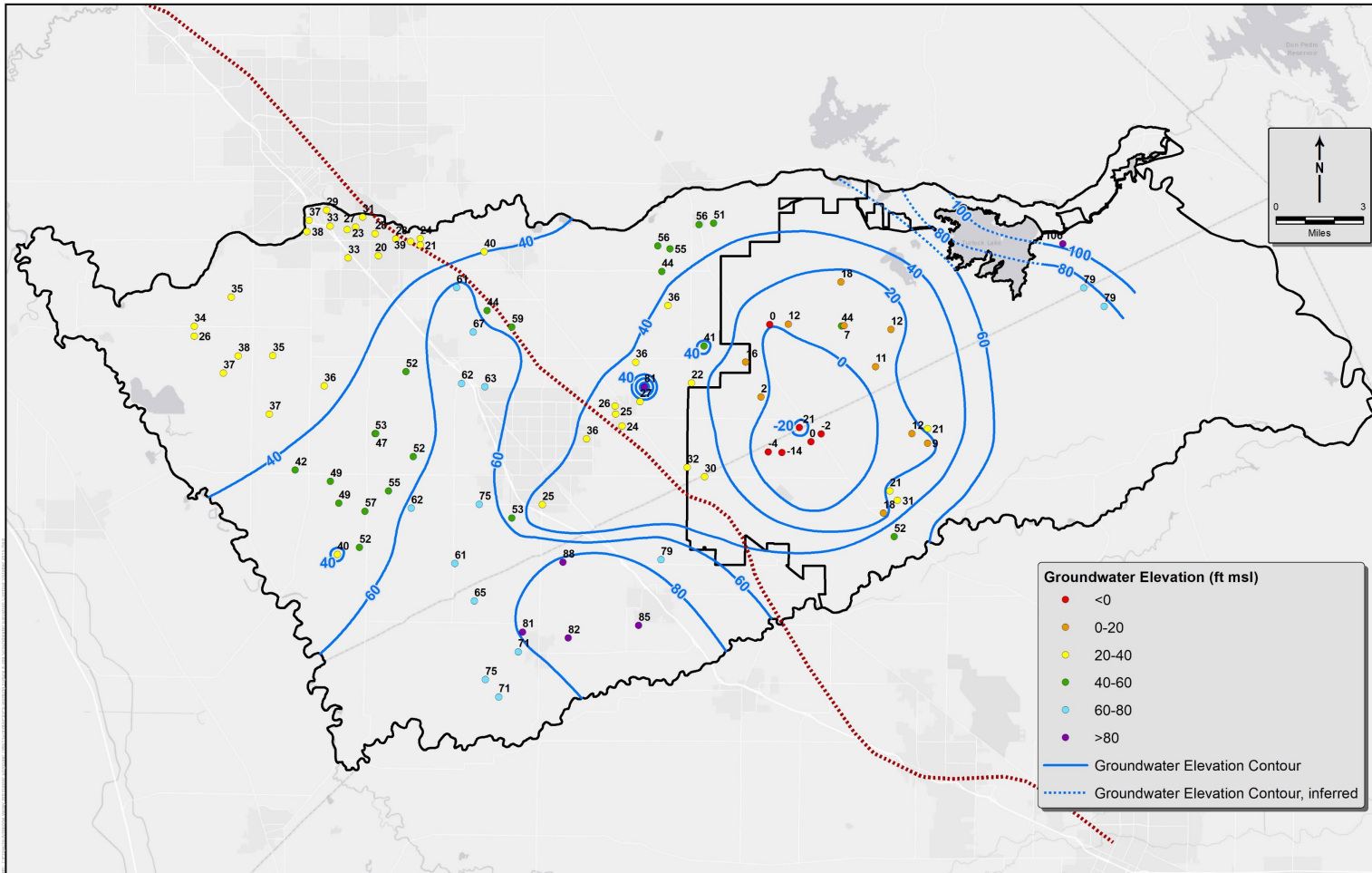


Up to 20' decline during recent drought





2015 GROUNDWATER ELEVATIONS



- Cone of depression expanding
- Historical overdraft
- Increasing subsurface flow from the west
- Increasing streamflow depletion projected in the future baseline



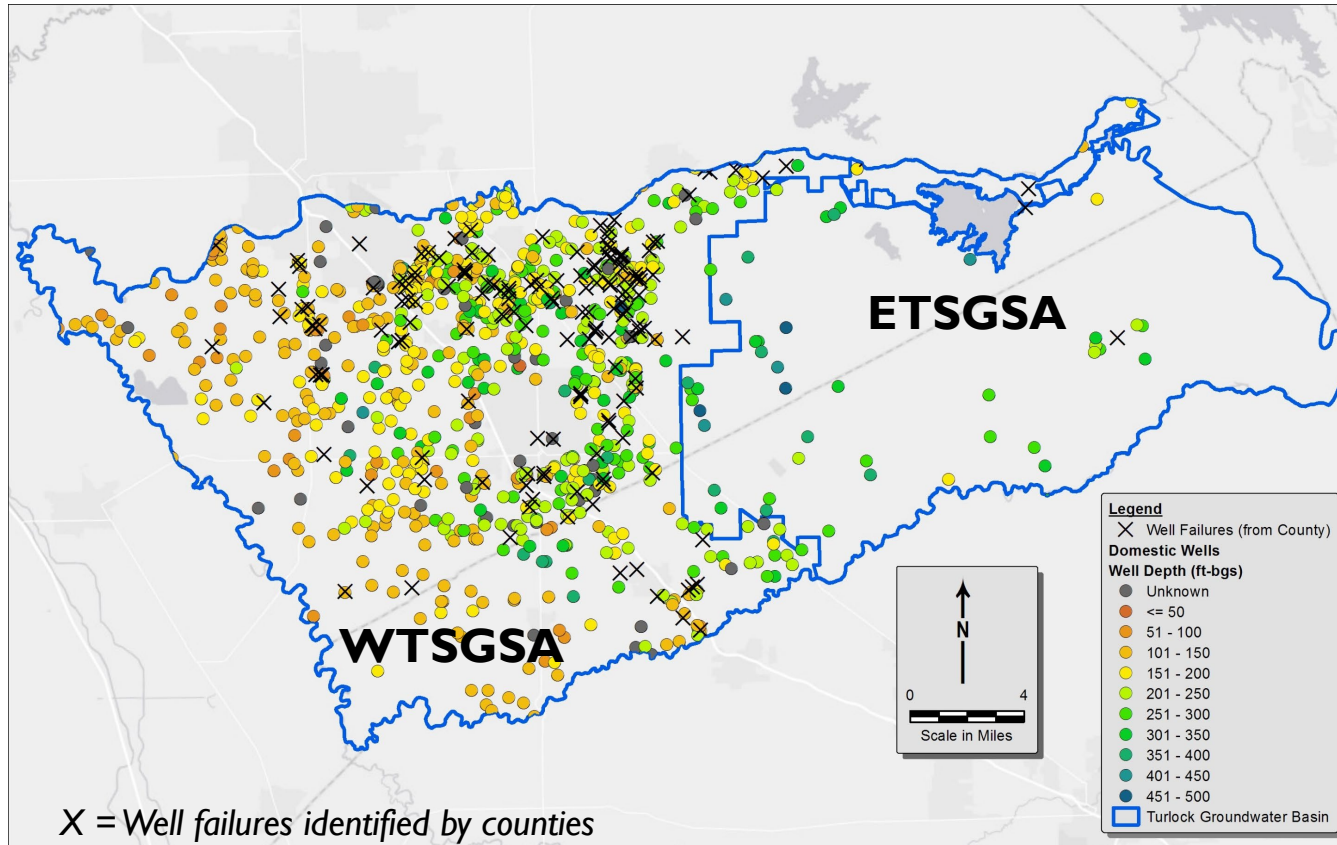
ADVERSE IMPACTS

LOW WATER LEVELS DURING THE RECENT DROUGHT

- “Dry” domestic wells (Stanislaus and Merced counties, Delhi)
- Failed shallow, old domestic wells (<100 feet; >50-years old) (Stanislaus and Merced counties)
- Collapsed casing in municipal supply wells (Waterford, Hilmar)
- Loss of capacity in municipal supply wells (wells had to be deepened) (Waterford)
- Dry landscape irrigation wells (City of Turlock)
- Numerous wells previously rented for agriculture supply could not be used (TID)
- Private agricultural well owners pressured to stop pumping by domestic well owners (TID)
- Water quality issues – increasing arsenic, nitrate, and/or TDS (Hilmar, Waterford, Modesto, Ceres, Delhi)
- Aging wells at risk of failure during another similar drought (Hilmar, Waterford)



LOCATIONS OF FAILED DOMESTIC WELLS



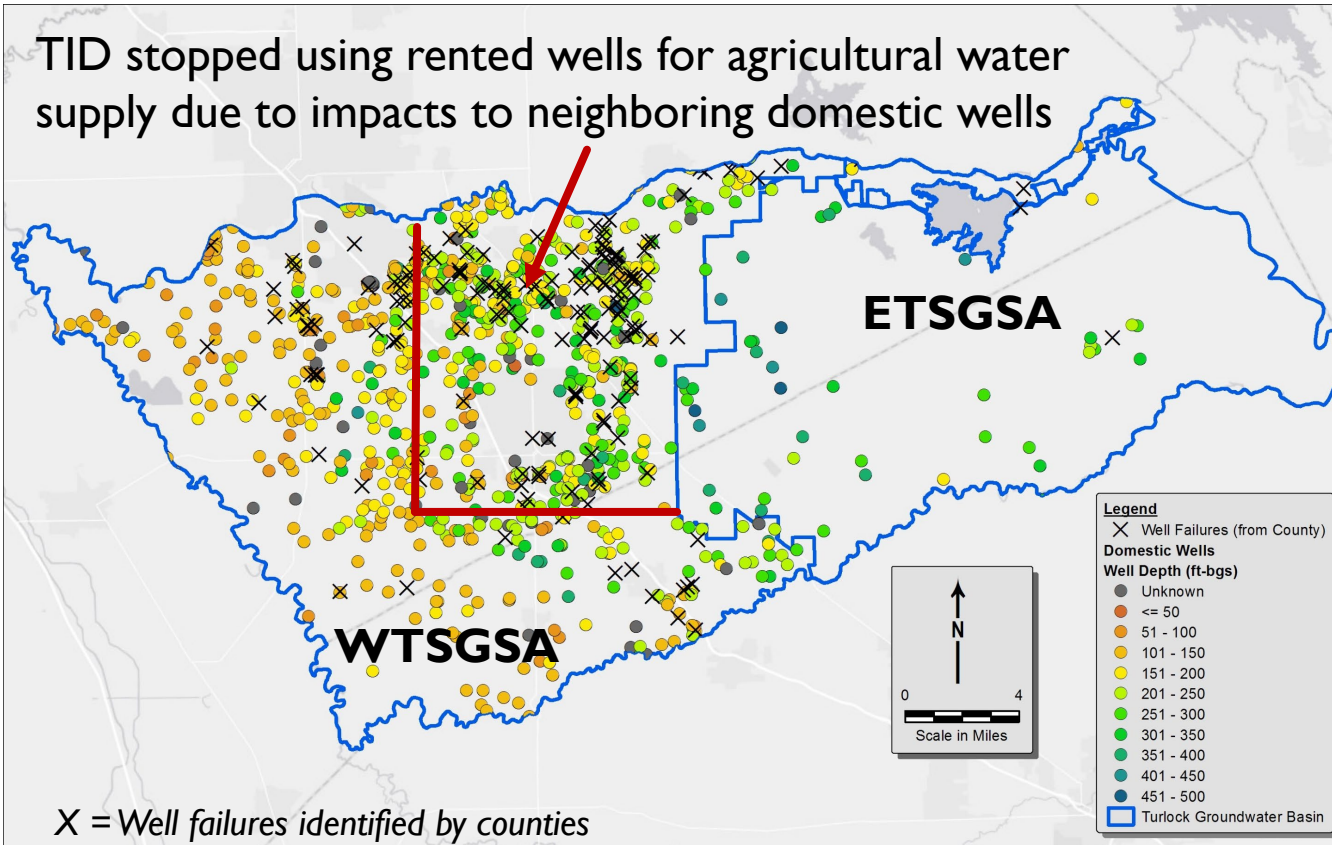
- About 150 domestic well problems as mapped by Stanislaus and Merced counties during recent drought.
- Most well failures in eastern WTSGSA.

*Data from DWR Well Completion Report Database:
Well status is not known.*



IMPACTS ON DOMESTIC AND AGRICULTURAL SUPPLY

TID stopped using rented wells for agricultural water supply due to impacts to neighboring domestic wells

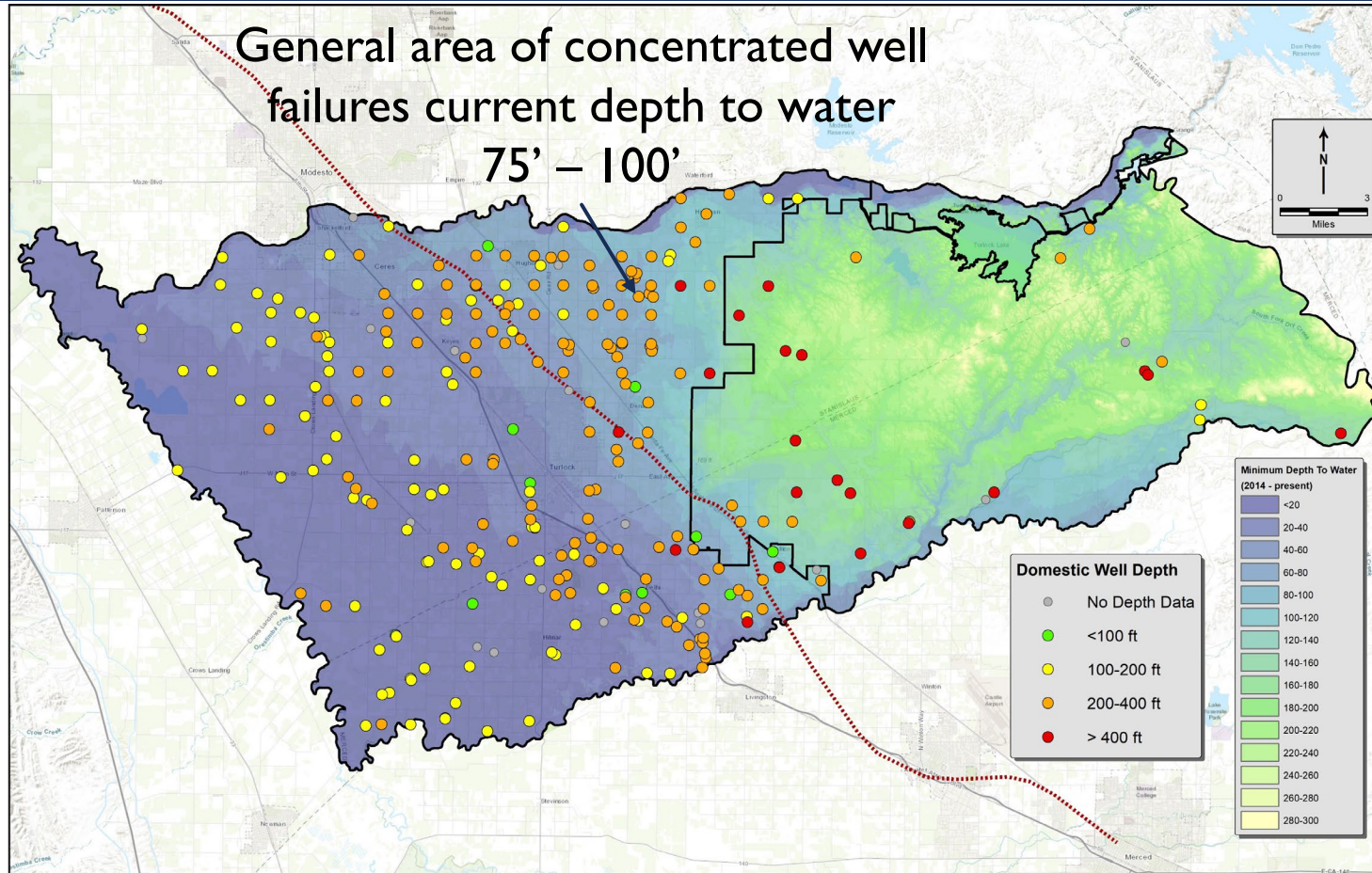


- TID delineated NE service area to curtail rented well pumping where domestic wells were having problems
- TID stopped pumping in rented wells, impacting its ability to deliver agricultural water supply
- Private irrigation well owners also had to turn off pumps in response to impacted domestic wells

*Data from DWR Well Completion Report Database:
Well status is not known.*



NEW DOMESTIC WELLS SINCE 2015



- More than 350 new domestic wells have been drilled since 2015
- Most wells are deeper, but shallow wells were also drilled
- Depth to water at ETSGSA boundary declined from <100' to more than 150' in some wells since 1990s drought
- Avoid widespread domestic well failures during next drought

WORKING DEFINITION FOR UNDESIRABLE RESULT CHRONIC LOWERING OF GROUNDWATER LEVELS



Significant and unreasonable water level declines such that water supply wells are adversely impacted during multi-year droughts in a manner that cannot be readily managed or mitigated.

- Impacts to water supply wells in the WTSGSA during recent drought (2013-2016)
 - Impacts in areas of urban communities from municipal/urban pumping
 - Impacts in eastern WTSGSA where water levels are declining from the expansion of the eastern cone of depression
- If MTs are set significantly too low in some areas, it may be difficult to achieve higher MTs in other areas where needed to avoid well impacts
- Consider a representative year (or series of years) to set the MTs Subbasin-wide such as recent historic low levels

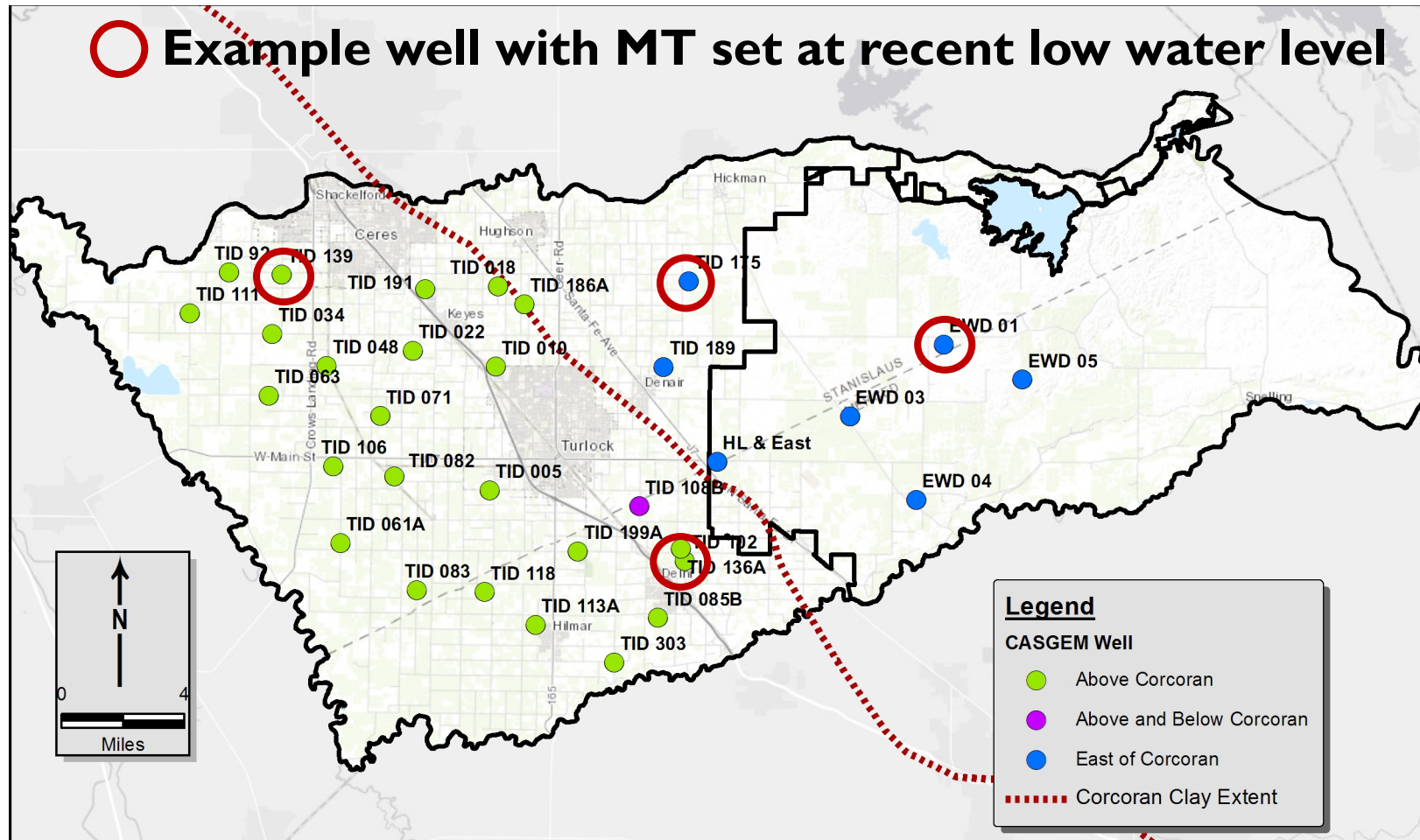
FRAMEWORK FOR MINIMUM THRESHOLD CHRONIC LOWERING OF GROUNDWATER LEVELS



URs will be evidenced by an exceedance of minimum thresholds (minimum water levels to be determined) in xx% of GSP monitoring wells in # consecutive semiannual monitoring events.

- Undesirable Result definition considers the number of wells and monitoring events that exceed the MT
- More than one well is needed to identify widespread declines (rather than a spike in a single well)
- Number of wells can be adjusted when monitoring network has been finalized
- Number of consecutive semi-annual monitoring events should consider declines in a multi-year drought; suggest two to three consecutive years during dry periods
- Consider using water year type to maintain higher water levels during wet periods while also allowing declines during drought

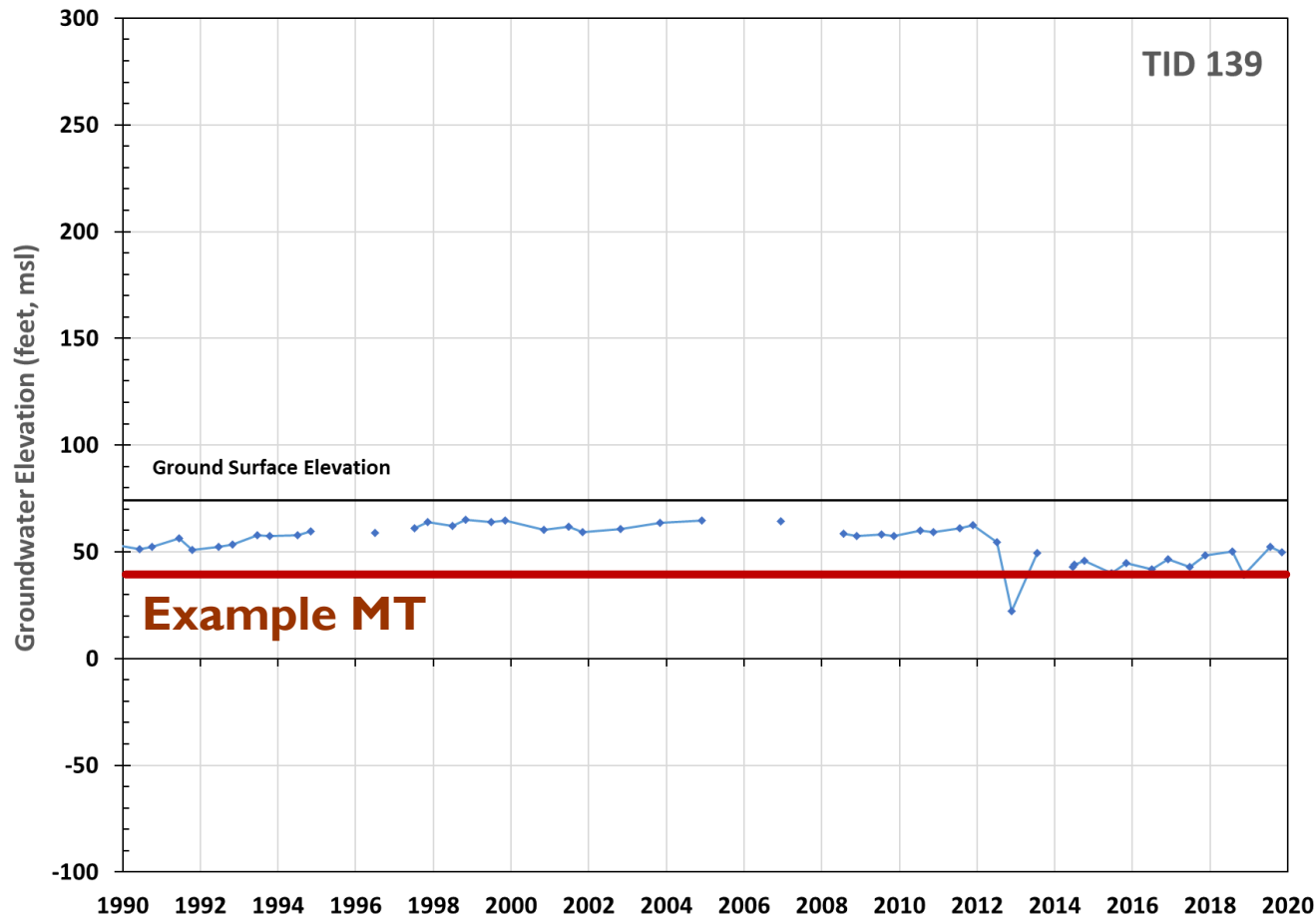
CURRENT CASGEM MONITORING NETWORK



- 32 monitoring wells
- Data gaps:
 - Western Lower Principal Aquifer
 - Eastern Subbasin
- New monitoring wells coming online:
 - TSS DWR Grant
 - SGMP Round 3 Grant (6 wells)



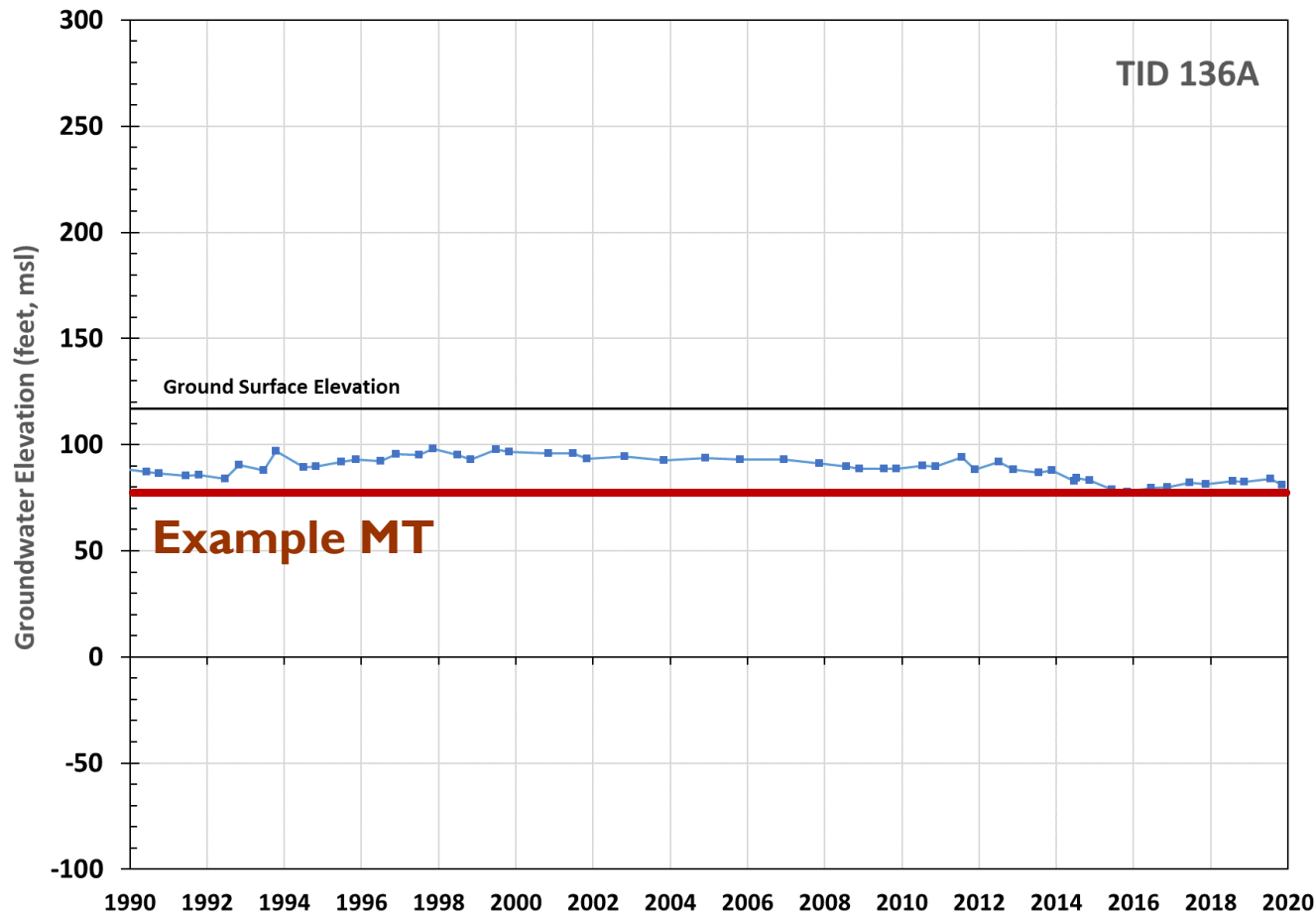
HISTORIC LOW GROUNDWATER LEVEL 2013-2019



- Near Ceres and Modesto urban pumping
- No significant long-term declines – some streamflow depletion indicated from modeling
- Recent declines correlate with water quality issues



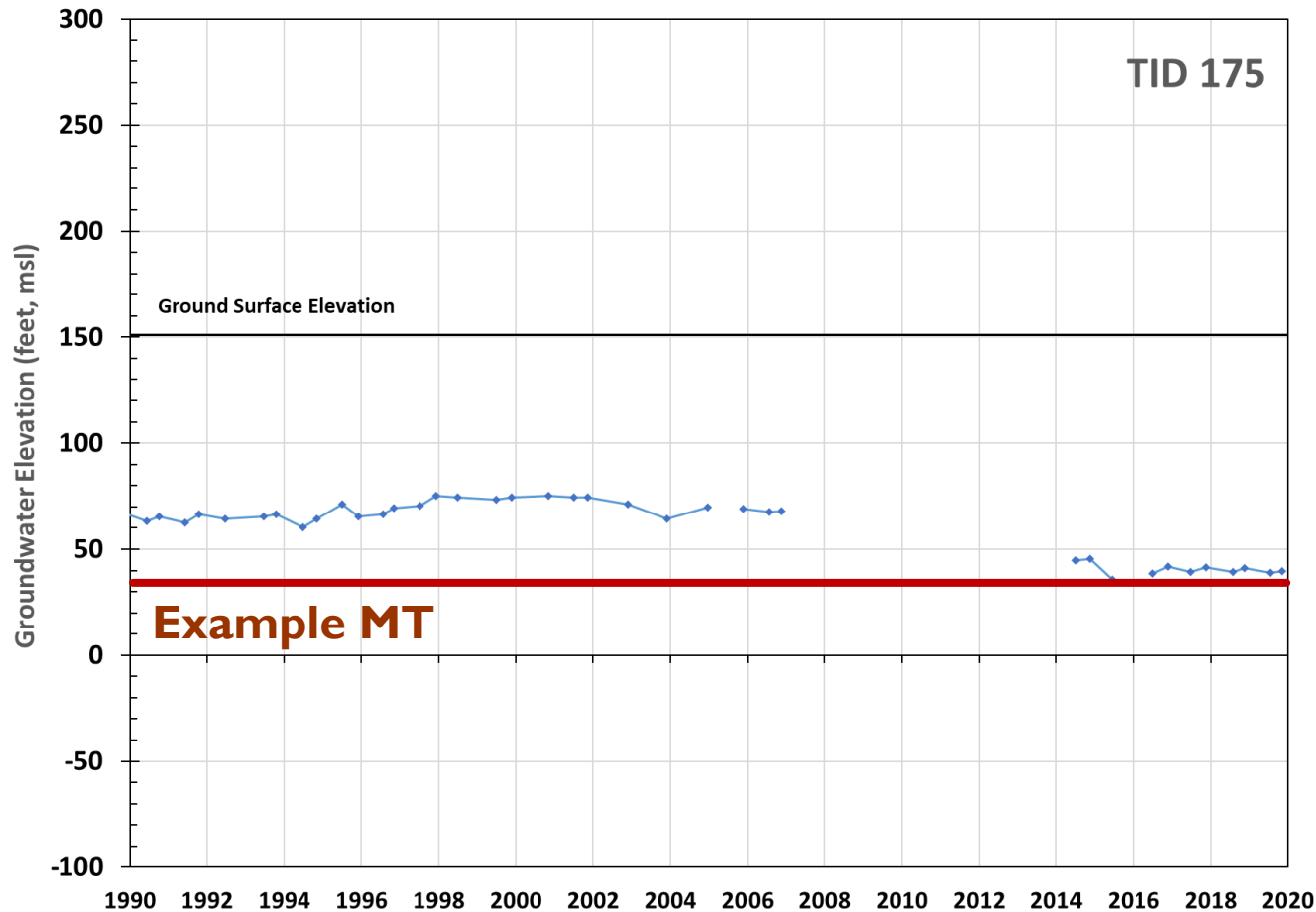
HISTORIC LOW GROUNDWATER LEVEL 2013-2019



- Near areas of domestic well failures in Delhi
- Minimal long-term declines in Western Upper Principal Aquifer
- Area of recently-drilled shallow wells



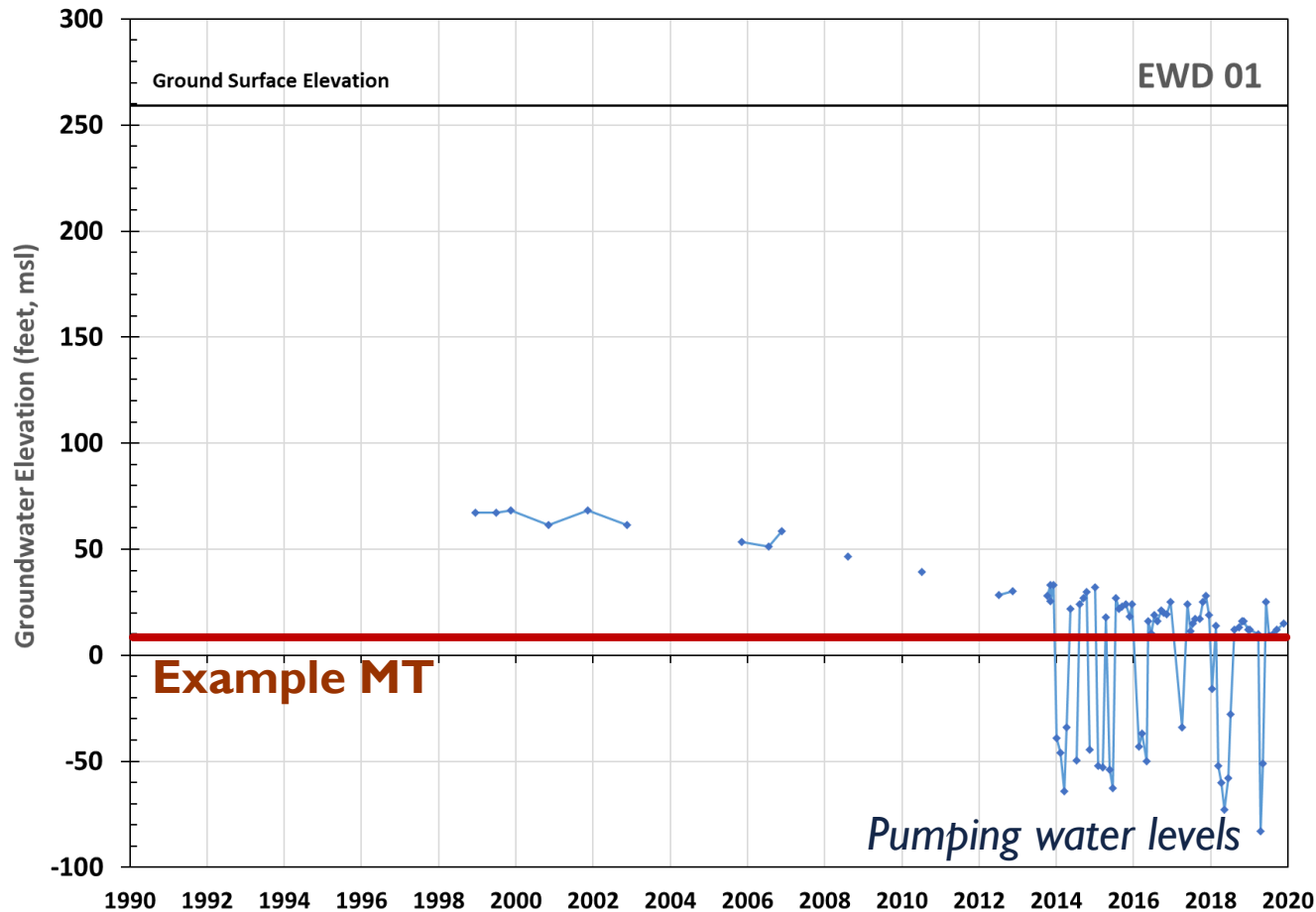
HISTORIC LOW GROUNDWATER LEVEL 2013-2019



- Northeast WTSGSA area
- Areas of water supply impacts during drought
- About 25 feet of overall decline since the 1990s drought



HISTORIC LOW GROUNDWATER LEVEL 2013-2019



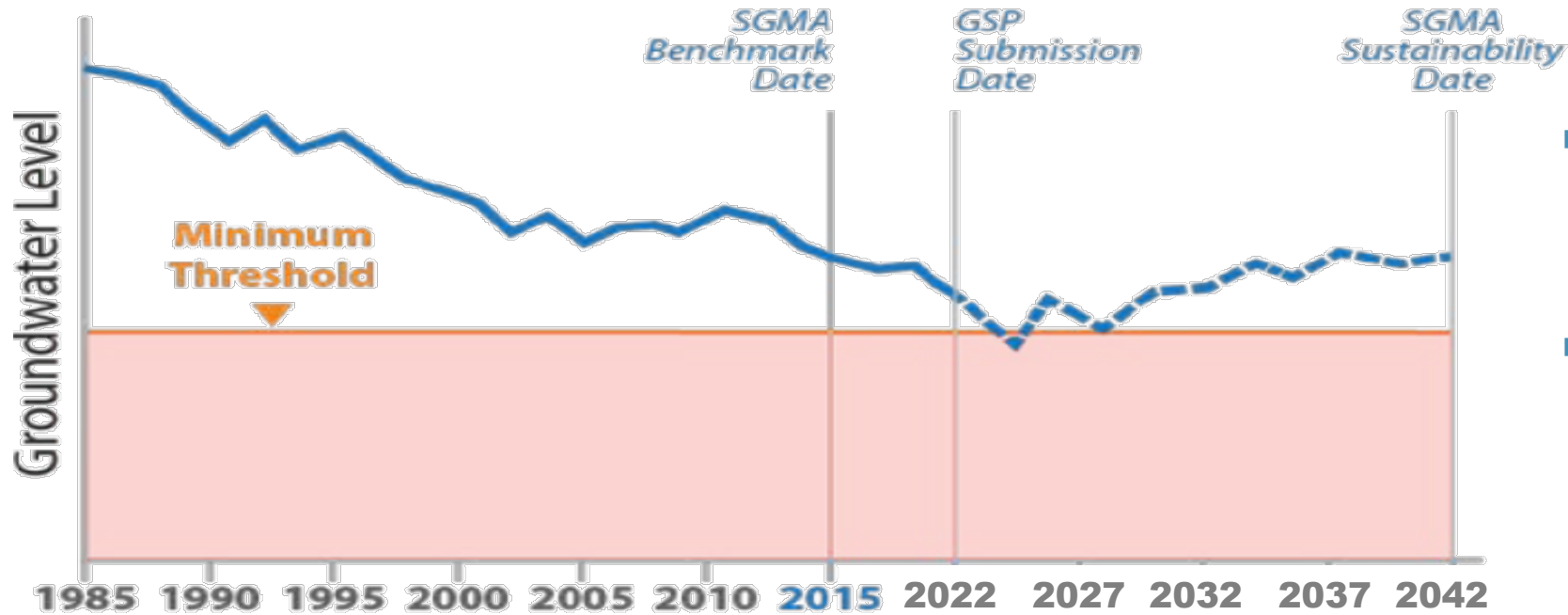
- ETSGSA area of water level declines
- More long-term declines indicated in water levels
- Avoid pumping wells for GSP monitoring to get water levels more representative of the aquifer



MINIMUM THRESHOLD DISCUSSION

CHRONIC LOWERING OF GROUNDWATER LEVELS

- Set preliminary MTs at/near historical low levels?
- Mitigates historical overdraft, addresses water supply well issues
- Additional MTs will be needed for other sustainability indicators



- Establish a “glide path” to sustainability using interim milestones
- Water levels will continue to decline without projects and management actions

NEXT STEPS

- Complete baseline modeling process:
 - Sustainable yield analysis
 - Climate change analysis
- Complete sustainable management criteria for all sustainability indicators
- Complete draft chapters of the GSP and release for public comment
- Continue to define parameters for GSP Projects and Management Actions; final GSP model runs

QUESTIONS?



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