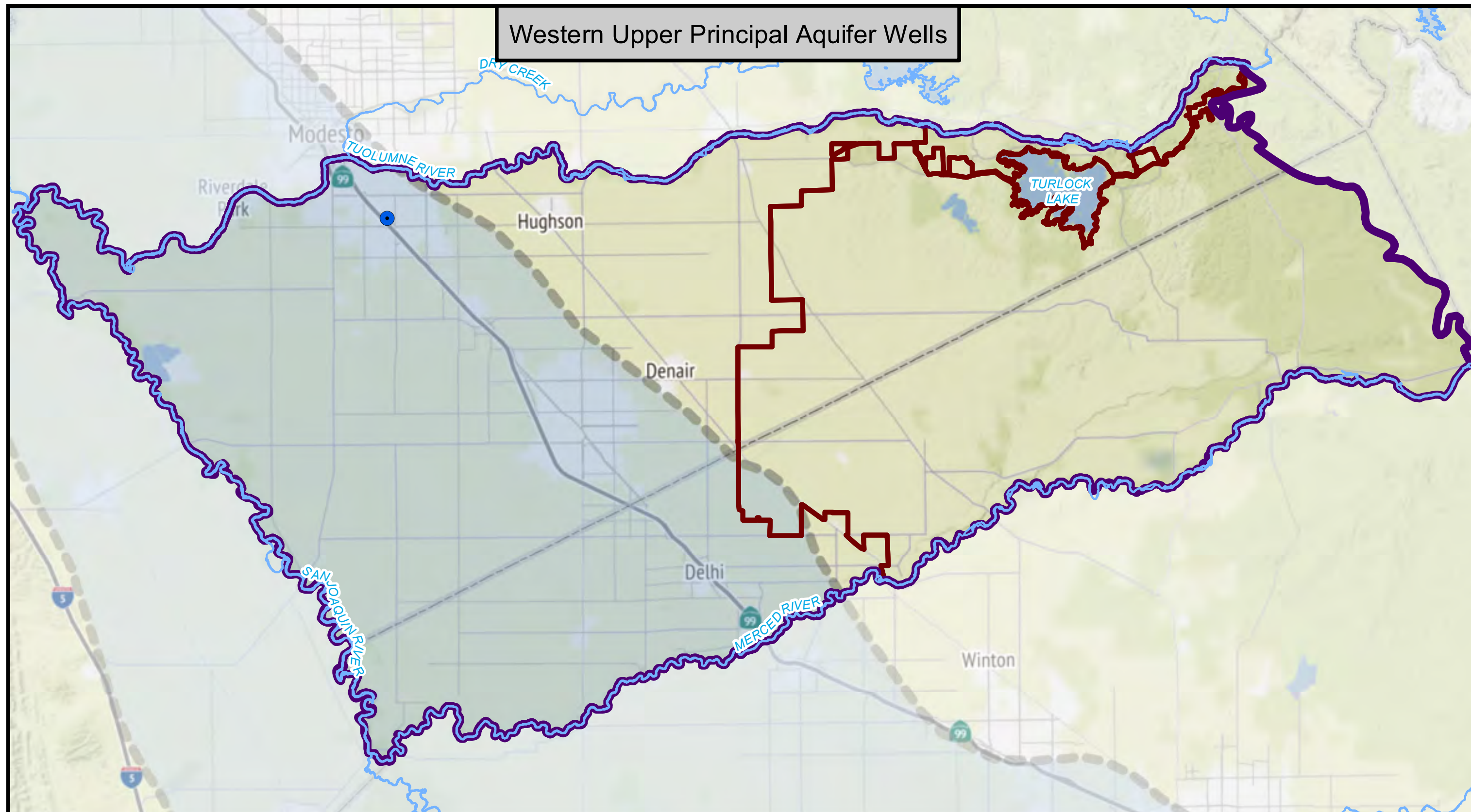

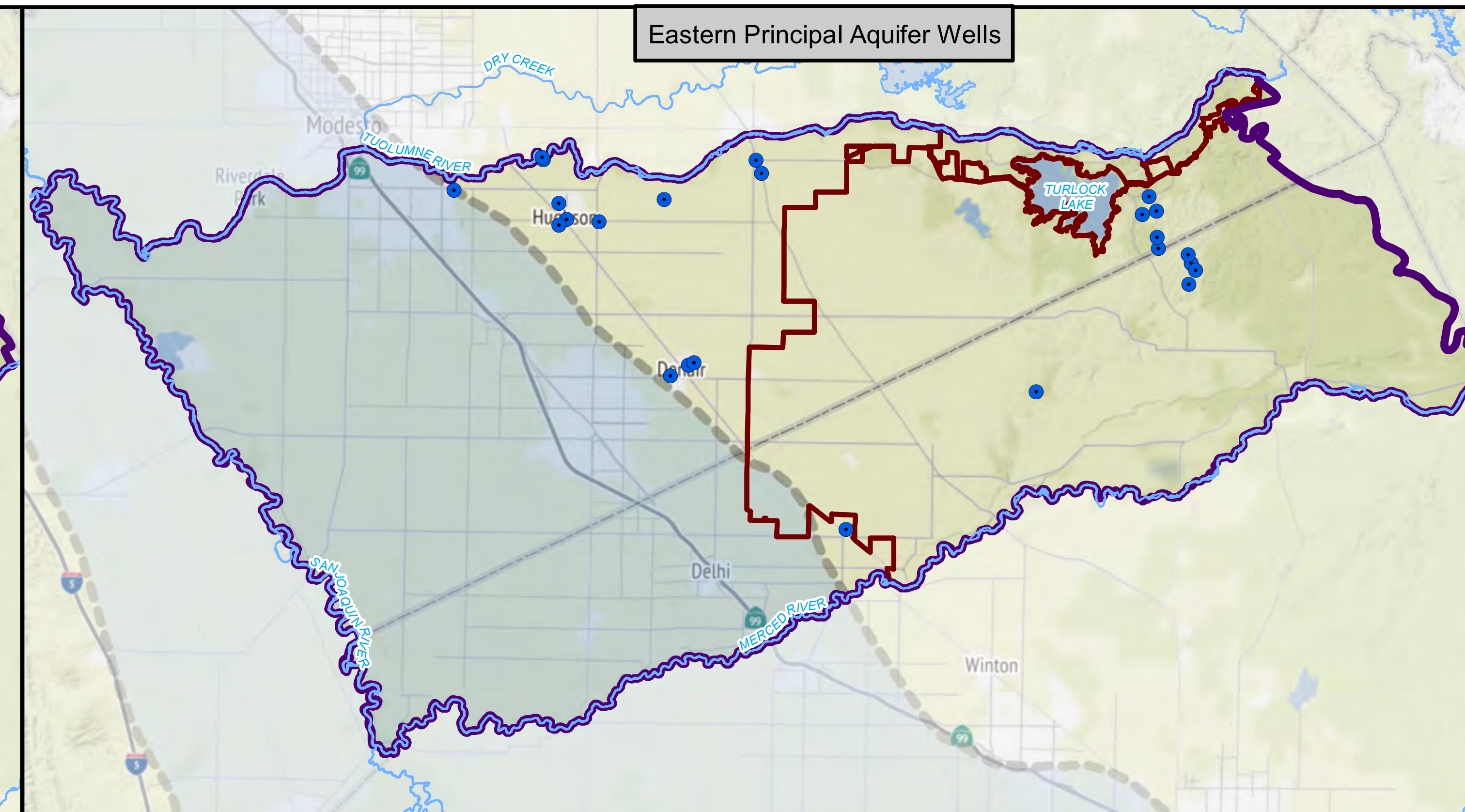

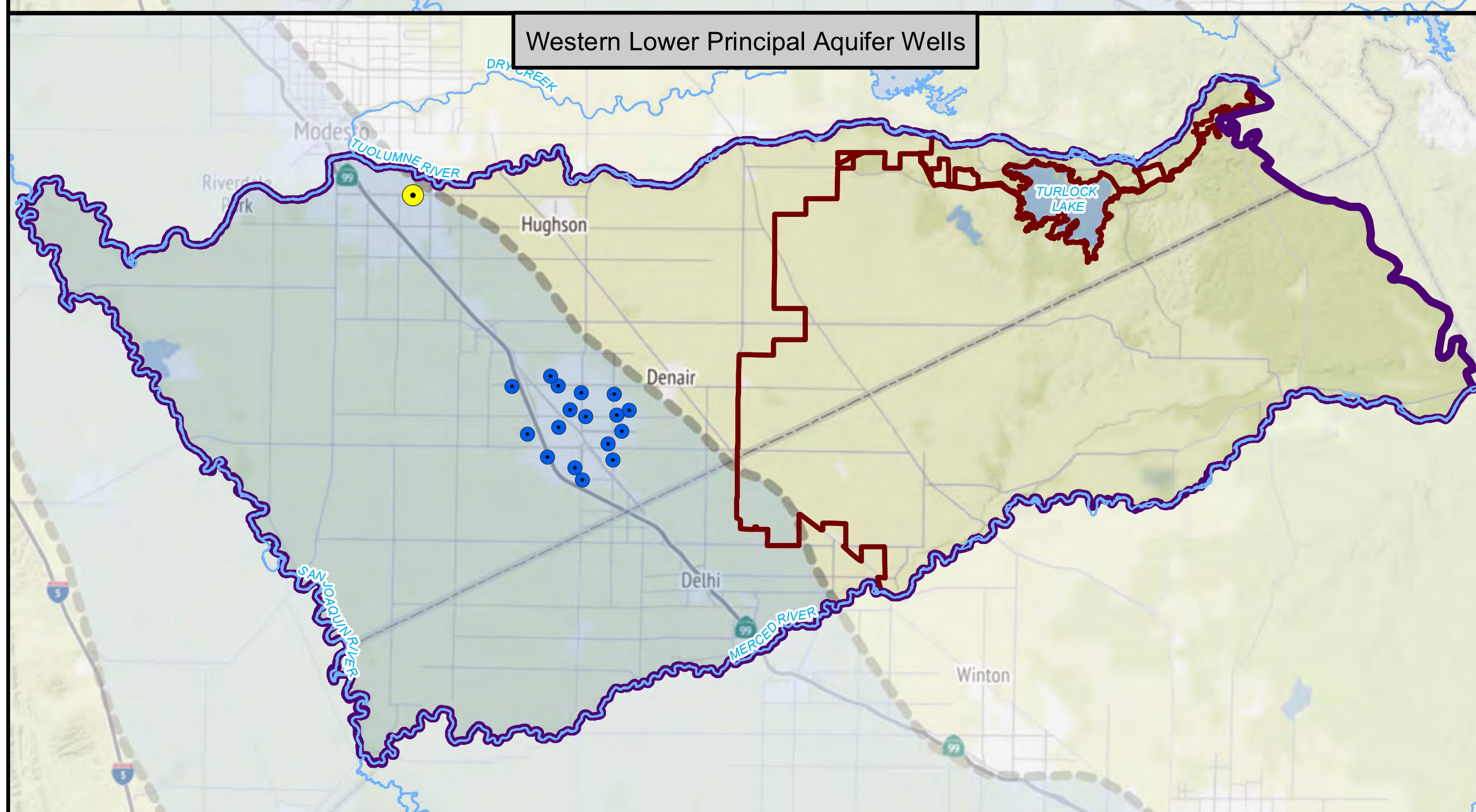

Boron Concentration (ug/L)

- < 250
- 250 - 500
- 500 - 750
- 750 - 1,000
- > 1,000

- Major River or Tributary
- Turlock Subbasin
- Turlock GSAs
- Approximate Extent of Corcoran Clay[1]
- County Boundary

Note:
Boron can occur in groundwater from leaching of rocks and soils, or can be introduced by anthropogenic sources, such as wastewater and fertizilers/pesticides. For California public drinking water systems, there is a notification level for boron of 1,000 micrograms/liter (µg/L). Notification levels are health-based advisory levels for chemicals that do not have primary maximum contaminant levels.

For irrigation, boron is necessary for crop growth, but becomes toxic to the point that crop yields may begin to decrease above these threshold boron levels:

Beans: 750 - 1000 µg/L
Squash: 2000 - 4000 µg/L
Walnuts: 500 - 750 µg/L
Tree Crops: 500 - 750 µg/L
Grapes: 500 - 750 µg/L
Tomatoes: 4000 - 6000 µg/L
Wheat: 750 - 1000 µg/L

N
0 3
Miles

Sources:
[1]Approximate Extent of the Corcoran Clay, as revised by Burow et al (2004).

Water quality data compiled from California State Water Resources Control Board - Division of Drinking Water (DDW), CV-SALTS, and GAMA databases, and private (non-public agency) water quality reports.

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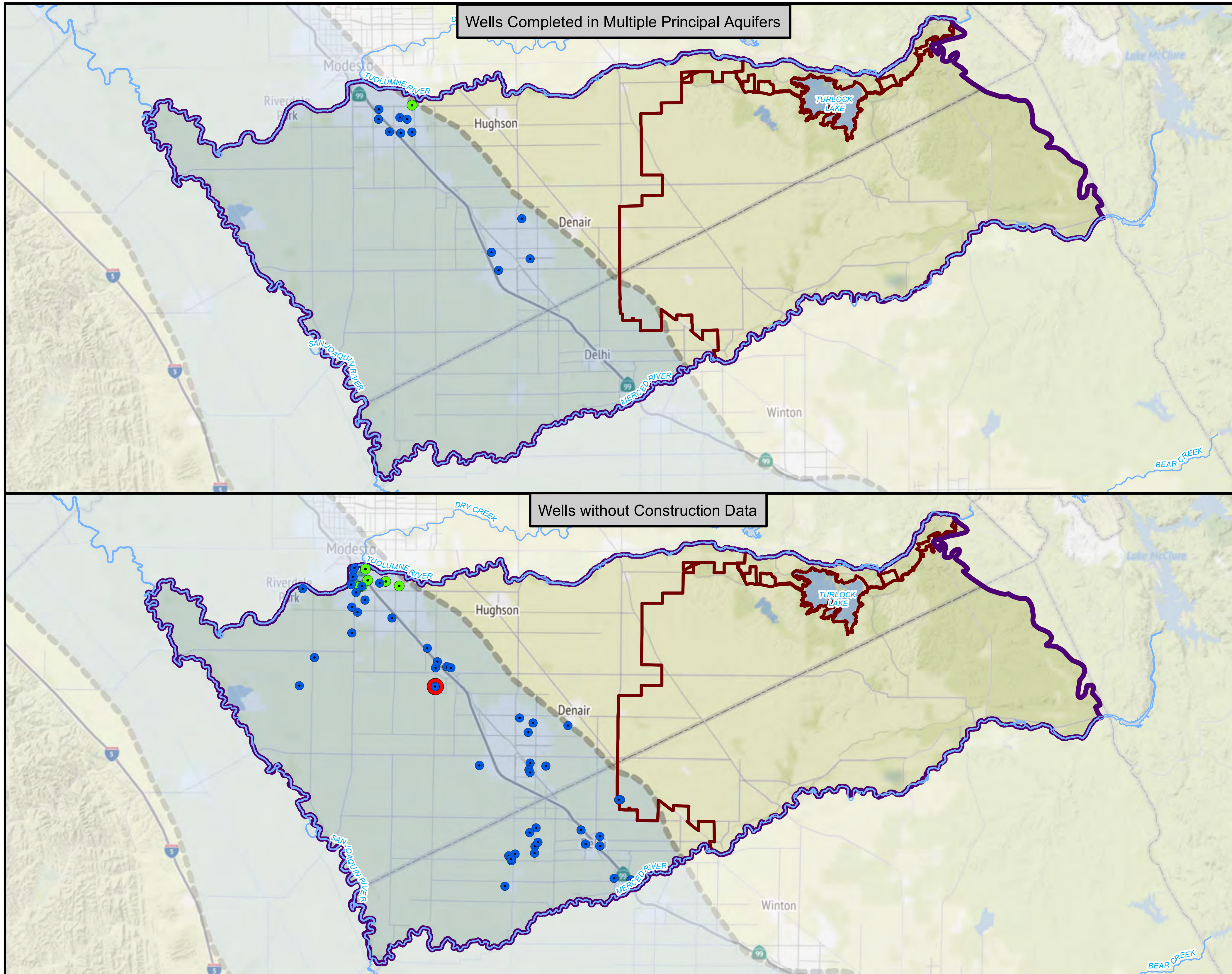
Figure 4-49
Boron
in Principal
Aquifers



Boron Concentration (ug/L)

- < 250
- 250 - 500
- 500 - 750
- 750 - 1,000
- > 1,000

- Major River or Tributary
- Turlock Subbasin
- Turlock GSAs
- Approximate Extent of Corcoran Clay[1]
- County Boundary

Note:
Boron can occur in groundwater from leaching of rocks and soils, or can be introduced by anthropogenic sources, such as wastewater and fertilizers/pesticides. For California public drinking water systems, there is a notification level for boron of 1,000 micrograms/liter (μg/L). Notification levels are health-based advisory levels for chemicals that do not have primary maximum contaminant levels.

For irrigation, boron is necessary for crop growth, but becomes toxic to the point that crop yields may begin to decrease above these threshold boron levels:

Beans: 750 - 1000 μg/L
Squash: 2000 - 4000 μg/L
Walnuts: 500 - 750 μg/L
Tree Crops: 500 - 750 μg/L
Grapes: 500 - 750 μg/L
Tomatoes: 4000 - 6000 μg/L
Wheat: 750 - 1000 μg/L

N

0 5.5
Miles

Sources:
[1]Approximate Extent of the Corcoran Clay, as revised by Burow et al (2004).

Water quality data compiled from California State Water Resources Control Board - Division of Drinking Water (DDW), CV-SALTS, and GAMA databases, and private (non-public agency) water quality reports.

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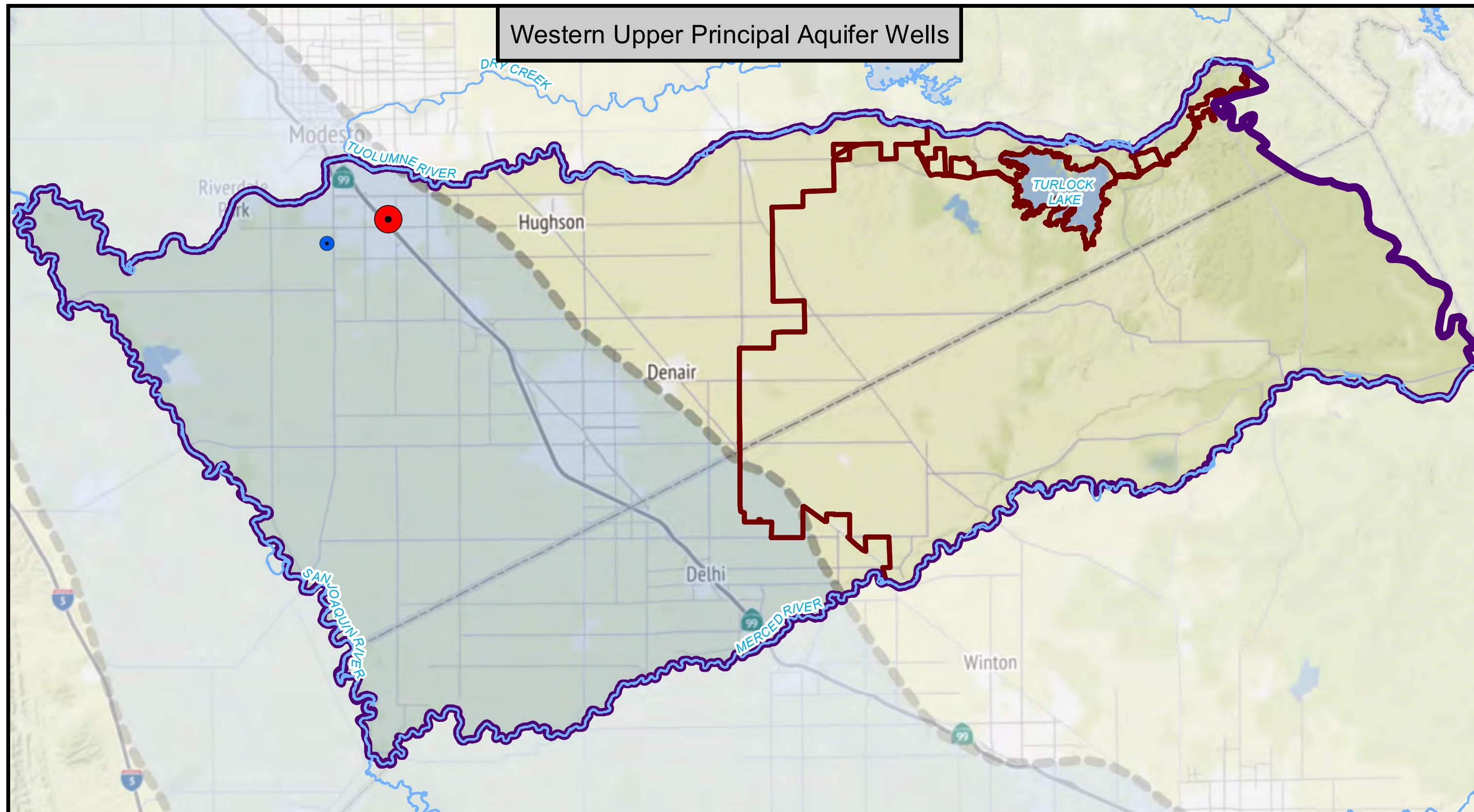
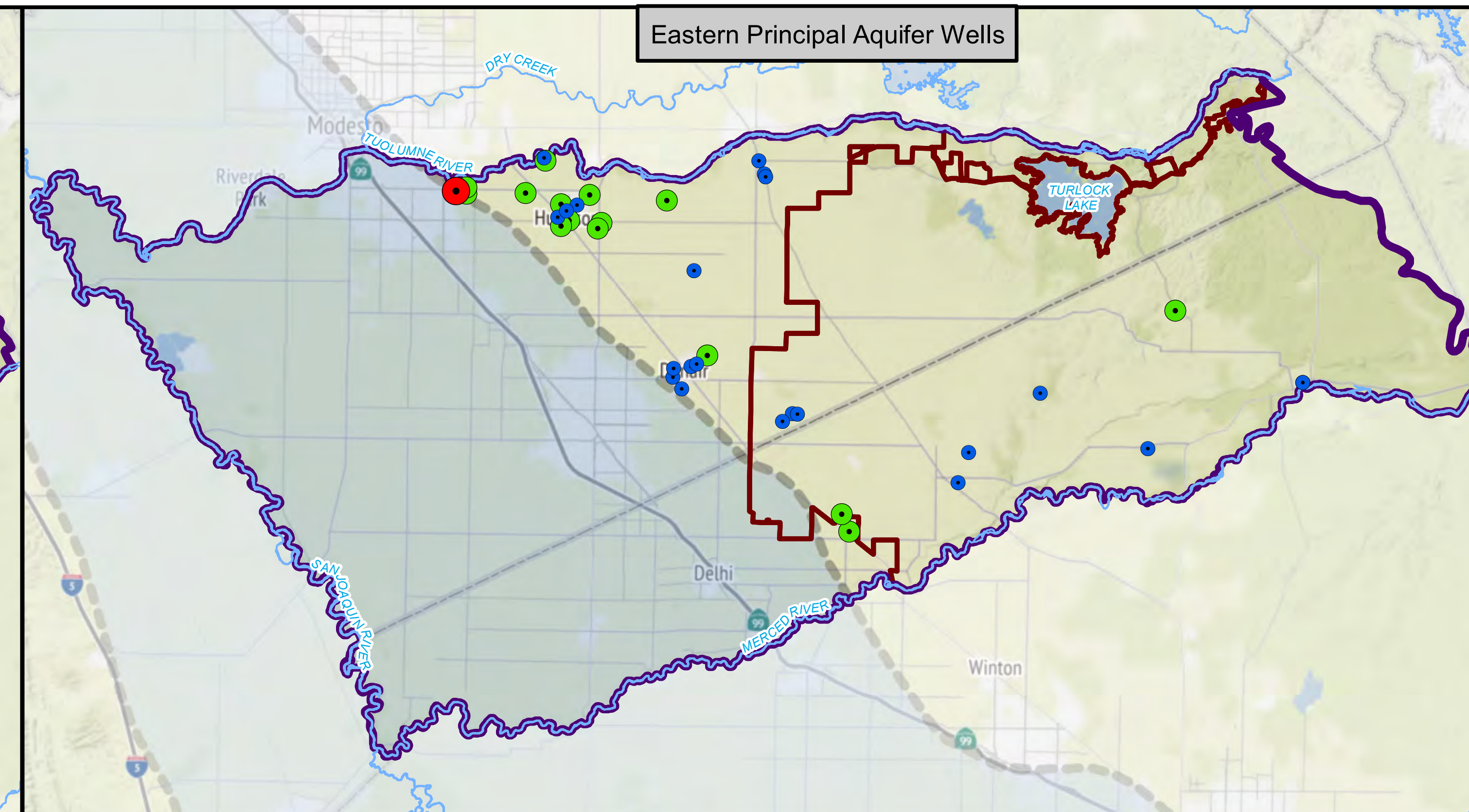
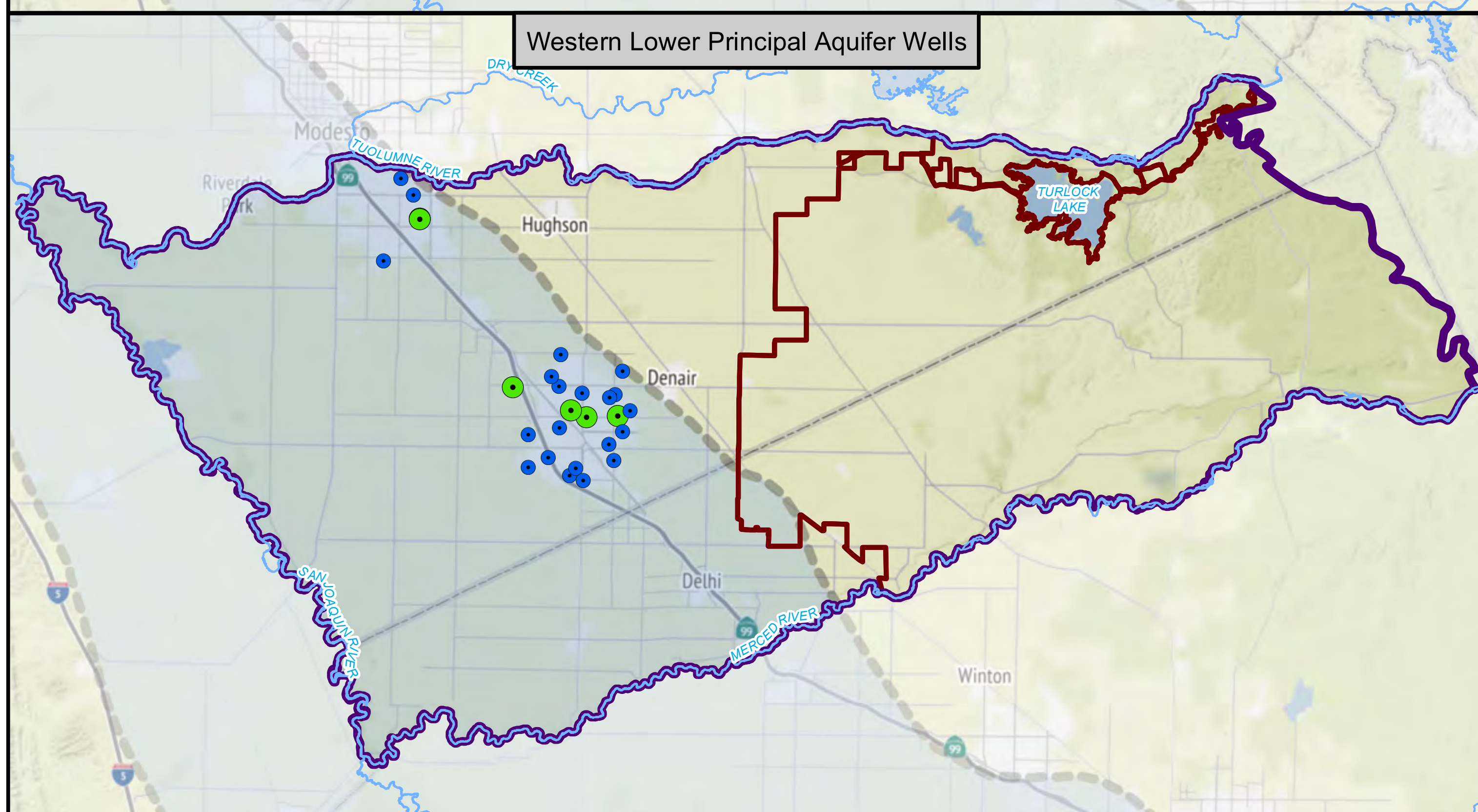
Figure 4-50
Boron in Undesignated Wells







1,2,3-Trichloropropane (TCP) (ug/L)

- < 0.005
- 0.005 - 0.5
- > 0.5

- Major River or Tributary
- Turlock Subbasin
- Turlock GSAs
- Approximate Extent of Corcoran Clay[1]
- County Boundary

N

0 3 Miles

Note:
1,2,3-Trichloropropane (TCP) is a manufactured chemical (chlorinated hydrocarbon) typically found at industrial or hazardous waste sites, and is used as a cleaning and degreasing solvent. It is also associated with pesticides (soil fumigants). Occurrence of 1,2,3-TCP in groundwater is caused by leaching from contaminated soil.

For California public drinking water systems, the maximum contaminant level for 1,2,3-TCP is 0.005 micrograms/liter (µg/L).

Sources:
[1]Approximate Extent of the Corcoran Clay, as revised by Burow et al (2004).

Water quality data compiled from California State Water Resources Control Board - Division of Drinking Water (DDW), CV-SALTS, and GAMA databases, and private (non-public agency) water quality reports.

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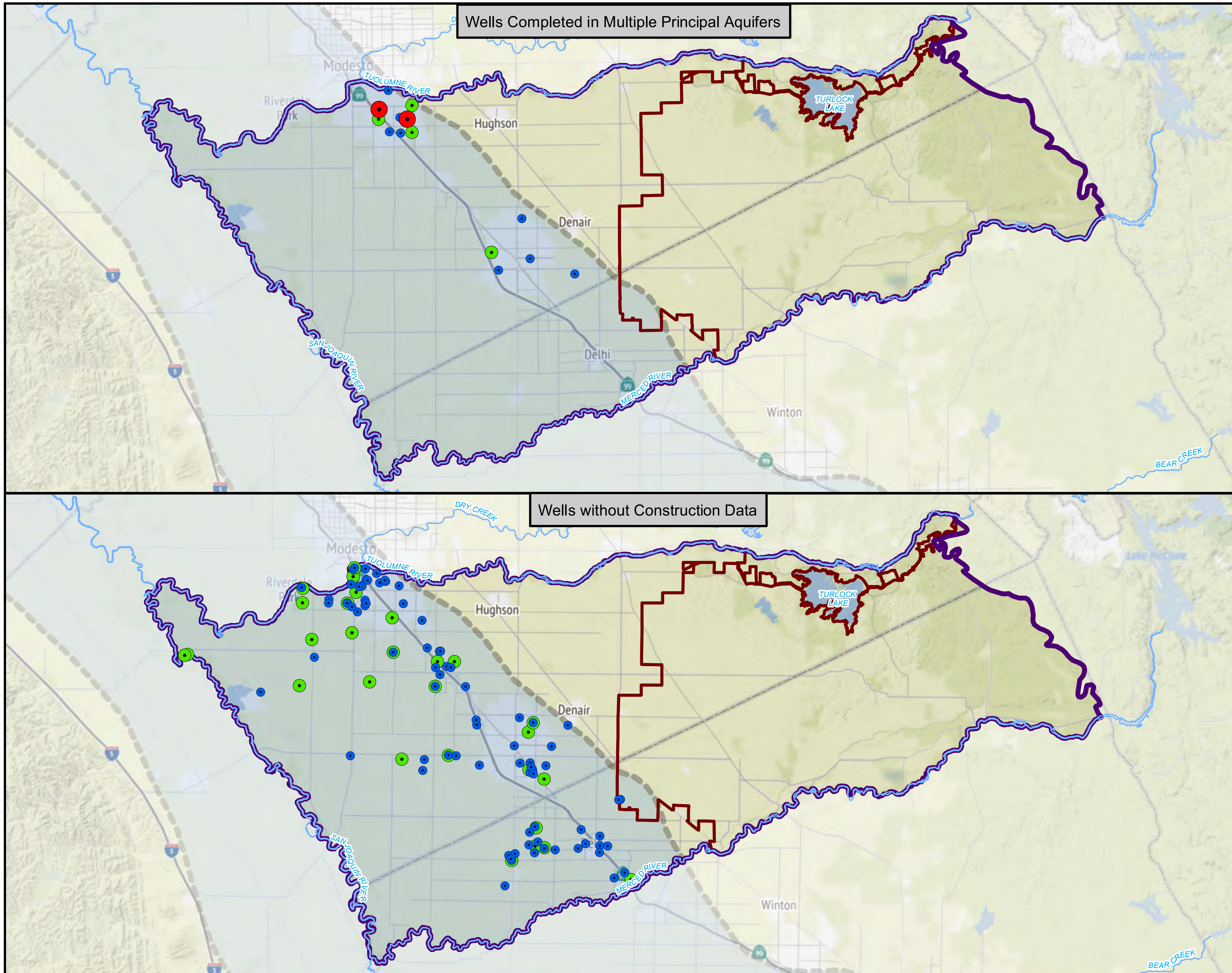
Figure 4-51
TCP
in Principal
Aquifers



1,2,3-Trichloropropane (TCP) (ug/L)

- < 0.005
- 0.005 - 0.5
- > 0.5
- Major River or Tributary
- Turlock Subbasin
- Turlock GSAs
- Approximate Extent of Corcoran Clay[1]
- County Boundary

Note:
1,2,3-Trichloropropane (TCP) is a manufactured chemical (chlorinated hydrocarbon) typically found at industrial or hazardous waste sites, and is used as a cleaning and degreasing solvent. it is also associated with pesticides (soil fumigants). Occurrence of 1,2,3-TCP in groundwater is caused by leaching from contaminated soil.

For California public drinking water systems, the maximum contaminant level for 1,2,3-TCP is 0.005 micrograms/liter (µg/L).

N

0 5.5
Miles

Sources:
[1]Approximate Extent of the Corcoran Clay, as revised by Burow et al (2004).

Water quality data compiled from California State Water Resources Control Board - Division of Drinking Water (DDW), CV-SALTS, and GAMA databases, and private (non-public agency) water quality reports.

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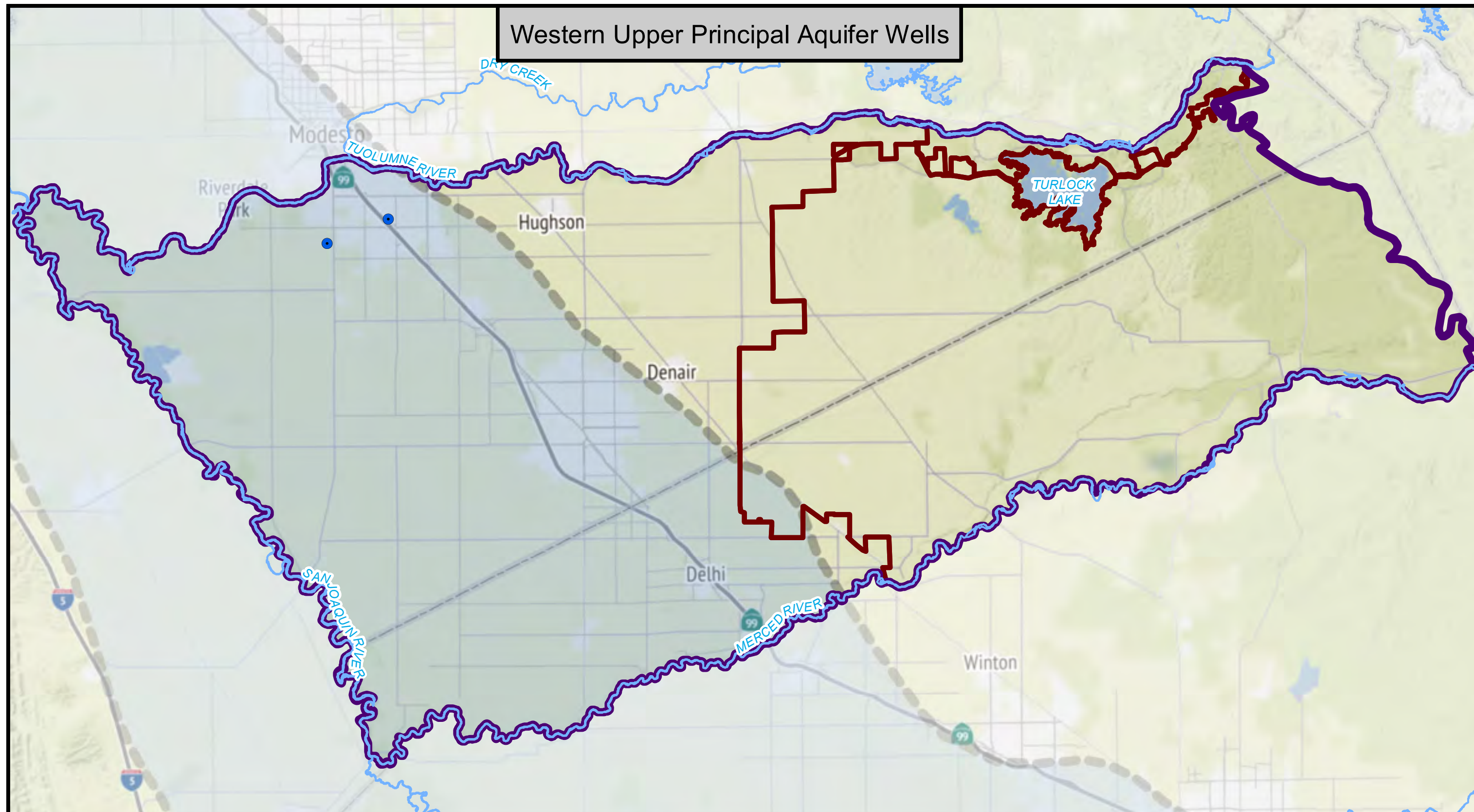
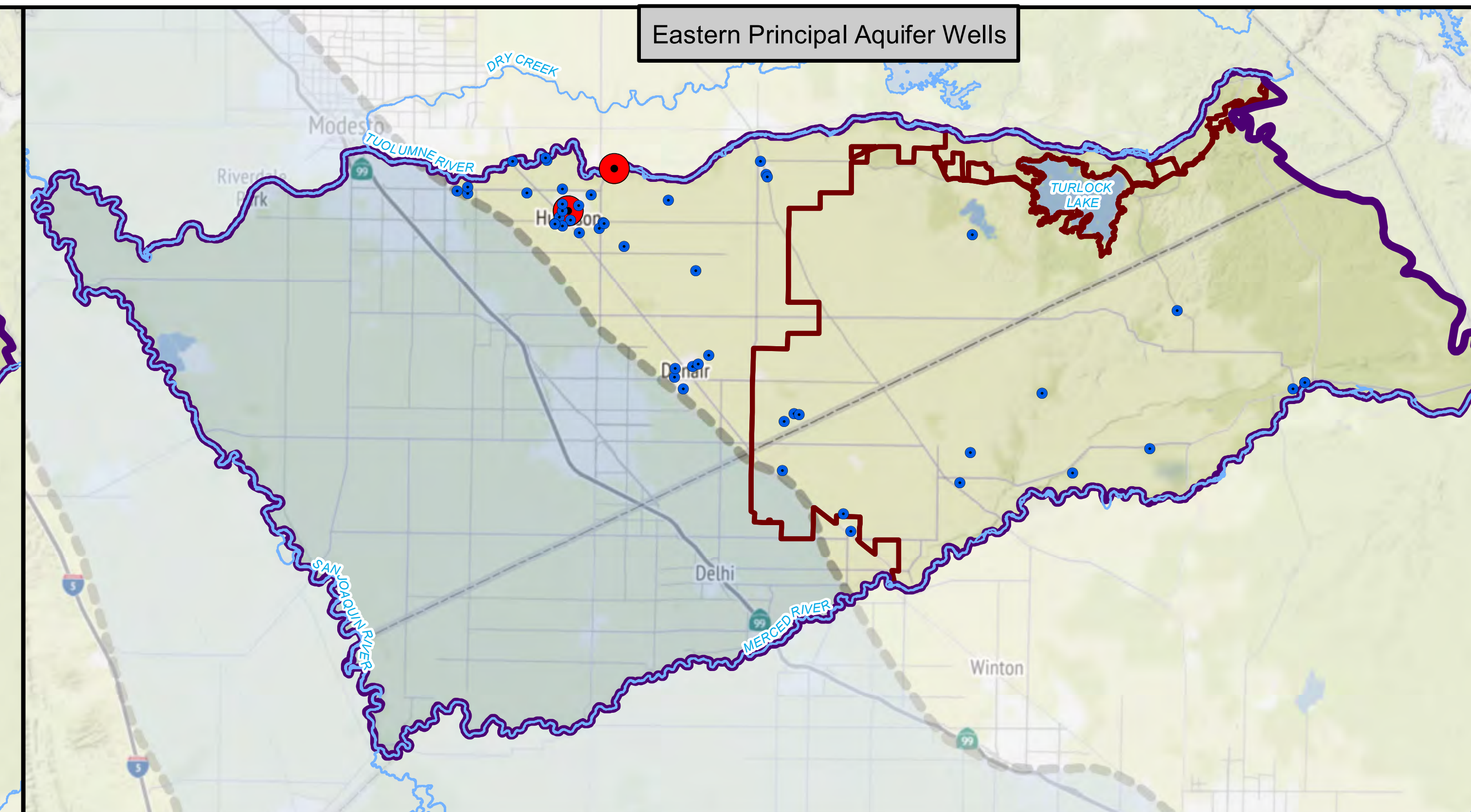
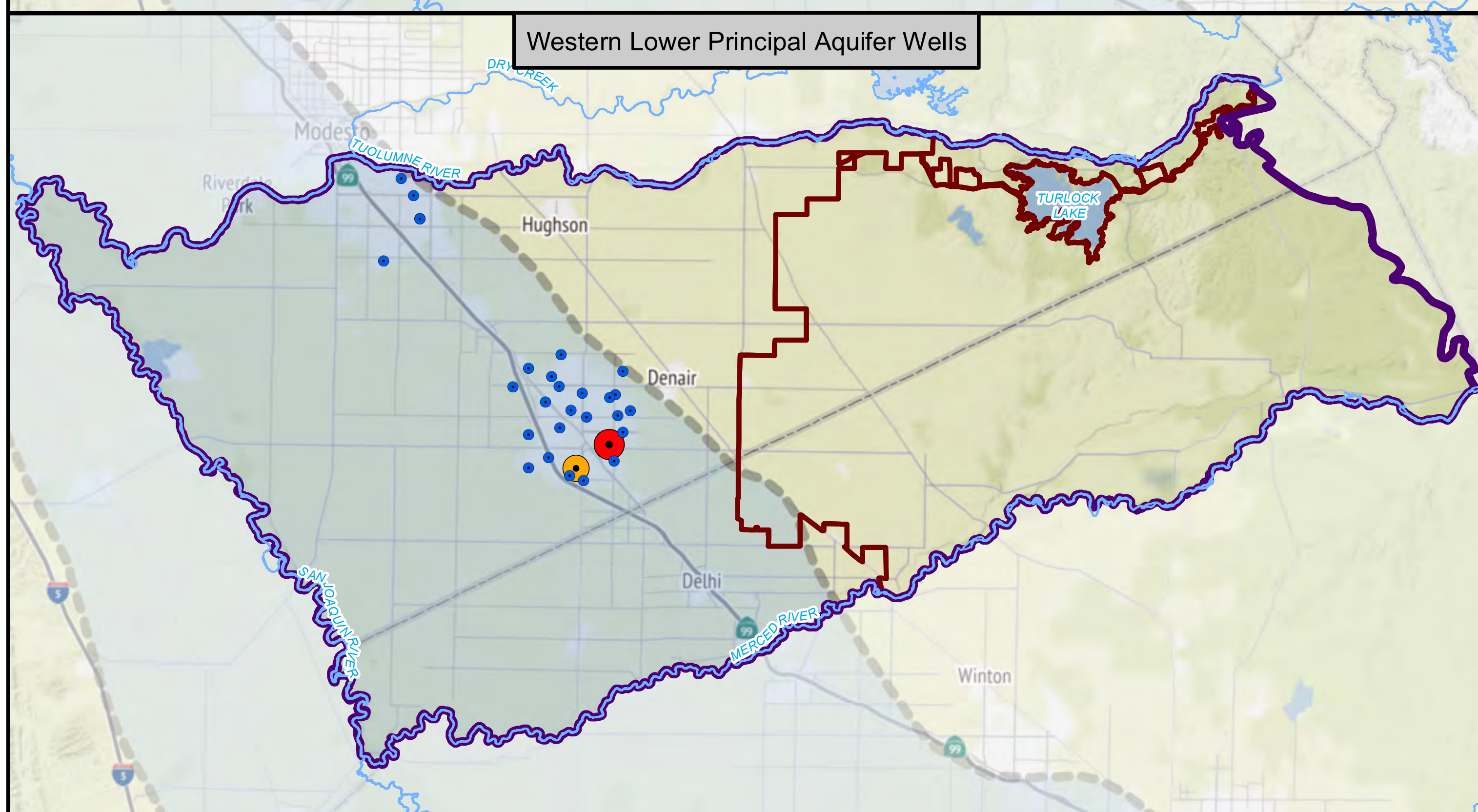
Figure 4-52
TCP
in Undesignated
Wells







Tetrachloroethylene (PCE) (ug/L)

- < 0.5
- 0.5 - 1
- 1 - 2.5
- 2.5 - 5
- > 5

- Major River or Tributary
- Turlock Subbasin
- Turlock GSAs
- Approximate Extent of Corcoran Clay[1]
- County Boundary

N

0 3

Miles

Note:
Tetrachloroethylene (PCE) is a manufactured chemical associated with dry cleaning, textile operations, and metal degreasing activities, and used in printing inks, glues/sealants, lubricants and pesticides. Occurrence of PCE in groundwater is caused by leaching from contaminated soil.

For California public drinking water systems, the maximum contaminant level for PCE is 5 micrograms/liter (µg/L).

Sources:
[1]Approximate Extent of the Corcoran Clay, as revised by Burow et al (2004).

Water quality data compiled from California State Water Resources Control Board - Division of Drinking Water (DDW), CV-SALTS, and GAMA databases, and private (non-public agency) water quality reports.

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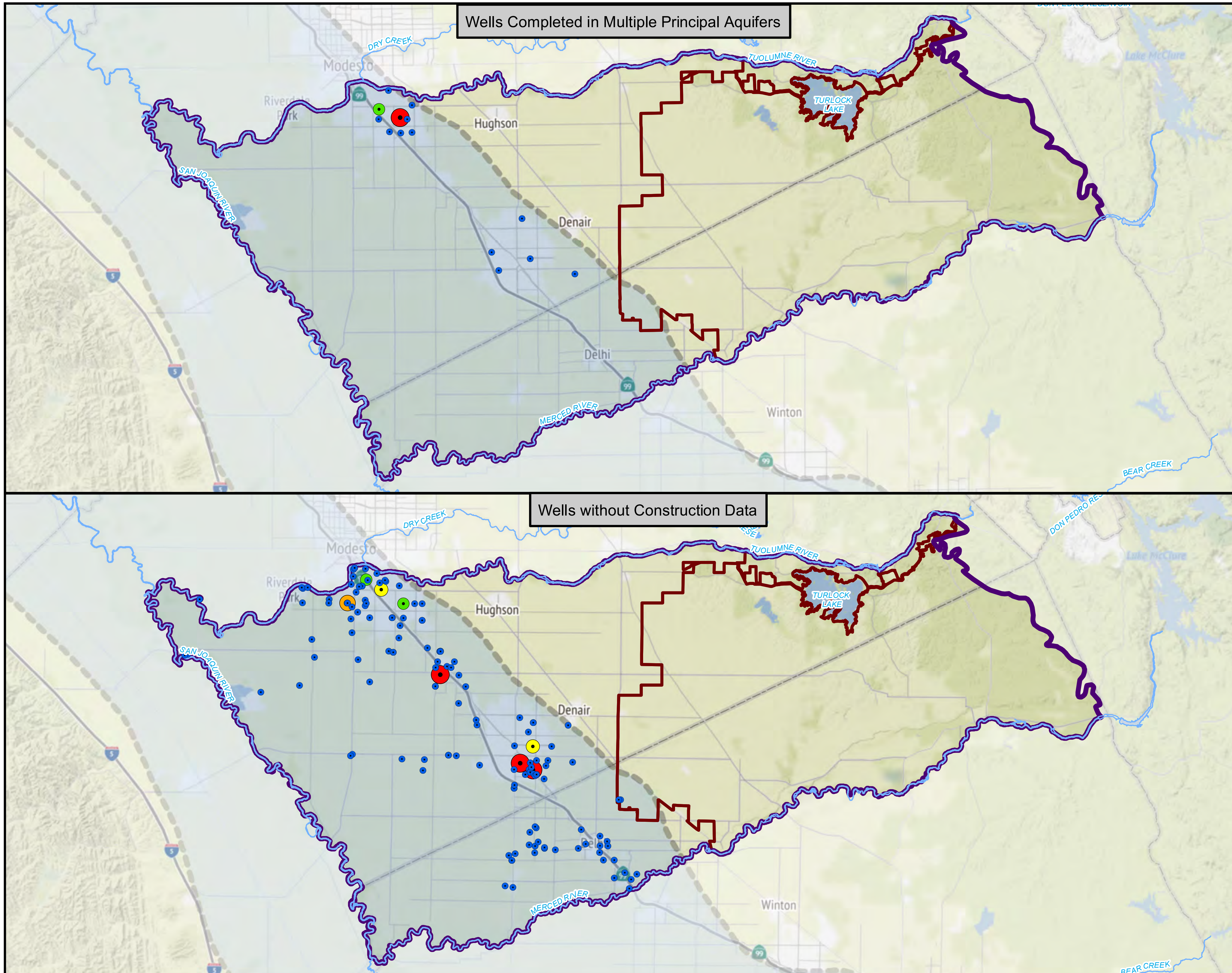
Figure 4-53
PCE
in Principal
Aquifers



Tetrachloroethylene (PCE) (ug/L)

- < 0.5
- 0.5 - 1
- 1 - 2.5
- 2.5 - 5
- > 5
- Major River or Tributary
- Turlock Subbasin
- Turlock GSAs
- Approximate Extent of Corcoran Clay[1]
- County Boundary

Note:
Tetrachloroethylene (PCE) is a manufactured chemical associated with dry cleaning, textile operations, and metal degreasing activities, and used in printing inks, glues/sealants, lubricants and pesticides. Occurrence of PCE in groundwater is caused by leaching from contaminated soil.

For California public drinking water systems, the maximum contaminant level for PCE is 5 micrograms/liter (µg/L).

N

0 5.5
Miles

Sources:
[1]Approximate Extent of the Corcoran Clay, as revised by Burow et al (2004).

Water quality data compiled from California State Water Resources Control Board - Division of Drinking Water (DDW), CV-SALTS, and GAMA databases, and private (non-public agency) water quality reports.

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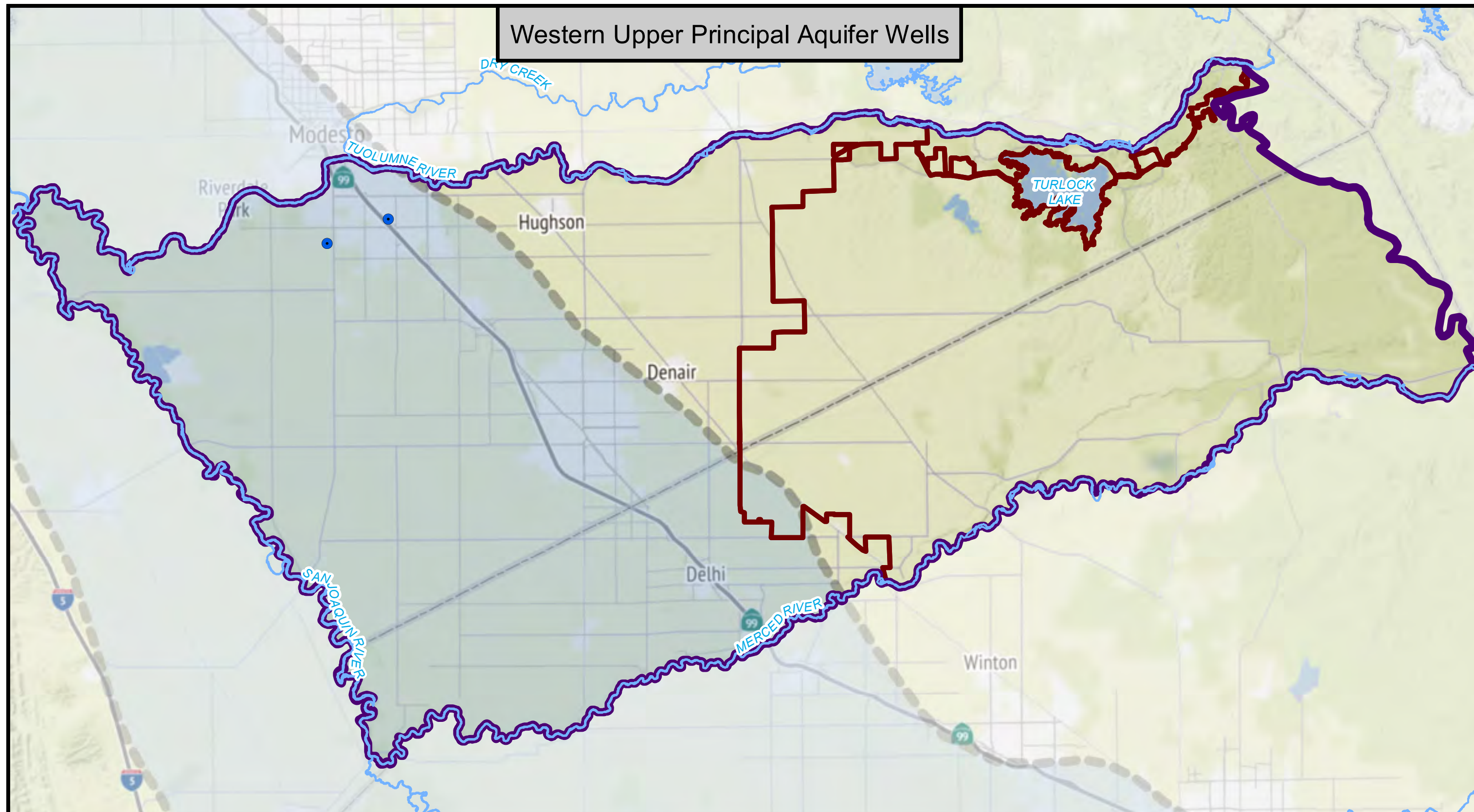
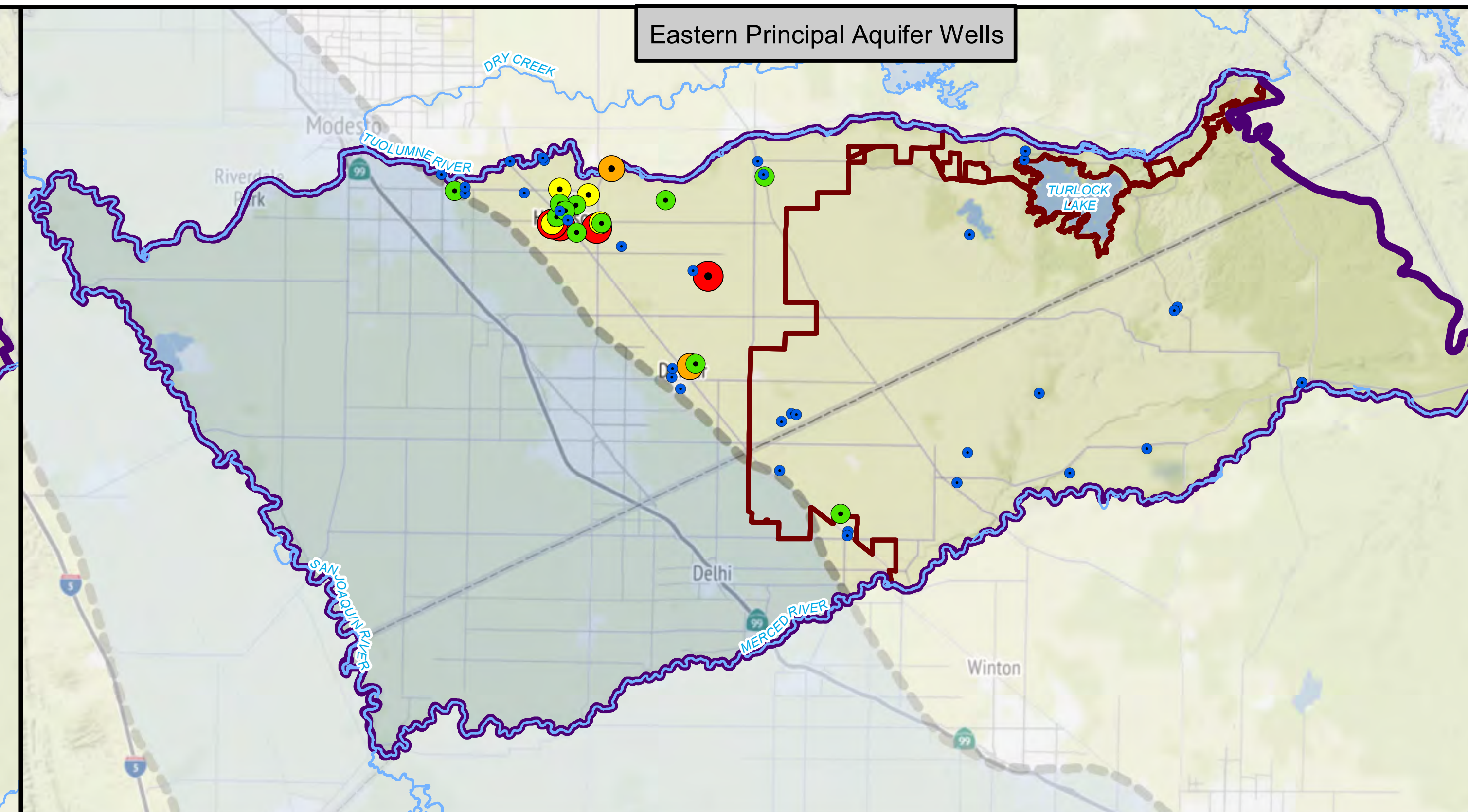
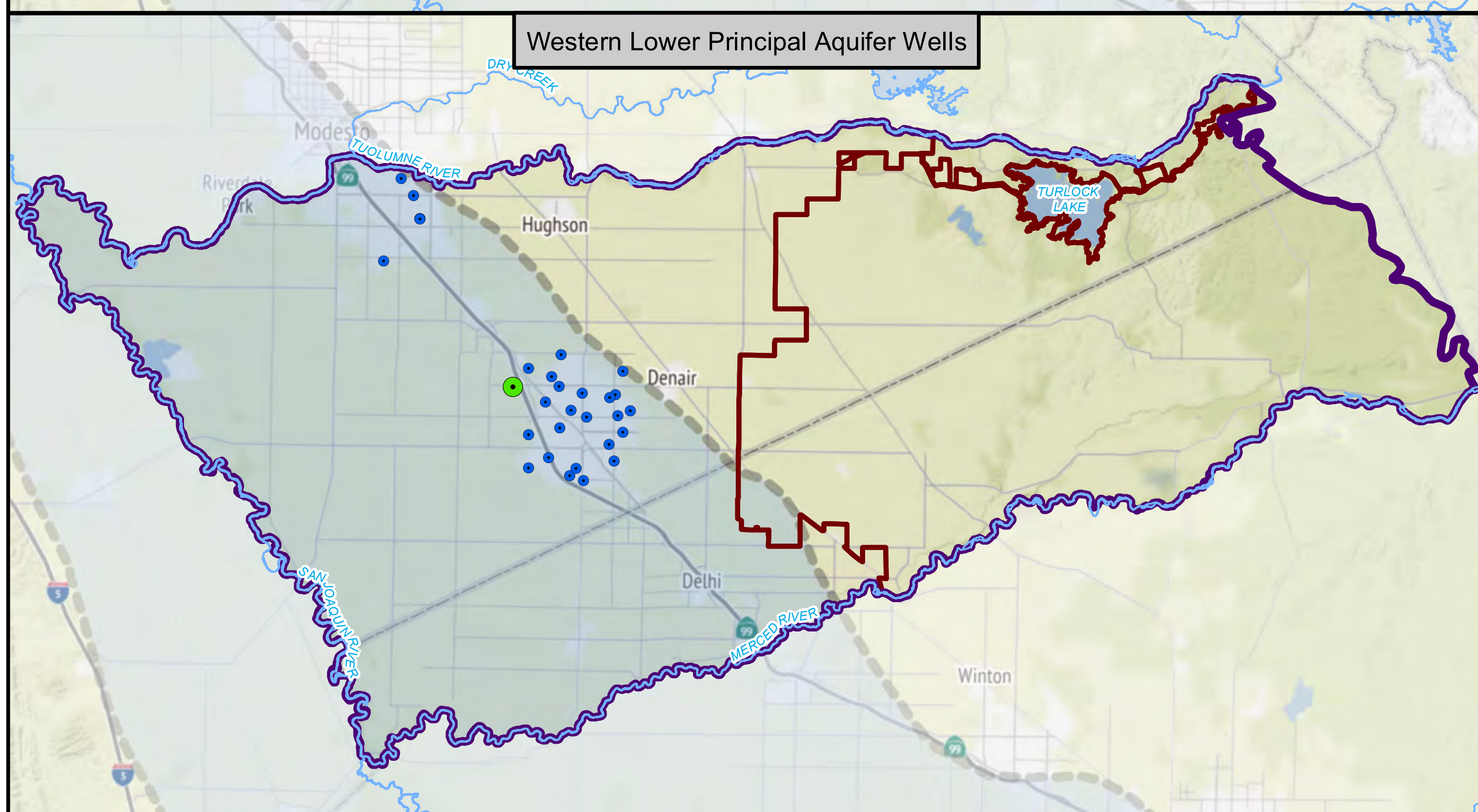
Figure 4-54
PCE
in Undesignated Wells







Dibromochloropropane (DBCP) (ug/L)

- < 0.01
- 0.01 - 0.075
- 0.075 - 0.15
- 0.15 - 0.2
- > 0.2

- Major River or Tributary
- Turlock Subbasin
- Turlock GSAs
- Approximate Extent of Corcoran Clay[1]
- County Boundary

N

0 3

Miles

Note:
Dibromochloropropane (DBCP) is a manufactured chemical that was used as a soil fumigant in agricultural practices until it was banned in California in 1979. DBCP readily dissolves in water and may occur as a dense non-aqueous phase liquid (DNAPL), where it may sink to the bottom of an aquifer and persist for long periods.

For California public drinking water systems, the maximum contaminant level for DBCP is 0.2 micrograms/liter (µg/L).

Sources:
[1]Approximate Extent of the Corcoran Clay, as revised by Burow et al (2004).

Water quality data compiled from California State Water Resources Control Board - Division of Drinking Water (DDW), CV-SALTS, and GAMA databases, and private (non-public agency) water quality reports.

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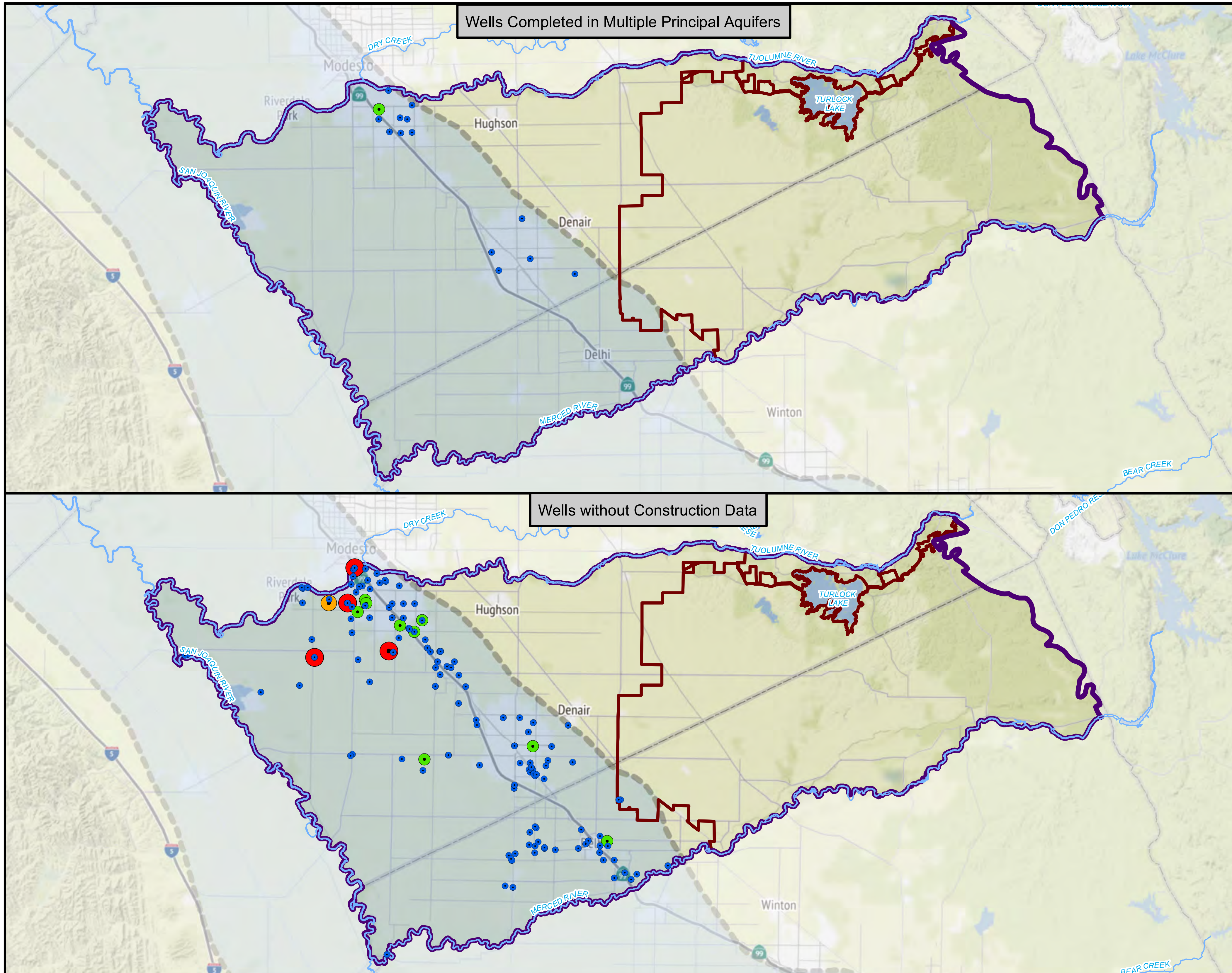
Figure 4-55
DBCP
in Principal Aquifers



Dibromochloropropane (DBCP) (ug/L)

- < 0.01
- 0.01 - 0.075
- 0.075 - 0.15
- 0.15 - 0.2
- > 0.2
- Major River or Tributary
- Turlock Subbasin
- Turlock GSAs
- Approximate Extent of Corcoran Clay[1]
- County Boundary

Note:
Dibromochloropropane (DBCP) is a manufactured chemical that was used as a soil fumigant in agricultural practices until it was banned in California in 1979. DBCP readily dissolves in water and may occur as a dense non-aqueous phase liquid (DNAPL), where it may sink to the bottom of an aquifer and persist for long periods.

For California public drinking water systems, the maximum contaminant level for DBCP is 0.2 micrograms/liter (µg/L).

N

0 5.5

Miles

Sources:
[1]Approximate Extent of the Corcoran Clay, as revised by Burow et al (2004).

Water quality data compiled from California State Water Resources Control Board - Division of Drinking Water (DDW), CV-SALTS, and GAMA databases, and private (non-public agency) water quality reports.

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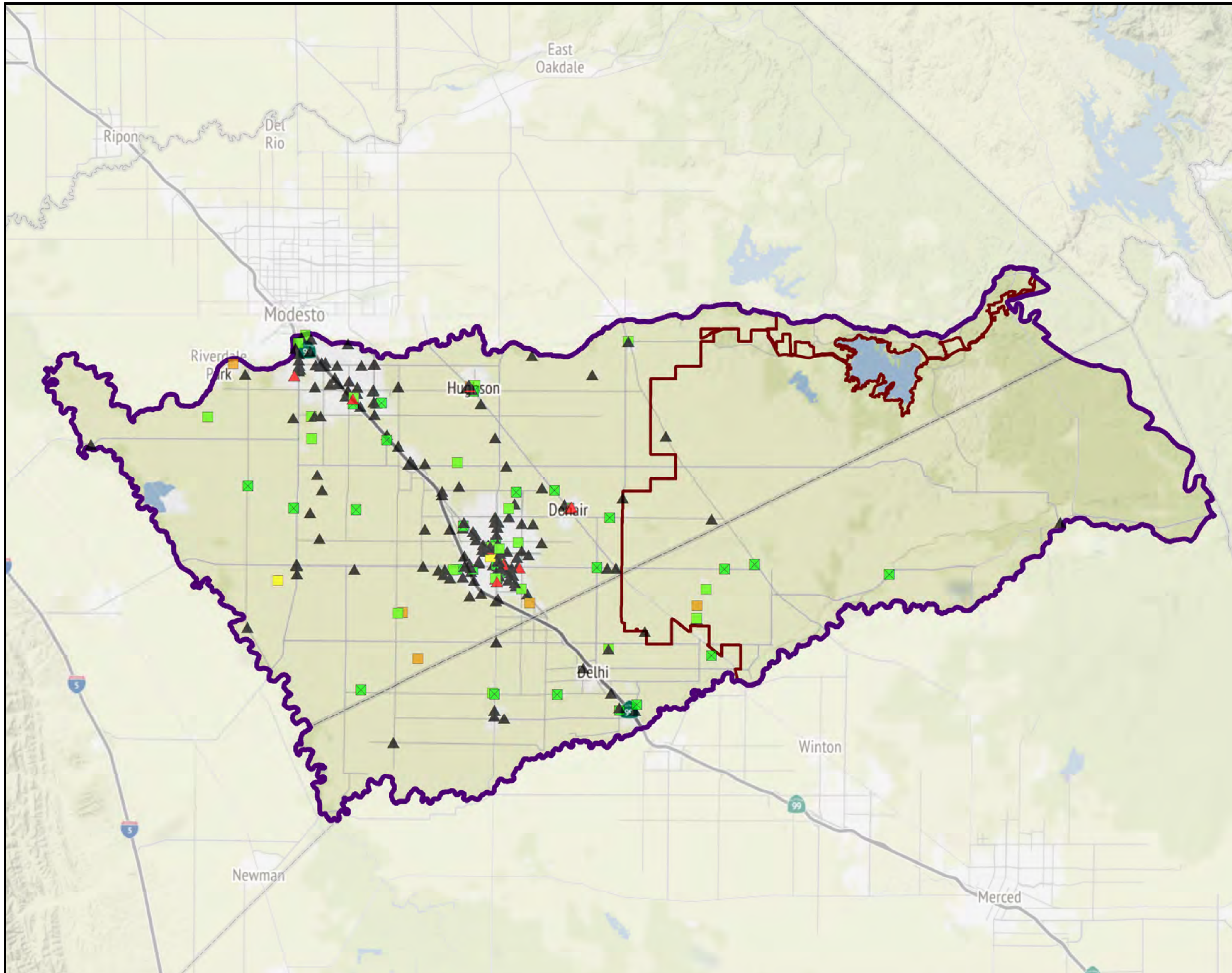
Figure 4-56
DBCP
in Undesignated Wells



Site Type and Case Status

- LUST Site - Case Open
- LUST Site - Case Closed
- Cleanup Program Site - Case Open
- Cleanup Program Site - Case Closed
- Land Disposal Site
- Military Site - Case Open
- Military Site - Case Closed
- Turlock GSAs
- Turlock Subbasin
- County Boundary

N

0 4.5

Miles

Sources:
Contamination cleanup sites accessed from SWRCB GeoTracker online database.

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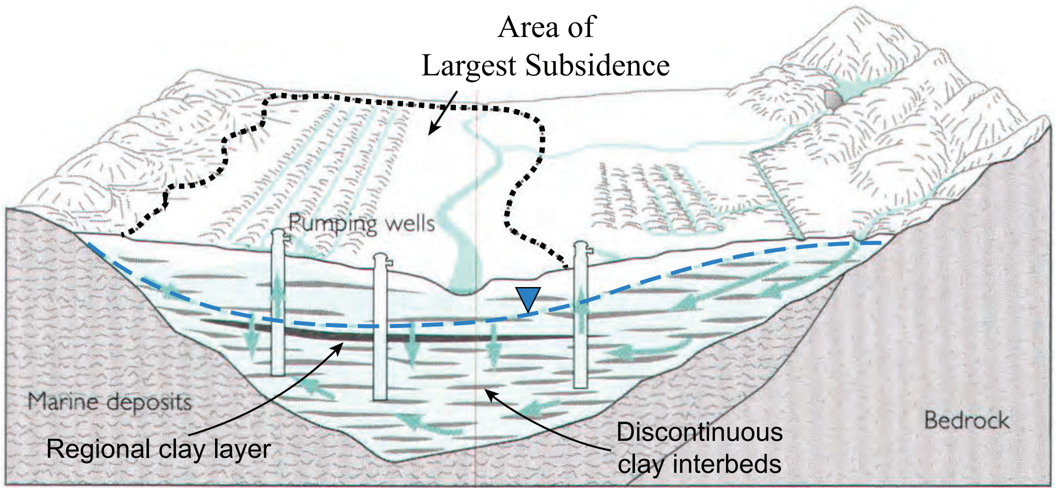
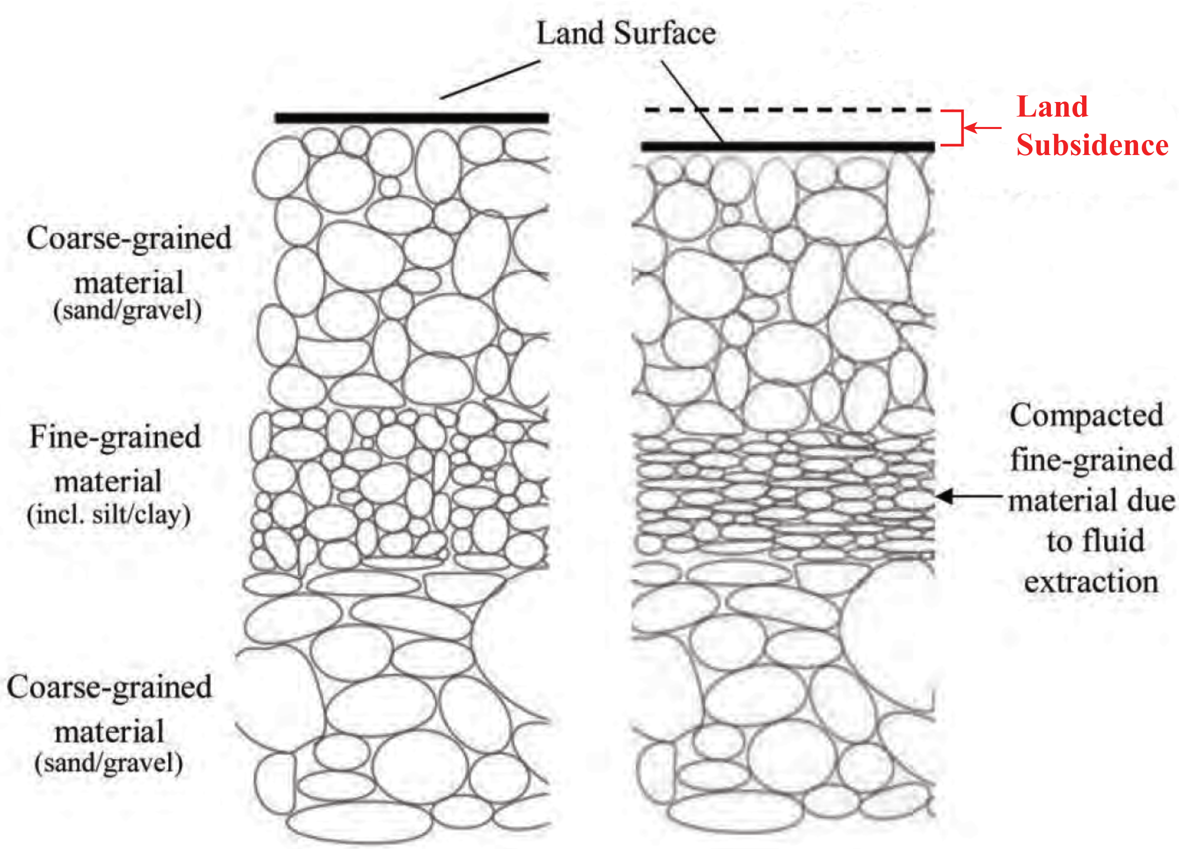
Figure 4-57
Contamination Sites



Source: Galloway et al., 1999.



After LSCE et al., 2014.

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Figure 4-58
Concepts of Land Subsidence

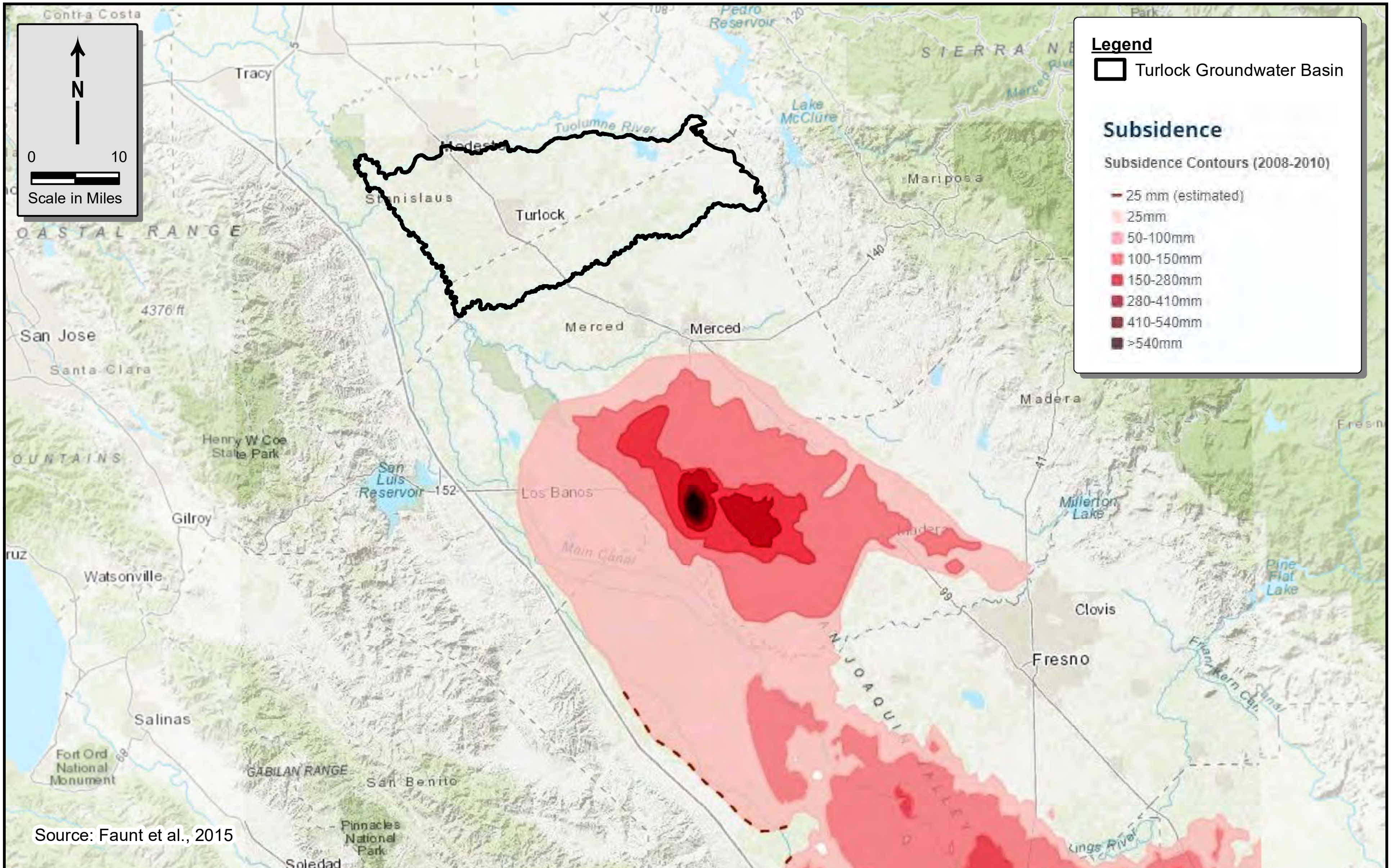

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Figure 4-59
Subsidence
2008-2010

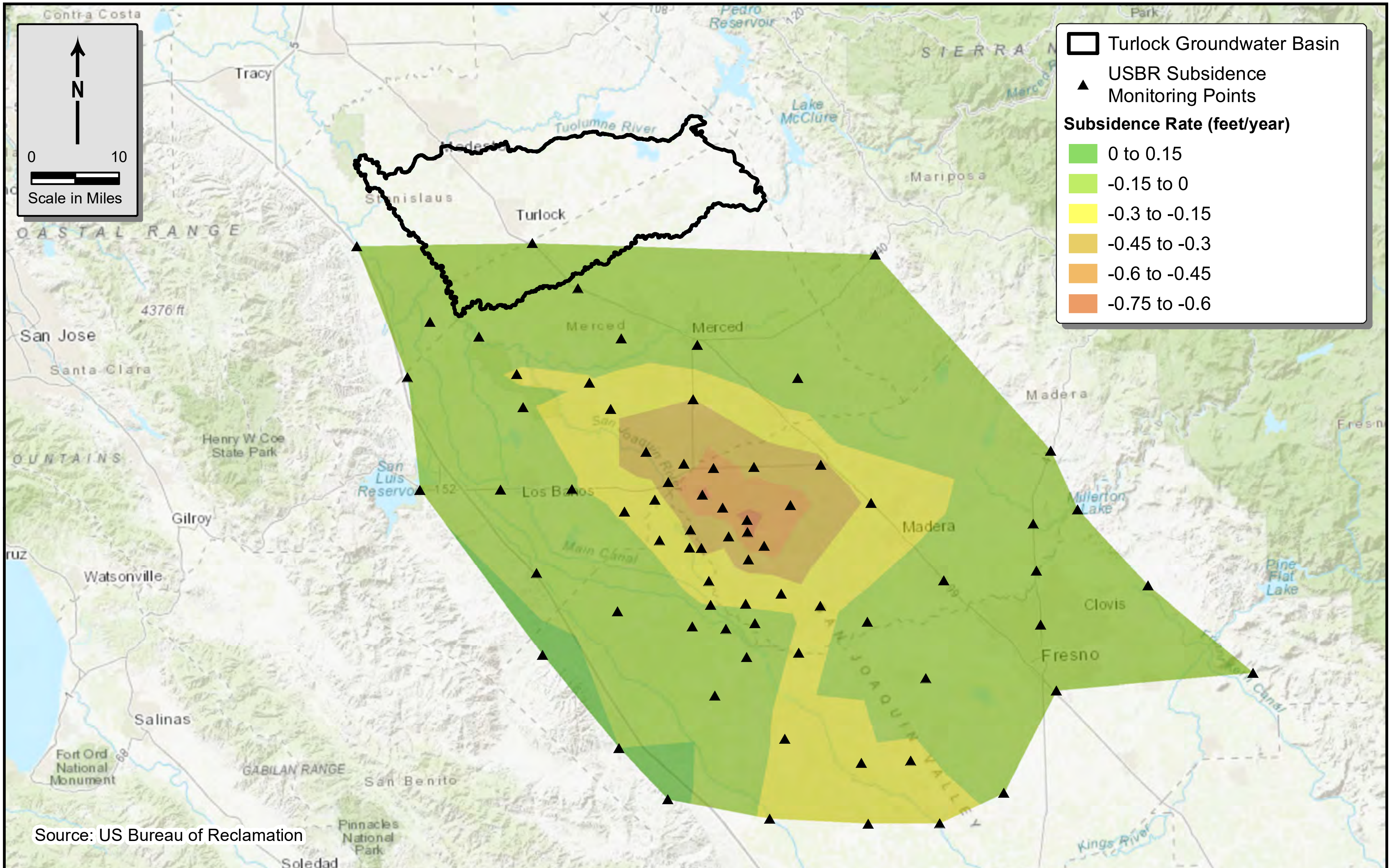

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Figure 4-60
Subsidence
July 2012 - July 2018

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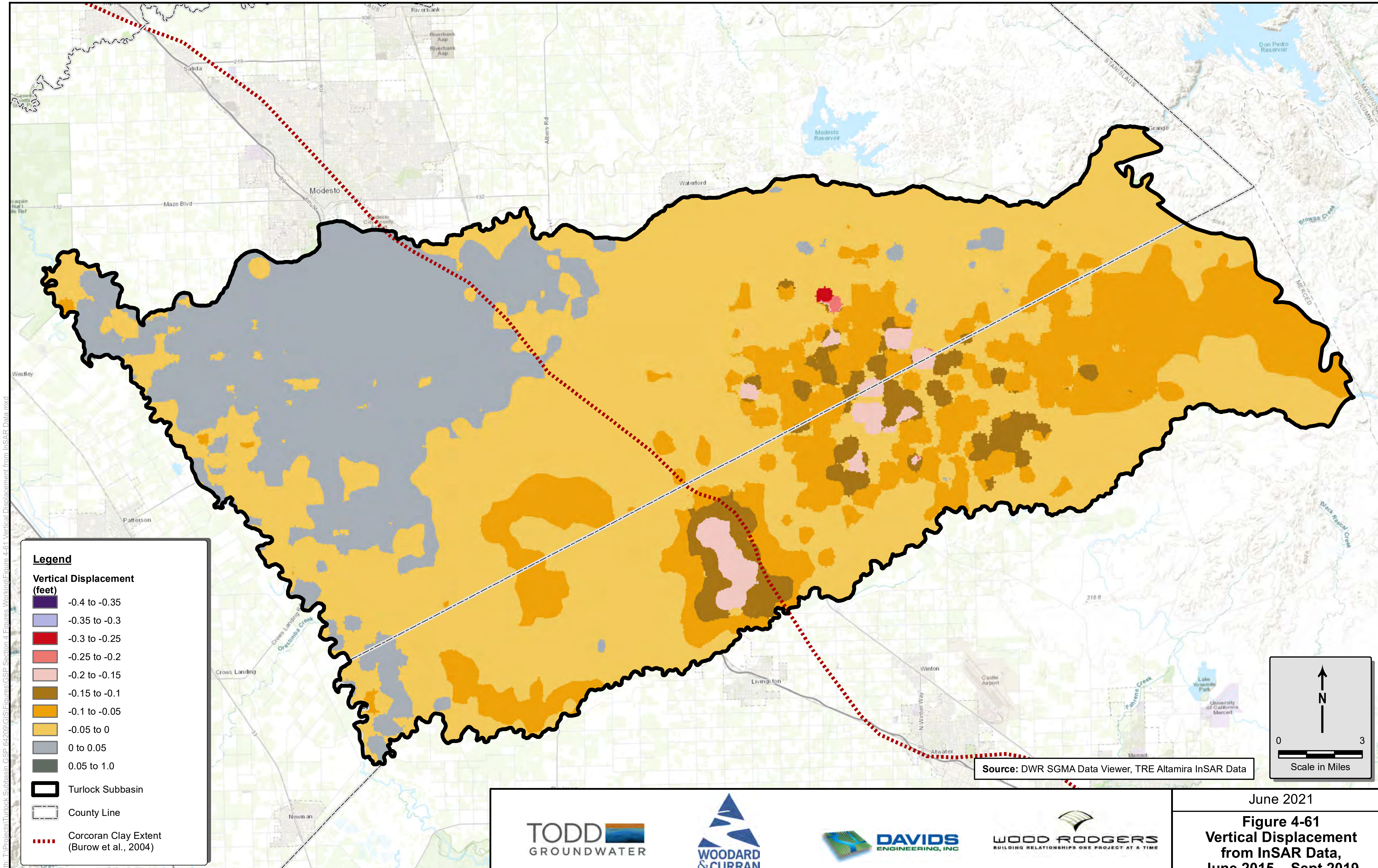

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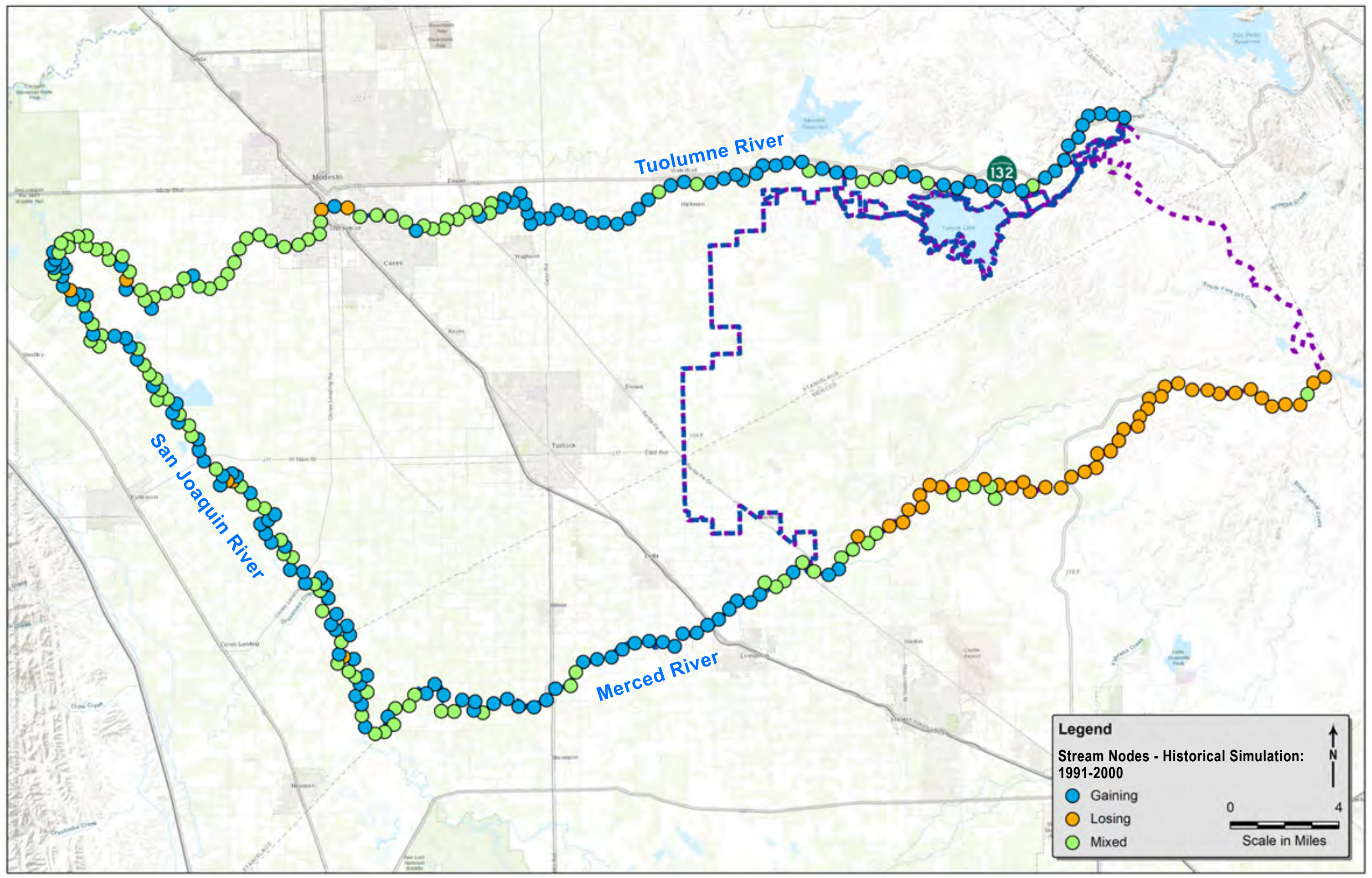
Figure 4-61
Vertical Displacement from InSAR Data, June 2015 – Sept 2019

Historical Simulation: 1991-2000



Historical Simulation: Years 2006-2015

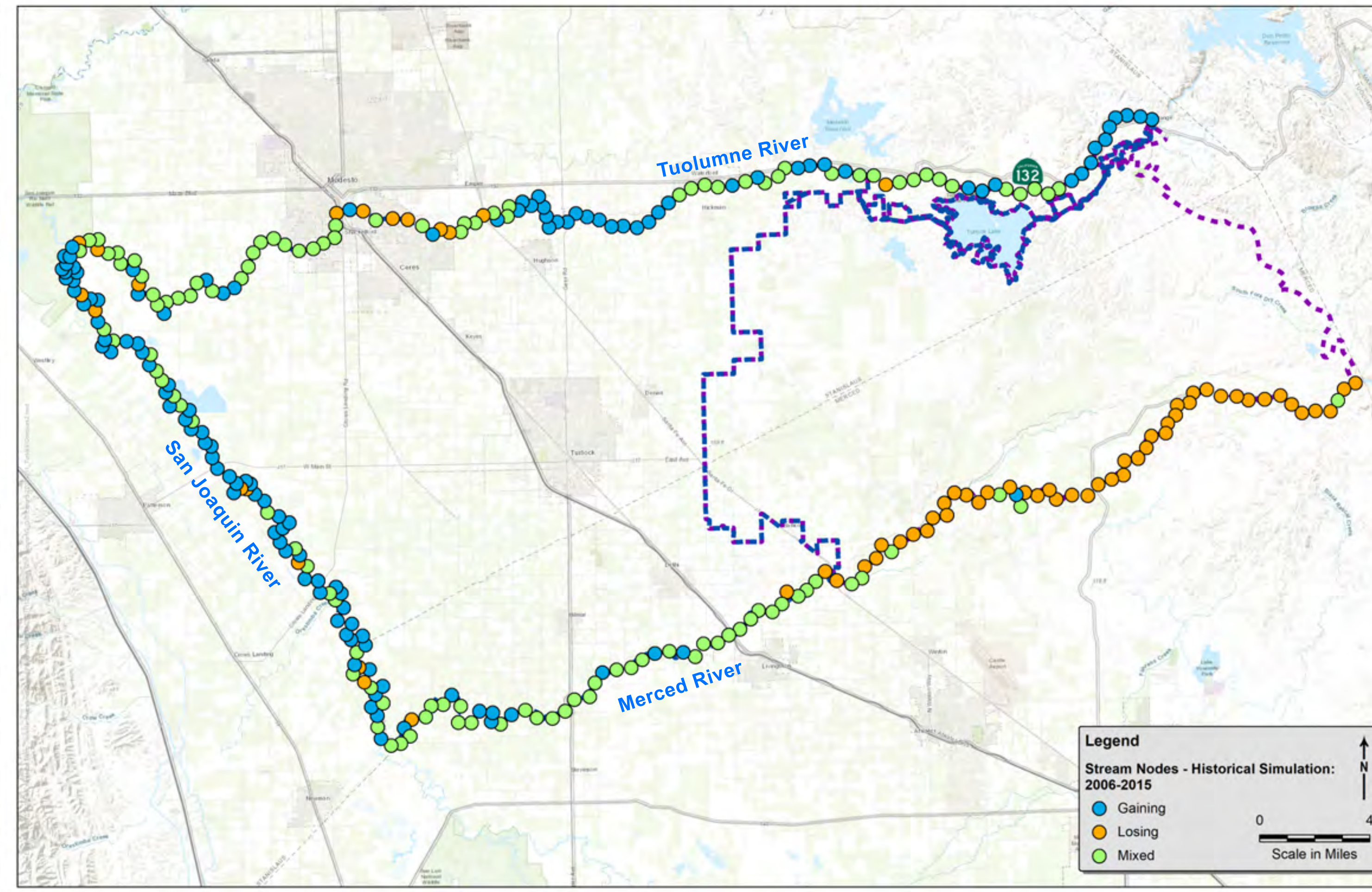


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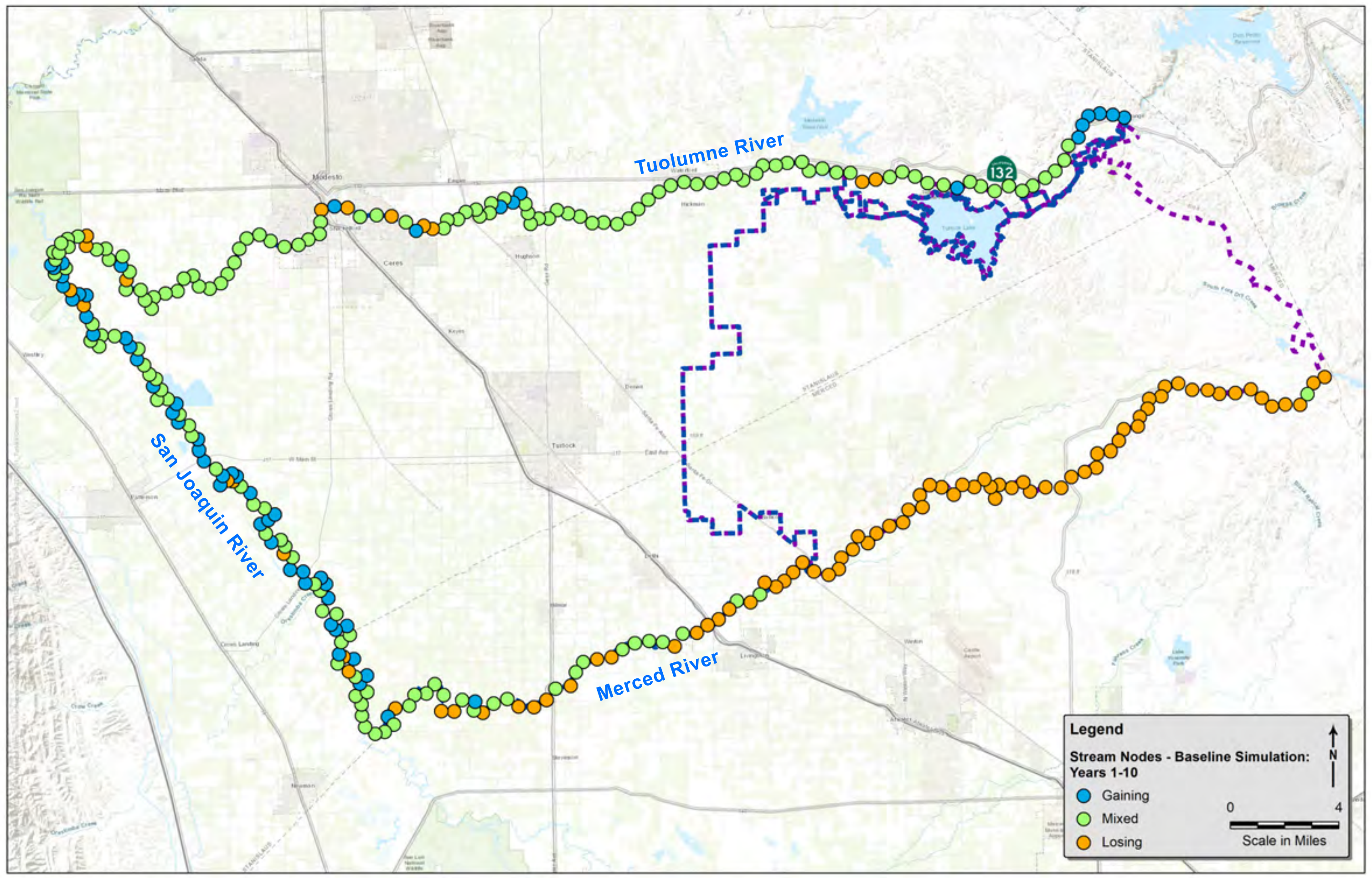
Figure 4-62
Interconnected Surface Water Conditions During Historical Study Period

Projected Future Simulation: Years 1-10



Projected Future Simulation: Years 41-50

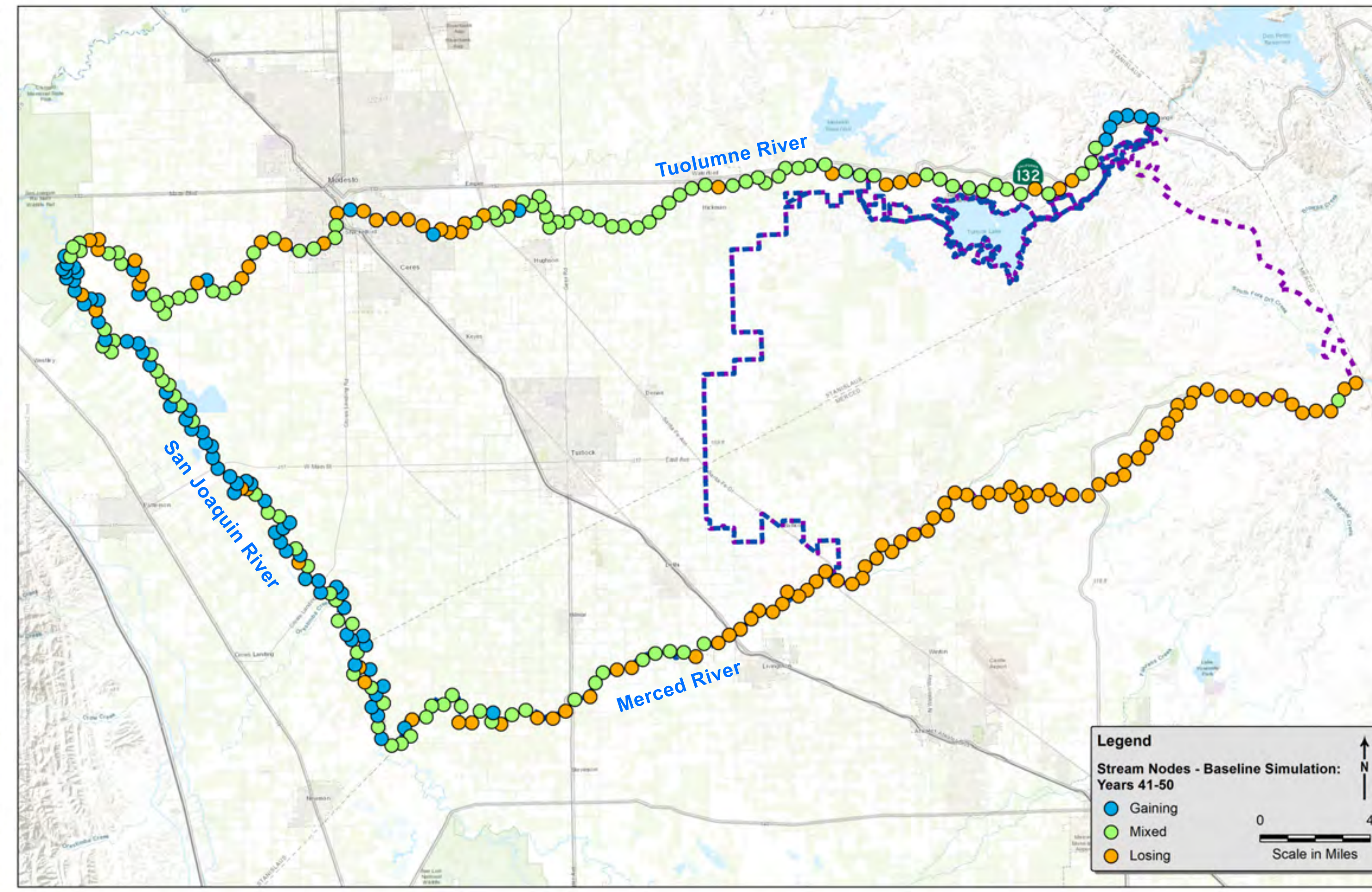


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Figure 4-63
Interconnected Surface Water Conditions During Projected Future Conditions

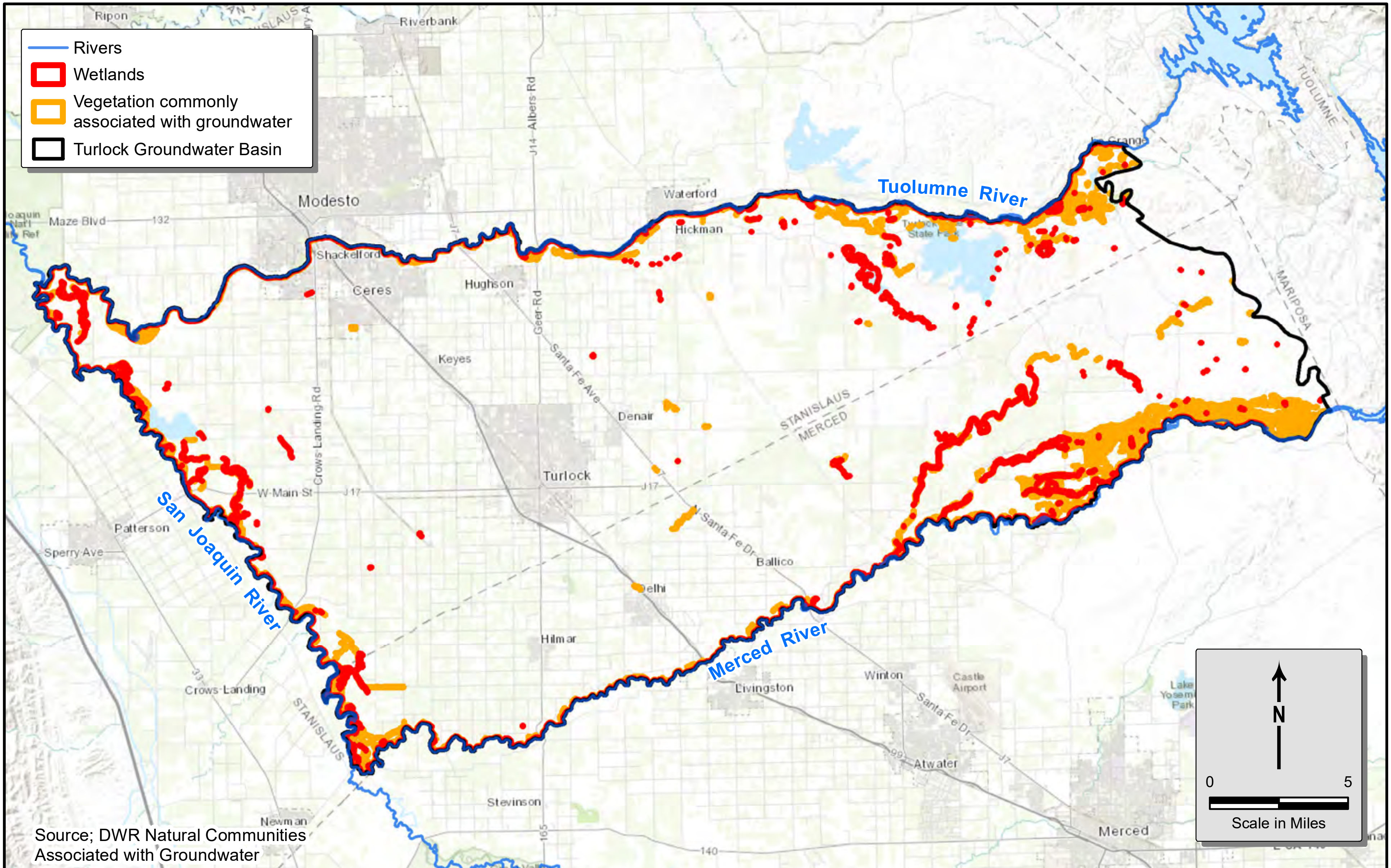

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Figure 4-64
Vegetation Commonly Associated with Groundwater and Wetlands

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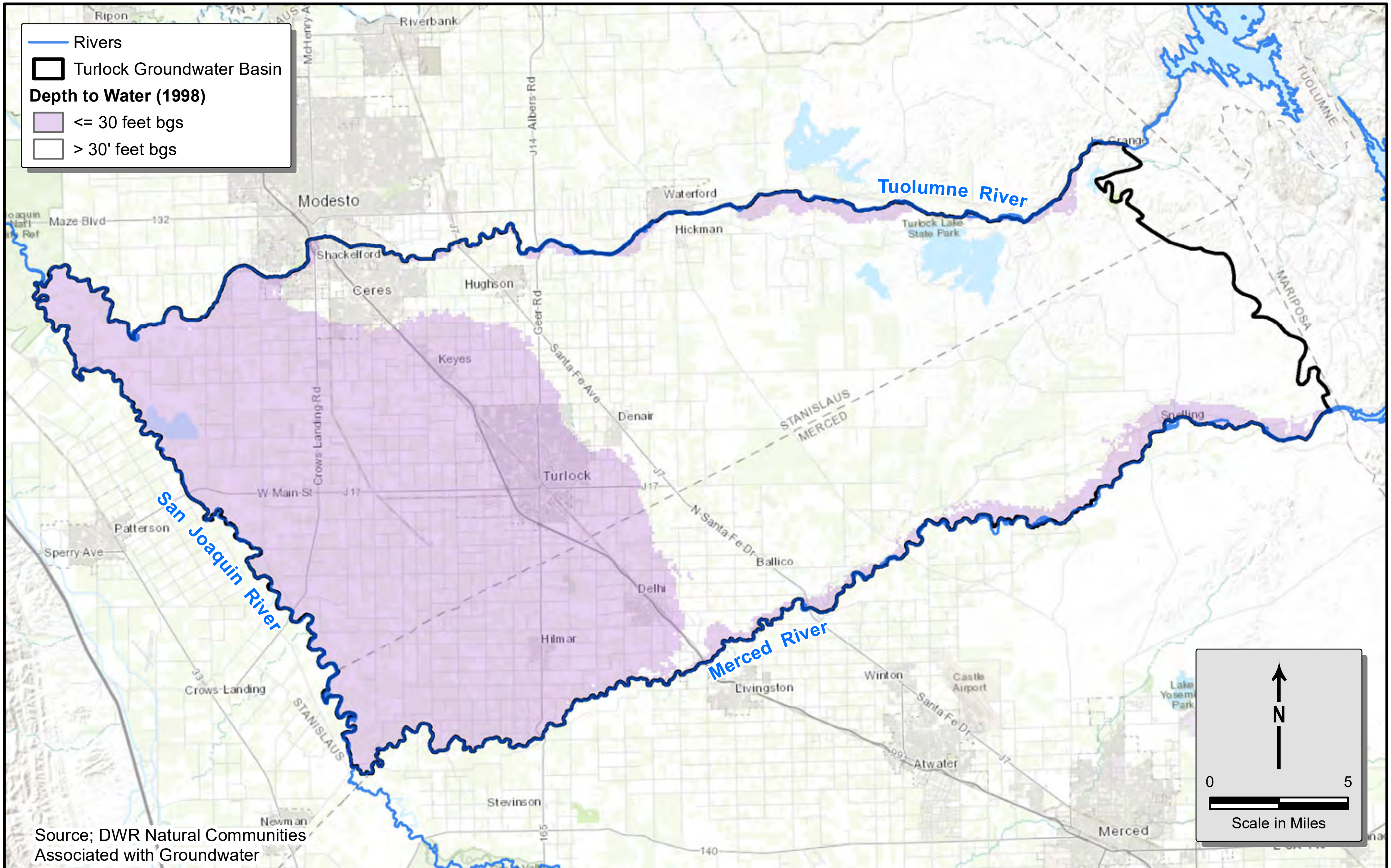

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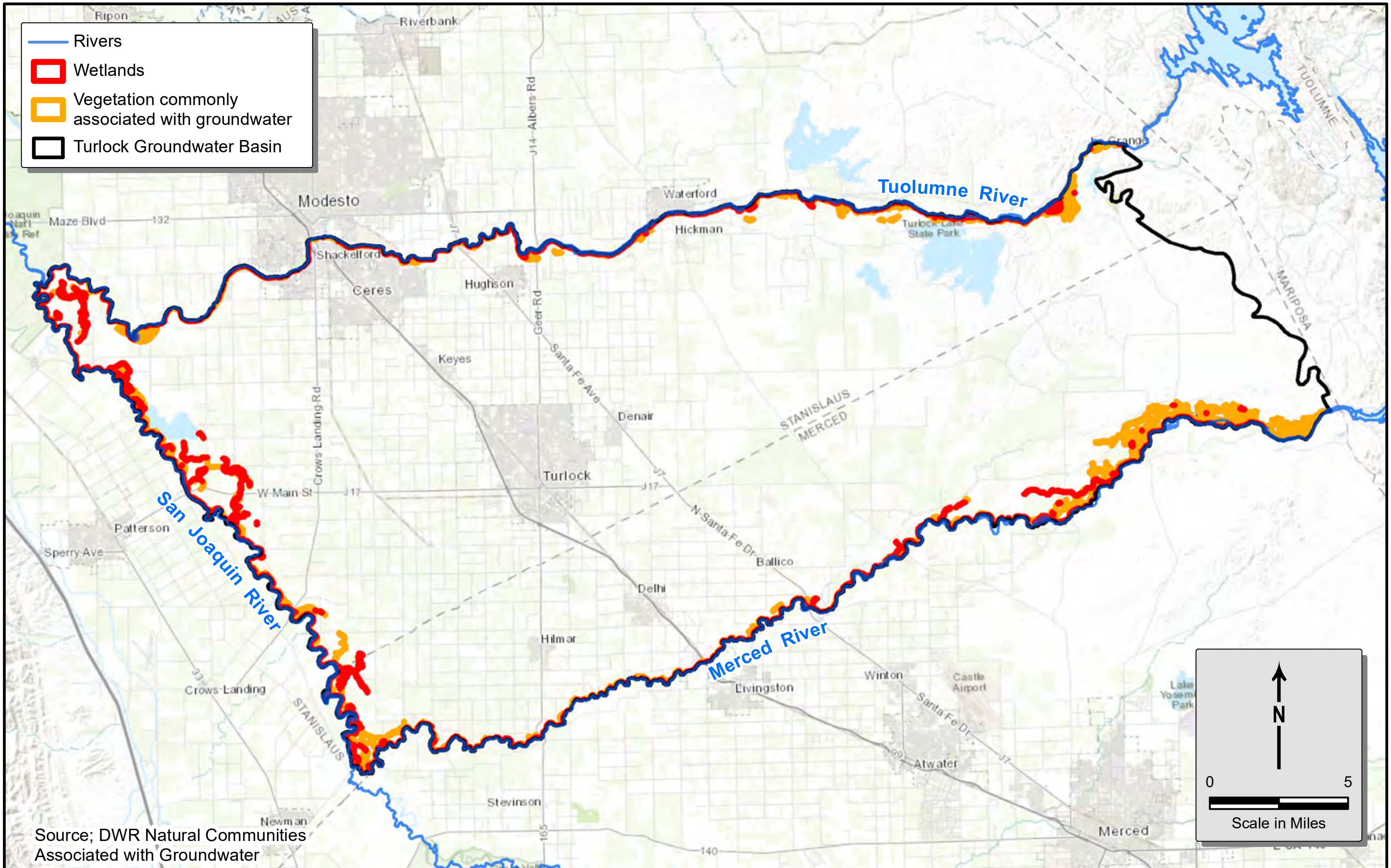
Figure 4-65
Areas with Depth to Water within 30 feet in 1998



Source; DWR Natural Communities Associated with Groundwater

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Figure 4-66
Potential Vegetation and Wetland GDEs

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5. WATER BUDGETS

Water budgets are a critical component of understanding and evaluating the sustainability of a groundwater basin. This chapter discusses the:

- General background on water budgets, the basis of the selected water budgets (historical, current conditions, projected conditions), and their components
- Average annual Subbasin- and GSA-wide stream, land and water use, and groundwater budgets summarized in tabular format
- Results and insights from the water budget for the historical, current conditions, and projected conditions budgets with supporting figures
- Projected water budget under climate change conditions, including climate change methodology and resulting impacts on the Subbasin
- Sustainable yield assumptions and resulting water budgets

5.1. WATER BUDGET INFORMATION

Water budgets were developed to provide a quantitative account of water entering (inflows) and leaving (outflows) the Turlock Subbasin. Water budgets are generally provided for three interconnected systems that define the overall hydrologic balance in the Turlock Subbasin, the land surface system, the stream and river system, and the groundwater system. GSP regulations call for a comprehensive water budget for the hydrologic system in the Subbasin. Water entering and leaving each one of the physical systems, and water movement among the systems are because of natural processes, such as rainfall, or are the result of human activities and anthropogenic conditions. **Figure 5-1** highlights the main water budget components and interconnectivity of stream, surface, and groundwater components of the natural and human related hydrologic system used in this analysis.

The values presented in the water budget provide information on historical, current, and projected conditions as they relate to hydrology, water demand, water supply, land use, population, climate change, groundwater and surface water interaction, and subsurface groundwater flow. This information can assist in management of the Subbasin by identifying the scale of different uses, highlighting potential risks, and identifying potential opportunities to improve water supply conditions and use of resources.

Water budgets primarily reflect the movement of water through the integrated water system, and includes the surface processes (soil zone), stream system, and the groundwater system, as well as interaction among various systems forming the comprehensive water cycle for the Subbasin. This comprehensive water budget representation is consistent with the DWR's SGMA regulations, Best Management Practices, and recommendations in the handbook of water budget published by the DWR (DWR, 2020).

Water budgets can be developed at different temporal scales. Daily water budgets can be used to demonstrate diurnal variation in the temperature and water use for agricultural