



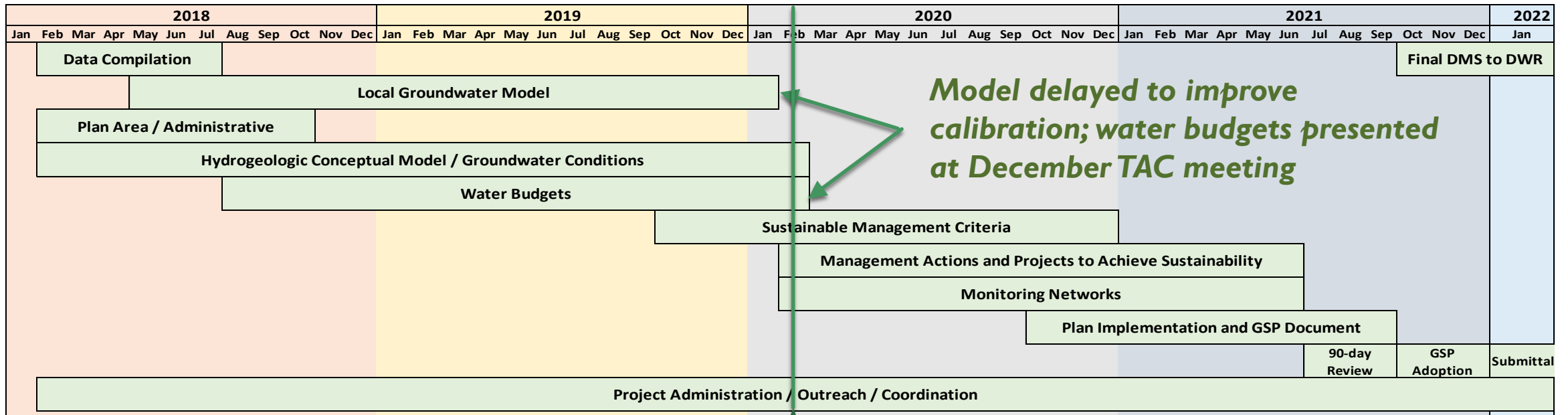
TECHNICAL WORKSHOP SUSTAINABLE MANAGEMENT CRITERIA

JOINT TECHNICAL ADVISORY COMMITTEES (TACs) MEETING


FEBRUARY 27, 2020



GSP SCHEDULE UPDATE



Model delayed to improve calibration; water budgets presented at December TAC meeting

 **We are here**

Work on Sustainable Management Criteria and Projects while future water budget modeling continues; initial discussion on Sustainable Management Criteria today

DRAFT

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

SUSTAINABLE MANAGEMENT CRITERIA

STEPS FOR ANALYSIS

1. Analyze the 5 **Sustainability Indicators** relevant to the Turlock Subbasin (applying conditions from the Basin Setting).
2. Define **Undesirable Results** (conditions we want to avoid).
3. Select a **Minimum Threshold (MT)** for each indicator – i.e., a ***metric*** that can be used to define undesirable results.
4. Select a **Measurable Objective** for each indicator – i.e., a target metric to stay away from MTs and undesirable results.
5. Select **Interim Milestones** that show progress toward each **Measurable Objective** over the 20-year planning horizon.

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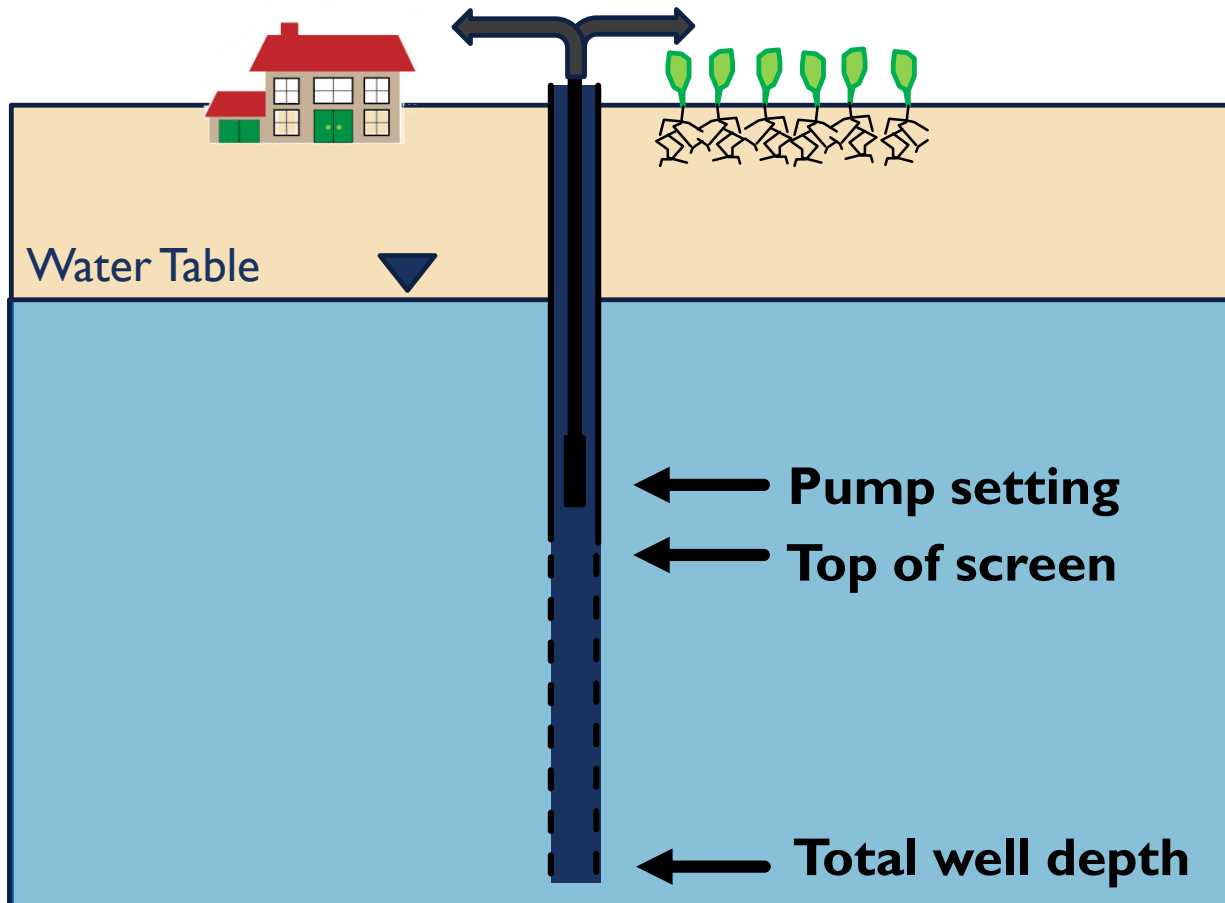


Depletion of Interconnected Surface Water affecting beneficial use

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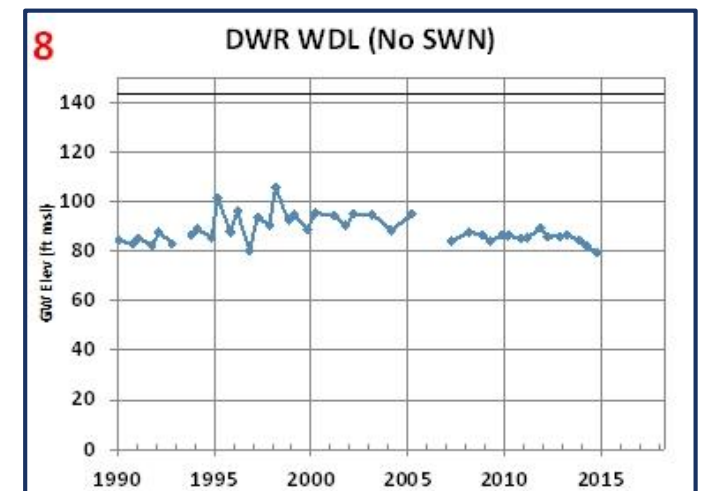
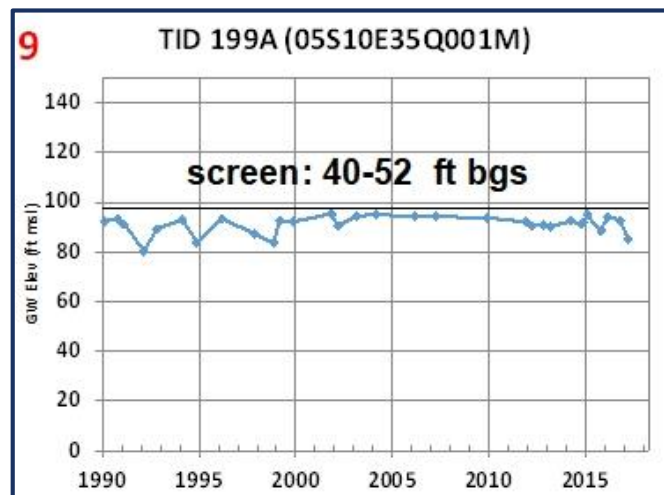
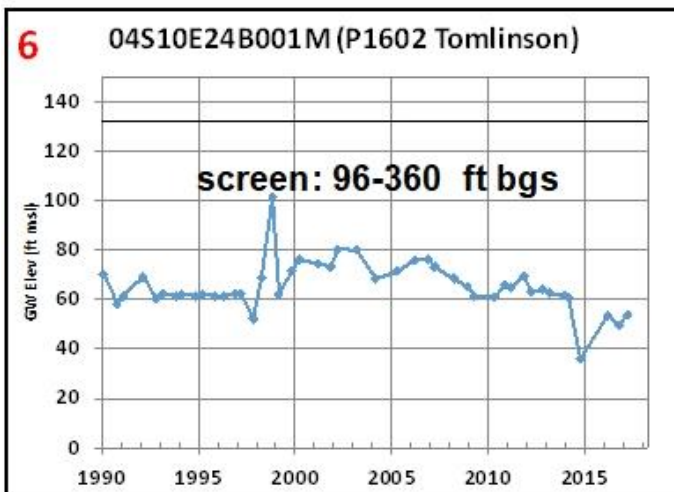
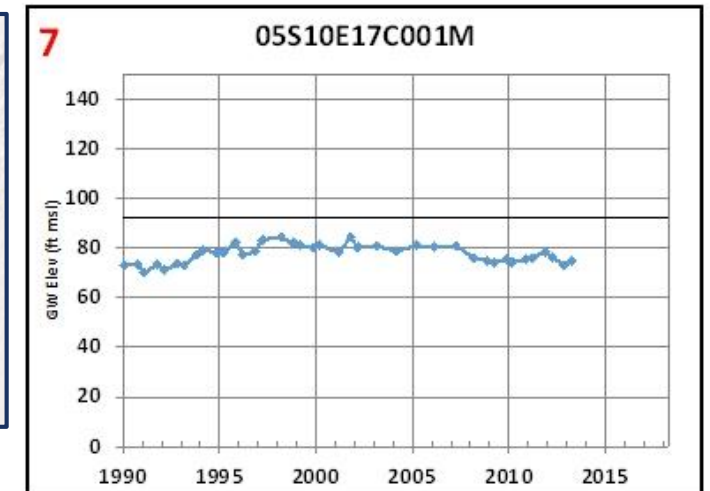
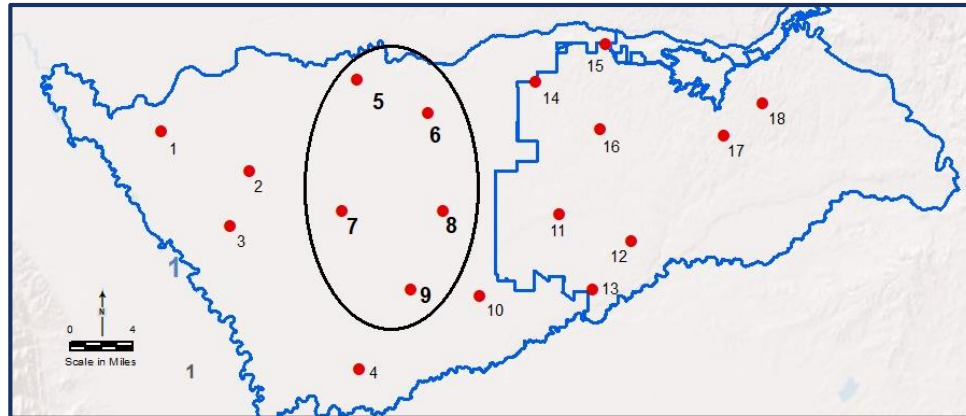
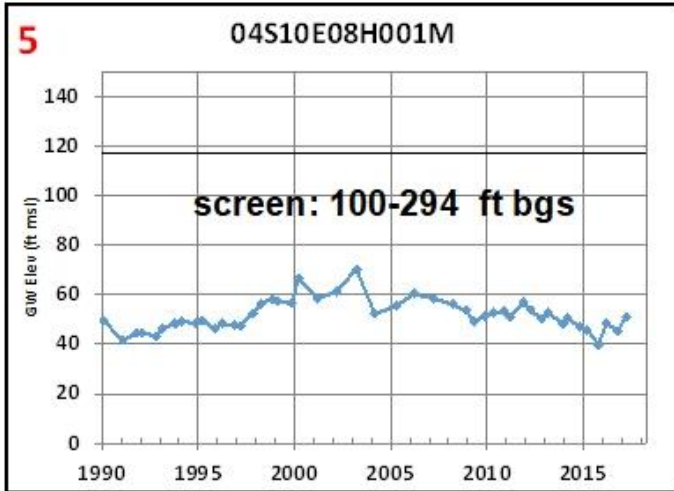
CHRONIC LOWERING OF WATER LEVELS



- Have water level declines affected beneficial uses of wells?
- During the recent drought of record, did we have:
 - Dry wells?
 - Operational issues?
 - Water quality concerns?
- Are these undesirable results?

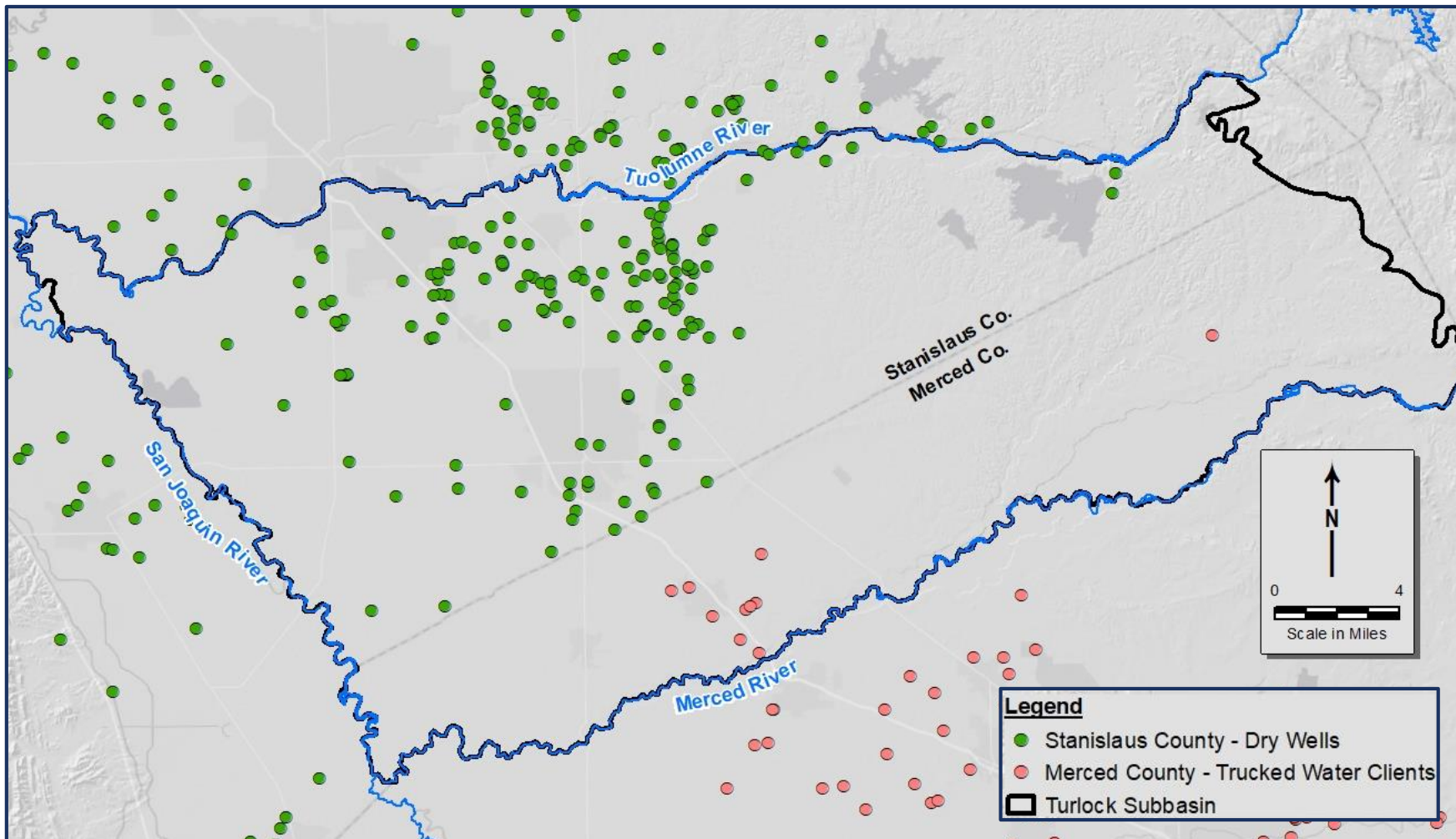


REPRESENTATIVE HYDROGRAPHS - WESTERN SUBBASIN LESS DECLINE ABOVE CORCORAN?





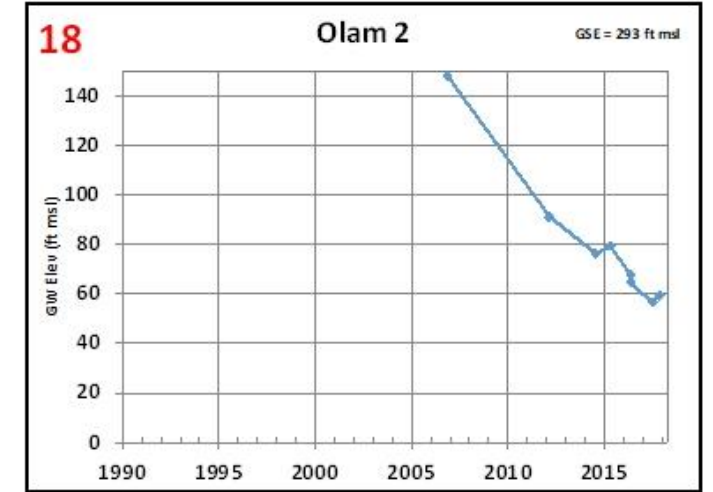
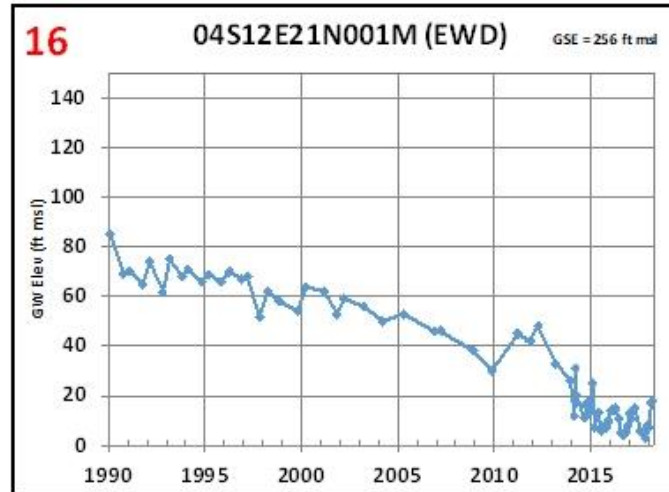
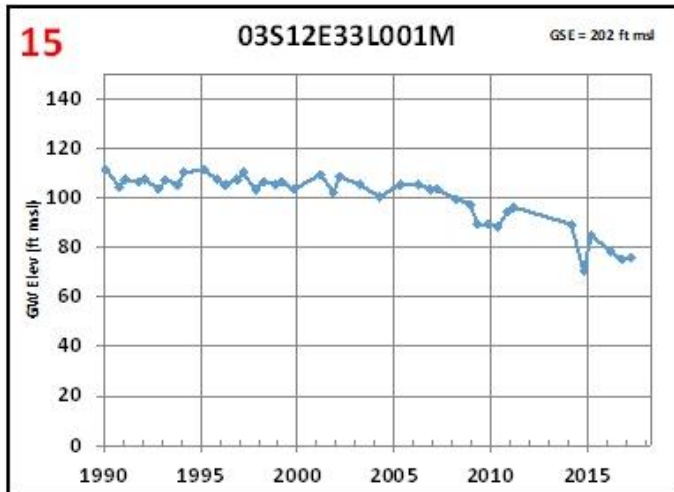
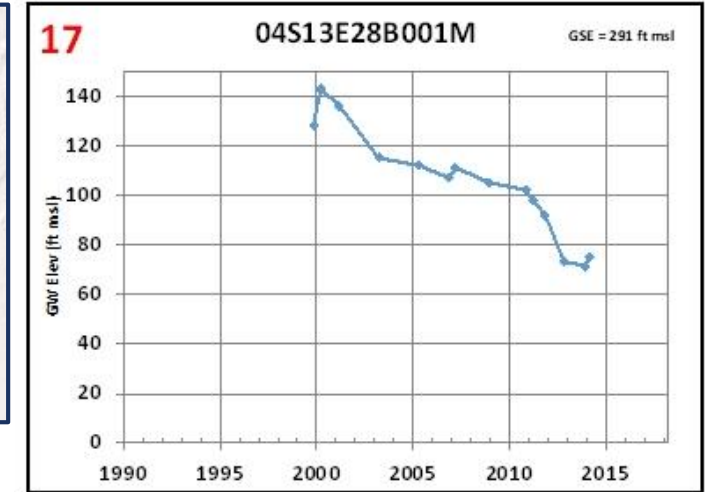
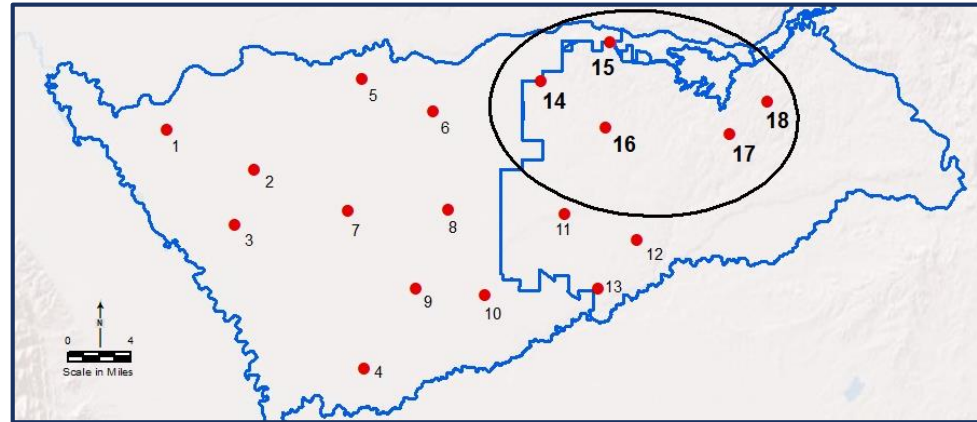
DRY OR FAILED WELLS 2014-2017



- Assistance from the two counties
- Most failed wells were old with shallow screens
- Most in western Subbasin
- What constitutes an undesirable result?



REPRESENTATIVE HYDROGRAPHS EASTERN SUBBASIN – CONSIDER RATE OF DECLINE





DEFINING UNDESIRABLE RESULTS QUESTIONS FOR CONSIDERATION

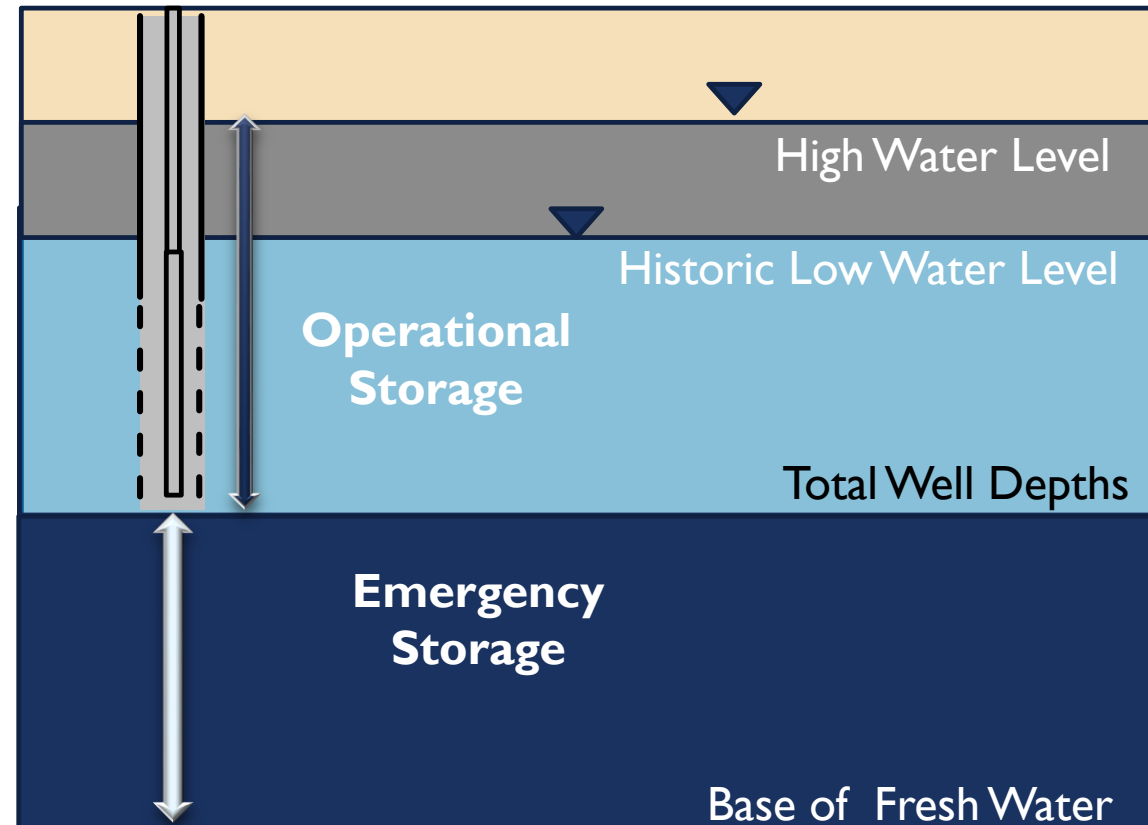
- How were wells managed during the recent drought of record? What problems did well owners encounter when water levels reached historic lows? What management issues occurred for agencies?
 - I. Could another similar drought be managed? What about a longer drought period? What conditions do we need to avoid (i.e., very difficult to manage)? Are these *undesirable results*?
- Were undesirable results occurring anywhere as of January 1, 2015? If so, what metric triggered that condition? If not, what would be a reasonable metric for a triggering event?



REDUCTION OF GROUNDWATER IN STORAGE

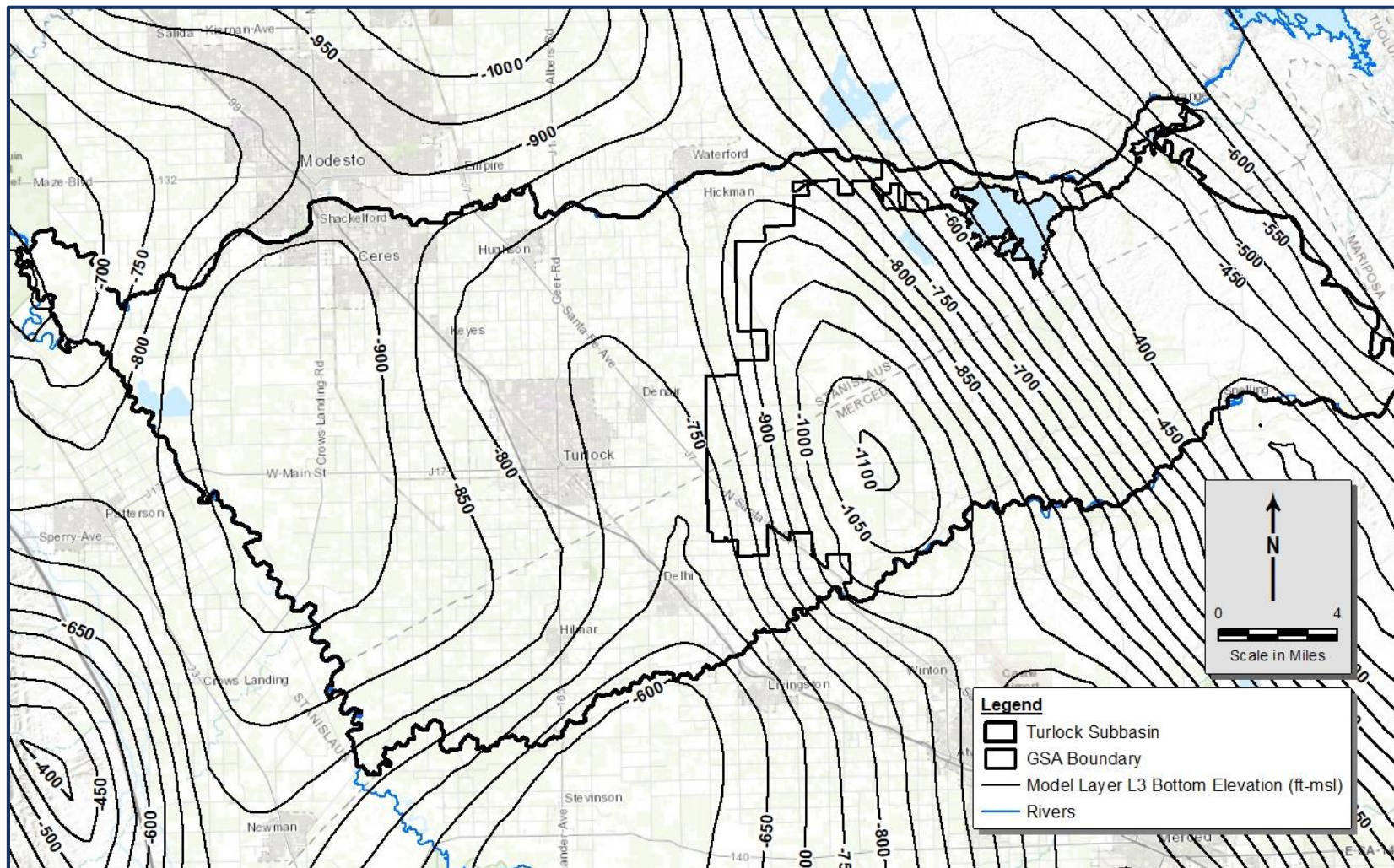
Two Aspects for this Sustainability Indicator:

- Depletion of Supply
 - *Will we “run out of water”?*
- Overdraft Conditions
 - *Is the basin being managed within its sustainable yield?*





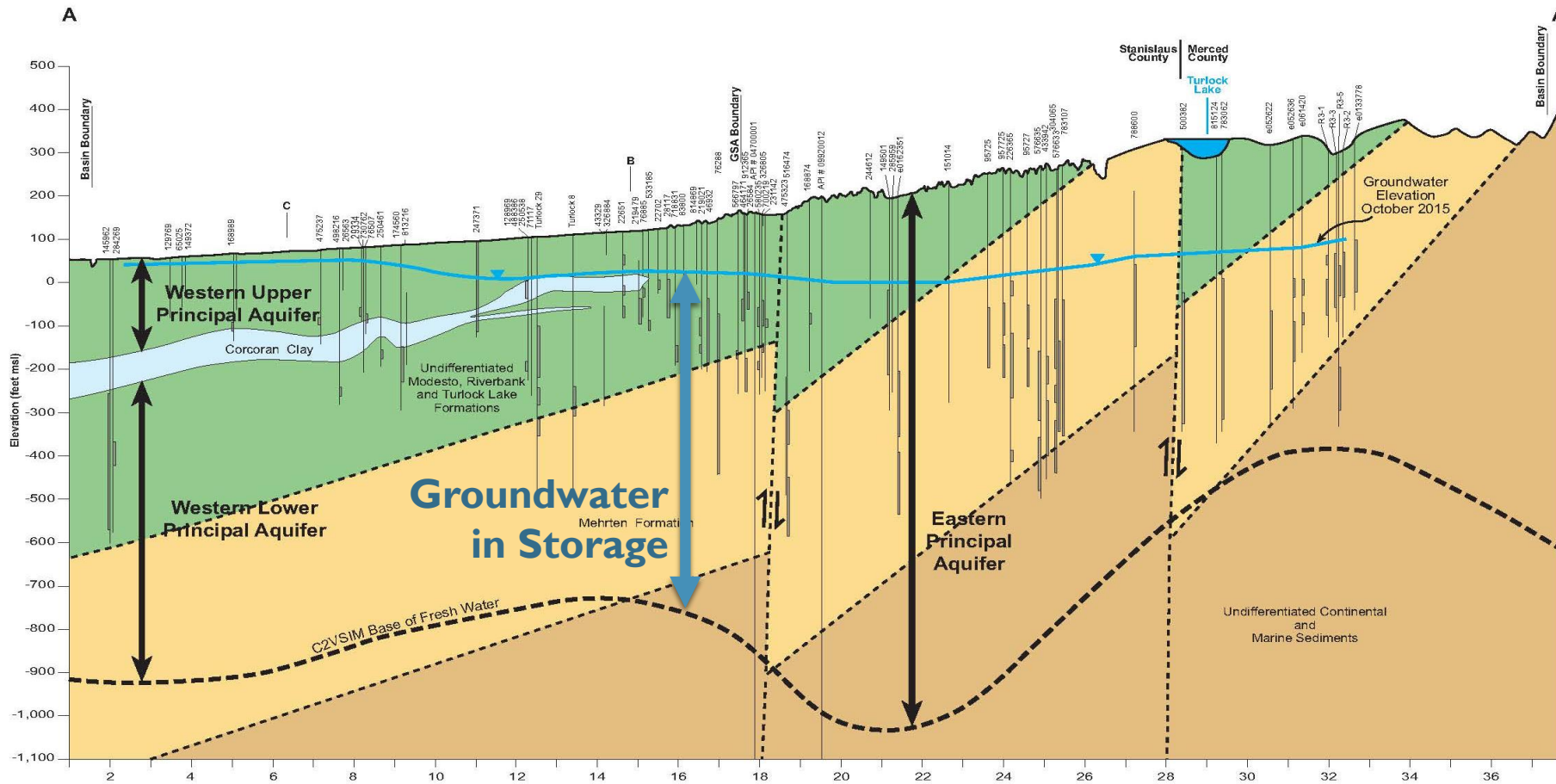
DEPLETION OF SUPPLY? C2VSIM BASE OF FRESH WATER



- Is groundwater in storage being depleted at a rate that would affect long-term supply?
- Consider the amount of groundwater in storage for the Principal Aquifers



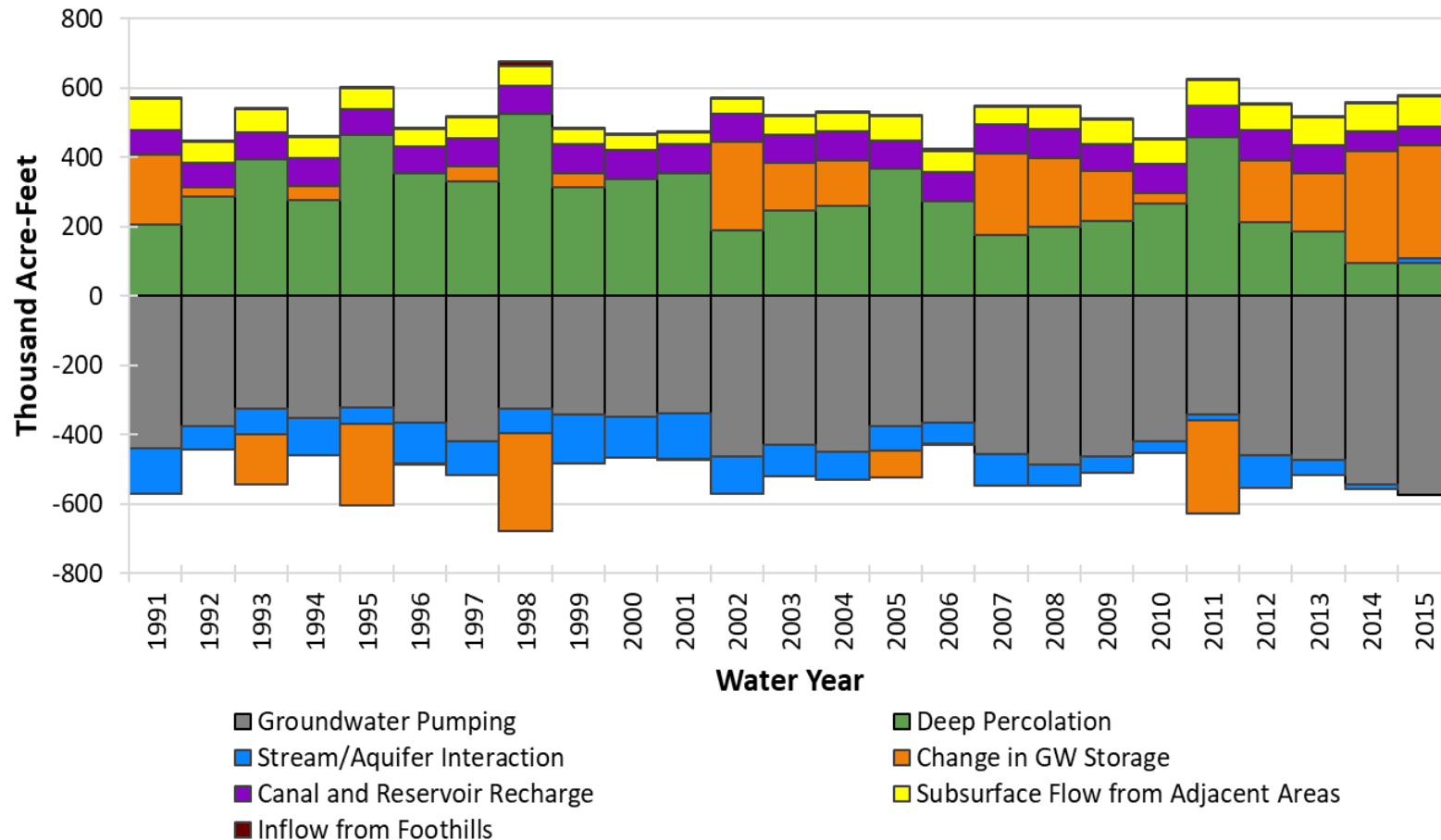
GROUNDWATER IN STORAGE



- Depletions have only impacted a relatively small percentage of the supply
- Most wells appear to be sufficiently deep to access supplies



CONSIDER SUBBASIN SUSTAINABLE YIELD



- Historical water budget indicates a deficit of about -58,600 AFY
- Includes inflow from surrounding subbasins
- Sustainable yield will vary depending on the target for subsurface flows



DEFINING UNDESIRABLE RESULTS QUESTIONS FOR CONSIDERATION

- What is the potential to adversely affect the ability of an adjacent basin to implement its plan?
- What is the target sustainable yield of the Subbasin?
 - Historical Study Period – average hydrologic conditions
 - Projected Study Period – future demands, land use, climate change
- Were undesirable results occurring as of January 1, 2015?
- If so, what metric triggered that condition? If not, what would be a reasonable metric for a triggering event?

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

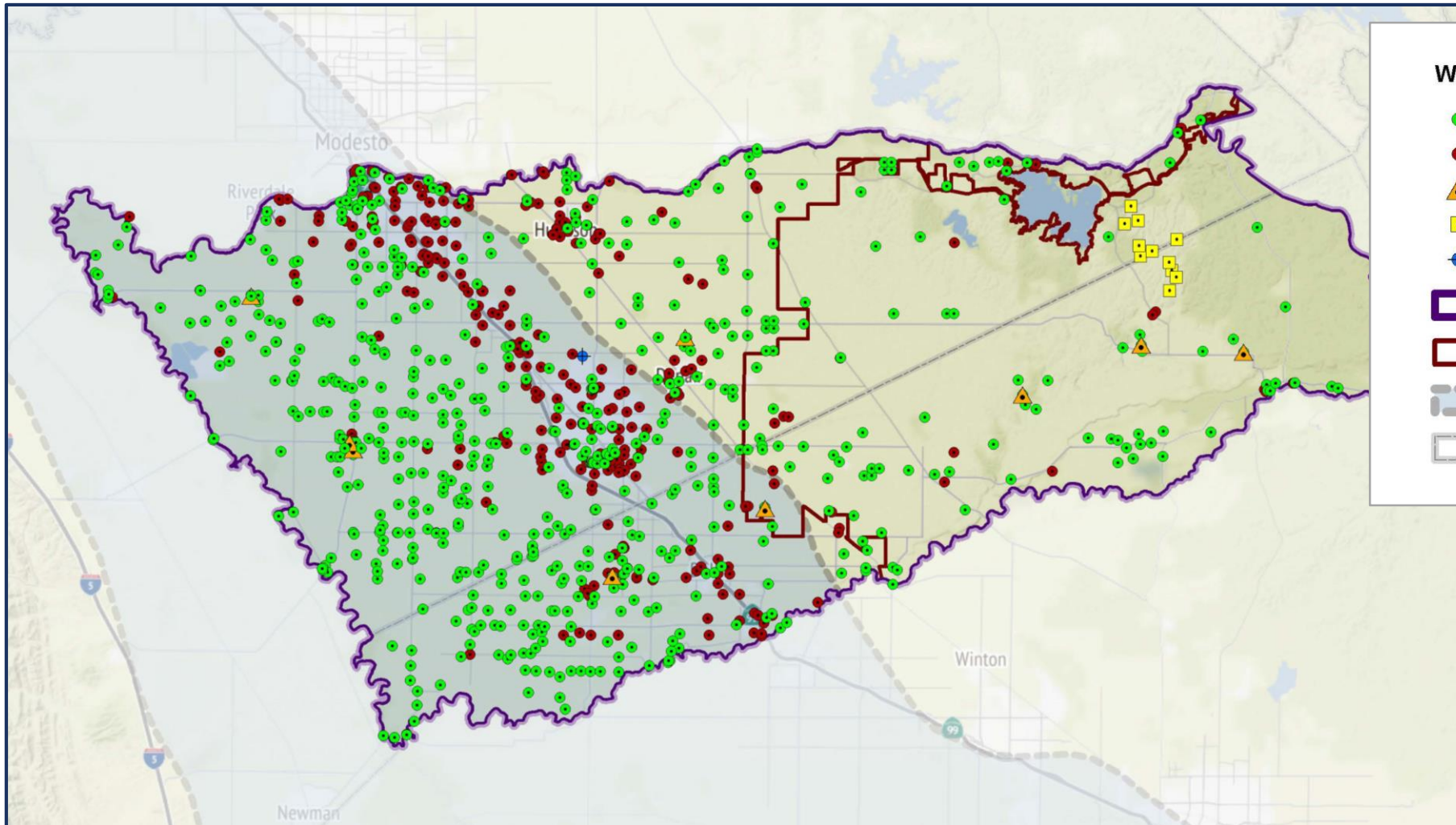


Depletion of Interconnected Surface Water affecting beneficial use

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



WELLS WITH WATER QUALITY DATA

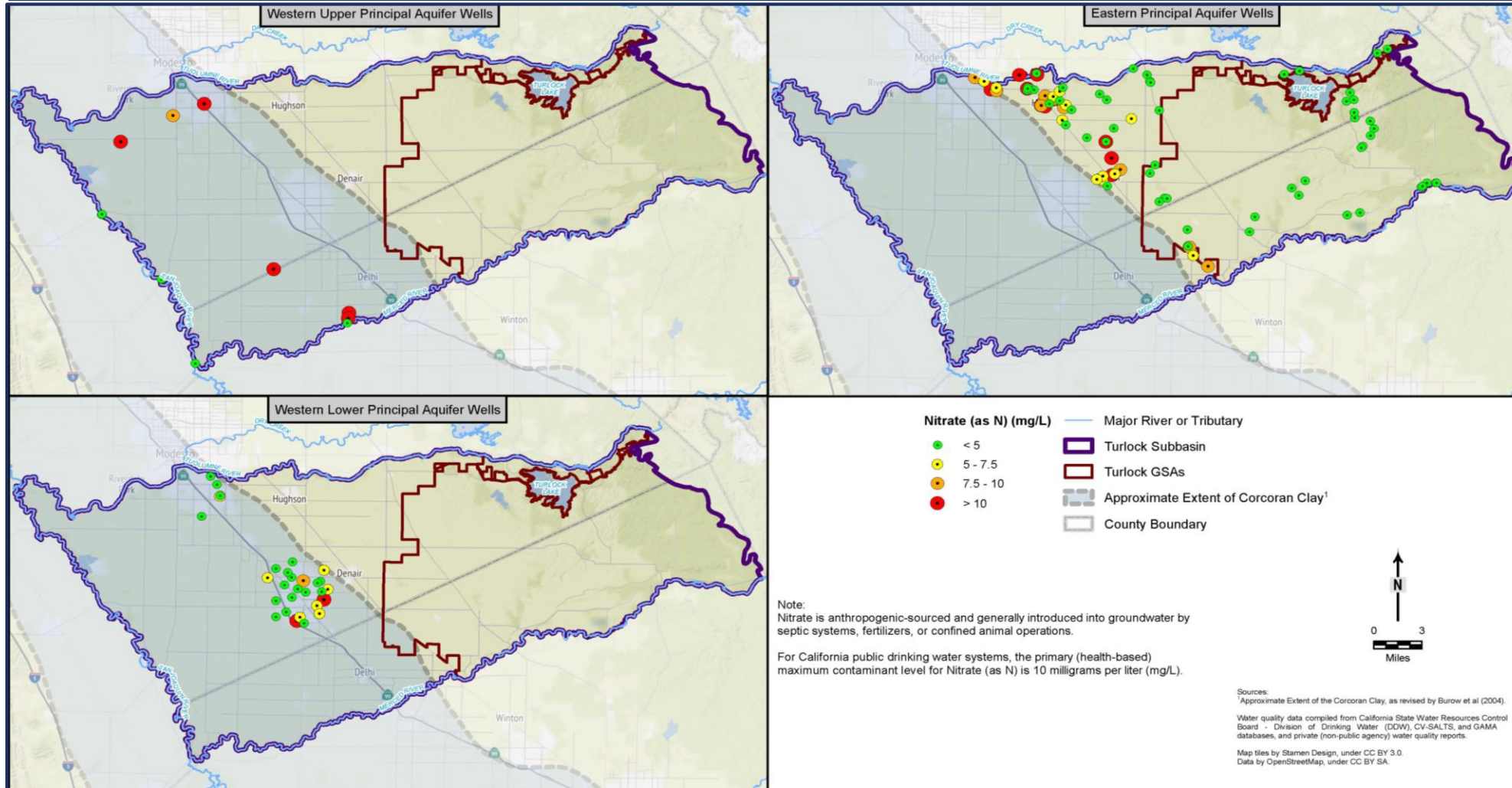


Wells with Water Quality by Data Source

- CV-SALTS
- DDW
- ▲ GAMA
- Private/Non-Agency
- ◆ Other Special Studies
- ▭ Turlock Subbasin
- ▭ Turlock GSAs
- ▭ Approximate Extent of Corcoran Clay¹
- ▭ County Boundary



NITRATE (N) IN PRINCIPAL AQUIFERS



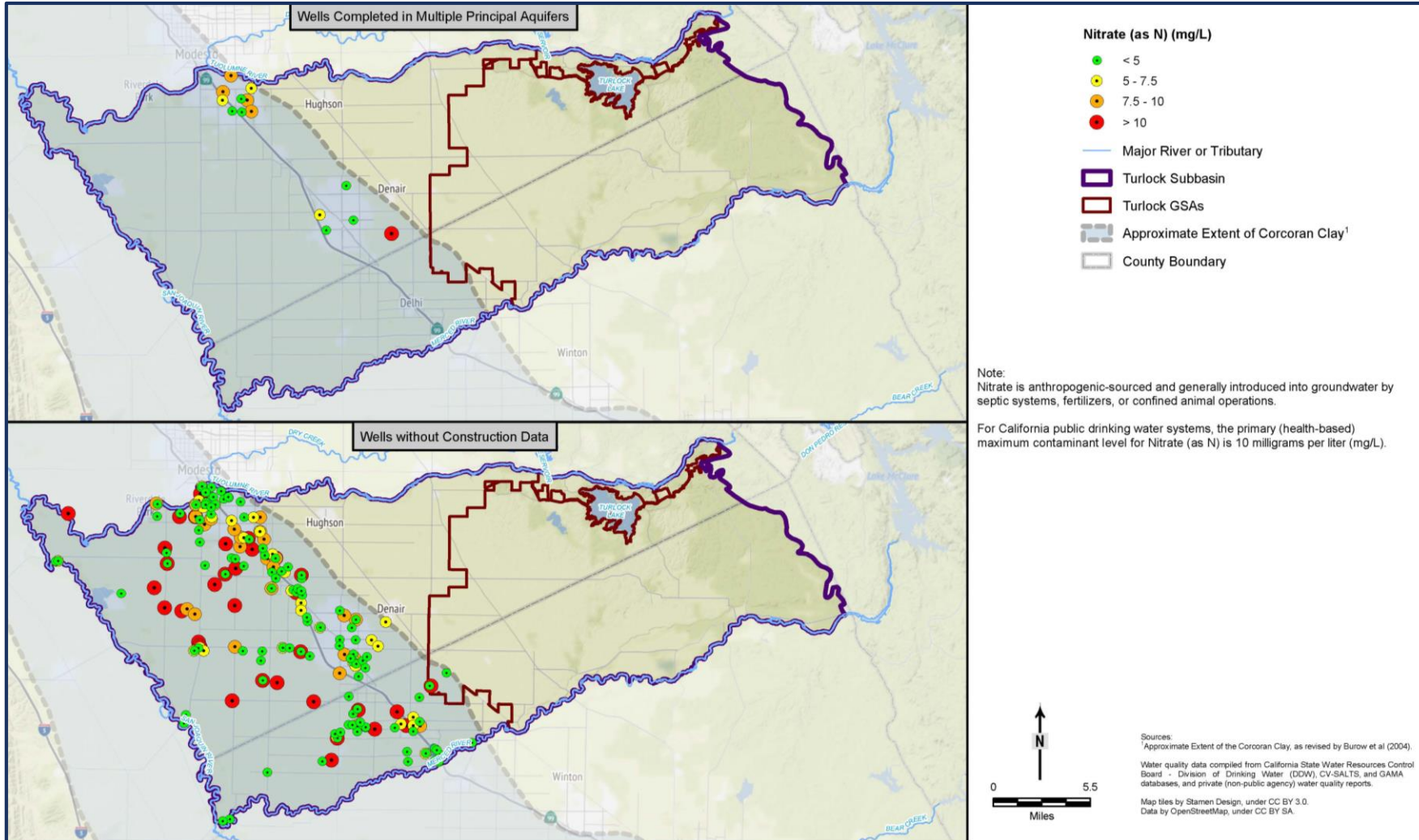
- Local elevated nitrate in groundwater
- Addressed through BMPs and ILRP?

TODD
GROUNDWATER

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME



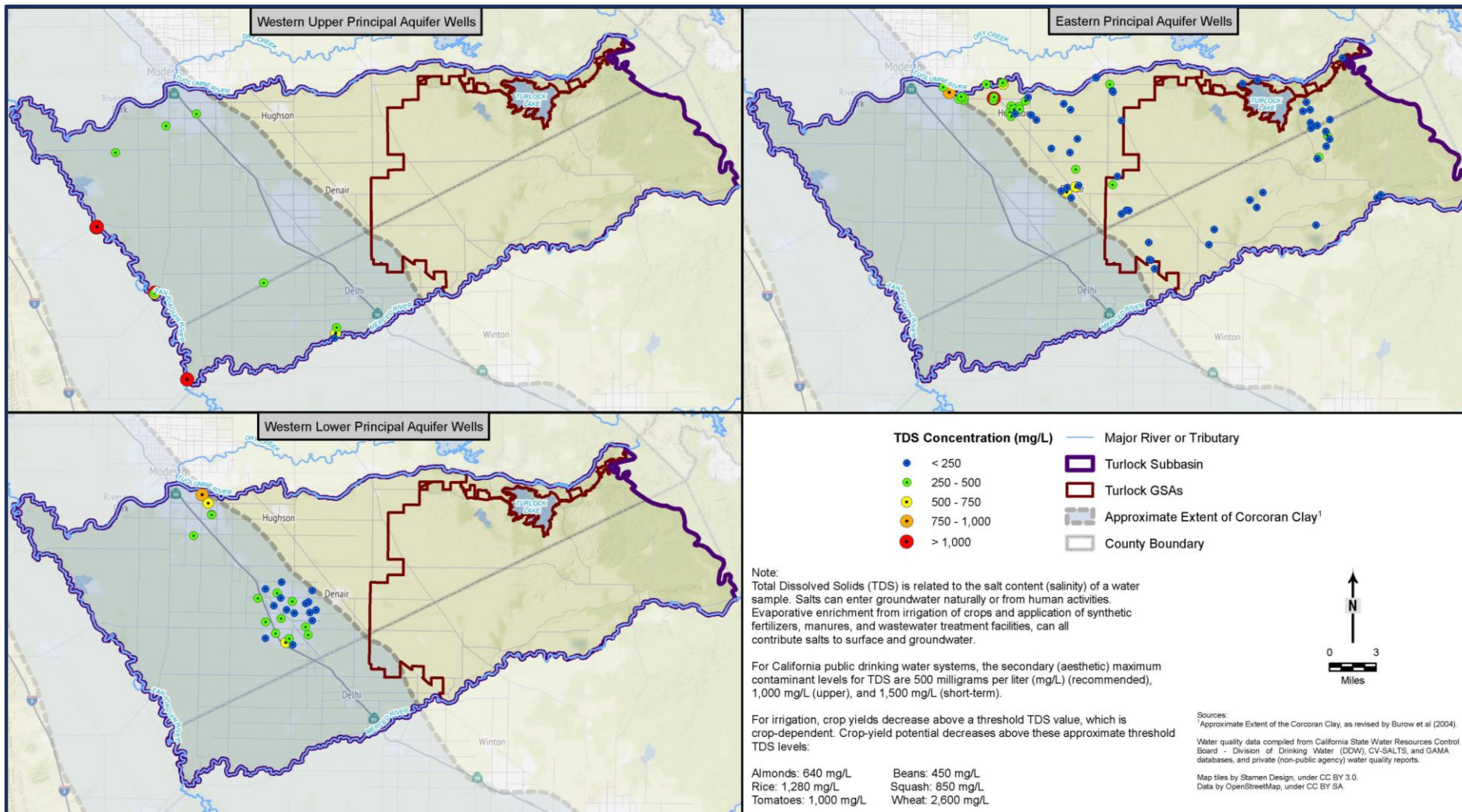
NITRATE (N) IN UNDESIGNATED WELLS



- Numerous western wells without construction data
- Elevated nitrate likely in Western Upper Principal Aquifer



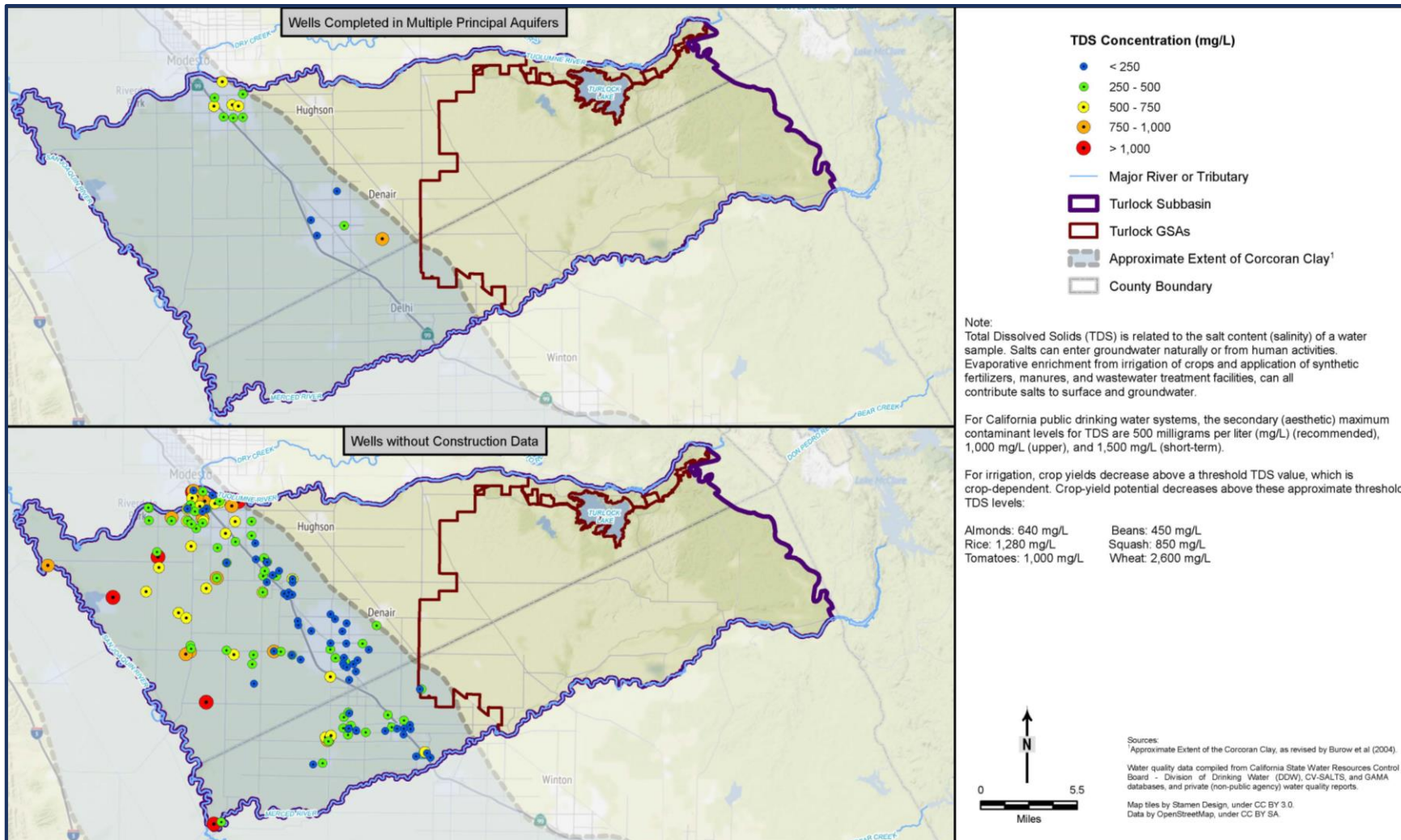
TOTAL DISSOLVED SOLIDS (TDS) IN PRINCIPAL AQUIFERS



- TDS appears relatively low except in a few localized areas
- Elevated areas in north-central and western Subbasin



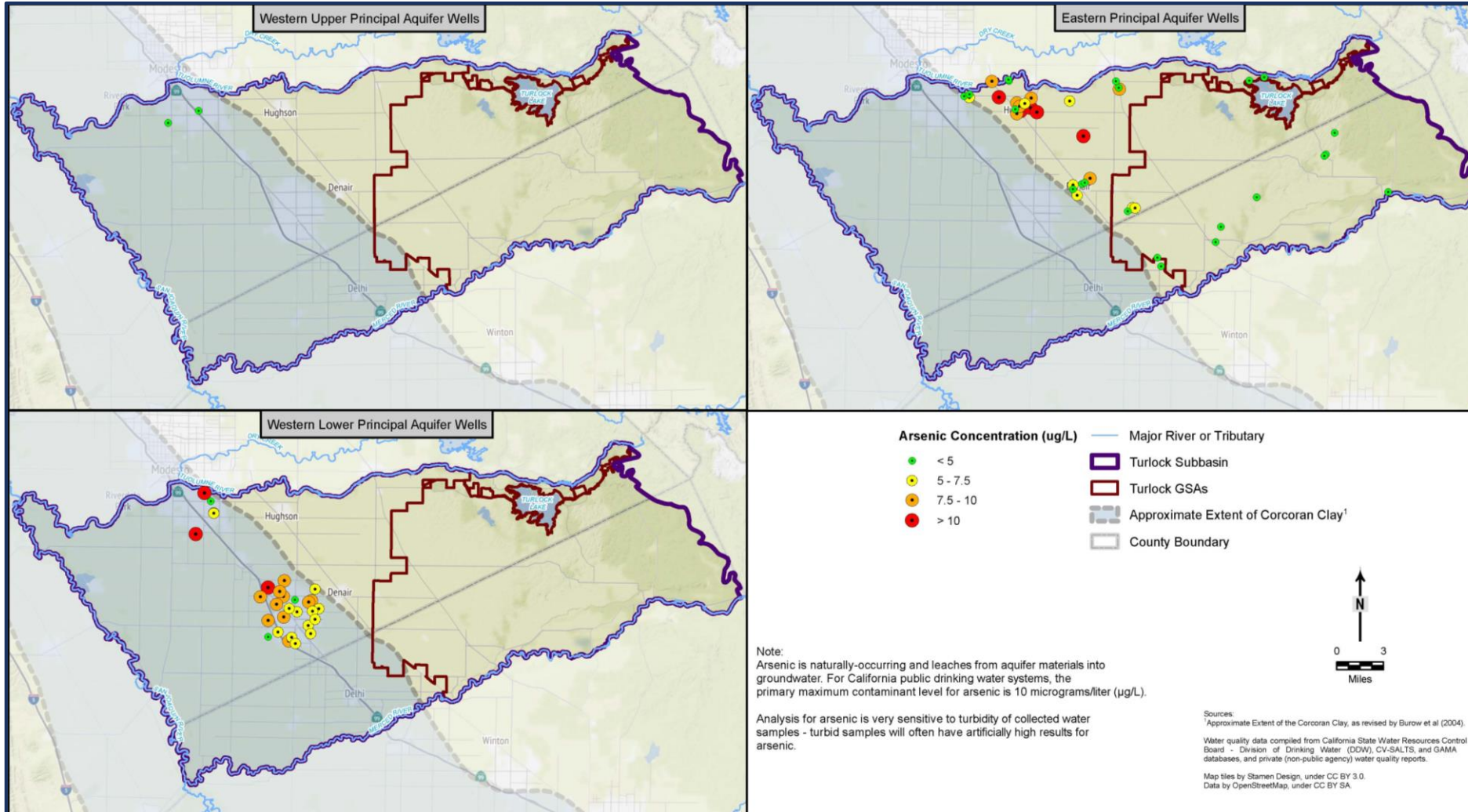
TOTAL DISSOLVED SOLIDS (TDS) IN UNDESIGNATED WELLS



- Additional areas of elevated TDS in western Subbasin
- Western Principal Aquifer unknown (Upper or Lower)



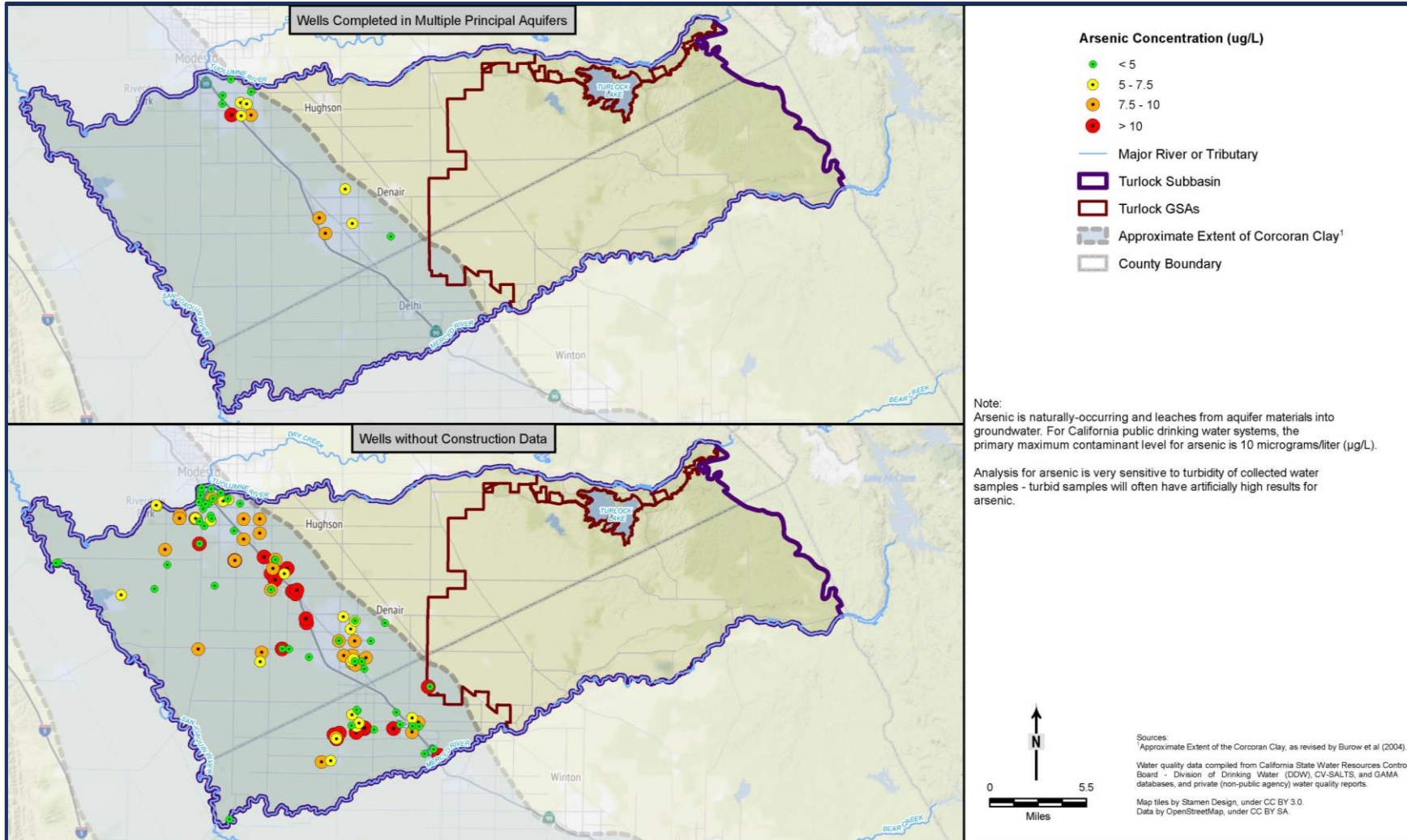
ARSENIC IN PRINCIPAL AQUIFERS



- Elevated in Eastern Principal Aquifer (northwest near Tuolumne River)
- Elevated in Western Lower Principal Aquifer



ARSENIC IN UNDESIGNATED WELLS



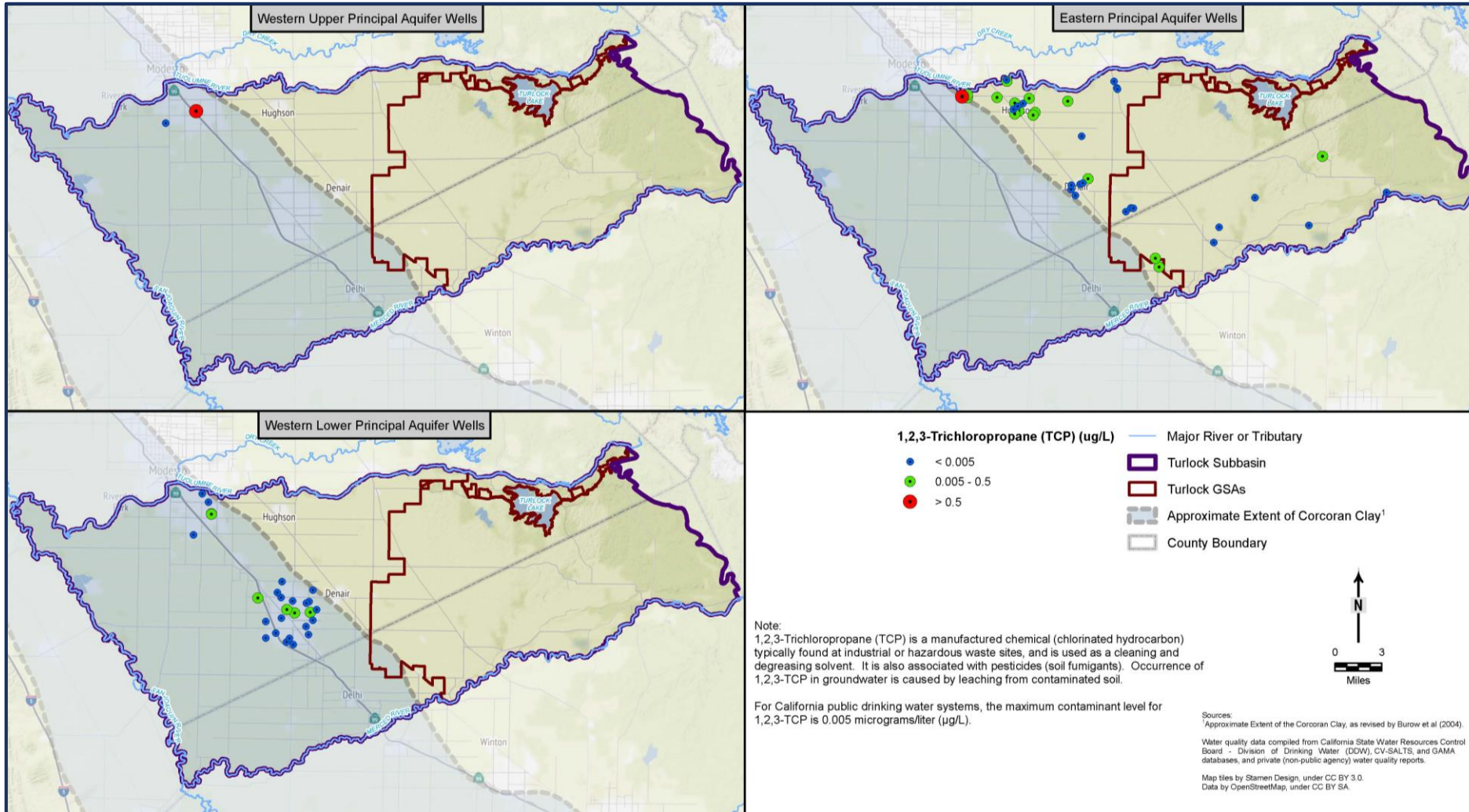
- Elevated areas in western Subbasin
- Arsenic typically associated with deeper aquifers
- Western wells with arsenic likely screened in the Western Lower Principal Aquifer?

TODD
GROUNDWATER

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME



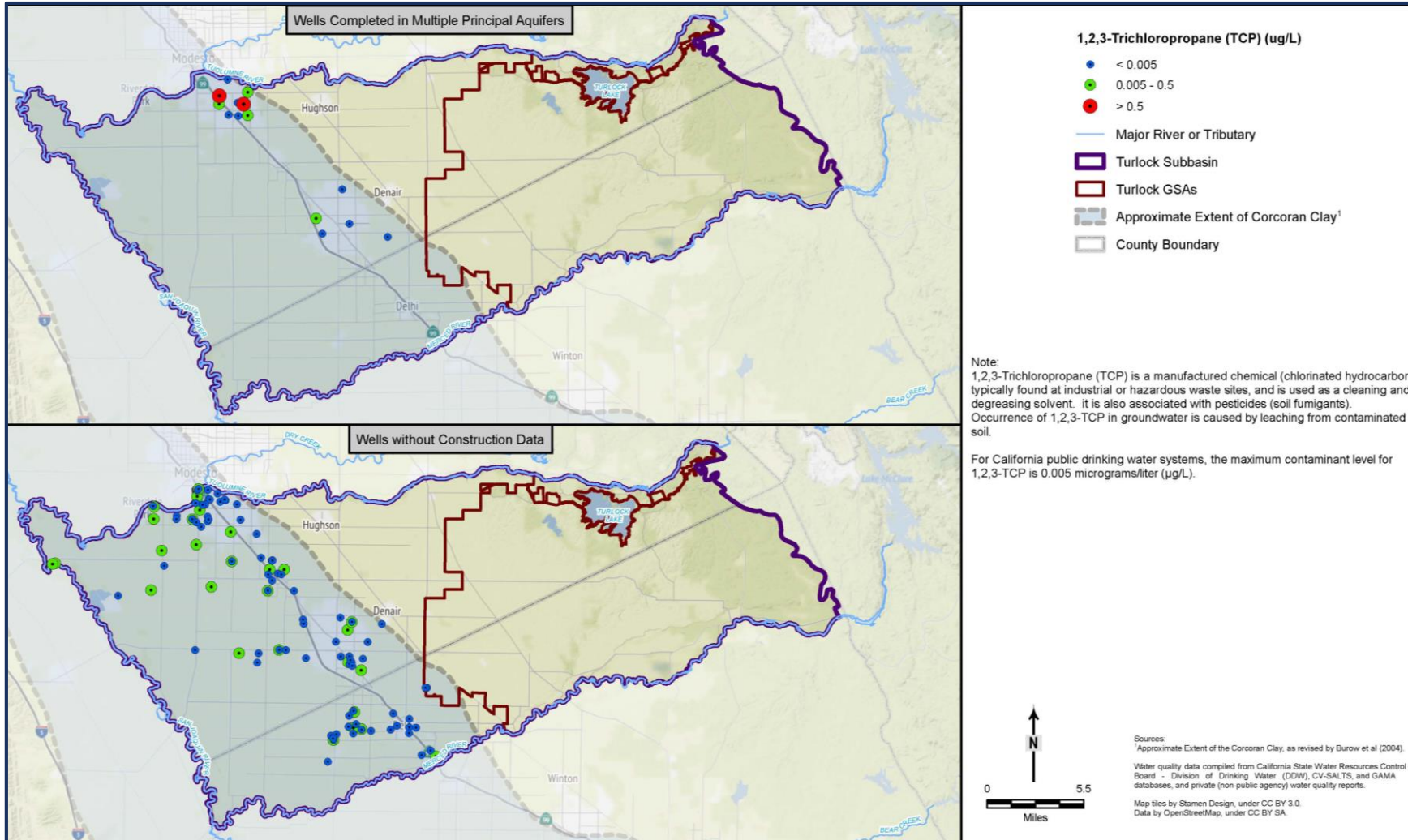
1,2,3-TCP IN PRINCIPAL AQUIFERS



- Possible non-point source from soil fumigants
- Limited data; 2017 MCL 0.005 ug/L
- How are agencies handling?



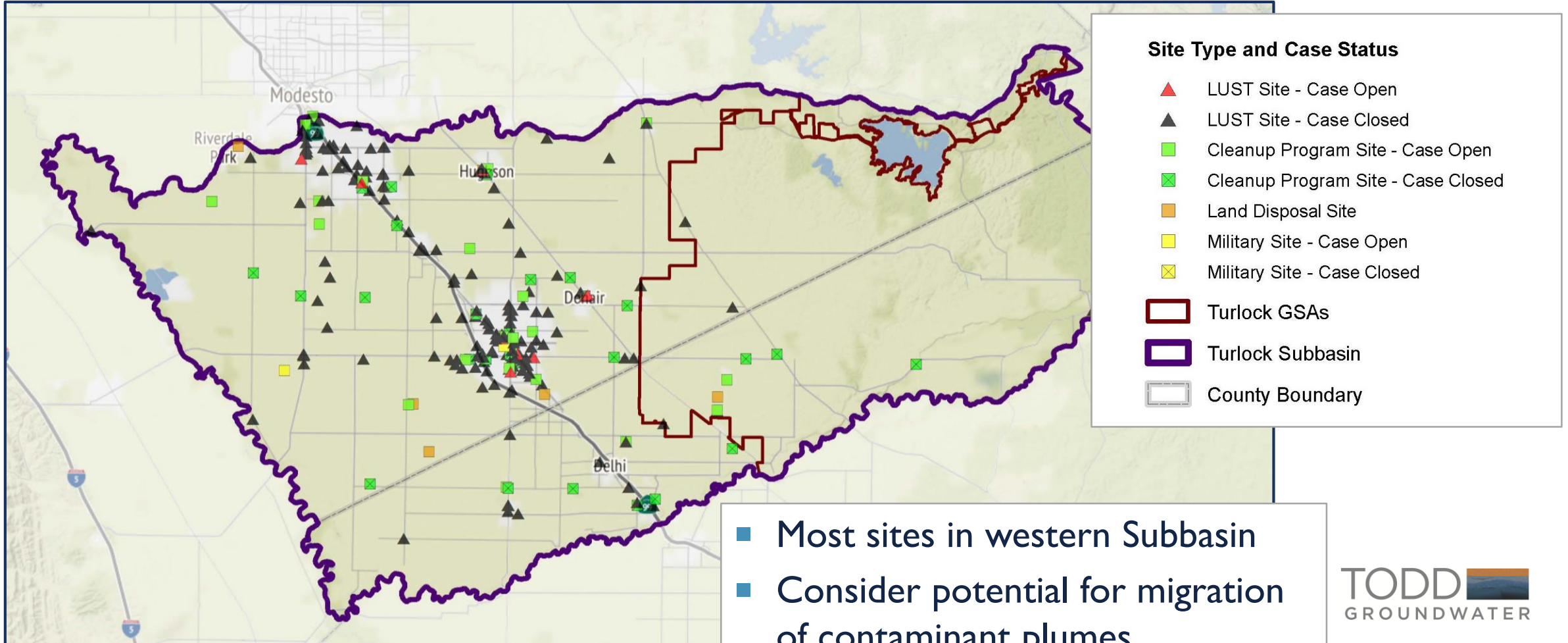
1,2,3-TCP IN UNDESIGNATED WELLS



- If sourced from the surface, elevated concentrations would more likely occur in the Western Upper Principal Aquifer (rather than deeper aquifers)



REGULATED CONTAMINATION SITES





DEFINING UNDESIRABLE RESULTS

QUESTIONS FOR CONSIDERATION

- What constituents of concern apply to the Subbasin?
- How are they being managed now?
- Were undesirable results occurring anywhere as of January 1, 2015?
- GSAs do not have the authority or mandate to duplicate other regulatory water quality programs.
- Consider how management actions and projects will affect water quality.

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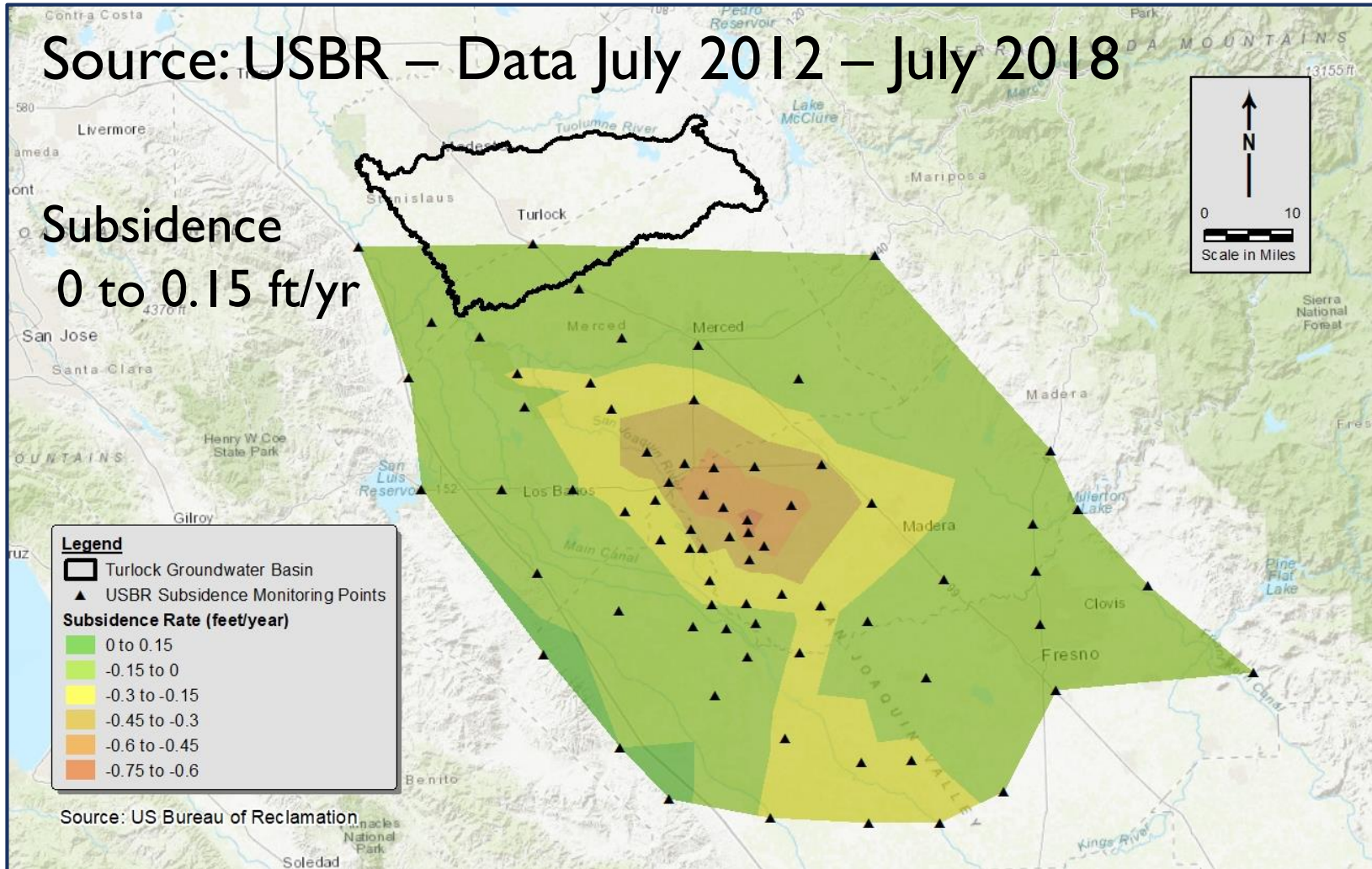
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LAND SUBSIDENCE AFFECTING LAND USE

Source: USBR – Data July 2012 – July 2018

Subsidence
0 to 0.15 ft/yr



- Subsidence not currently an issue for the Turlock Subbasin
- Set SMC to mitigate future subsidence?
- Consider adopting the Merced County ordinance as a Management Action



POSSIBLE SUBSIDENCE MANAGEMENT ACTION MERCED COUNTY GROUNDWATER ORDINANCE (#1930)

Purpose

- provide technical information on cumulative impacts of the shifting of groundwater production from below the Corcoran Clay to above the Corcoran Clay

Requirements

- As of April 2015, Merced County requires a permit for drilling a new well and moving production between aquifer systems
- Permitting process requires understanding of impacts from the well
- New wells require measuring devices for pumping and water levels

Benefits

- Will help reduce subsidence by shifting pumping from below Corcoran Clay to above Corcoran Clay
- Shallower aquifer is less stressed and easier to recharge

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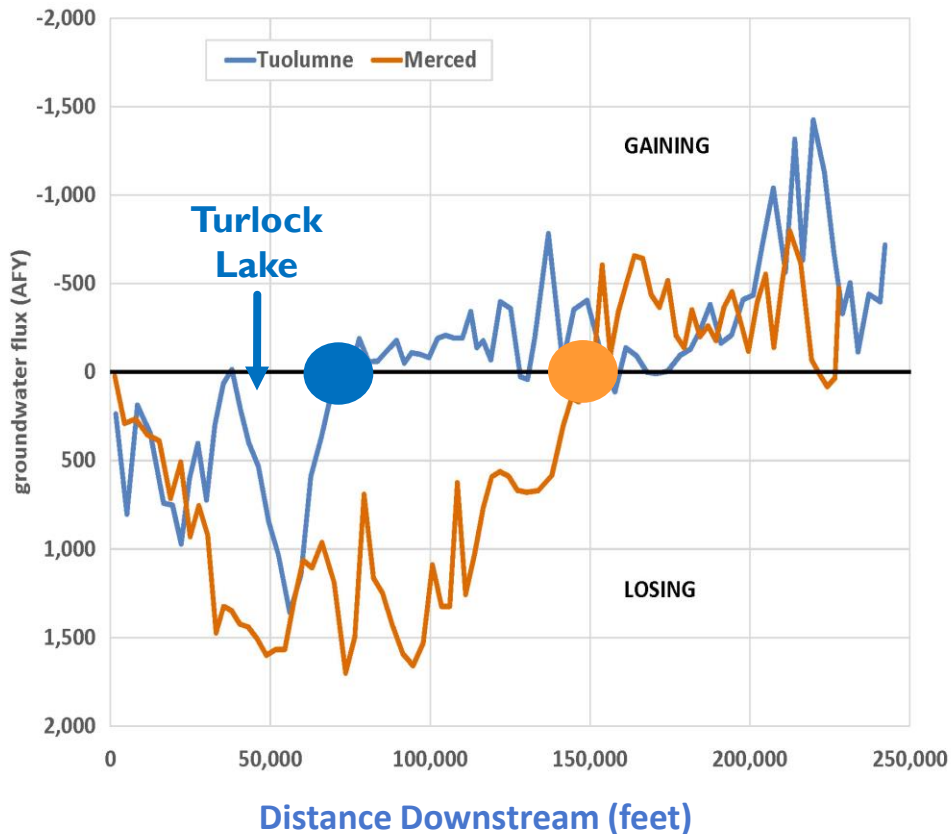
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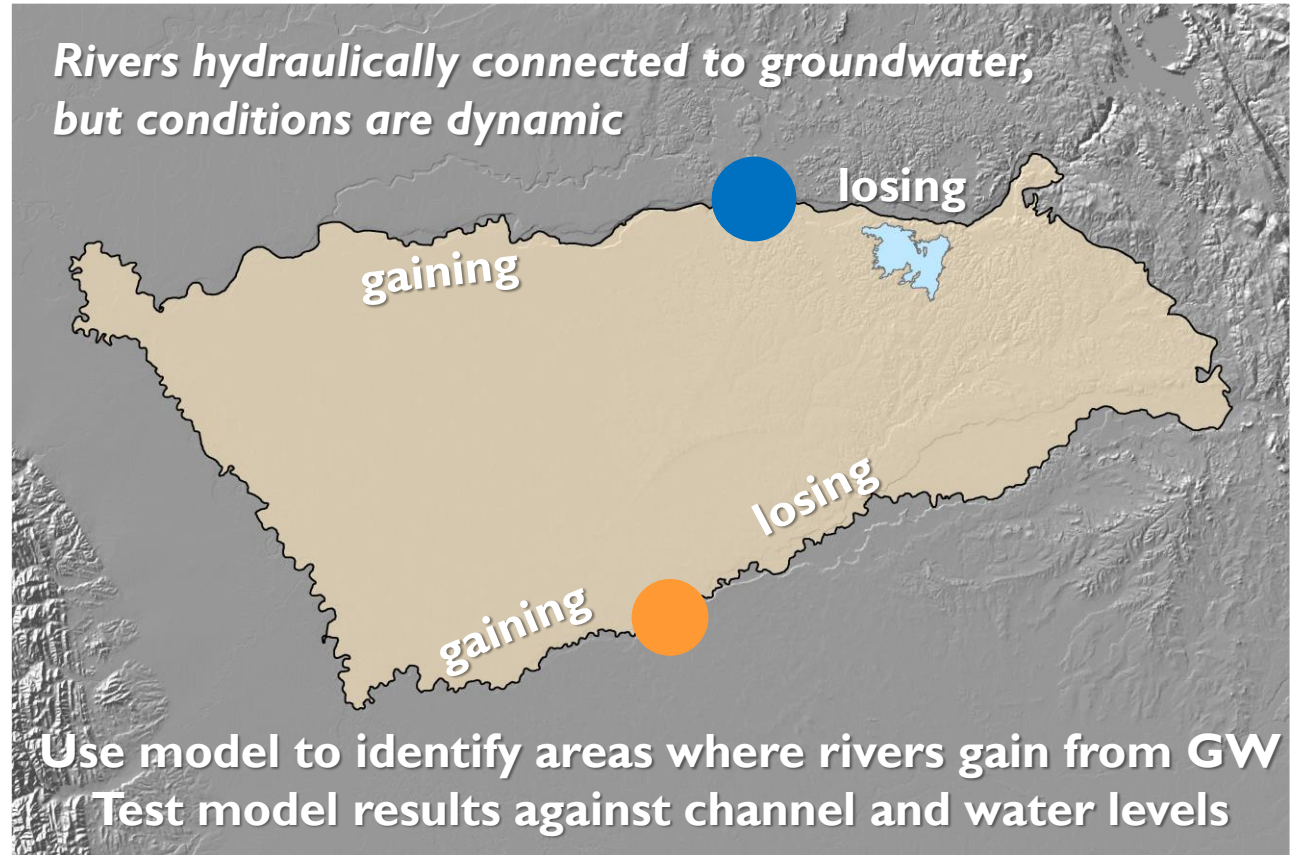


CURRENT GSP SCOPE OF SERVICES INTERCONNECTED SURFACE WATER ANALYSIS

Simulated River Fluxes – December 2012








Rivers hydraulically connected to groundwater,
but conditions are dynamic



Use model to identify areas where rivers gain from GW
Test model results against channel and water levels

Data based on former TID model: C2VSim evaluations underway.

NEXT STEPS

- Develop and approve a DRAFT Sustainability Goal
- Define undesirable results for water levels and water quality  
- Select metrics and process for:
 - Minimum thresholds
 - Measurable objectives
- Continue modeling evaluations for:
 - Reduction of groundwater in storage 
 - Interconnected surface water 
- Consider approach for land subsidence 

DISCUSSION?

