

Turlock Subbasin
Groundwater Sustainability Plan
Community Workshop

Denair Community Center

March 12, 2019

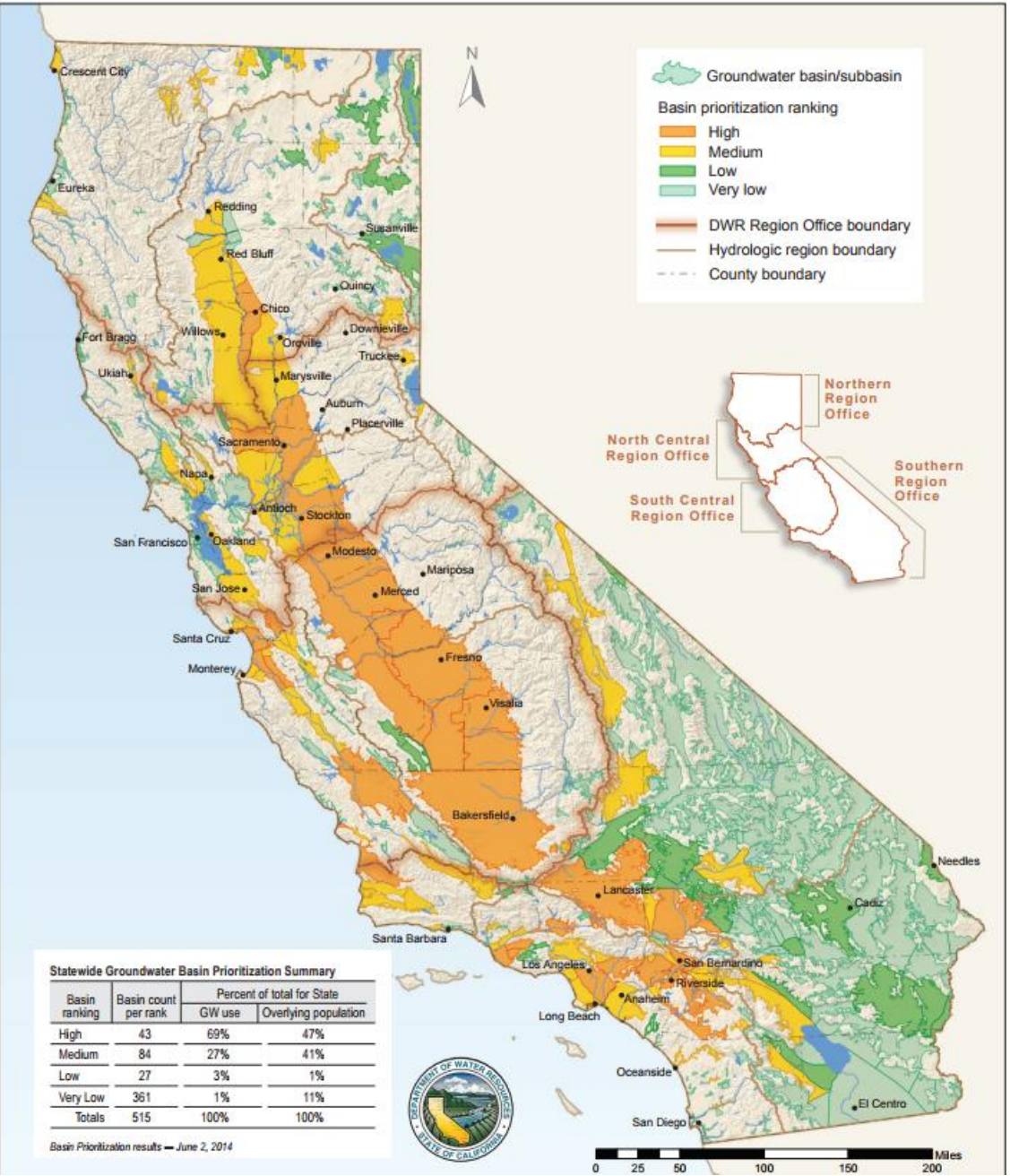
Agenda

- **SGMA Recap:** What We're Doing & Why We're Doing It
- **What We're Learning:** Hydrogeologic Model & Basin Setting
- **Coming Soon:** Water Budget, Sustainability Indicators & Undesirable Results
- **What's Going On With Our Neighbors?** Adjacent Subbasin Activities
- **Ways to Stay Informed & Get Involved**

Funding for this project has been provided in full or in part from the Water Quality, Supply, and Infrastructure Improvement Act of 2014 and through an agreement with the State Department of Water Resources.



Groundwater Basin Prioritization

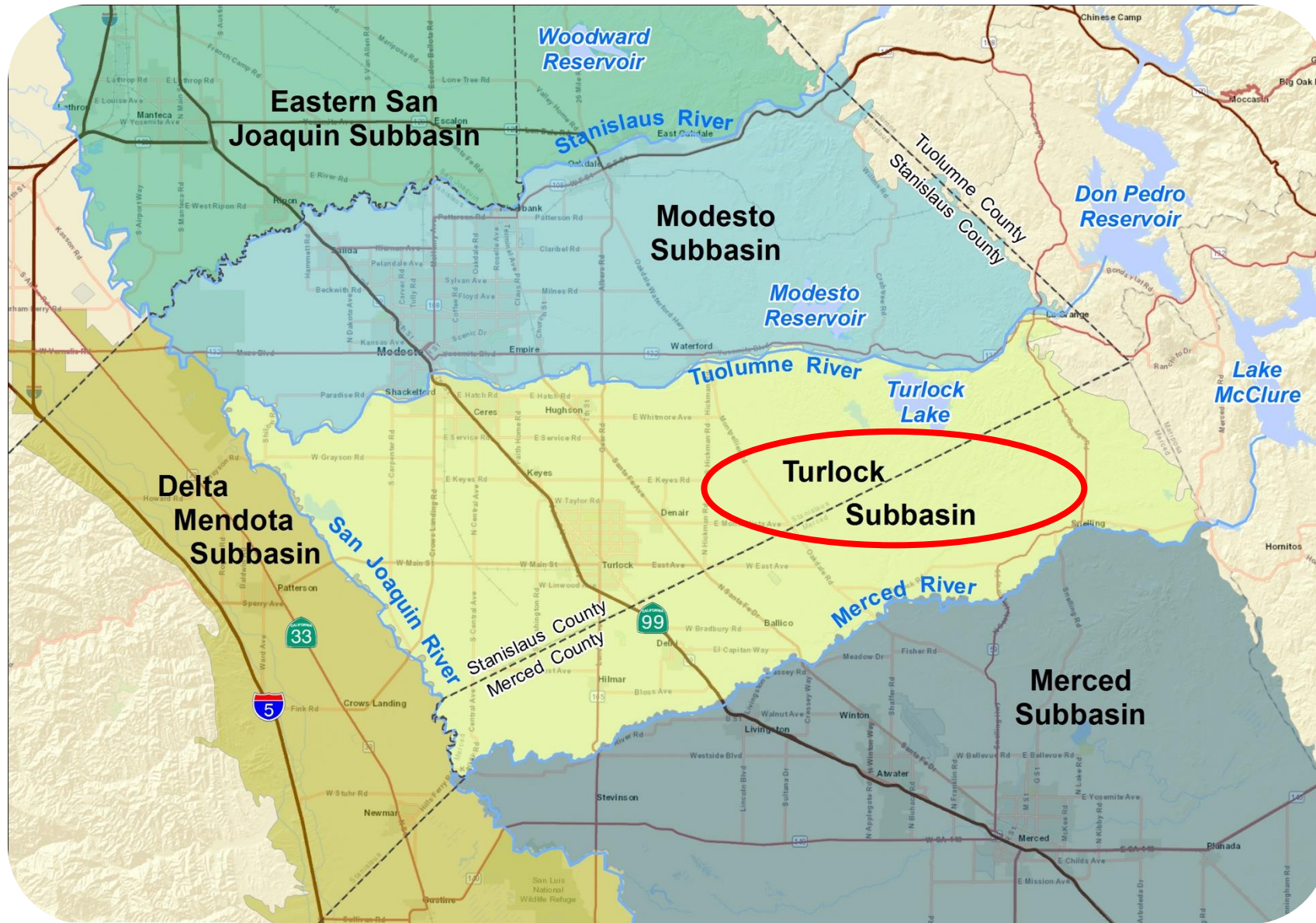


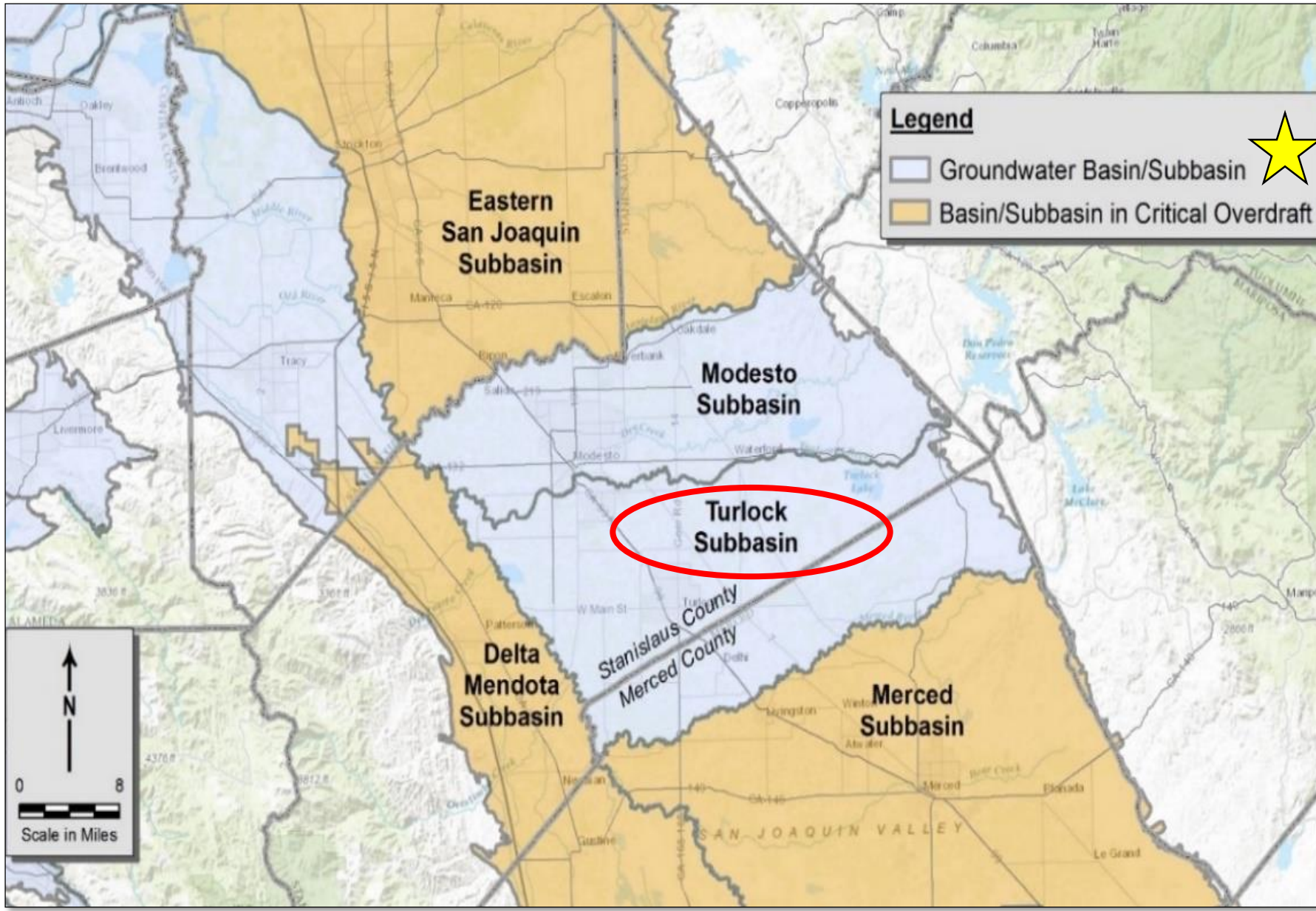
Statewide Groundwater Basin Prioritization Summary

Basin ranking	Basin count per rank	Percent of total for State	
		GW use	Overlying population
High	43	69%	47%
Medium	84	27%	41%
Low	27	3%	1%
Very Low	361	1%	11%
Totals	515	100%	100%

Basin Prioritization results — June 2, 2014



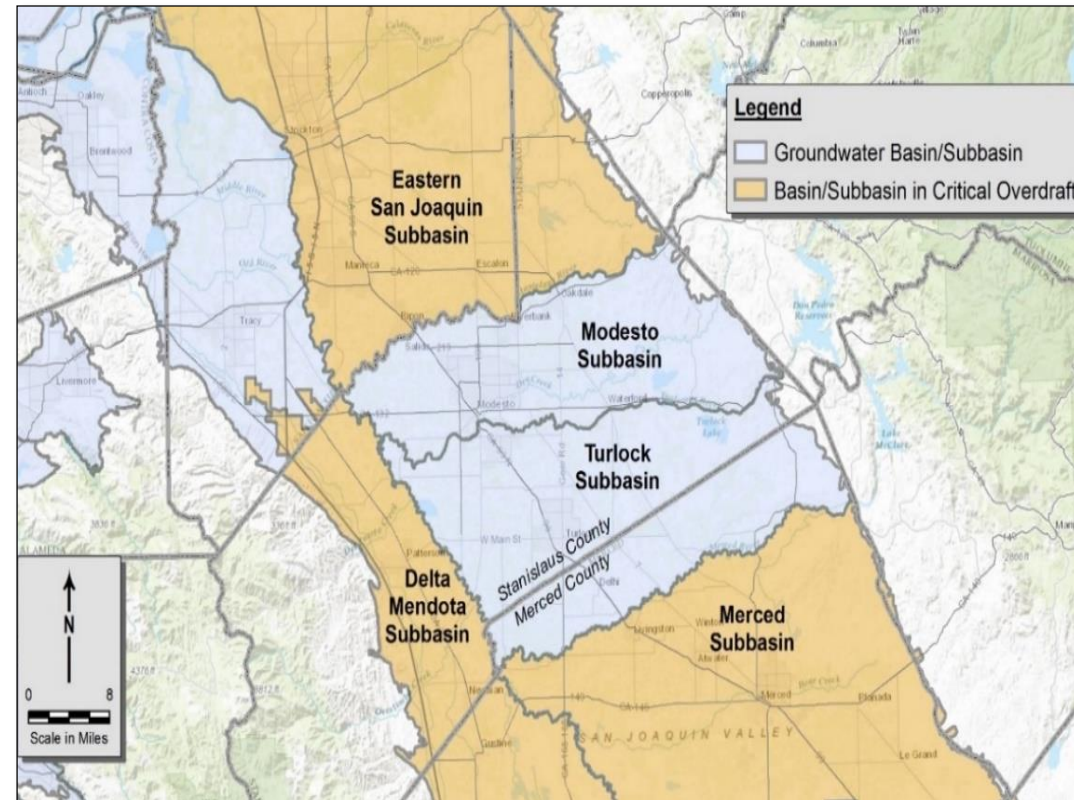




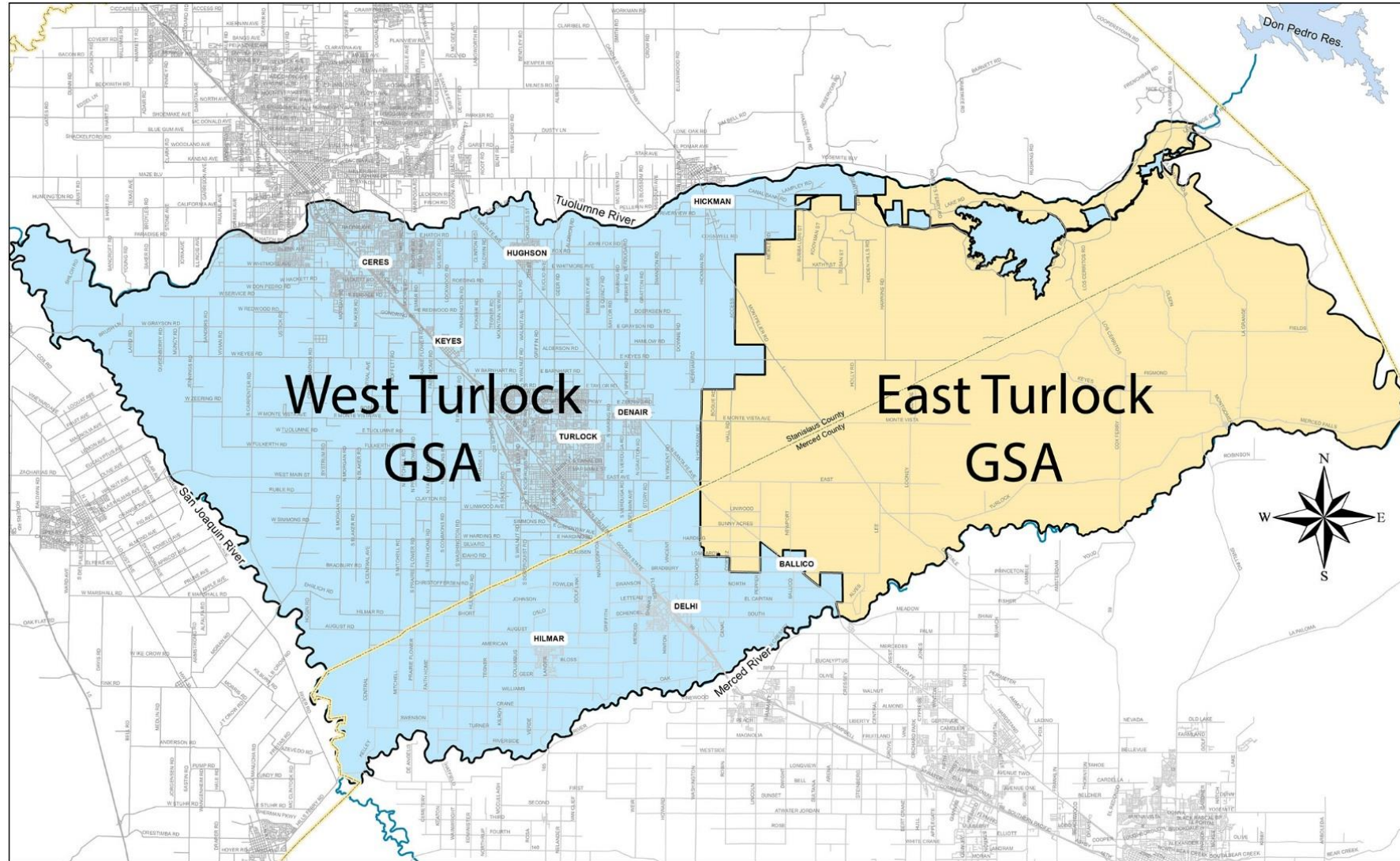
Turlock is in non-critical overdraft

Neighboring Critically Overdrafted Basins

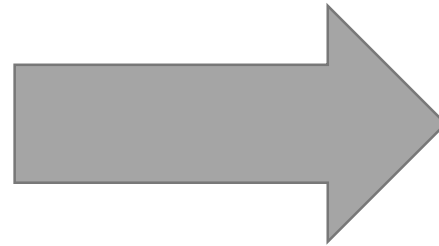
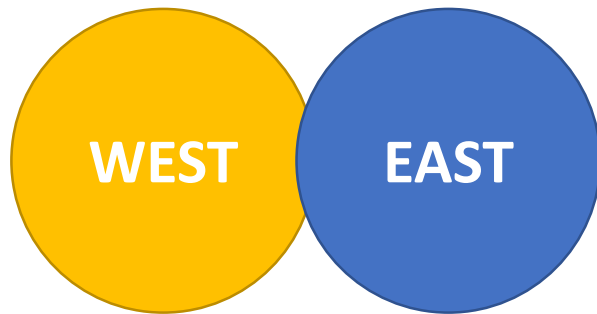
- Critically Overdrafted Basins to the **south and west** of the Turlock Subbasin
- GSPs for Critically Overdrafted Basins *due 2020*
- **Turlock Subbasin GSP due 2022**
- Turlock Subbasin **required to coordinate the GSP** analyses across the river boundaries
- **Expedite technical analysis to allow for coordination**



Groundwater Sustainability Agencies (GSAs)



TWO GSAs



ONE Plan

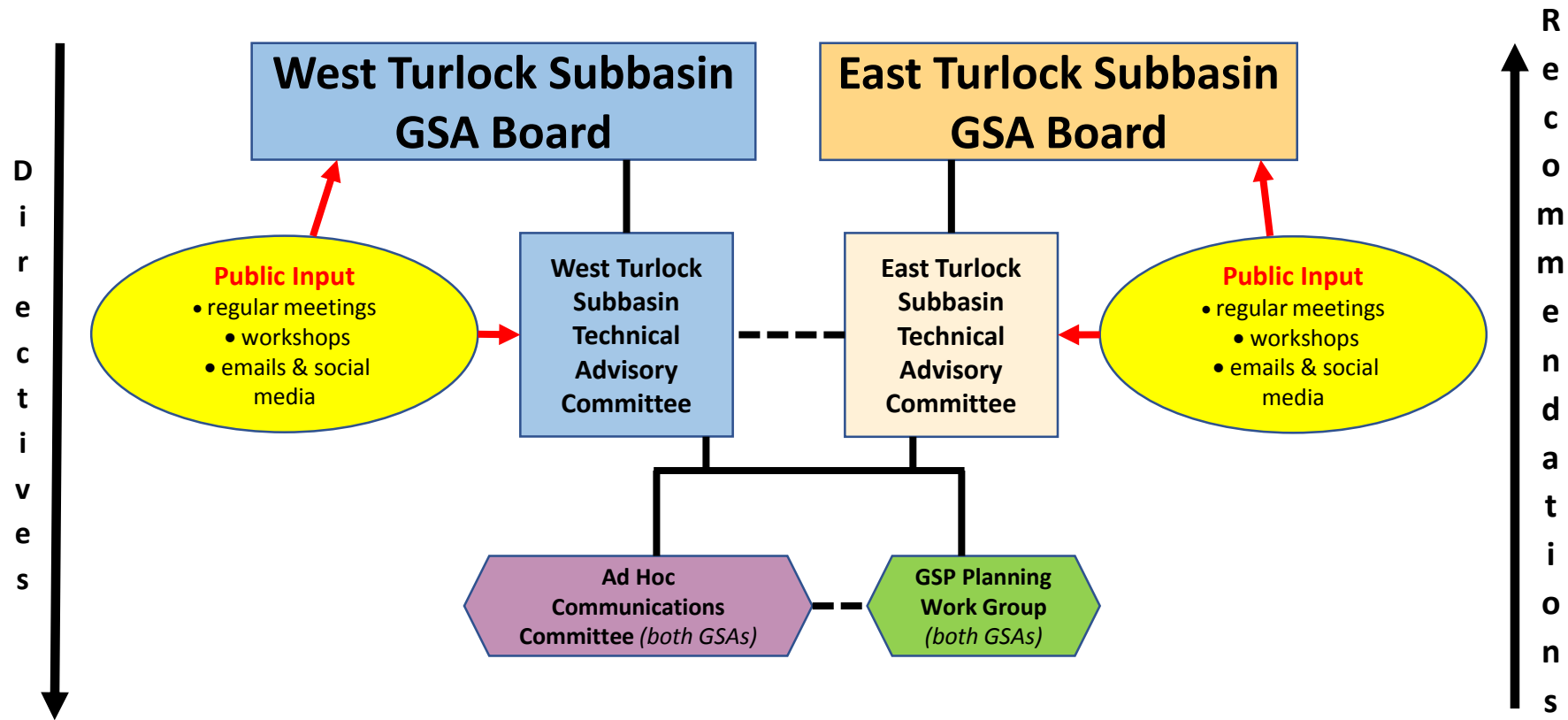


GSP = Groundwater Sustainability Plan

- **Groundwater Conditions**
- **Sustainability Criteria**
- **Monitoring**
- **Projects & Actions**



Turlock Subbasin Governance



Previous Meetings

TAC Meetings

- > ≡ TAC Meeting - 2-28-19
- > ≡ TAC Meeting - 1-24-19
- > ≡ TAC Meeting Cancelled - 12-27-18
- > ≡ TAC Special Meeting - 12-13-18
- > ≡ TAC Meeting Cancelled - 11-22-18
- > ≡ TAC Meeting - 10-25-18
- > ≡ TAC Meeting - 9-27-18
- > ≡ TAC Meeting - 8-23-18
- > ≡ TAC Meeting - 7-26-18
- > ≡ TAC Meeting - 6-28-18
- > ≡ TAC Meeting - 5-24-18
- > ≡ TAC Meeting - 4-26-18
- > ≡ TAC Special Meeting - 4-18-18
- > ≡ TAC Meeting - 3-22-18
- > ≡ TAC Meeting - 2-22-18
- > ≡ TAC Meeting - 1-25-18
- > ≡ TAC Special Meeting - 12-18-17
- > ≡ TAC Meeting - 12-7-17
- > ≡ TAC Special Meeting - 12-4-17
- > ≡ TAC Meeting - 11-16-17
- > ≡ TAC Meeting - 10-26-17
- > ≡ TAC Meeting - 9-28-17
- > ≡ TAC Meeting - 8-24-17
- > ≡ TAC Meeting - 7-27-17
- > ≡ TAC Meeting - 6-22-17
- > ≡ TAC Meeting - 5-25-17
- > ≡ TAC Special Meeting - 5-15-17
- > ≡ TAC Meeting - 4-27-17

West Turlock GSA

- > ≡ WTSGSA Meeting - 2-7-19
- > ≡ WTSGSA Meeting - 12-13-18
- > ≡ WTSGSA Meeting - 9-6-18
- > ≡ WTSGSA Meeting - 6-7-18
- > ≡ WTSGSA Special Meeting - 4-18-18
- > ≡ WTSGSA Meeting - 3-1-18
- > ≡ WTSGSA Meeting - 1-11-18
- > ≡ WTSGSA Meeting - 12-14-17
- > ≡ WTSGSA Meeting - 9-7-17
- > ≡ WTSGSA Meeting - 6-1-17
- > ≡ WTSGSA Meeting - 3-2-17
- > ≡ WTSGSA Meeting - 2-2-17

East Turlock GSA

- > ≡ ETSGSA Meeting - 02-28-2019
- > ≡ ETSGSA Meeting - 01-24-2019
- > ≡ ETSGSA Meeting - 12-27-2018 - Cancelled
- > ≡ ETSGSA Meeting - 11-29-2018 - Cancelled
- > ≡ ETSGSA Meeting - 10-11-2018
- > ≡ ETSGSA Meeting - 9-27-18 - Rescheduled
- > ≡ ETSGSA Meeting - 8-23-18
- > ≡ ETSGSA Meeting - 7-26-18
- > ≡ ETSGSA Meeting - 6-28-18
- > ≡ ETSGSA Meeting - 5-24-18
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- > ≡ ETSGSA Meeting - 7-27-17
- > ≡ ETSGSA Meeting - 6-29-17
- > ≡ ETSGSA Meeting - 4-27-17
- > ≡ ETSGSA Meeting - 3-30-17 and 3-31-17

Previous Meetings

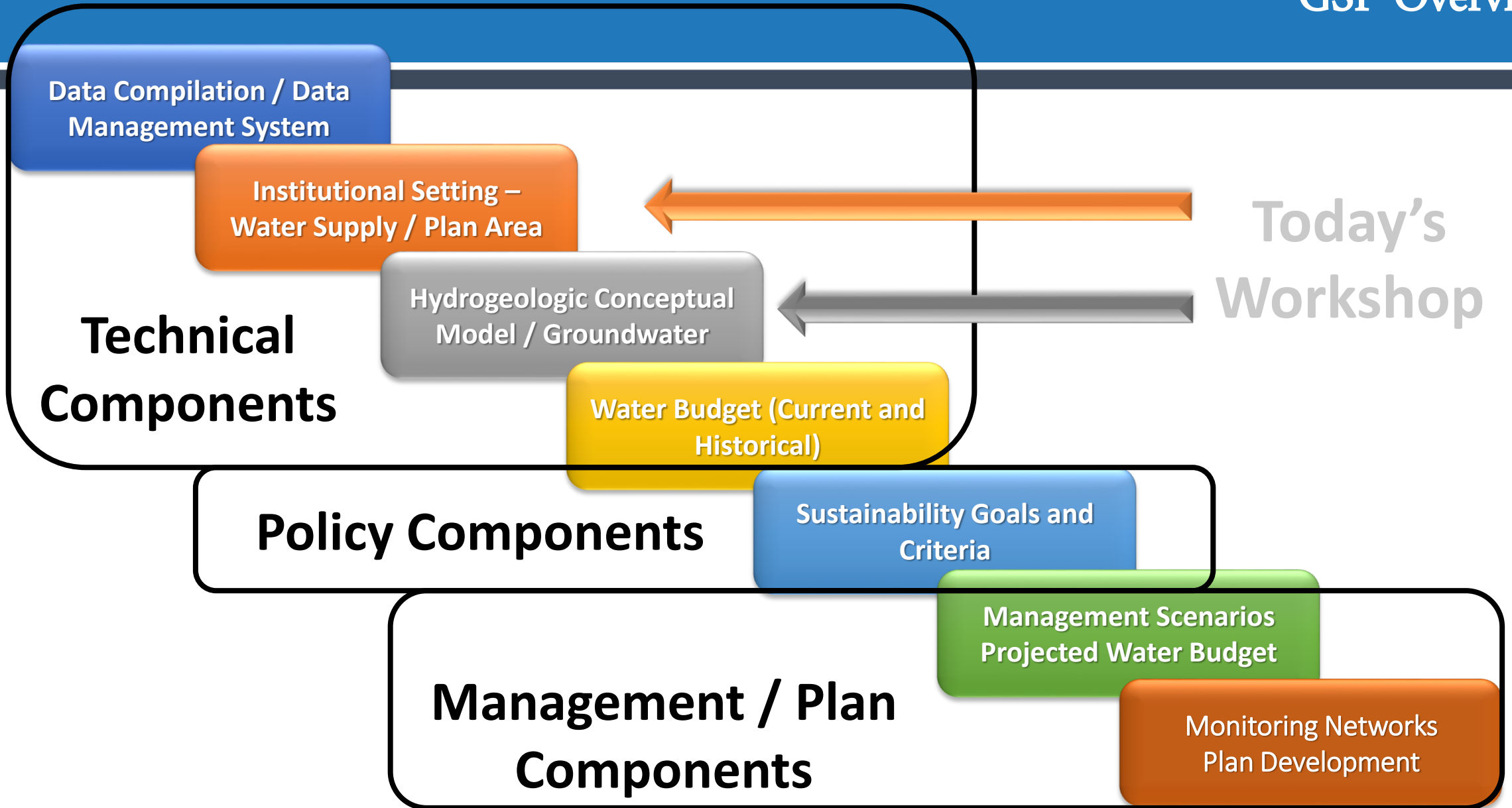
Adjacent Basin Meetings

- > ≡ [Coordination Meeting with Merced Subbasin - 4-23-18](#)
- > ≡ [Coordination Meeting with Merced Subbasin - 6-19-18](#)
- > ≡ [Coordination Meeting with Delta-Mendota Subbasin - 7-12-18](#)

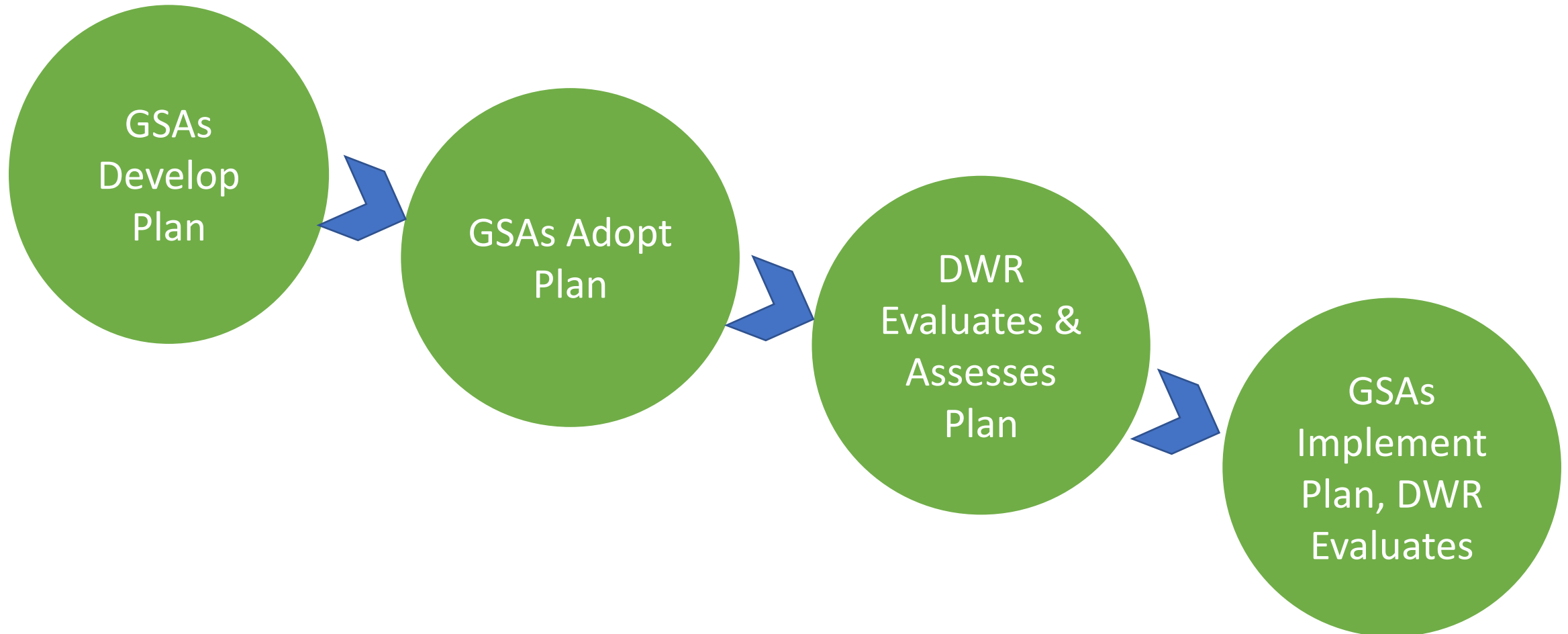
Community & Technical Meetings

- [Community Workshop #3 03-12-2019](#)
- [Technical Workshop #2 12-13-2018](#)
- [Technical Workshop #1 08-23-2018](#)
- [Community Workshop #2 06-20-2018](#)
- [Community Workshop #1 04-18-2018](#)

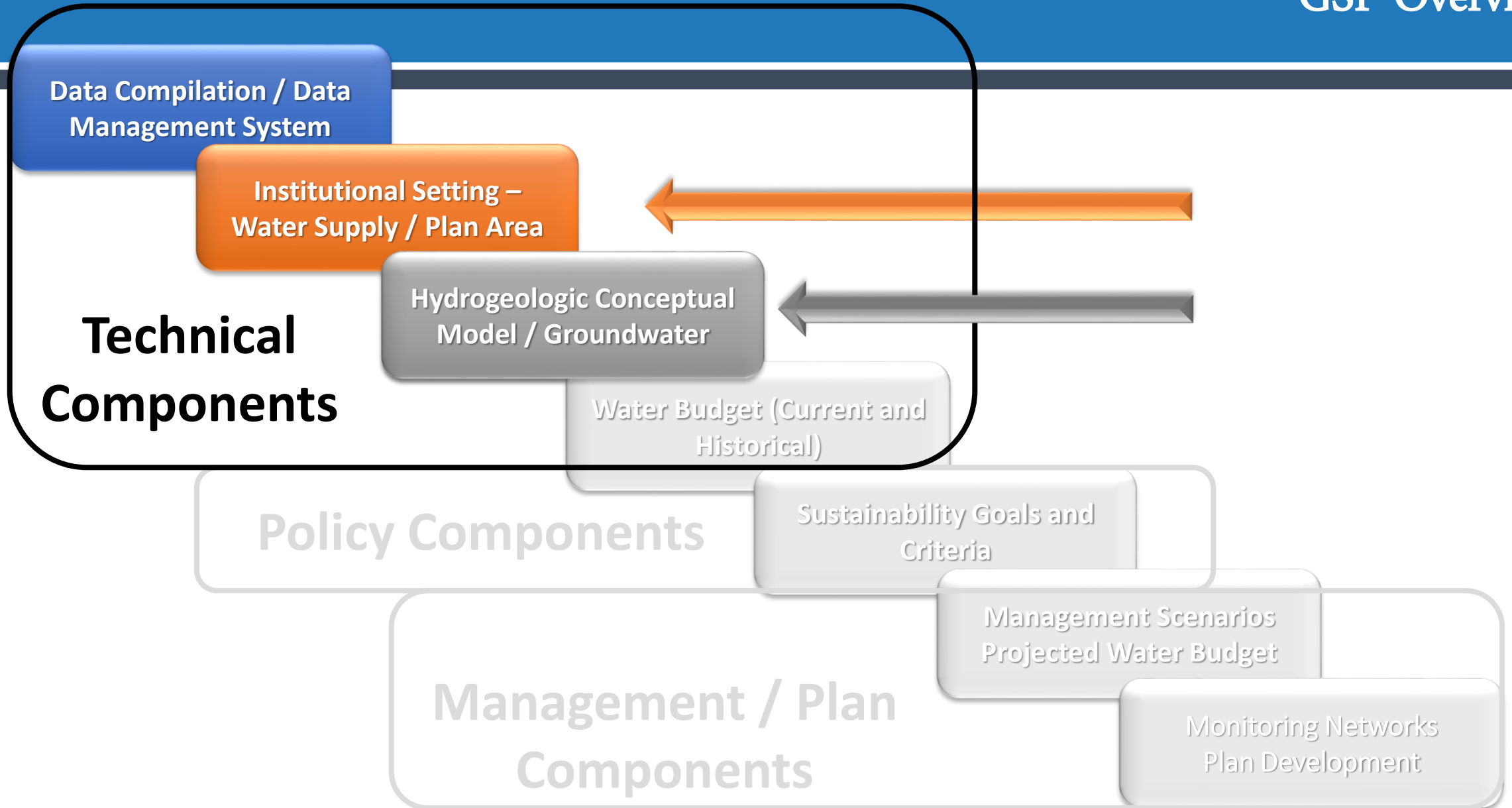
<https://turlockgroundwater.org/meetings/>



GSP Adoption & Review Process



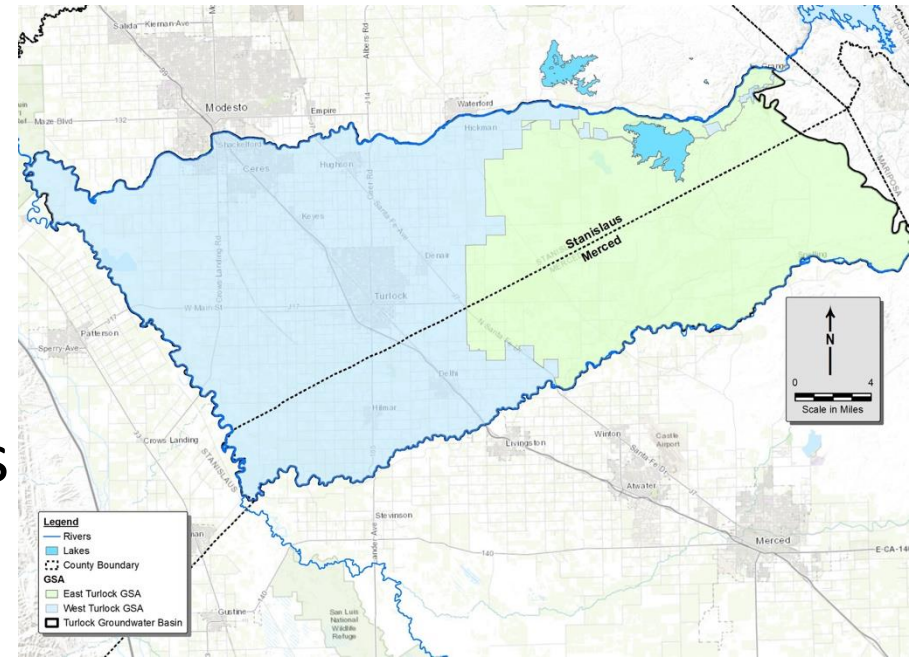
About that Plan...



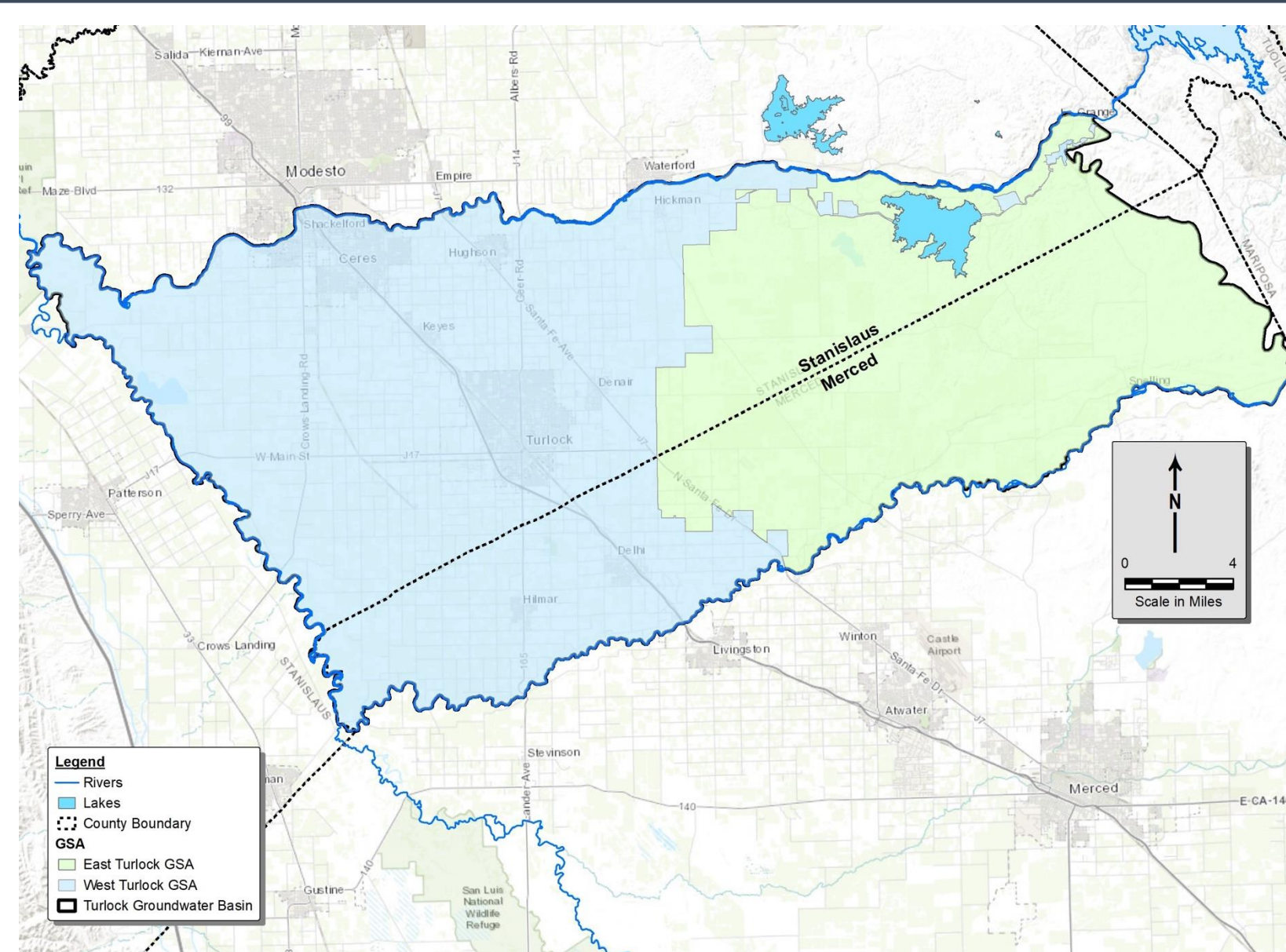
Plan Area: GSP Requirements

What are the Institutional and Water Supply Conditions?

- Agencies and Jurisdictional Boundaries
- Existing Land Use
- Water Sources and Use
- Water Resources Monitoring
- Water Resources Management Programs
- Land Use Planning Elements

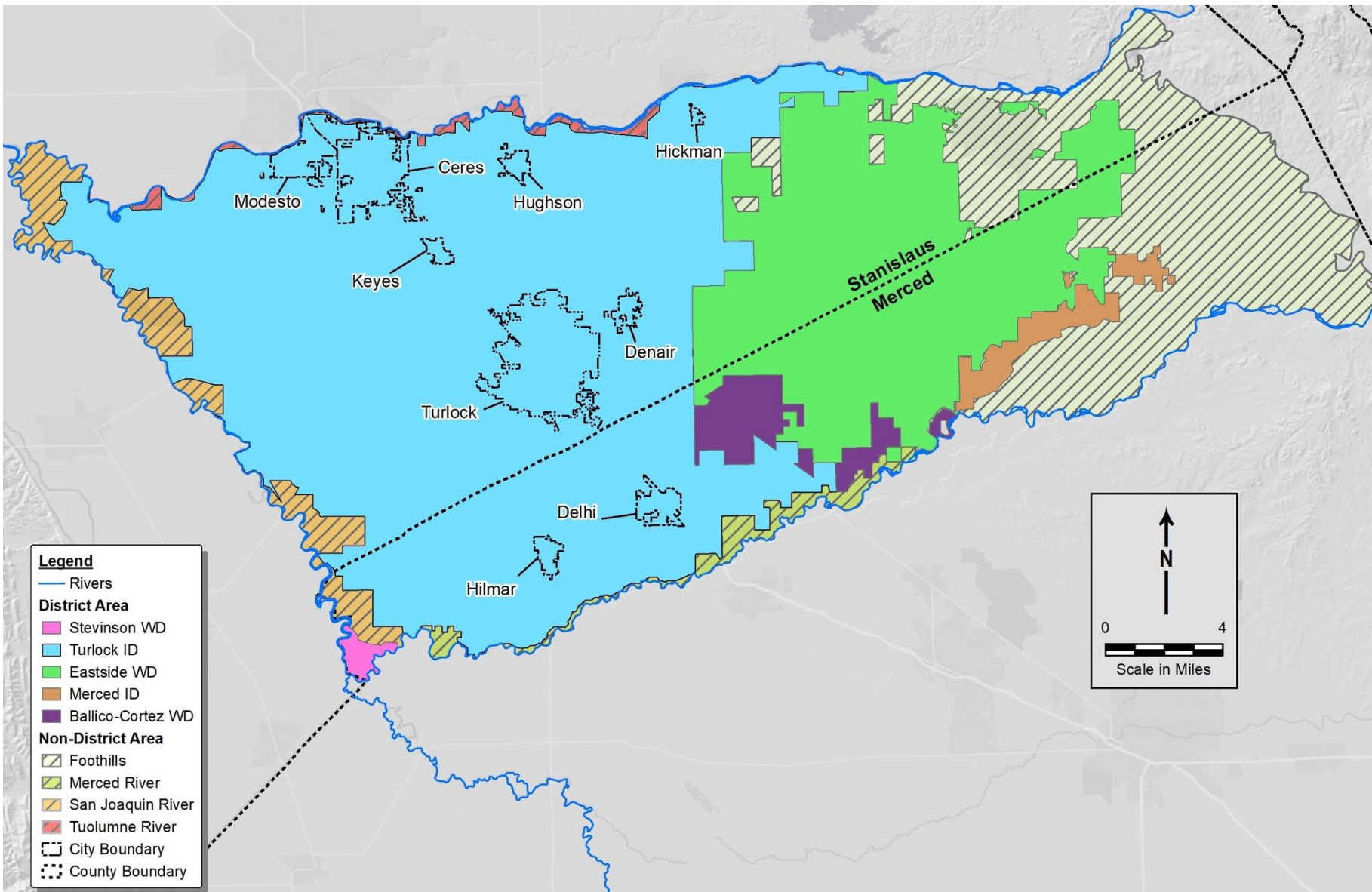


Agencies and Jurisdictional Boundaries



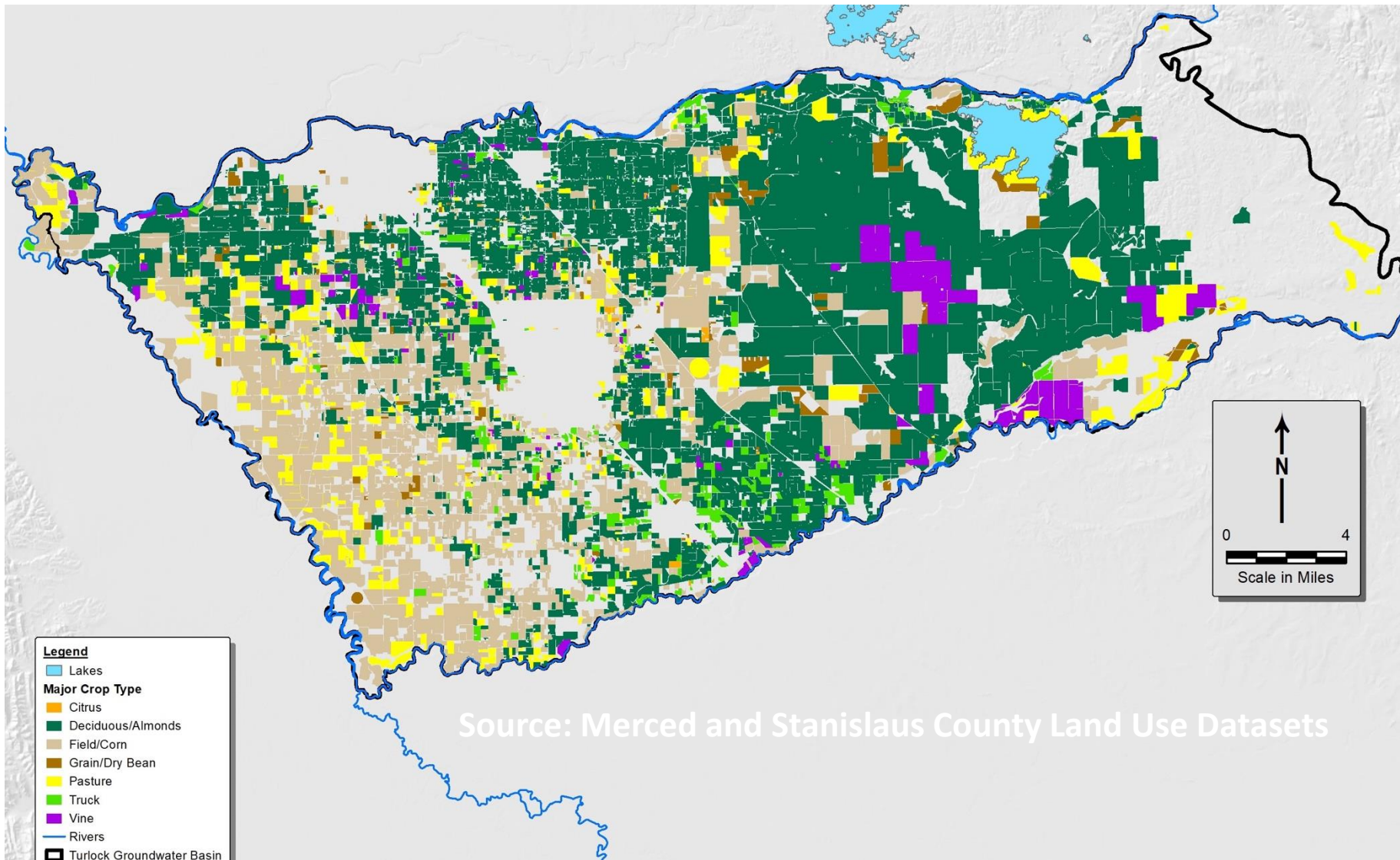
- Subbasin 544 mi²
- West T. GSA 327 mi²
(60% of Plan Area)
- East T. GSA 217 mi²
(40% Plan Area)

Agencies and Jurisdictional Boundaries



- **9** Municipalities and Urban Communities
- **5** Irrigation and Water Districts
- **106,091 acres (30%)** Non-District Areas in eastern subbasin and along river boundaries

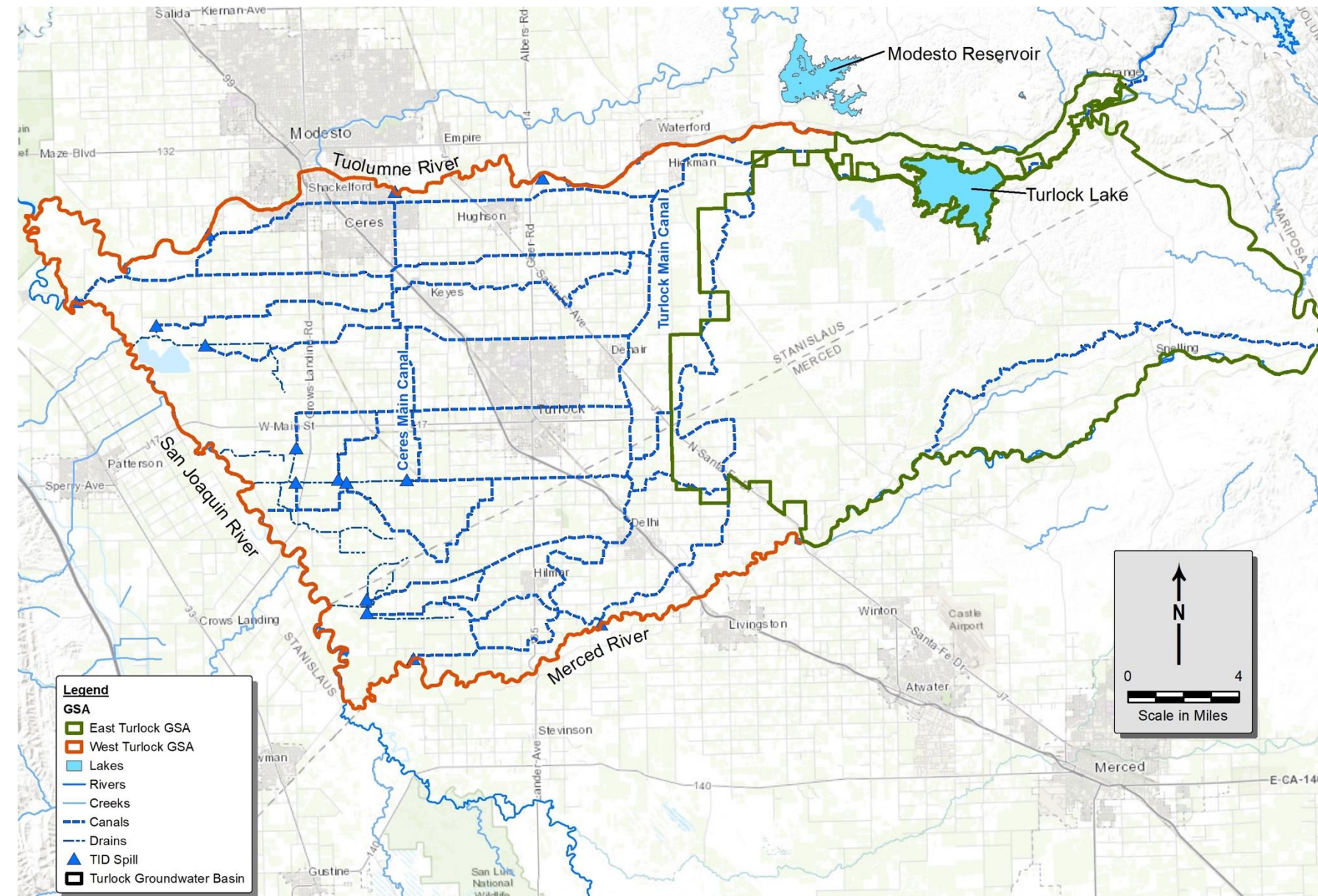
Existing Land Use 2014



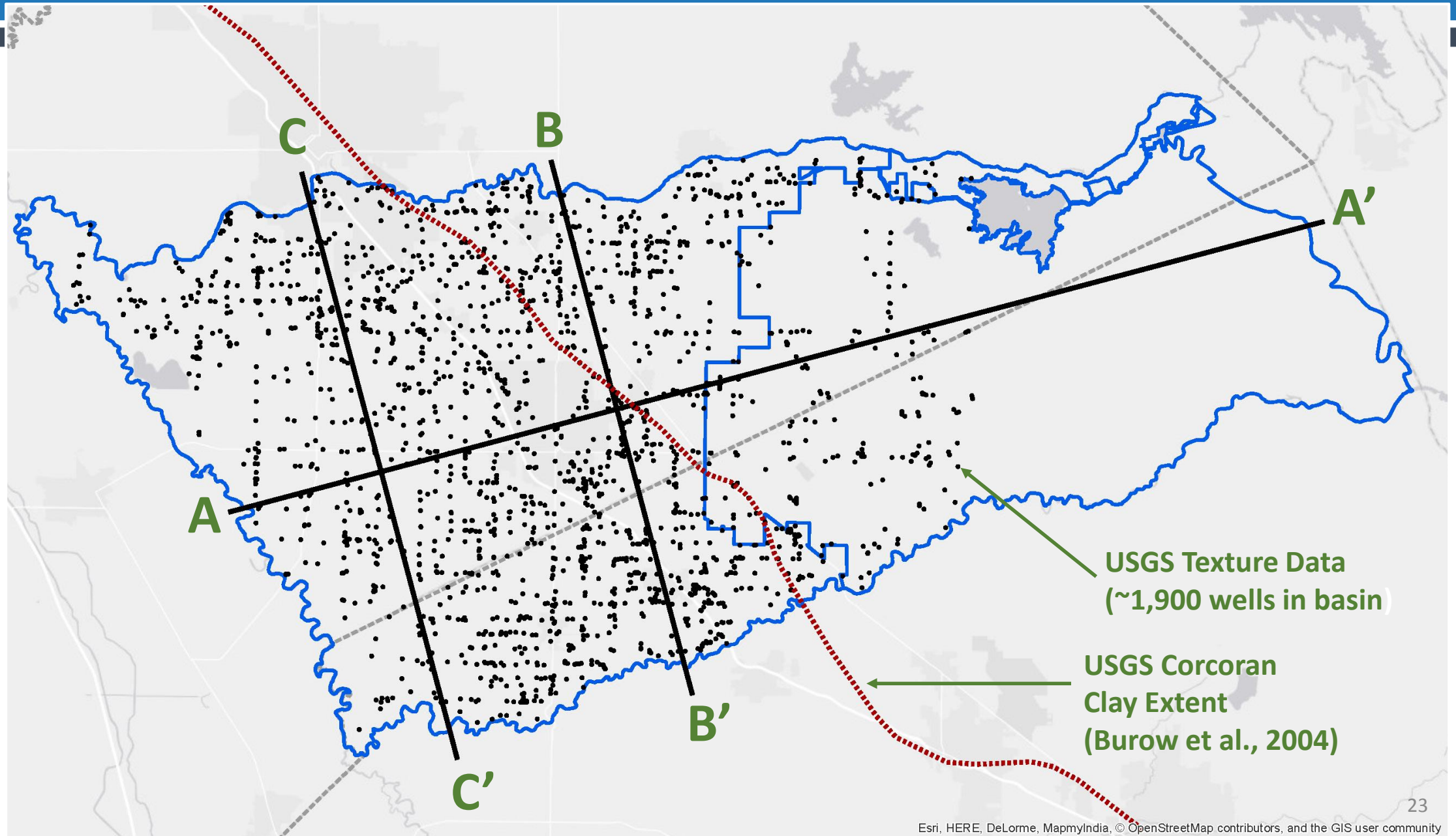
- 235,676 acres Irrigated Agriculture (**68% basin**)
- 17,463 acres Urban (**5% basin**)
- 95,048 acres Non-irrigated Agriculture and Undeveloped (**27% basin**) (includes surface water, i.e., Turlock Lake)

Surface Water Supply and Infrastructure

- Surface water from the Tuolumne and Merced Rivers
- Groundwater
- No imported water sources

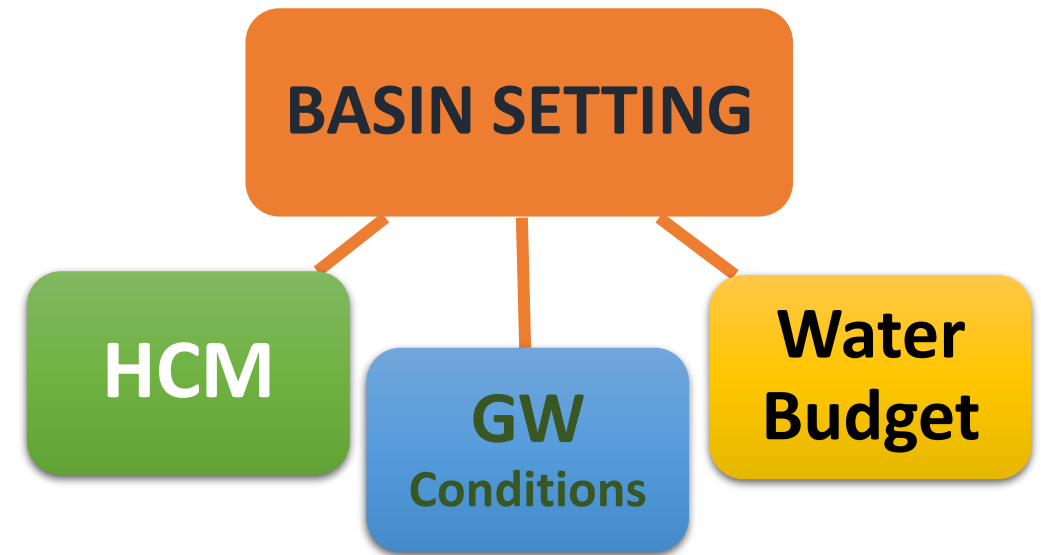


Texture Data and Cross Section Transects



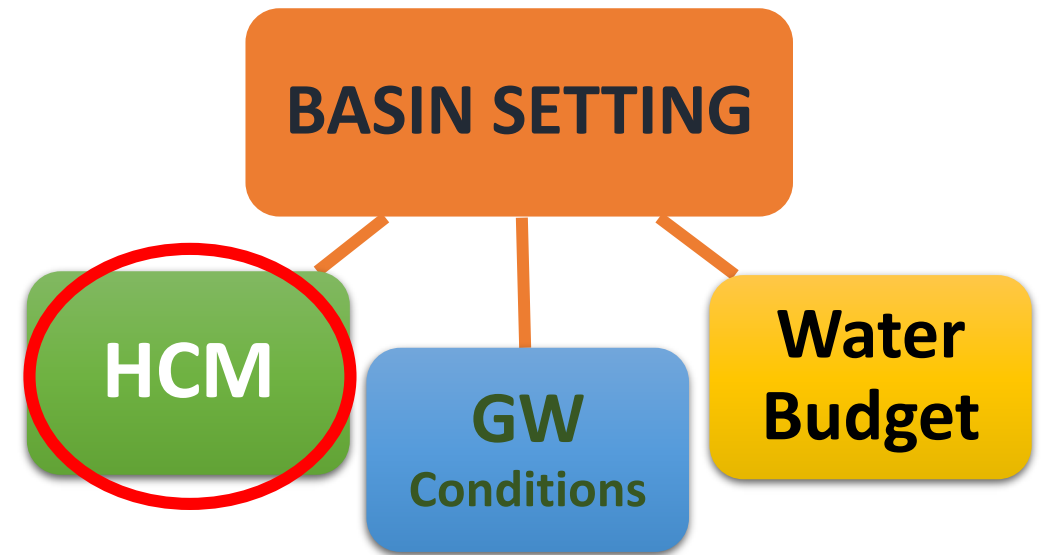
GSP Requirements for Basin Setting

- Hydrogeologic Conceptual Model (HCM)
- Groundwater Conditions
- Water Budget Analysis
 - Historical and Current periods
 - Uses groundwater model
 - *Revisions in Progress*



GSP Requirements for Basin Setting

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What does the groundwater basin look like?

- **Physical Setting**

- Topography
- Geologic and structural setting
- Surface geology, soils
- Hydrology
- Climate

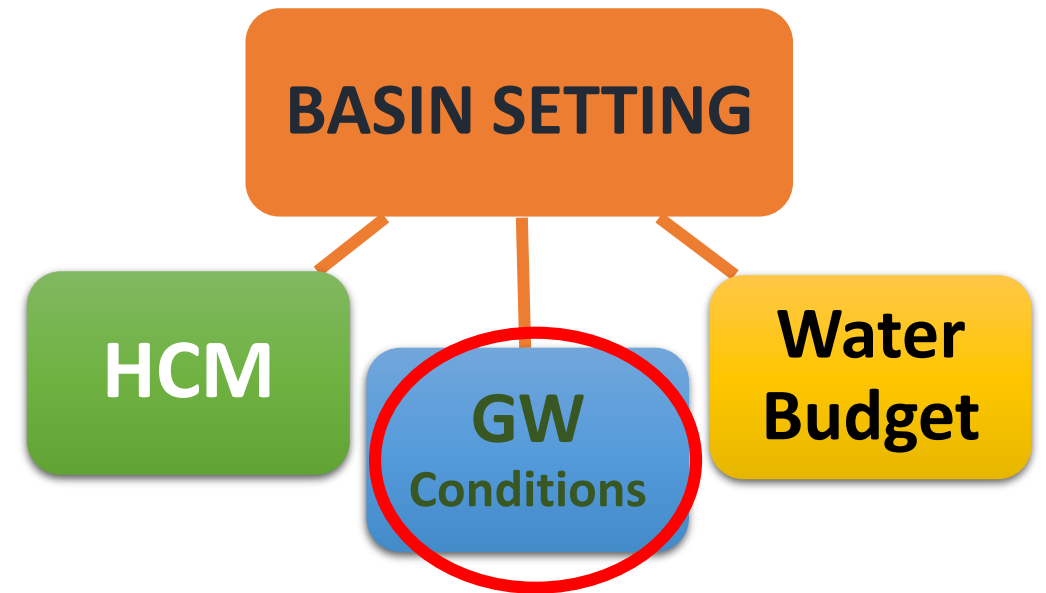
- **Groundwater Basin and Aquifers**

- Basin geometry, lateral boundaries and bottom
- Areas of Recharge and Discharge
- Aquifer framework



GSP Requirements for Basin Setting

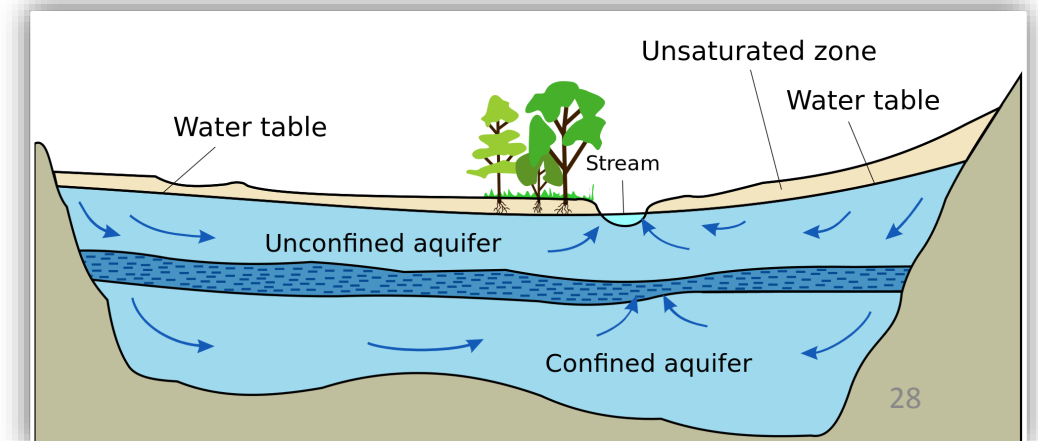
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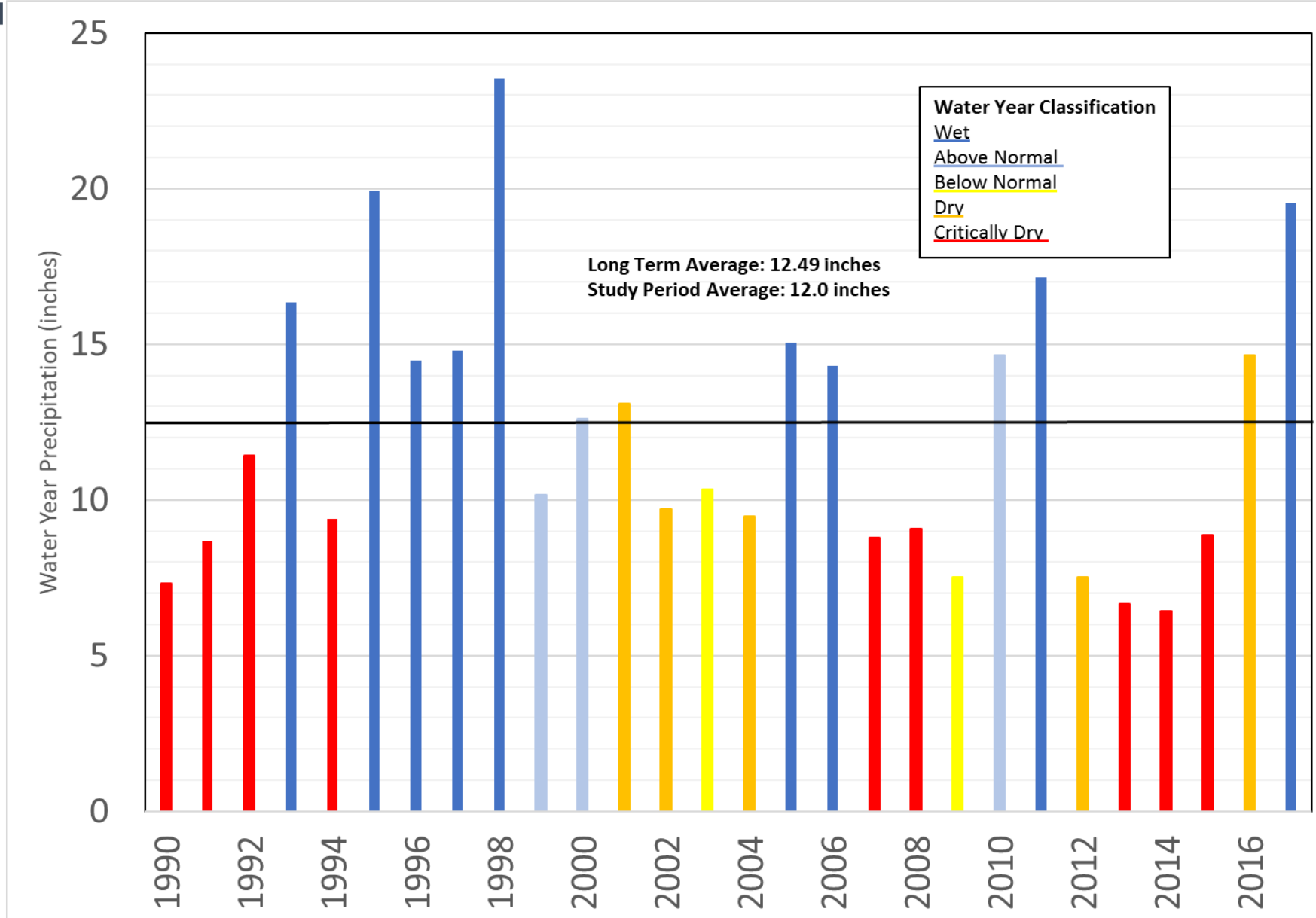
Groundwater Conditions: GSP Requirements

What are the current and historical groundwater conditions?

- Hydrographs (changes in groundwater levels over time)
- Groundwater elevation contour maps
- Changes in groundwater in storage (between seasonal highs)
- Groundwater quality
- Land subsidence
- Groundwater Dependent Ecosystems (if applicable)

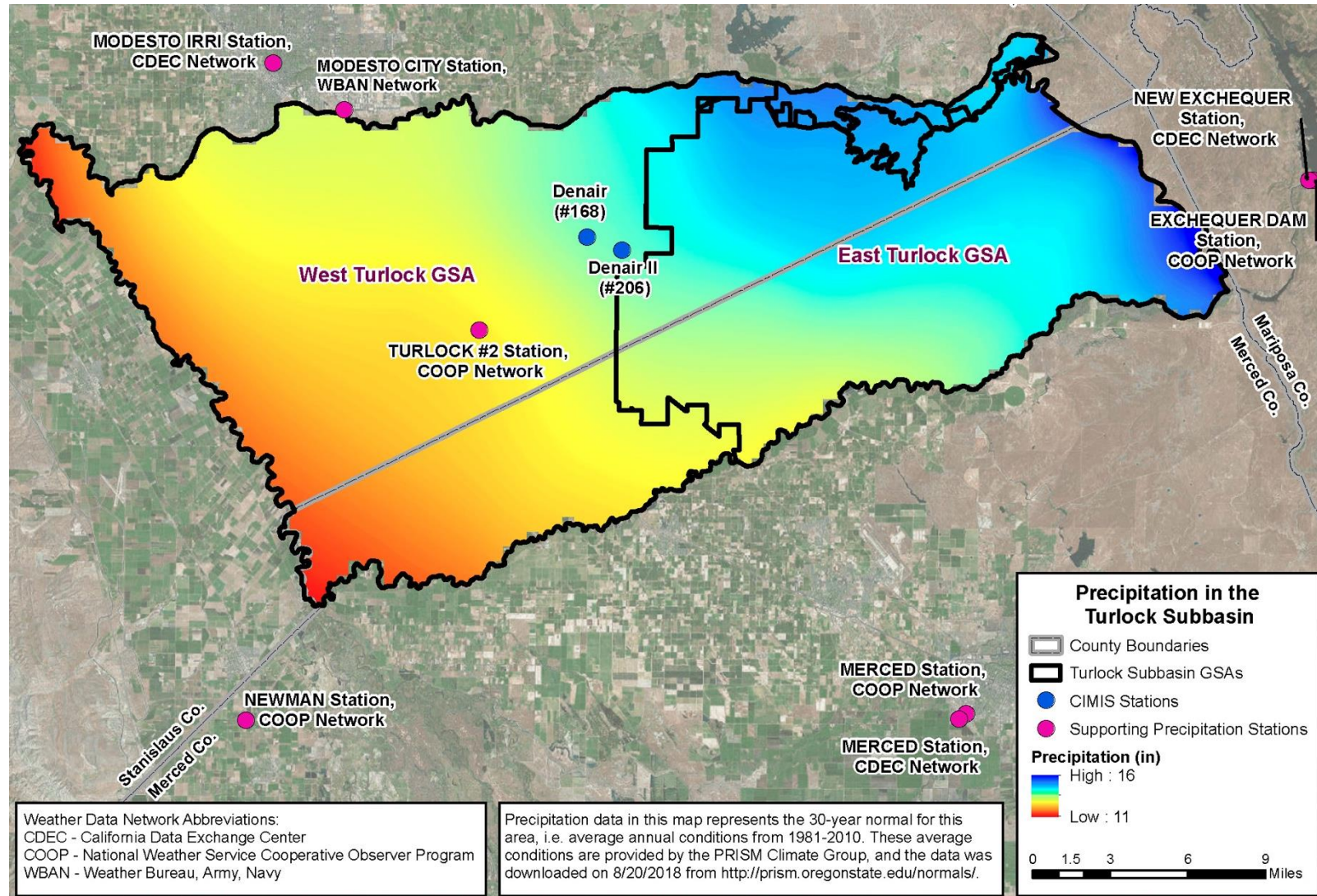


Annual Precipitation



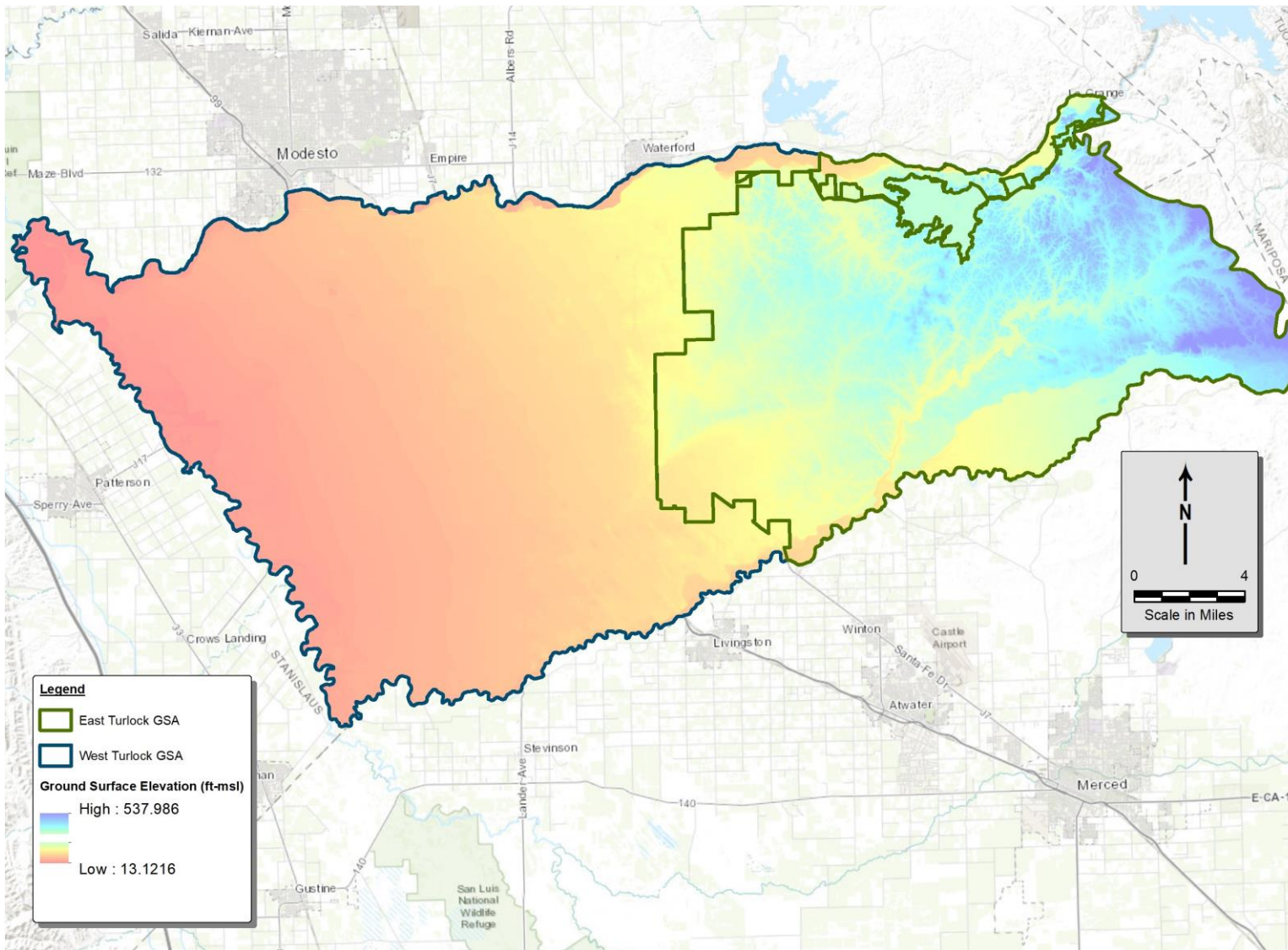
- NOAA Site 049073 (Jan 1990-July 2002)
- CIMIS Denair (#168) and Denair II (#206) (August 2002-present)
- DWR Water Year Classification for San Joaquin Valley

Average Annual Precipitation 1981-2010



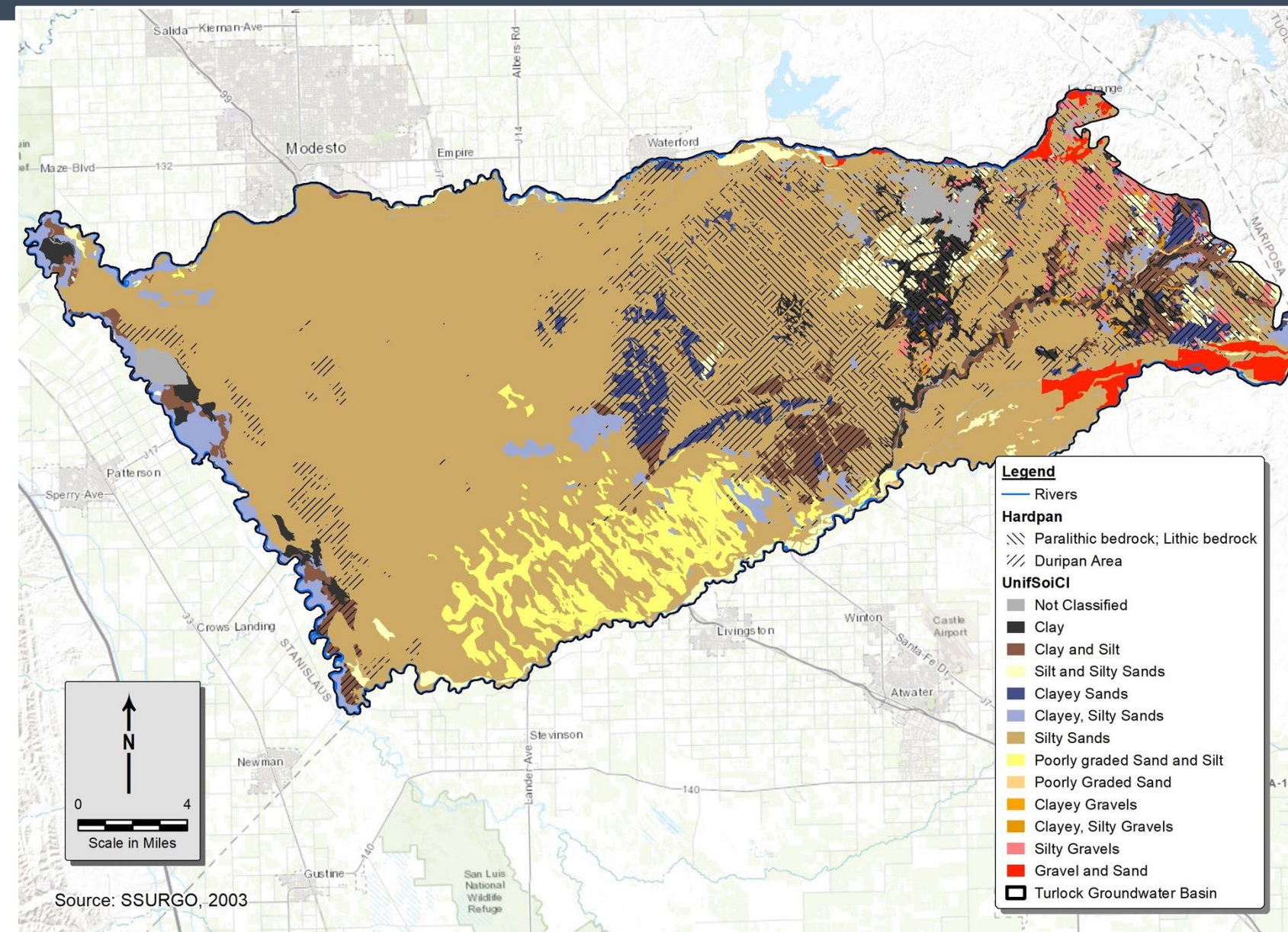
- Data from PRISM, 30-year average
- Ranges from 11 to 16 inches per year
- Precipitation data used in C2VSim

Ground Surface Elevation



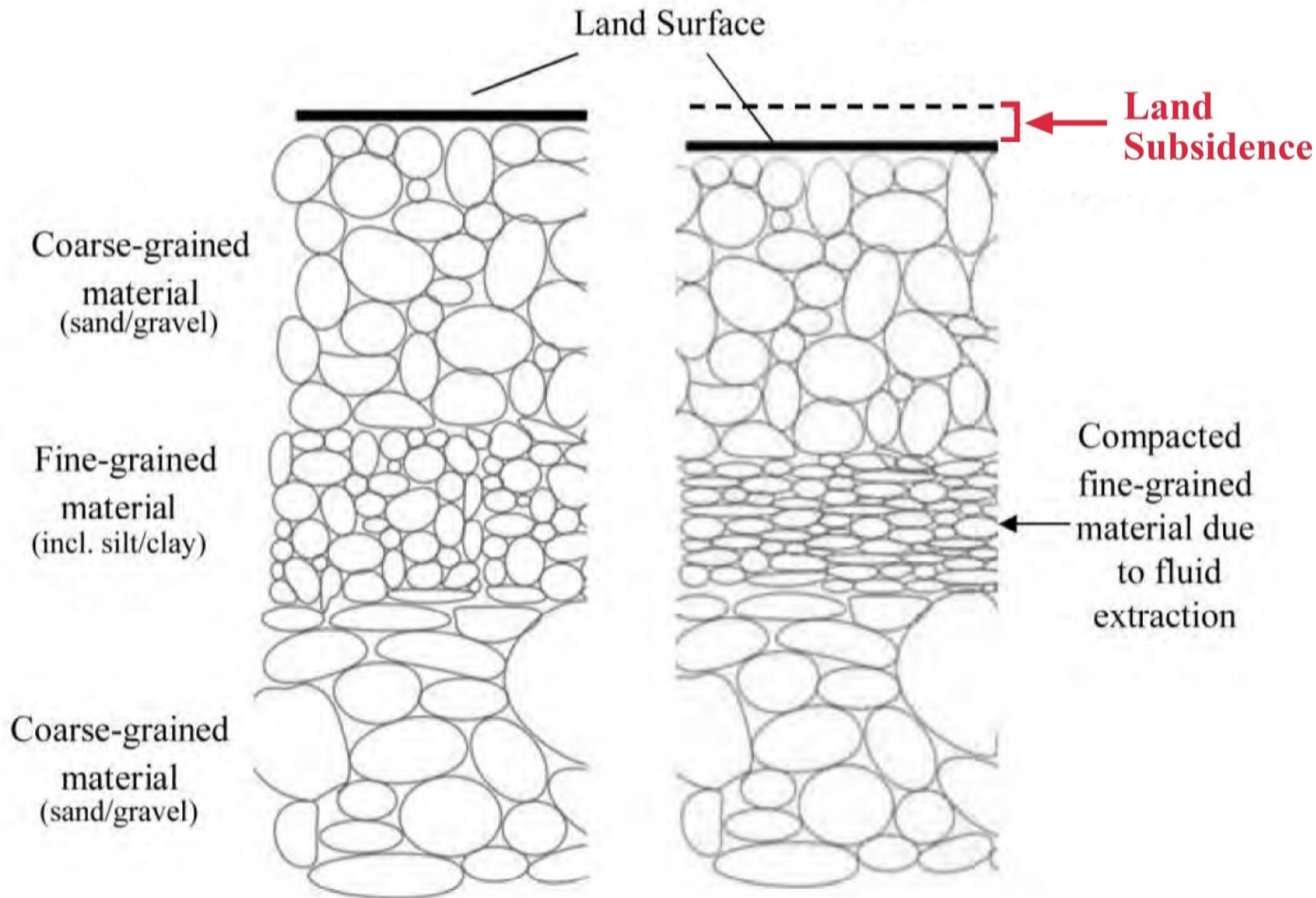
- Elevations range from about **530 feet** msl in the east to about **15 feet** msl in the west.
- WTSGSA is relatively flat
- ETSGSA is hilly and dissected

Plan Area Soils and Restrictive Layers



- Soils used in C2VSim
- Restrictive layers limit natural recharge in portions of the eastern subbasin
- Clay-rich soils in west limit infiltration and create perched conditions locally

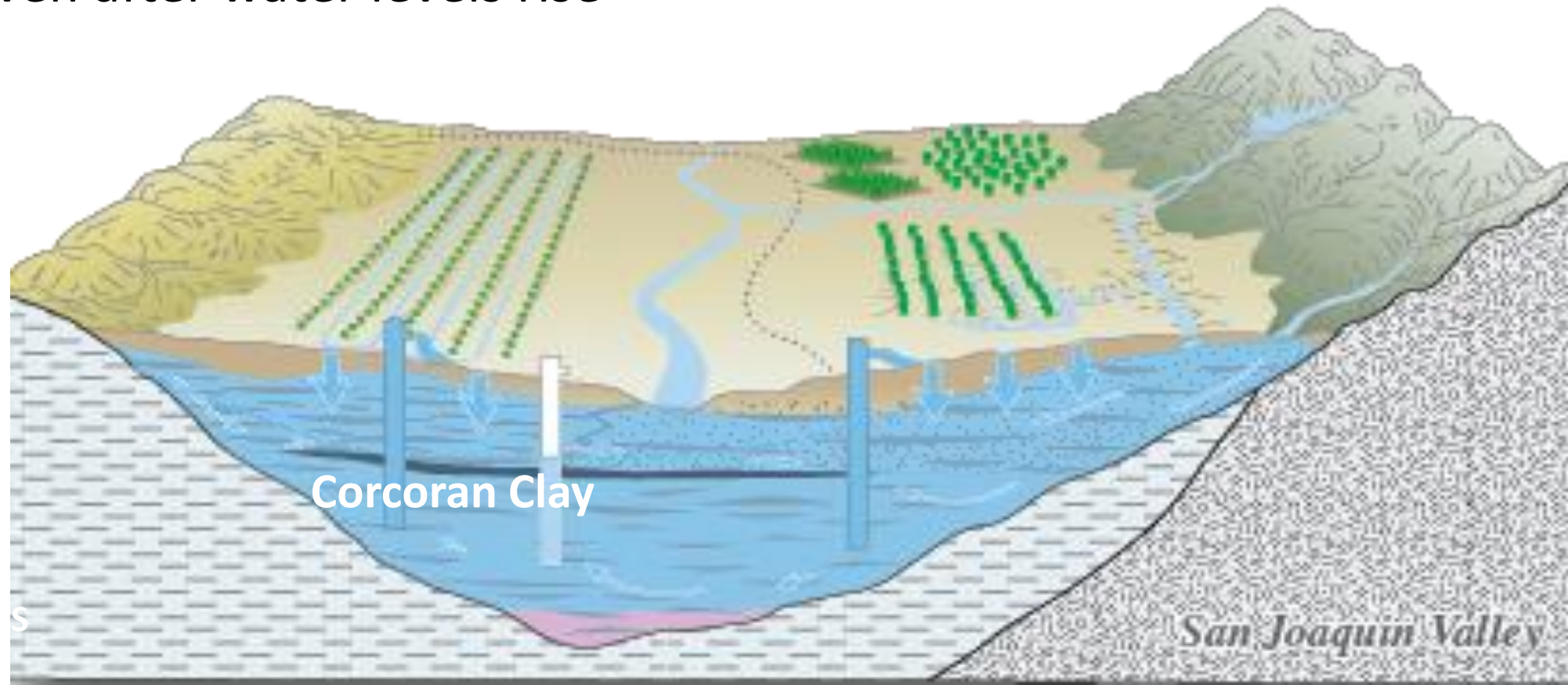
Conceptual Diagram - Land Subsidence



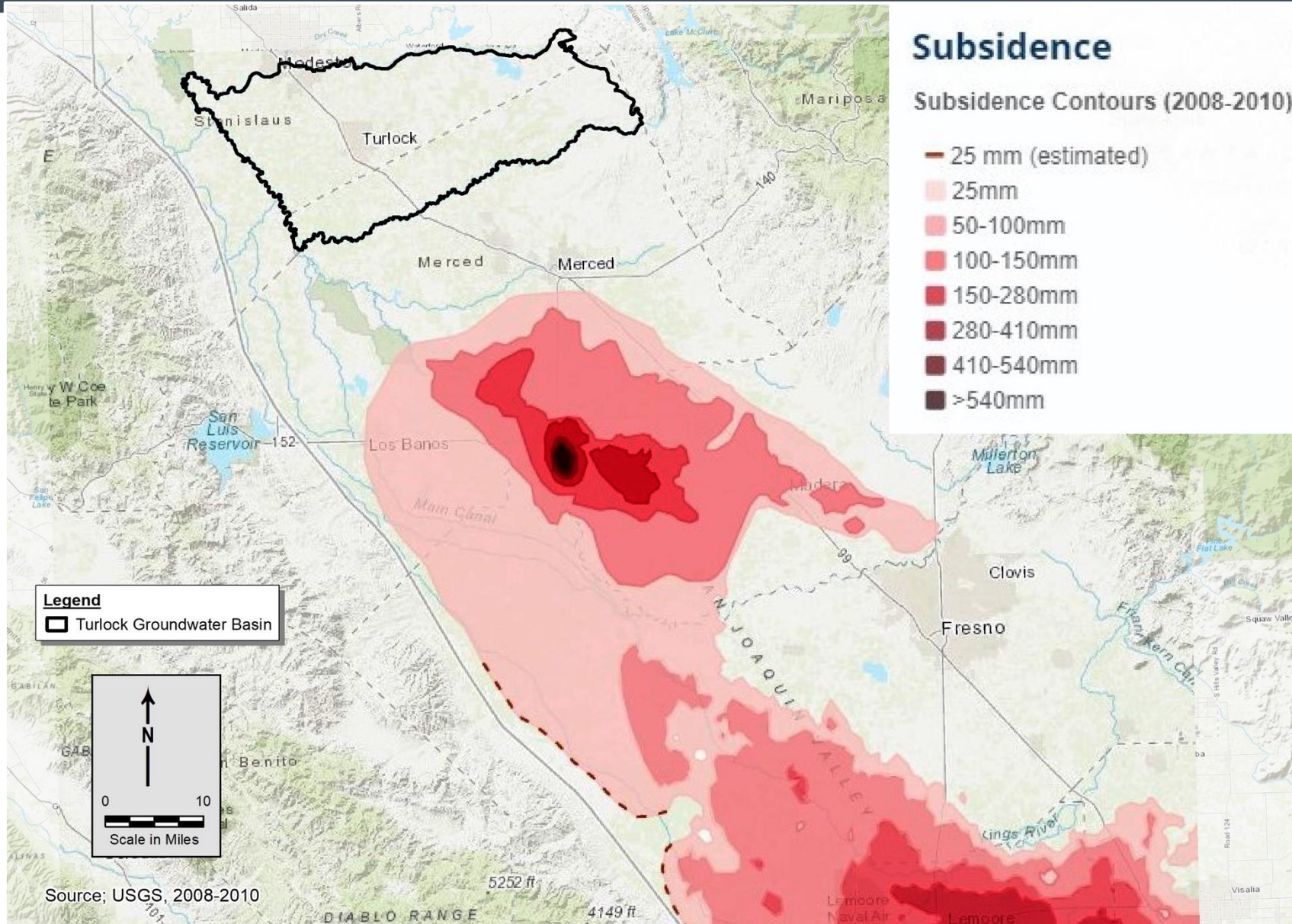
- Declining water levels decrease pore pressure
- Can lead to subsurface compaction
- Most of the deformation in the Central Valley is associated with the Corcoran Clay

Corcoran Clay and Land Subsidence

- Paleo Lake Deposits - Regional Aquitard
- Much of the deformation is below the top of the clay (confined aquifer)
- Clay compaction is very slow and subsidence continues for a long time, even after water levels rise

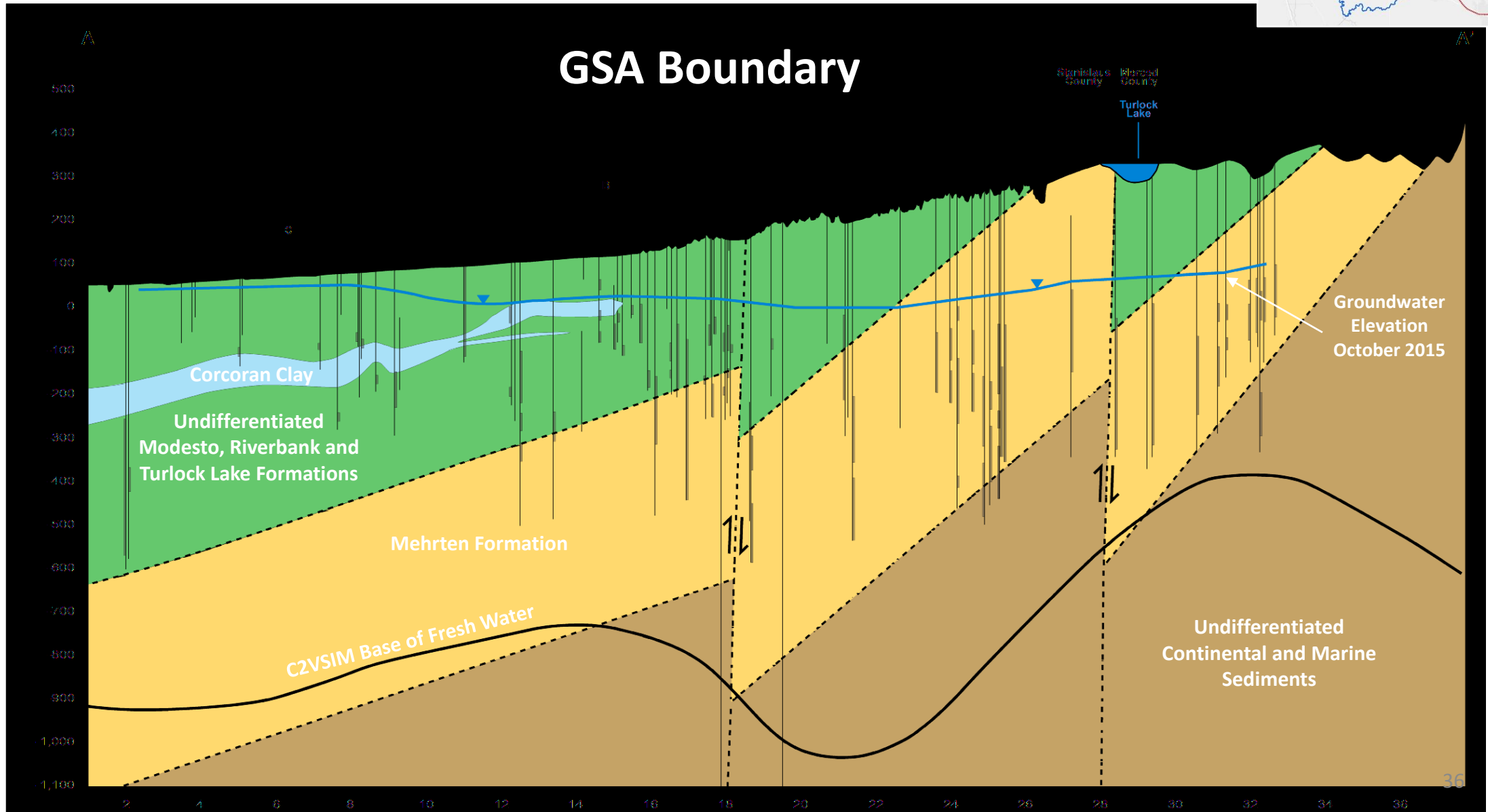
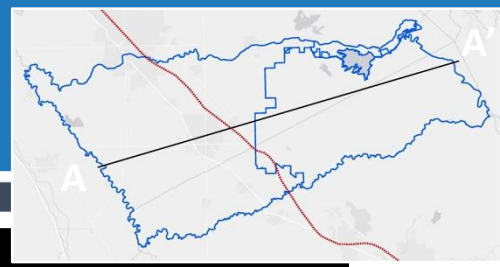


Subsidence South of Turlock Subbasin



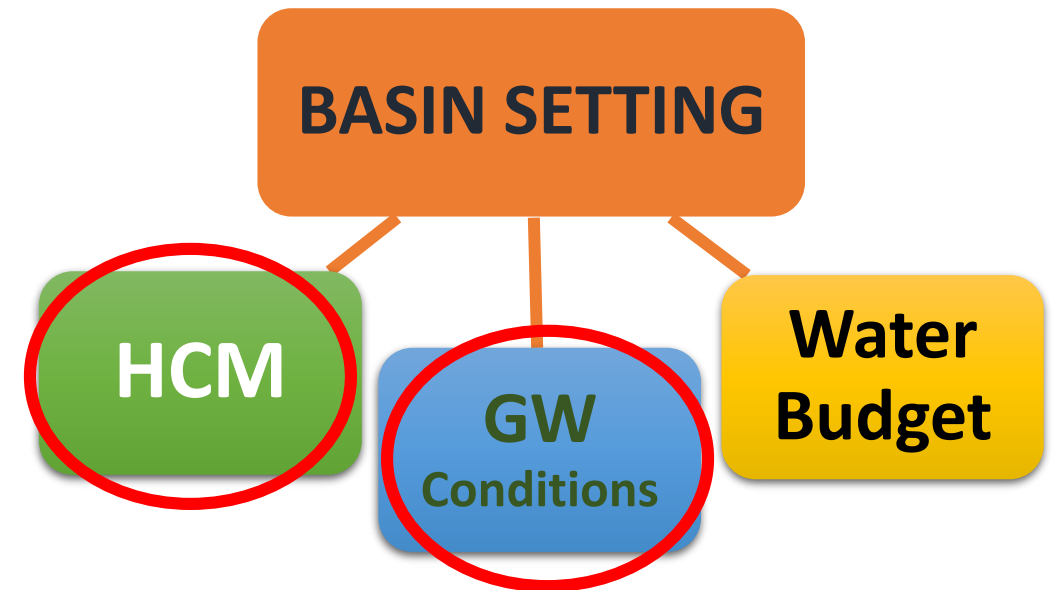
- **Historical subsidence is not a significant issue in Turlock Subbasin, but has occurred south of the Turlock Subbasin**
- Lowering of water levels could result in compaction in western Turlock Subbasin
- Important to understand the extent and thickness of the Corcoran Clay

Regional Cross Section



GSP Requirements for Basin Setting

- Hydrogeologic Conceptual Model (HCM)
- Groundwater Conditions
- Water Budget Analysis
 - Historical and Current periods
 - Uses groundwater model
 - *Revisions in Progress*



4. Basin Setting.....	4-1
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*Sections to be supplemented
when model and analyses are
complete*



Model Representation



Data Gaps

- 4.2. Groundwater Conditions..... 4-20
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 - 4.2.2. Water Levels and Trends 4-20
 - 4.2.3. Groundwater Flow 4-22
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 - 4.2.6. Land Subsidence 4-37
 - 4.2.7. Interconnected Surface Water 4-38
 - 4.2.8. Groundwater Dependent Ecosystems..... 4-39

GW Elevation Contour Maps

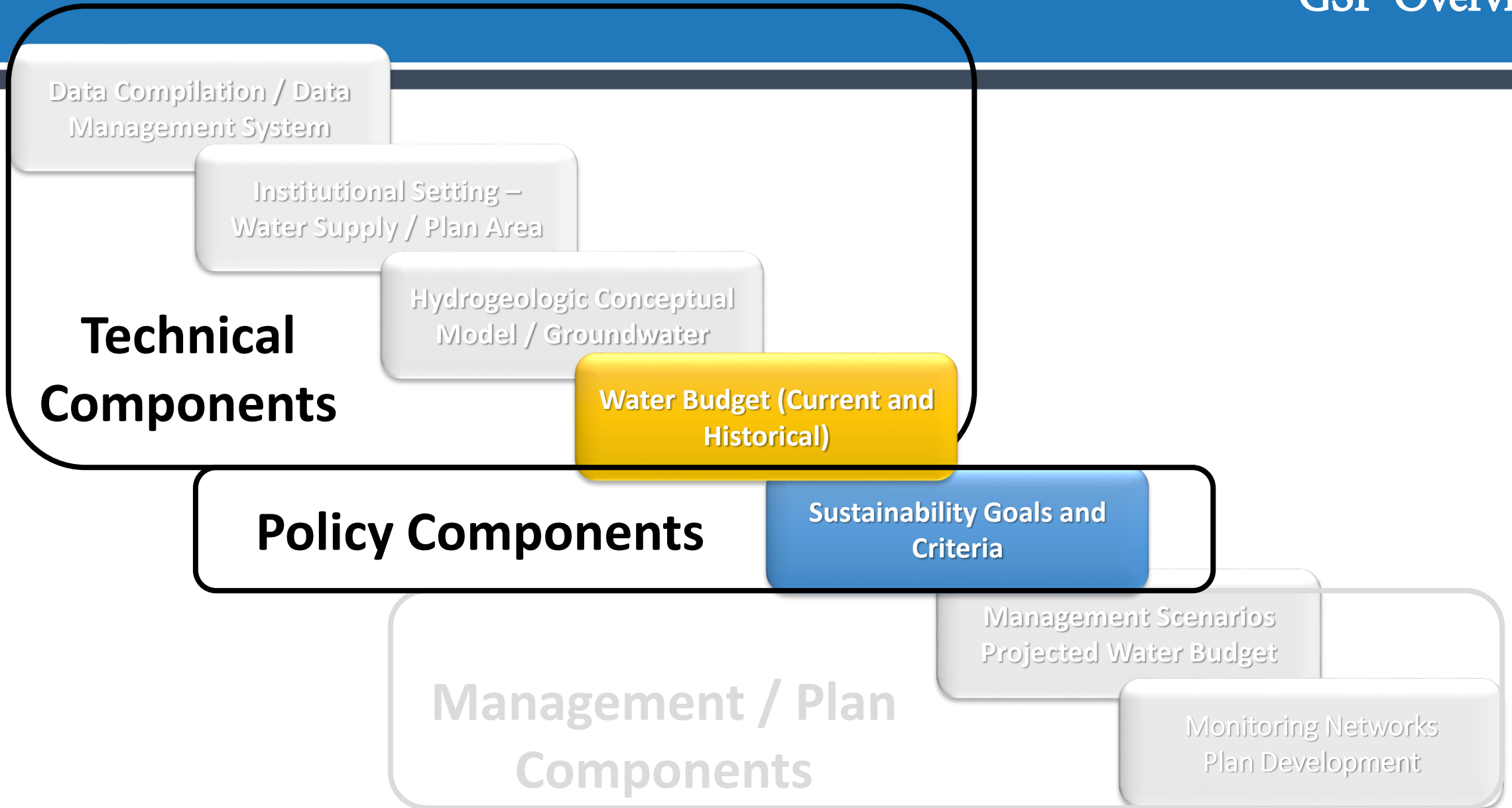
Changes in Groundwater Storage

Sections to be supplemented when model and analyses are complete

**Interconnected Surface Water
Groundwater Dependent Ecosystems**

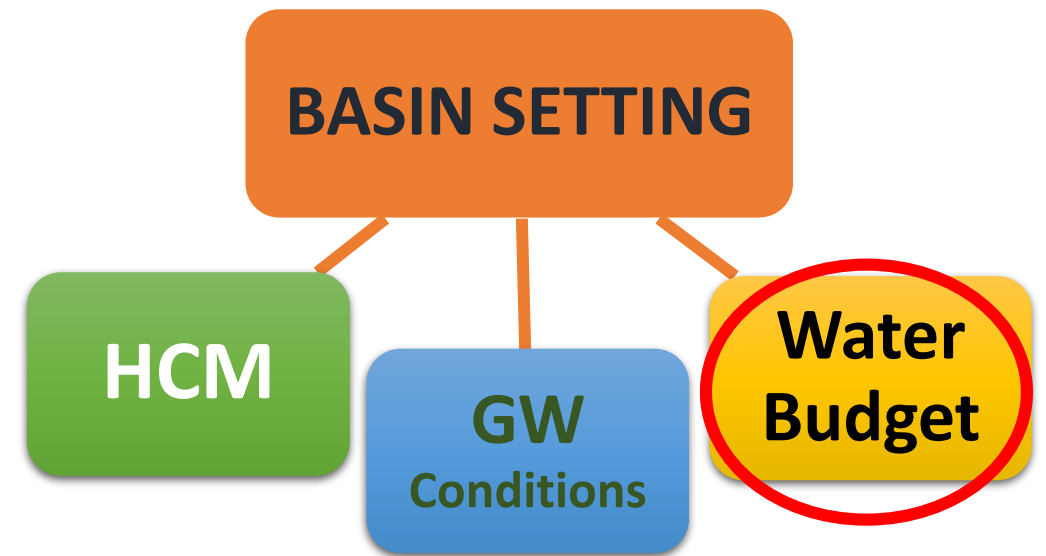
Coming Soon:

Water Budget, Sustainability Indicators &
Undesirable Results

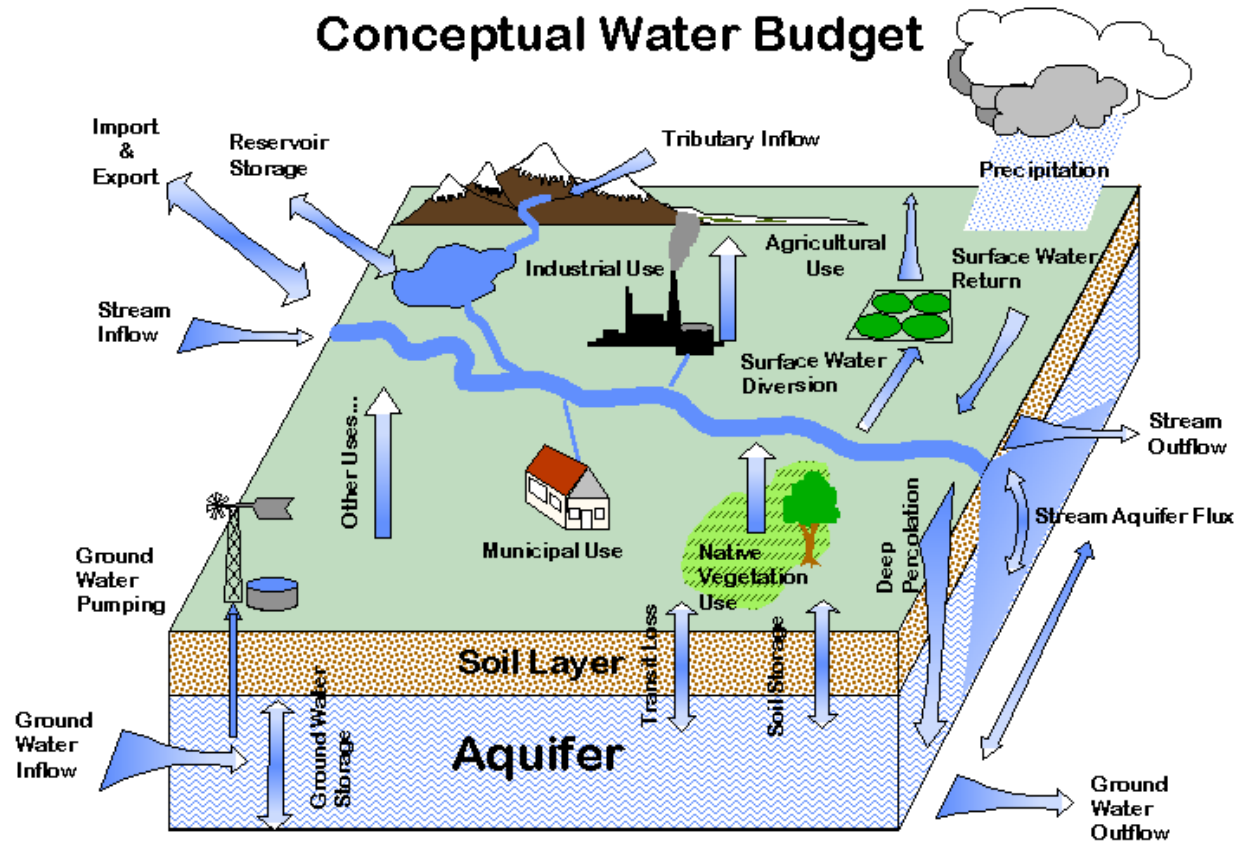


GSP Requirements for Basin Setting

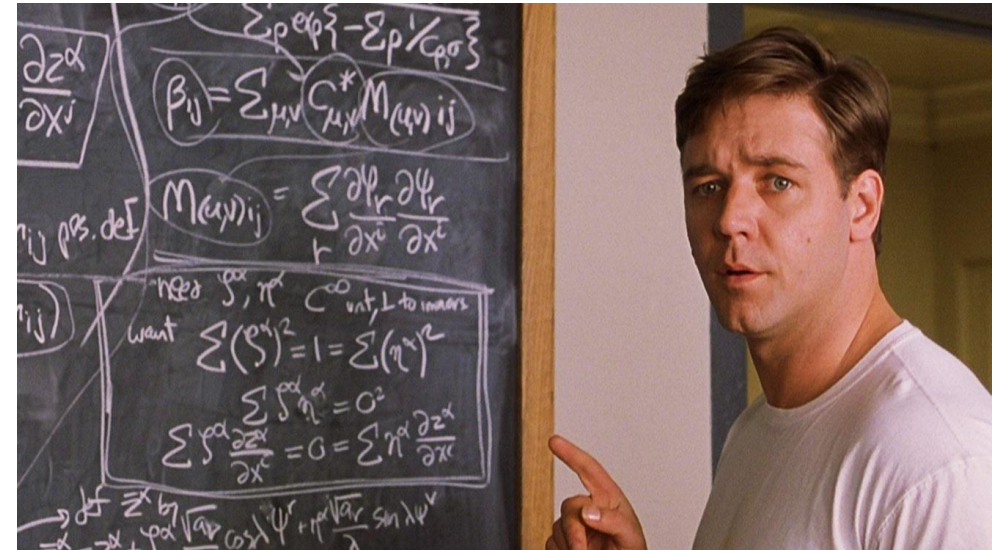
- Hydrogeologic Conceptual Model (HCM)
- Groundwater Conditions
- **Water Budget Analysis**
 - Historical and Current periods
 - Uses groundwater model
 - *Revisions in Progress*



Water Budget



water-research.net



Sustainability Indicators



Chronic Lowering of Water Levels



Reduction of Groundwater Storage



Degradation of Water Quality



Land Subsidence Affecting Land Use



Depletion of Interconnected Surface Water Affecting Beneficial Use

Sustainability Indicators

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

How will they be considered in the Plan?

- A) Sustainability Indicator Analysis
- B) Considerations for Turlock Subbasin
- C) Metrics and Minimum Thresholds to Define Undesirable Results

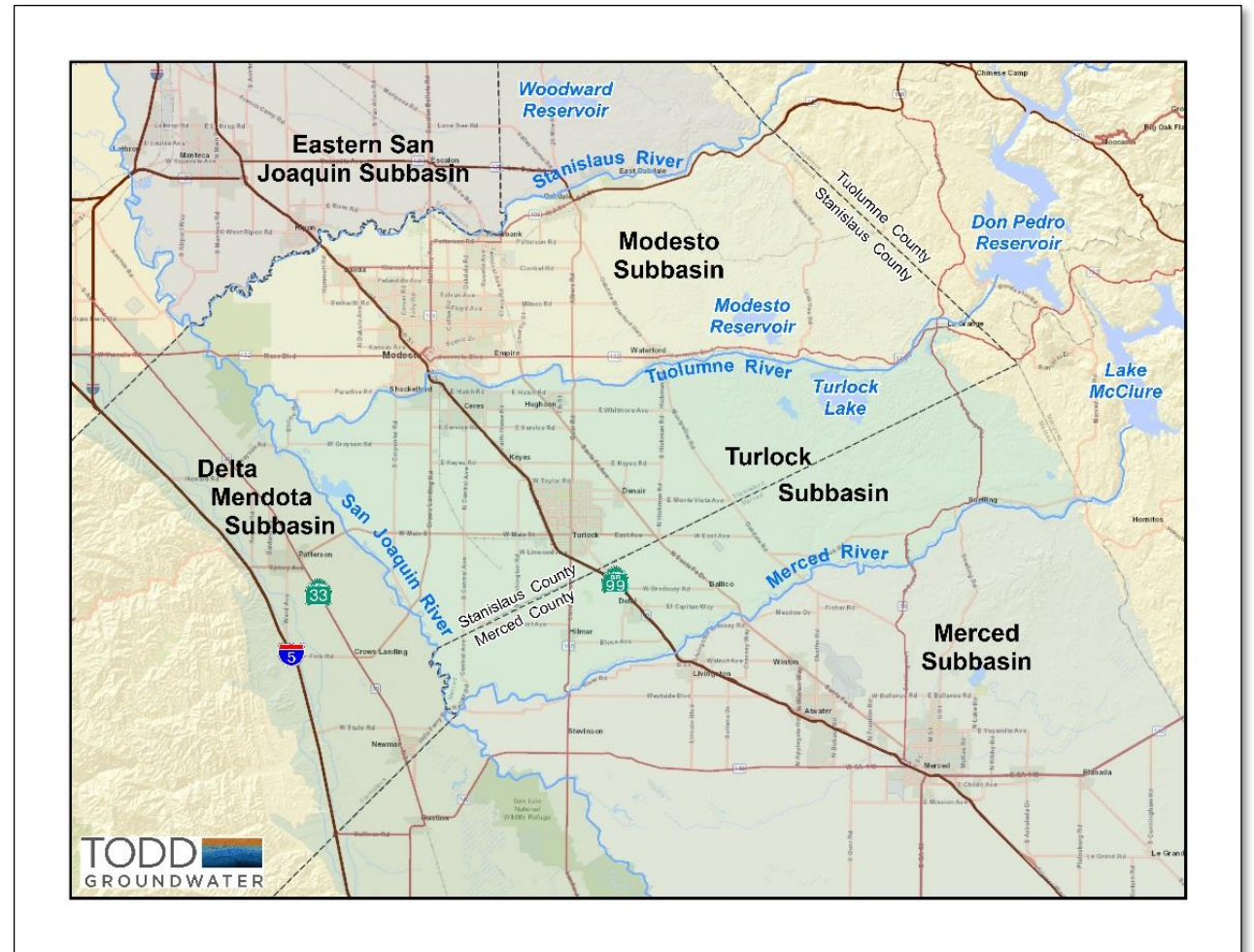
What's Going On With Our Neighbors?

Adjacent Subbasin Activities

Adjacent Subbasin Coordination

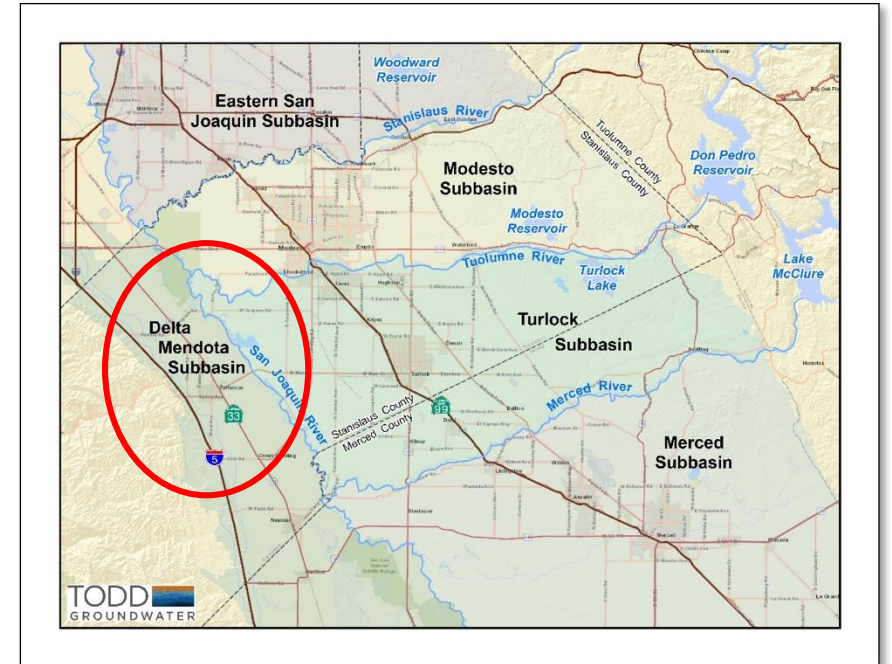
GSP *implementation* must:

- Show **coordination of GSPs** with Adjacent Stakeholders
- Show **no adverse affect** to adjacent Subbasins to implement their GSP



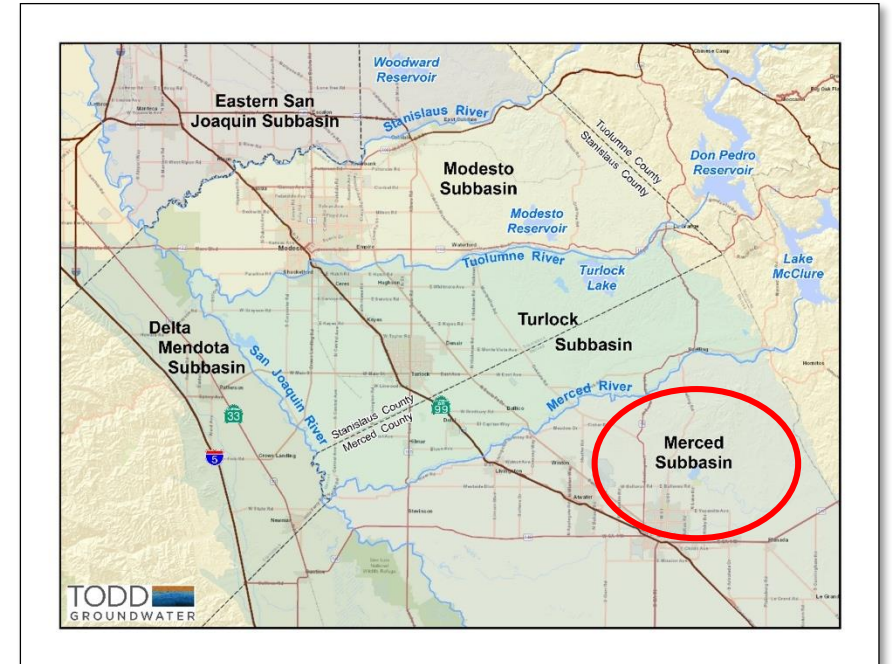
Delta-Mendota Subbasin Activities

- **GSAAs: 24**
- **GSPs being developed: 6**
- **GSP due date: Jan. 31, 2020**
- **Coordination thus far:**
 - Coordination Meeting No. 1 held 07/12/18
 - Discussions covering topics such as:
 - *data sharing*
 - *agreements for coordination*
 - *groundwater modeling*
 - *definition of aquifers*
 - *other technical information regarding our shared groundwater resources*



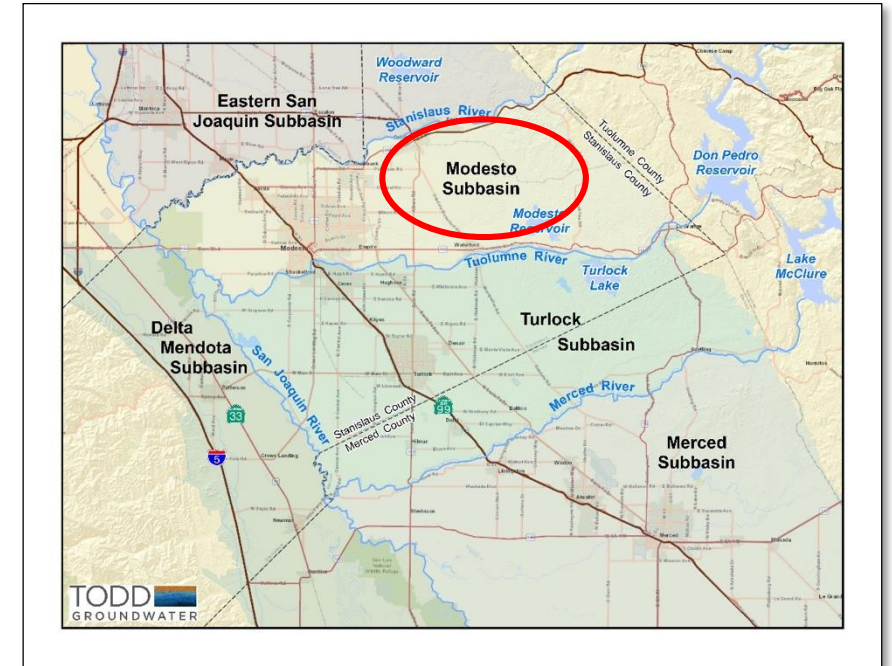
Merced Subbasin Activities

- **GSA: 3**
- **GSPs being developed: 1**
- **GSP due date: Jan. 31, 2020**
- **Coordination Thus Far:**
 - Coordination Meeting No. 1 held 4/23/18
 - Coordination Meeting No. 2 held 6/19/18
 - Discussions covering topics such as
 - *data sharing*
 - *development of one groundwater model that covers both subbasins*
 - *consistency of the respective GSPs*
 - *management along our shared Merced River boundary*
 - Both GSAs approved a Memorandum of Intent (MOI) with the Merced Subbasin in January 2019 to continue the ongoing collaboration on our GSPs.



Modesto Subbasin Activities

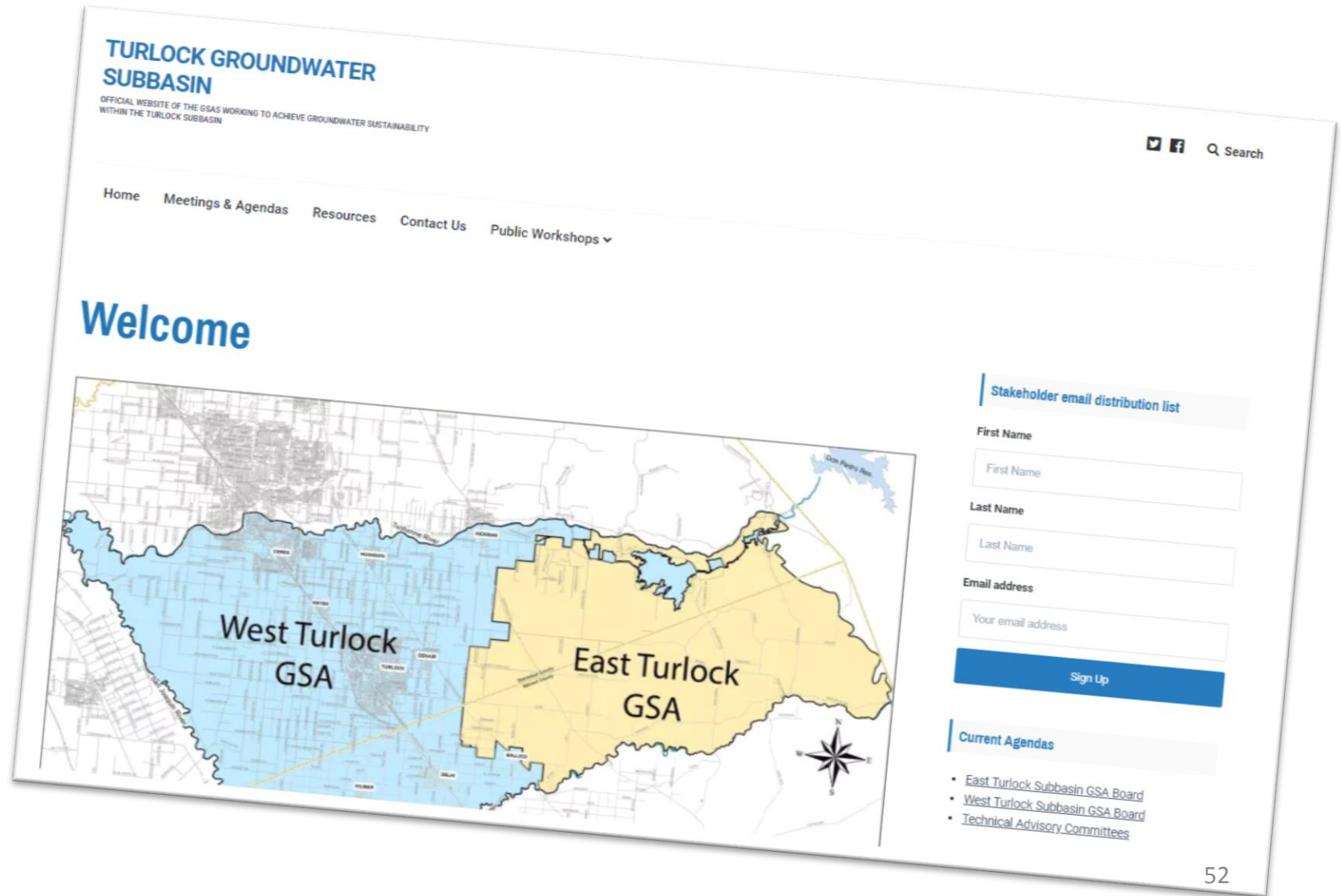
- **GSA: 1**
 - Stanislaus and Tuolumne Rivers Groundwater Basin Association
- **GSPs being developed: 1**
- **GSP due date: Jan. 31, 2022**
- **Coordination thus far:**
 - Both subbasins are sharing in the development of a groundwater model that covers both subbasins to ensure a consistent analysis along the Tuolumne River for their respective GSPs.
 - Both subbasins are on the same schedule for GSP development, allowing for ongoing coordination throughout the process



Ways to Stay Informed & Get Involved



- Provide feedback
- Agendas/minutes
- Stakeholder e-mail sign-up
- Meeting materials, presentations
- GSP schedule
- Resources



Receive our Emails to Stakeholders

- Meeting notices and agendas
- Workshop flyers and agendas
- Other pertinent updates and information

Stakeholder email distribution list

First Name

Last Name

Email address

[Sign Up](#)

TURLOCK GROUNDWATER SUBBASIN
OFFICIAL WEBSITE OF THE GSAS WORKING TO ACHIEVE GROUNDWATER SUSTAINABILITY WITHIN THE TURLOCK SUBBASIN




[View the Agenda](#)

West Turlock Subbasin Groundwater Sustainability Agency (GSA) Board Meeting Notice

The agenda for the **February 7, 2019 meeting** of the West Turlock Subbasin Groundwater Sustainability Agency is now posted online on the Subbasin's [Meetings & Agendas](#) page. Click the button below to view the agenda directly, and be sure to note the time and location of the meeting.

Should you have any questions about the agenda, please contact West Turlock Subbasin GSA Board Secretary Dorinda Soiseth directly at dsoiseth@tid.org.

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Published by Herb Smart [?] · February 2 at 12:05 PM · 🌐

Wishing you all a proper Saturday today. Next meeting of the West Turlock Subbasin Groundwater Sustainability Agency Board set for Thu 2/7 @TurlockID 6p.m. <https://mailchi.mp/.../west-turlock-subbasin-gsa-meeting-noti...>

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Notice | Feb. 7 West Turlock Subbasin GSA Meeting
The agenda for the February 7, 2019 meeting of the West Turlock Subbasin Groundwater Sustainability Agency is now posted online on...

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@TurlockSubbasin



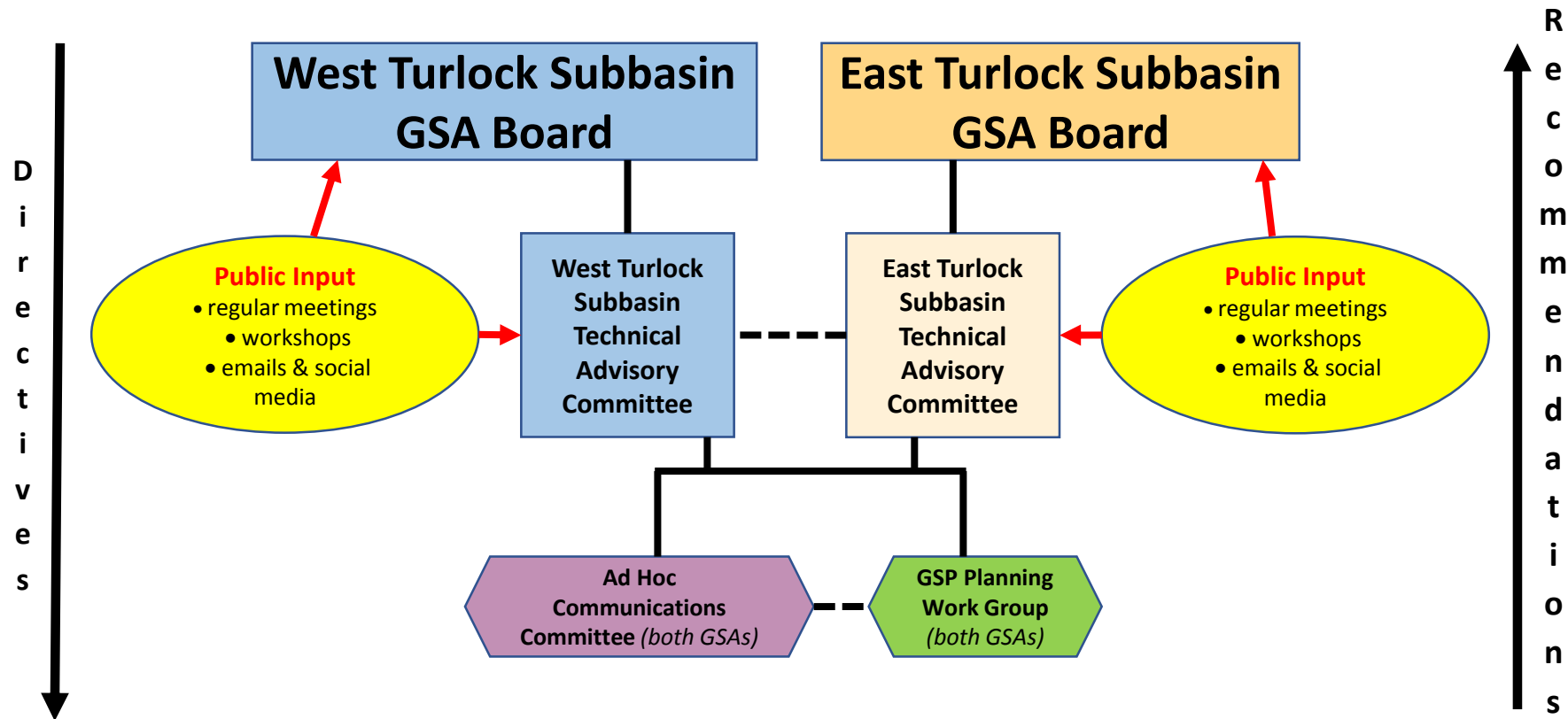
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Ain't technology grand?! Now we have an even easier way for stakeholders to sign up for our email distributions. Just visit our site turlockgroundwater.org and complete the opt-in form.

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Happy Monday. Just a reminder if you are not getting emails from us about meetings etc and wish to stay up to date with emails direct to you inbox sign up here turlockgroundwater.us7.list-manage.com/subscribe?u=ef...

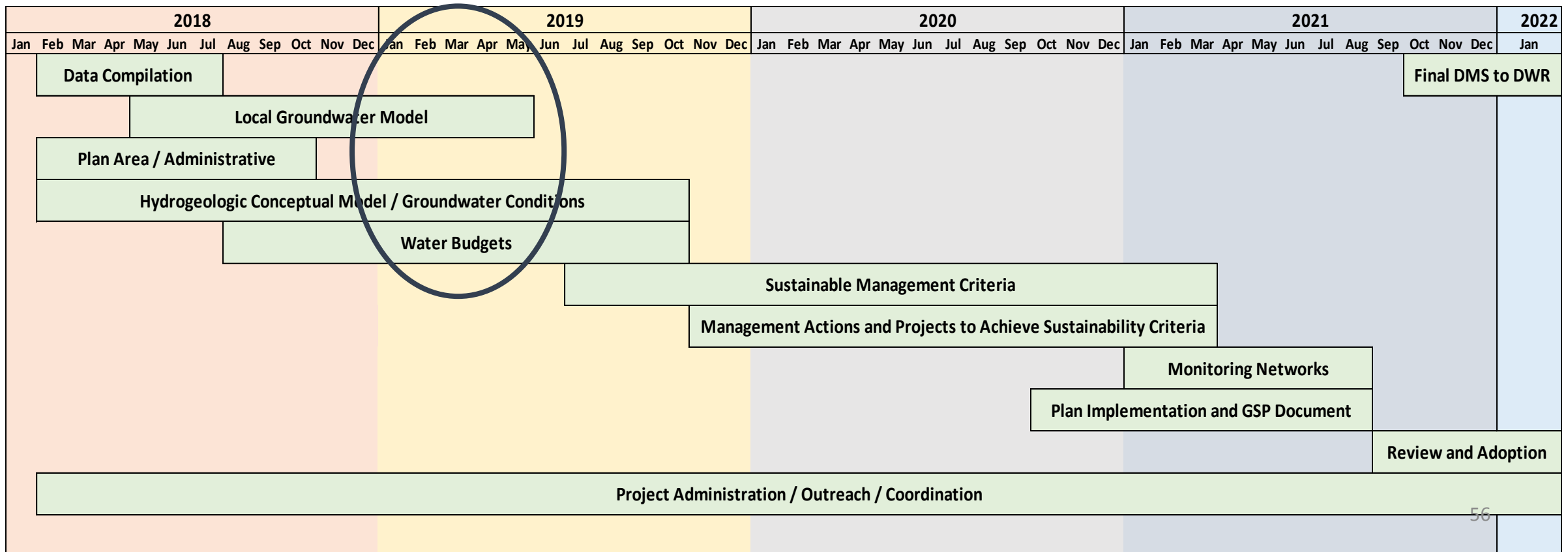
12:17 PM - 5 Feb 2019

Turlock Subbasin Governance

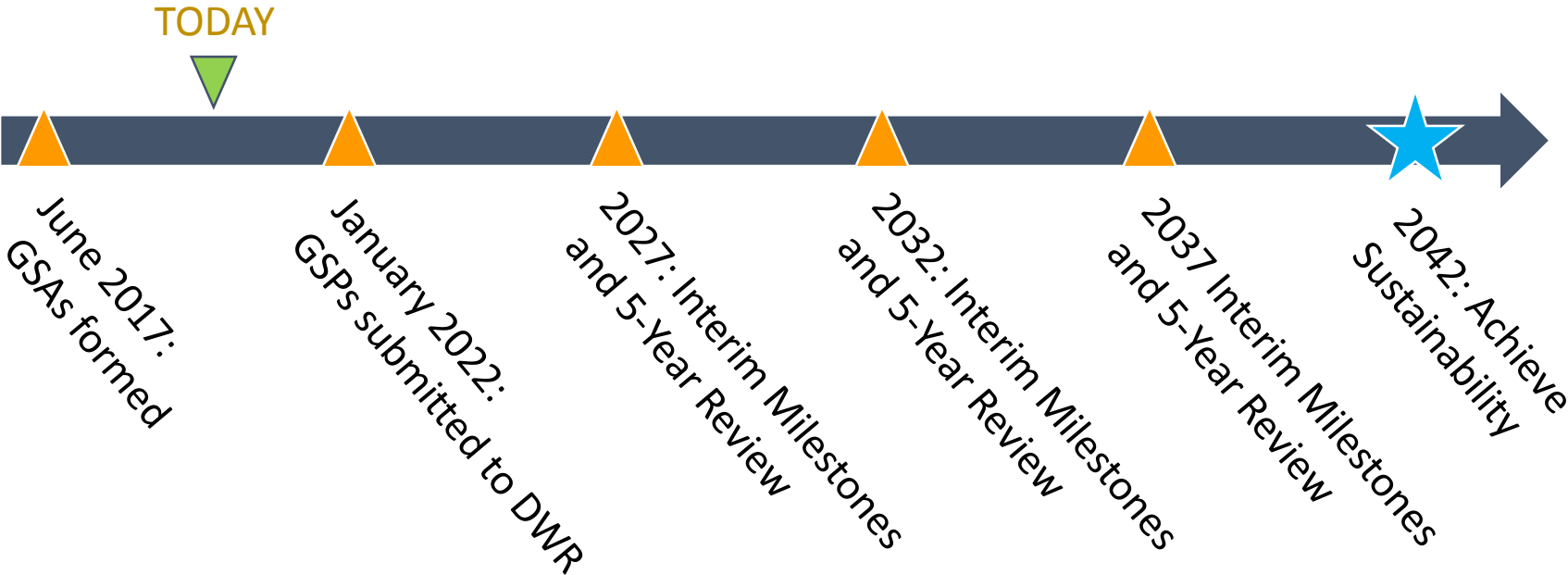


Ongoing Work Early 2019

- Model revisions – Water Budgets
- Coordination with adjacent subbasins
- Completing HCM/Groundwater sections of the GSP



Overall Timeline for Turlock Subbasin



Next Steps & Upcoming Meetings

- **Model Water Budgets** March/April
- **Technical Workshop No. 3** (April 25, 2019)
- **Community Workshop No. 4** (July 2019)
 - Water Budgets
 - Sustainability Criteria Definitions
- **Subbasin Coordination Meetings** this month and next
 - Delta-Mendota No. 2
 - Merced No. 3
 - Modesto No. 1
- **GSA Board Meetings**
 - West Turlock: next meeting May 2, 2019
 - East Turlock: next meeting March 28, 2019
- **GSA TAC meetings**
 - Next meeting March 28; generally last Thur. of each month