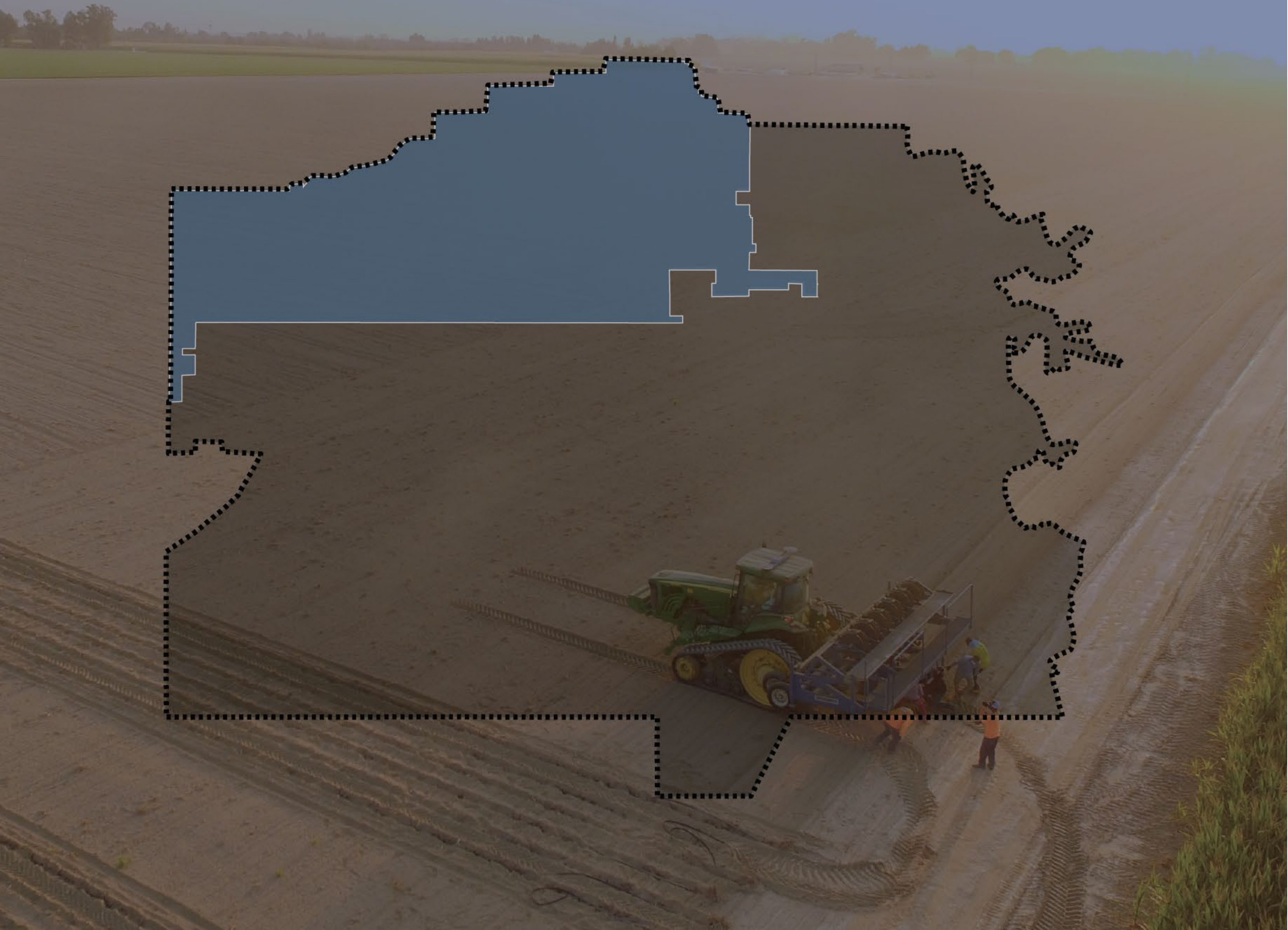
# Sustainable Groundwater Management Act
# Annual Report



## Lower Tule River Irrigation District
## Groundwater Sustainability Agency

### Tule Subbasin

October 2019 - September 2020

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# ATTACHMENTS

# ABBREVIATIONS & ACRONYMS

| | |
|---|---|
| amsl | above mean sea level |
| CASGEM | California State Groundwater Elevation Monitoring |
| CDWR | California Department of Water Resources |
| CEOP | Communication, Engagement and Outreach Plan |
| CEQA | California Environmental Quality Act |
| CGQMP | Comprehensive Groundwater Management Plan |
| CSD | Community Services District |
| CVP | Central Valley Project |
| CVPIA | Central Valley Project Improvement Act |
| DCTRA | Deer Creek Tule River Authority |
| DDW | Division of Drinking Water |
| DMS | Data Management System |
| DWR | Department of Water Resources |
| EC | Electrical Conductivity |
| ET | Evapotranspiration |
| EIR | Environmental Impact Report |
| FKC | Friant-Kern Canal |
| GAMA | Groundwater Ambient Monitoring and Assessment |
| GAR | Groundwater Assessment Report |
| GDEs | Groundwater Dependent Ecosystems |
| GFM | Groundwater Flow Model |
| GP | General Plan |
| GSA | Groundwater Sustainability Agency |
| GSP | Groundwater Sustainability Plan |
| GQTMP | Groundwater Quality Trend Monitoring Program |
| GQTMW | Groundwater Quality Trend Monitoring Workflow |
| ILRP | Irrigated Lands Regulatory Program |
| InSAR | Interferometric Synthetic Aperture Radar |
| IRWM | Integrated Regional Water Management |
| IRWMGs | Integrated Regional Water Management Groups |
| IRWMP | Integrated Regional Water Management Plan |
| ITRC | Irrigation Training and Research Center |
| JPL | Jet Propulsion Laboratory |

| | |
|---|---|
| LTRID | Lower Tule River Irrigation District |
| LUSTs | leaking underground storage tanks |
| MOU | Memorandum of Understanding |
| NASA | National Aeronautics and Space Administration |
| NC | Natural Communities |
| NOAA | National Oceanic and Atmospheric Administration |
| NPL | National Priority List |
| NTFGW | net to and from groundwater |
| PCSD | Poplar Community Service District |
| PUD | Public Utility District |
| RMS | representative monitoring sites |
| RWQCB | Regional Water Quality Control Board |
| SAGBI | Soil Agricultural Groundwater Banking Index |
| SB | Senate Bill |
| SCADA | Supervisory Control and Data Acquisition |
| SGMA | Sustainable Groundwater Management Act |
| SMC | Sustainable Management Criteria |
| SREP | Success Reservoir Enlargement Project |
| SWRCB | State Water Resources Control Board |
| TBWQC | Tule Basin Water Quality Coalition |
| TCSD | Tipton Community Service District |
| Tipton CP | Tipton Community Plan |
| TRA | Tule River Association |
| TSMP | Tule Subbasin Monitoring Plan |
| UABs | Urban Area Boundaries |
| UDBs | Urban Development Boundaries |
| USACE | United States Army Corps of Engineers |
| USBR | United States Bureau of Reclamation |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| WDL | Water Data Library |
| WPUD | Woodville Public Utility District |

# EXECUTIVE SUMMARY [§356.2(a)]

**23 Cal. Code Regs. § 356.2 Annual Reports.** *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

**(a)** *General information, including an executive summary and a location map depicting the basin covered by the report.*

The Tule Subbasins hydrogeologist, Thomas Harder and Company, has prepared an Annual Report summarizing the 2019/20 groundwater conditions for the entirety of the subbasin (see Attachment 1). Appendices A through F of the subbasin-wide annual report describes groundwater conditions as it relates to each of the six (6) adopted Groundwater Sustainability Plans (GSPs) that collectively cover the subbasin. The data for describing the groundwater conditions within the LTRID GSA Plan area is provided as Appendix A of the subbasin-wide annual report and will be referenced throughout this report (see Attachment 1).

This is the first annual report of the Lower Tule River Irrigation District Groundwater Sustainability Agency (LTRID GSA, GSA), as part of the Tule Subbasin identified by the California Department of Water Resources (CDWR) as No. 5-22-13 of the Tulare Lake Hydrologic Region (see Attachment 1, Figure 1). This report is being submitted in compliance with Title 23 of the California Code of Regulations, Division 2, Chapter 1.5, Subchapter 2, Article 7, Section 356.2, as required under the Sustainable Groundwater Management Act (SGMA). As per Section 356.2, this report addresses data collected for the preceding water year, which covers October 1, 2019 through September 30, 2020.

Sections of the LTRID GSA Annual Report Include the following:

**SECTION 1. INTRODUCTION.** A brief background on the GSA and coordination within the Tule Subbasin, a summary of the GSA Hydrogeologic Setting and Monitoring Networks.

**SECTION 2. GROUNDWATER ELEVATION DATA [§356.2(b)(1)(A)].** A description of 2019/20 groundwater elevation monitoring data with contours for spring and fall monitoring events and representative hydrographs.

**SECTION 3. GROUNDWATER EXTRACTION [§356.2(b)(2)].** A description of 2019/20 groundwater extractions by water use sector.

**SECTION 4. SURFACE WATER USE [§356.2(b)(3)].** A description of 2019/20 surface water use by source.

**SECTION 5. TOTAL WATER USE [§356.2(b)(4)].** A description of 2019/20 total groundwater extractions and surface water use.

**SECTION 6. CHANGE IN GROUNDWATER STORAGE [§356.2(b)(4)].** A description of 2018/19 to 2019/20 change in groundwater storage through maps and graphs depicting water year type, groundwater use, the annual change in groundwater storage, and the cumulative change in groundwater in storage.

**SECTION 7. PROGRESS TOWARDS PLAN IMPLEMENTATION [§356.2(c)].** A description of the 2019/20 groundwater conditions compared to SMC established in the GSA's GSP and the GSA's progress towards implementing projects and management action identified in the GSP.

## GROUNDWATER ELEVATIONS

The GSA has identified ten (10) wells to use as Representative Monitoring Sites (RMS), six (6) of which are perforated in the upper aquifer, three (3) are perforated in the lower aquifer, and one (1) well is perforated across both aquifers. Being the first year of monitoring RMS wells under the GSP, groundwater levels were collected at eight (8) of the RMS wells during the Spring 2020 monitoring event and at six (6) of the RMS wells during the Fall 2020 monitoring event these sites will be and is provided in **TABLE ES-1.**

**TABLE ES-1: GROUNDWATER LEVELS AT REPRESENTATIVE MONITORING SITE WELLS**

| Well ID | Aquifer | Groundwater Elevation (ft amsl) | | | |
|---|---|---|---|---|---|
| | | Spring 2019 | Fall 2019 | Spring 2020 | Fall 2020 |
| **LTRID Management Area** | | | | | |
| 21S/23E-32K01 | Upper Aquifer | 124.8 | 111.6 | 107.8 | 104.3 |
| 21S/24E-35A01 | Upper Aquifer | 112.8 | 115.0 | 110.92 | NM[1] |
| 21S/25E-03R01 | Upper Aquifer | NM | NM | NM[2] | NM[2] |
| 21S/26E-32A01 | Upper Aquifer | NM | NM | 172.3 | 170.1 |
| 21S/25E-36 | Lower Aquifer | 80.8[3] | NM | 92.9 | NM[3] |
| 22S/23E-07 | Lower Aquifer | NM | NM | -128.1 | -168.3 |
| 20S/26E-32 | Composite | 167.0 | 154.0 | 169.1 | 142.9 |
| **Tipton CSD Management Area** | | | | | |
| 22S/24E-01Q01 | Lower Aquifer | -13.6 | -36.6 | -1.1 | -63.4 |
| **Poplar CSD Management Area** | | | | | |
| 21S/26E-34 | Upper Aquifer | NM | NM | 264.7 | 261.1 |
| **Tulare County MOU Management Area** | | | | | |
| 22S/23E-30J01 | Upper Aquifer | NM | NM | NM[5] | NM[5] |

1: Bad measurement
2: Locked pumphouse
3: Corrected elevation from 2018/19 Annual Report
4: Running pump
5: Well disassembled

## GROUNDWATER EXTRACTIONS

The primary extractor of groundwater within the GSA was identified agricultural as it makes up the majority of the area covered by the GSP. Other sources of groundwater extractions included the communities of Tipton, Poplar, and Woodville, as well as groundwater pumped for exportation. Volumes of groundwater extraction by sector for the 2019/20 water year is provided in **TABLE ES-2**.

**TABLE ES-2: TOTAL GROUNDWATER EXTRACTIONS**

| Management Area | Agricultural (AF) | Municipal (AF) | Export (AF) | Total (AF) |
|---|---|---|---|---|
| LTRID | 223,000 | 0 | 14,100 | 237,100 |
| Municipal | 0 | 890 | 0 | 890 |
| Tulare County MOU | 3,000 | 0 | 0 | 3,000 |
| **Total** | **226,000** | **890** | **14,100** | **240,990** |

## Surface Water Use

Surface water supplies are available to the GSA as Tule River streamflow diversions, Central Valley Project (CVP) Friant Division imports, and effective precipitation. Volumes of surface water supplies used with the GSA during the 2019/20 water year is provided in **Table ES-3.**

**Table ES-3: Total Surface Water Supply**

| Management Area | Stream Diversions (AF) | Imported Water (AF) | Effective Precipitation (AF) | Total (AF) |
|---|---|---|---|---|
| LTRID | 25,200 | 71,200 | 55,300 | 151,700 |
| Municipal | 0 | 0 | 600 | 600 |
| Tulare County MOU | 0 | 0 | 600 | 600 |
| **Total** | **25,200** | **71,200** | **56,500** | **152,900** |

## Total Water Use

Total water use is the combination of groundwater extractions and surface water supplies. While surface water is used to meet agricultural crop demands and when available at times in excess of demands recharged for conjunctive management, groundwater meets agricultural demands in excess of available surface water supplies, as well as municipal demands and is exported. Precipitation makes up a portion of the agricultural demand met by surface water. **Table ES-4** breaks down total water use by sector and supply.

**Table ES-4:Total Water Use by Water Use Sector**

| Management Area | Groundwater (AF) | | | Surface Water (AF) | | Total (AF) |
|---|---|---|---|---|---|---|
| Source: | Ag. | Municipal | Exported | Ag[1]. | Recharged[2] | |
| LTRID | 223,000 | 0 | 14,100 | 99,600 | 52,000 | **388,700** |
| Municipal | 0 | 890 | 0 | 600 | 0 | **1,490** |
| Tulare County MOU | 3,000 | 0 | 0 | 600 | 0 | **3,600** |
| **Total** | **226,000** | **890** | **14,100** | **100,800** | **52,000** | **393,790** |

1) Includes effective precipitation
2) Recharge volumes include channel losses

## Groundwater Storage

Change in groundwater storage is calculated using several methodologies in this annual report, one to represent the conditions directly underlying the GSAs plan area using groundwater elevations and aquifer specific yield characteristics and the other based a net water balance accounting determined from surface water supplies less total water consumption. The first method is utilized for comparing change in groundwater storage to established SMCs but is influenced by groundwater flowing away from areas of natural and artificial recharge towards pumping depressions which is not indictive of a GSA's actions. The second method allows the GSA to account for storage strictly based on total consumptive water use, using remotely sensed ETc data and metered municipal use, compared to total surface water supplies to derive a net water balance accounting of change in groundwater storage.

Using the first methodology change in groundwater storage in the GSA plan area amounted to 362,000 acre-feet decrease in storage from the 2018/19 to 2019/20 water years. While this methodology is useful for understanding total groundwater storage in the Subbasin, it is not intended to account for ownership of water in storage. The volume of groundwater each GSA has access to will differ due to the accumulation of Net Water Balance contributions and extractions by the individual GSA over time. This apparent discrepancy is noted and will be investigated further as more data become available.

It is noted that the groundwater storage change indicated on Figures 13 and 14 of **ATTACHMENT 1** was based, in part, on comparison of two different groundwater contour maps developed from different data sets. A more limited set of wells with groundwater elevation data was available for the Fall 2019 contour map relative to the Fall 2020 map. The magnitude of the estimate of storage change should be evaluated in the context of the uncertainty in these data sets. As consistent monitoring data will be available year to year in the future, it is anticipated that a more representative and, thus, more accurate storage change estimates will be available in future reports.

The second methodology, calculating net water balance yields 115,560 acre-feet decline in groundwater storage from during the 2019/20 water year and is accounted for in **TABLE ES-5**.

**TABLE ES-5: GSA ACCOUNTING OF GROUNDWATER STORAGE (OCTOBER 2019 THROUGH SEPTEMBER 2020)**

| October 2019 thru September 2020 | Volume (AF) | | | |
|---|---|---|---|---|
| | LTRID | Municipal | Tulare Co. MOU | Total |
| **Total Non-Groundwater Supply** | **159,500** | **650** | **880** | **161,030** |
| *Surface Water (streamflow, imported)* | *96,400* | *0* | *0* | *96,400* |
| *Applied Irrigation* | *44,400* | *0* | *0* | *44,400* |
| *Recharged[1]* | *52,000* | *0* | *0* | *52,000* |
| *Total Precipitation[2]* | *63,100* | *650* | *880* | *64,630* |
| **Total Consumptive Use** | **(272,900)** | **(890)** | **(2,800)** | **(276,590)** |
| *ETc (agricultural)* | *(258,800)* | *0* | *(2,800)* | *(261,600)* |
| *Metered (municipal, exported)* | *(14,100)* | *(890)* | *0* | *(14,990)* |
| **Water Balance (Δ GW Storage)** | **(110,300)** | **(240)** | **(1,920)** | **(115,560)** |

1) Recharge volumes include channel losses
2) Total precipitation is used rather than effective precipitation because portion that is not effective is accounted for in ETc

The volume of groundwater each GSA has access to will differ due to the accumulation of Net Water Balance contributions and extractions by the individual GSA over time. This apparent discrepancy is noted and will be investigated further as more data become available.

## PROGRESS TOWARDS PLAN IMPLEMENTATION

Groundwater conditions experienced in the 2019/20 water year were compared to 2025 interim milestone and minimum thresholds established at RMS locations for the four (4) applicable sustainability indictors within the Tule Subbasin. Although conditions experienced during the previous water year were not within the implementation period for the GSP, the comparison provides insightful information for understanding how the aquifer(s) react to conditions as presented in this report. Based on the available data representing from RMS locations used to track groundwater conditions for the sustainability indicators, all RMS were within the 2025 interim milestones and minimum thresholds corresponding to the RMS.

Progress towards plan implementation was also evaluated in terms of progress of implementing projects and management actions proposed in the GSP. Several of the projects and management actions have been or are in the process of being implemented in the GSA in order to meet the sustainable groundwater management by the year 2040. Many of these projects and management action include policies providing for a structured reduction in groundwater use above sustainable supplies and incentives to promotes conjunctive management of water resources, along with other capital projects. Some of the completed and ongoing efforts include:

- Groundwater Accounting
- Water Supply Optimization
- Surface Water Development
- Managed Aquifer Recharge and Banking
- Municipal Management Actions

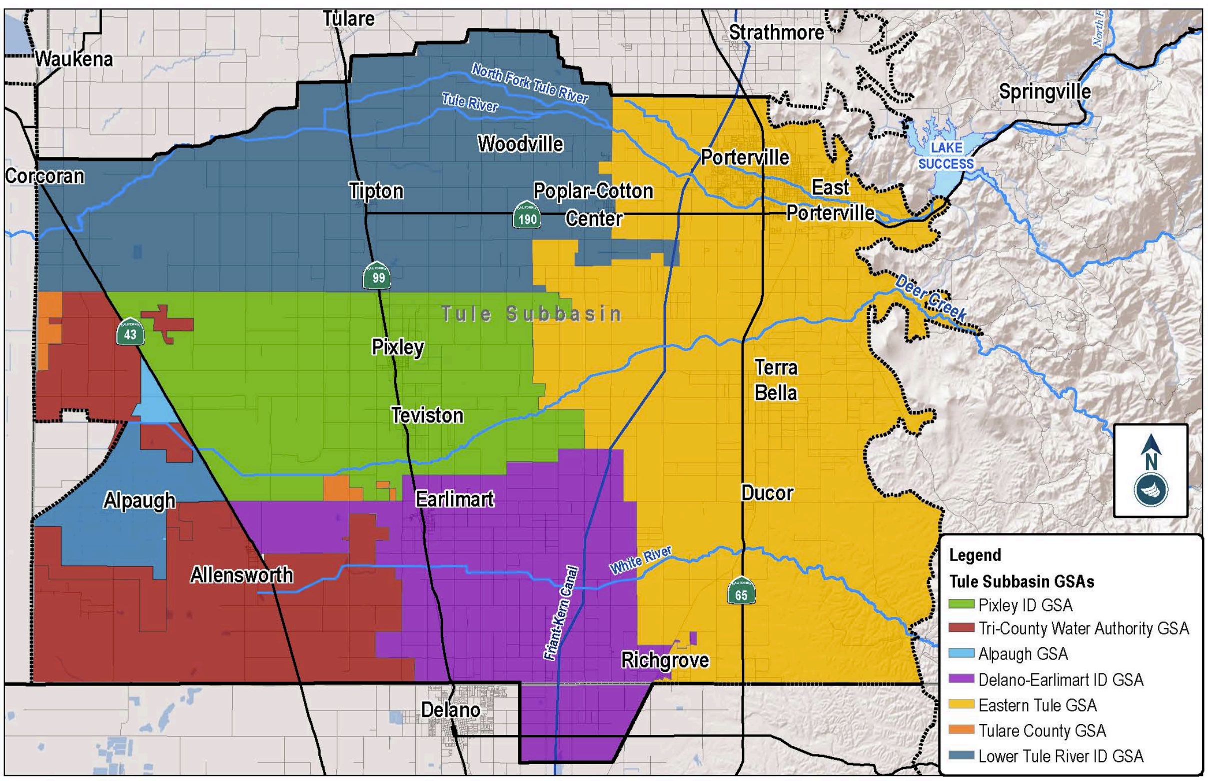
# 1 INTRODUCTION

## 1.1 DESCRIPTION OF THE TULE SUBBASIN

The Tule Subbasin is identified by the California Department of Water Resources (CDWR) as No. 5-22-13 of the Tulare Lake Hydrologic Region (see **ATTACHMENT 1**– Tule Subbasin 2019/20 Annual Report, Figure 1) is completely located within Tulare County. The following seven (7) GSAs are located within Tule Subbasin (see **FIGURE 1-1**):

1. Eastern Tule Groundwater Sustainability Agency (ETGSA),
2. Tri-County Water Authority Groundwater Sustainability Agency (TCWA GSA),
3. Pixley Irrigation District Groundwater Sustainability Agency (Pixley GSA),
4. Lower Tule River Irrigation District Groundwater Sustainability Agency (LTRID GSA),
5. Delano-Earlimart Irrigation District Groundwater Sustainability Agency (DEID GSA)
6. Alpaugh Groundwater Sustainability Agency (Alpaugh GSA), and
7. Tulare County Groundwater Sustainability Agency (Tulare County GSA)

**FIGURE 1-1: TULE SUBBASIN LOCATION MAP**



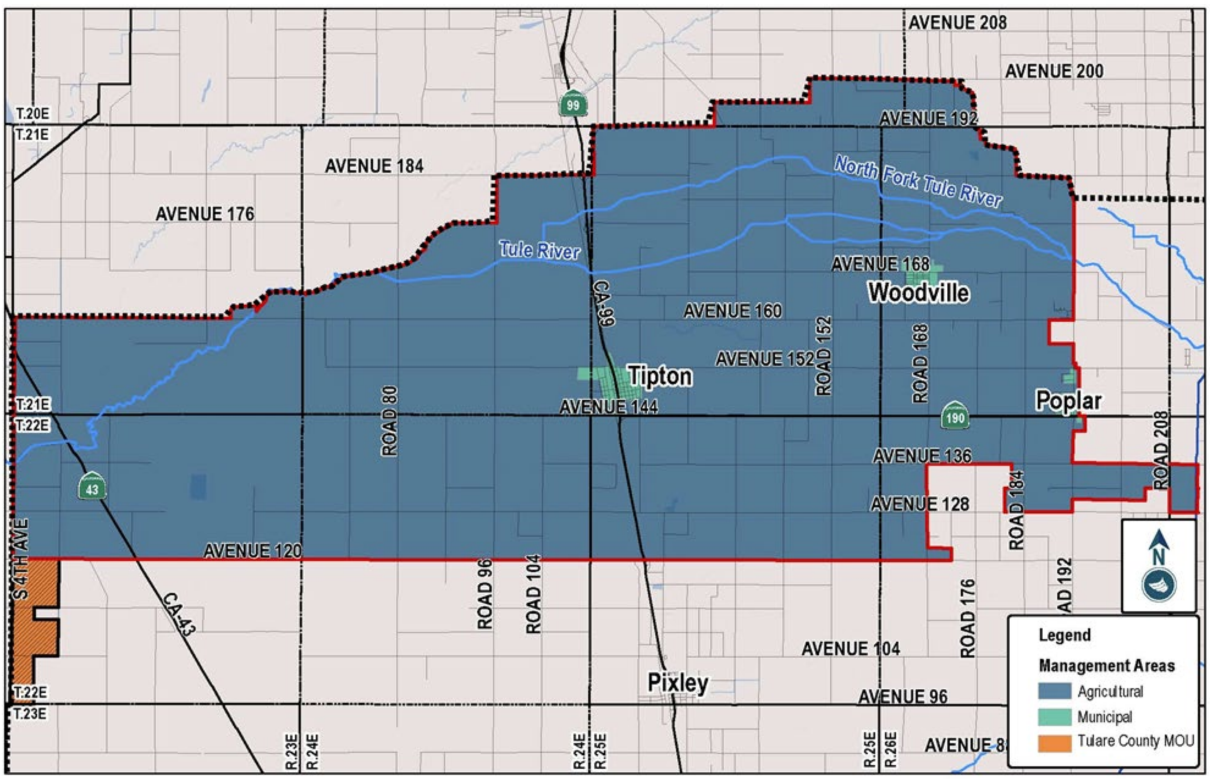

Six (6) of the seven (7) GSAs within the Tule Subbasin have developed and submitted to the CDWR independent Groundwater Sustainability Plans (GSPs) pursuant to 23 CCR §353.6. Tulare County GSA has entered into Memoranda of Understanding (MOUs) concerning coverage of territories under adjacent GSPs. As such, their jurisdictional areas are included in the other six GSPs.

Pursuant to 23 Cal. Code Regs. §357.4(a), the six (6) GSPs for the Tule Subbasin have been developed and submitted under a Coordination Agreement to fulfill all statutory and regulatory requirements related to intra-basin coordination agreements pursuant to SGMA. The Coordination Agreement includes two attachments: Attachment 1 describes the subbasin-wide monitoring network that all Tule Subbasin GSAs shall utilize for the collection of data to be used in annual reports. Attachment 2 describes the subbasin setting, which represents the coordinated understanding of the physical characteristics of the subbasin.

## 1.2 Description of the LTRID GSA

The LTRID GSA is located in the north-central portion of the Tule Subbasin and encompasses 105,338 acres within Tulare County. The GSA Plan area includes lands within the jurisdictional boundaries of Lower Tule River Irrigation District (LTRID), a portion of the Tulare County GSA area, and the municipalities adjacent to the District, each of which the Agency has entered into agreements providing for the management of groundwater under the LTRID GSA GSP (see **Figure 1-2**).

**Figure 1-2: LTRID GSA Plan Area**




Management Areas have been established to corresponded to the jurisdictional status and principle land use of their respective areas for defining different minimum thresholds and operate to different measurable objectives, understanding each management area presents unique circumstances and objectives for managing sustainably. Management areas are described by following three (3) categories and displayed on **Figure 1-2**:

1. LTRID/ Agricultural Management Area
2. Municipal Management Area
    - Tipton CSD, Woodville PUD, Poplar CSD
3. Tulare County MOU Management Area

## 1.3 HYDROGEOLOGICAL SETTING

The hydrogeological of the Tule subbasin is described in Section 1.2 of the Tule Subbasin 2019/20 Annual Report (see **ATTACHMENT 1**), and a description relating to the LTRID GSA Plan area is provided below.

The GSA Plan area is located on a series of coalescing alluvial fans that extend toward the center of the San Joaquin Valley from the Sierra Nevada Mountains (see **ATTACHMENT 1**, Figure 3). The alluvial fans merge with lacustrine deposits of the Tulare Lakebed in the western portion of the GSA Plan area. Land surface elevations within the GSA range from approximately 400 ft above mean sea level (amsl) along the eastern boundary of the GSA to approximately 180 ft amsl at the western boundary (see **ATTACHMENT 1**, Figure 3).

Where saturated in the subsurface, the permeable sand and gravel layers form the principal aquifers in the Plan Area and adjacent areas to the north, south and west. Individual aquifer layers consist of lenticular sand and gravel deposits of varying thickness and lateral extent. The aquifer layers are interbedded with low permeability silt and clay confining layers. There are four (4) aquifer/aquitard units in the subsurface beneath the Plan Area (see **ATTACHMENT 1**, Figure 4):

1. Upper Aquifer
2. The Corcoran Clay Confining Unit
3. Lower Aquifer
4. Pliocene Marine Deposits (generally considered an aquitard)

Two primary aquifers have been identified within the Plan Area: an upper unconfined to semi-confined aquifer and a lower semi-confined to confined aquifer. The upper and lower aquifers are separated by the Corcoran Clay confining unit in the western portion of the GSA.

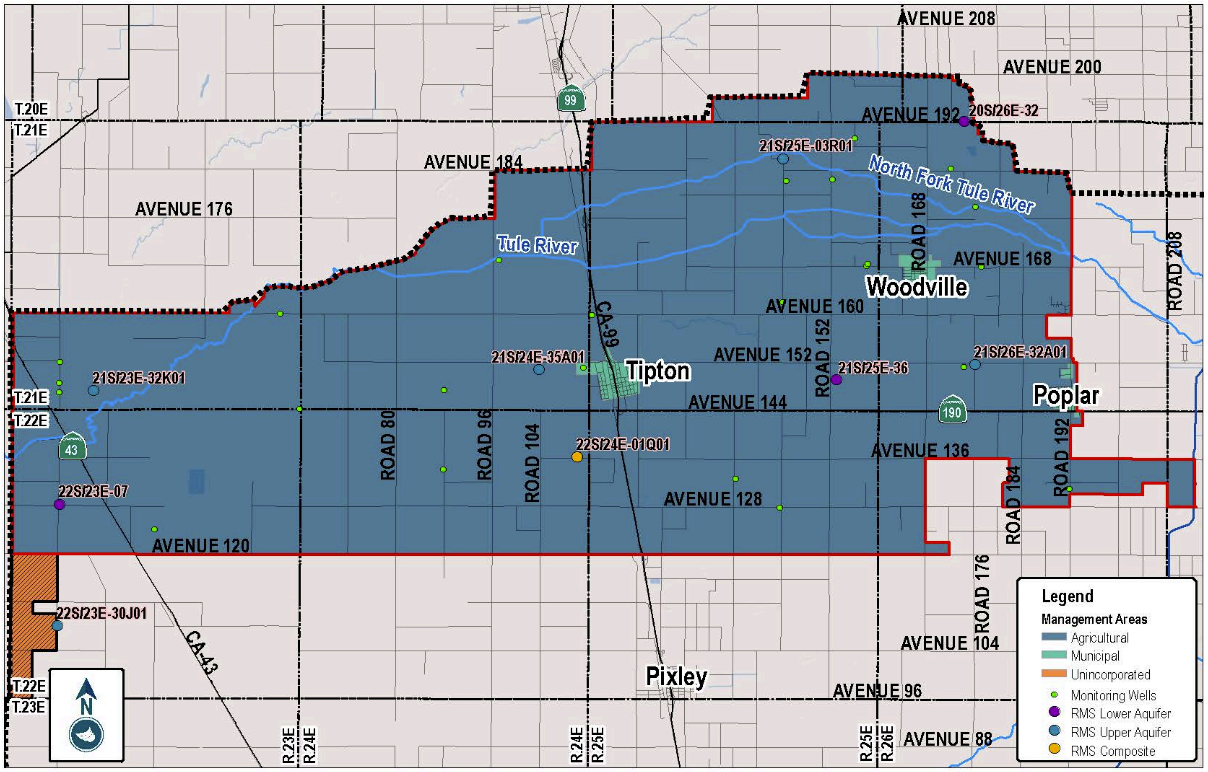
In general, groundwater in the GSA Plan area flows from areas of natural recharge along Tule River in the towards a pumping depression located south of the GSA Plan area in the adjacent Pixley GSA (see **ATTACHMENT 1**, Appendix A, Figures 8 through 11).

## 1.4 MONITORING FEATURES WITHIN THE PLAN AREA

The Tule Subbasin Technical Advisory Committee has developed a subbasin-wide monitoring plan, which describes the monitoring network and monitoring methodologies to be used to collect the data to be included in Tule Subbasin GSPs and annual reports. The subbasin-wide monitoring plan is included as **ATTACHMENT 1** to the Coordination Agreement. The groundwater level monitoring network for the Tule Subbasin includes monitoring features to enable collection of data from the Upper Aquifer, Lower Aquifer and Santa Margarita Formation aquifer (see **ATTACHMENT 1**, Figure 5). Groundwater levels are collected in the late winter/early spring (February to March) and in the fall (August to November) to account for seasonal high and low groundwater conditions.

A subset of groundwater level monitoring features in the monitoring plan have been identified as representative monitoring sites to be relied on for the purpose of assessing progress with respect to groundwater level sustainability in the GSA Plan area. The representative groundwater level monitoring sites for the are shown on **FIGURE 1-3**.

**FIGURE 1-3: RMS GROUNDWATER ELEVATION WELLS**



# 2 GROUNDWATER ELEVATIONS [§356.2(B)(1)]

**23 Cal. Code Regs. § 356.2 Annual Reports.** *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

**(b)** *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*

**(1)** *Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:*

## 2.1 GROUNDWATER ELEVATION CONTOUR MAPS [§356.2 (b)(1)(A)]

### 2.1.1 UPPER AQUIFER

Figures 8 and 9 of Appendix A in the Tule Subbasin 2019/20 Annual Report displays groundwater contours for the upper aquifer in the LTRID GSA Plan area for the spring and fall of 2019, respectively (see **ATTACHMENT 1**).

From visual examination of the groundwater contour maps, groundwater in the upper aquifer of the GSA Plan area flows from areas of natural recharge along Tule River towards a pumping depression located south of the GSA Plan area in the adjacent Pixley GSA. The pumping depression has reversed the natural groundwater flow direction in the western portion of the subbasin. The pumping depression is most pronounced between the Tule River and Deer Creek near Highway 99. The groundwater level depression was observed from data collected in both the spring and fall of 2019. Groundwater flow patterns in the upper aquifer did not change significantly between the spring and fall of 2019.

### 2.1.2 LOWER AQUIFER

Figures 10 and 11 of Appendix A in the Tule Subbasin 2019/20 Annual Report displays groundwater contours maps for the lower aquifer in the LTRID GSA Plan area for the spring and fall of 2019, respectively (see **ATTACHMENT 1**).

From visual examination of the groundwater contour maps, groundwater in the lower aquifer generally follows the same flow pattern as flows in the upper aquifer, with the pumping depression being observed moving slightly north along the LTRID GSA Plan area south boundary and in Tri-County GSA and Alpaugh GSA.

## 2.2 GROUNDWATER HYDROGRAPHS [§356.2 (b)(1)(B)]

Groundwater level hydrographs for Representative Monitoring Site (RMS) wells in the LTRID GSA Plan area are provided in Figures 1 through 7 of Appendix A in the Tule Subbasin 2019/20 Annual Report (see **ATTACHMENT 1**).

Spring and fall 2020 groundwater levels for the RMS wells are summarized in **TABLE 2-1**.

**TABLE 2-1: GROUNDWATER LEVELS AT REPRESENTATIVE MONITORING SITE WELLS**

| Well ID | Aquifer | Groundwater Elevation (ft amsl) | | | |
|---|---|---|---|---|---|
| | | Spring 2019 | Fall 2019 | Spring 2020 | Fall 2020 |
| **LTRID Management Area** | | | | | |
| 21S/23E-32K01 | Upper Aquifer | 124.8 | 111.6 | 107.8 | 104.3 |
| 21S/24E-35A01 | Upper Aquifer | 112.8 | 115.0 | 110.92 | NM[1] |
| 21S/25E-03R01 | Upper Aquifer | NM | NM | NM[2] | NM[2] |
| 21S/26E-32A01 | Upper Aquifer | NM | NM | 172.3 | 170.1 |
| 21S/25E-36 | Lower Aquifer | 80.8[3] | NM | 92.9 | NM[3] |
| 22S/23E-07 | Lower Aquifer | NM | NM | -128.1 | -168.3 |
| 20S/26E-32 | Composite | 167.0 | 154.0 | 169.1 | 142.9 |
| **Tipton CSD Management Area** | | | | | |
| 22S/24E-01Q01 | Lower Aquifer | -13.6 | -36.6 | -1.1 | -63.4 |
| **Poplar CSD Management Area** | | | | | |
| 21S/26E-34 | Upper Aquifer | NM | NM | 264.7 | 261.1 |
| **Tulare County MOU Management Area** | | | | | |
| 22S/23E-30J01 | Upper Aquifer | NM | NM | NM[5] | NM[5] |

1: Bad measurement
2: Locked pumphouse
3: Corrected elevation from 2018/19 Annual Report
4: Running pump
5: Well disassembled

The GSA has identified ten (10) wells to use as Representative Monitoring Sites (RMS), six (6) of which are perforated in the upper aquifer, three (3) are perforated in the lower aquifer, and one (1) well is perforated across both aquifers. Being the first year of monitoring RMS wells under the GSP, groundwater levels were collected at eight (8) of the RMS wells during the Spring 2020 monitoring event and at six (6) of the RMS wells during the Fall 2020.

Seasonal trends show that for the six (6) RMS wells with both spring and fall elevations, spring elevations were higher than fall as would be expected, with the average change in elevation between seasons being 23 feet.

For RMS wells that were not monitored during WY 2019/2020, the GSA will take the following provisions moving forward to ensure sufficient data is being collected for characterizing groundwater conditions and progress towards reaching the GSA's Sustainability Goal:

1. Resolve issues that prevented the RMS well from being monitored, or
2. Replace RMS well with a nearby existing well with similar characteristics, or
3. Prioritize the location for constructing a dedicated monitoring well.

# 3 GROUNDWATER EXTRACTIONS [§356.2(b)(2)]

**23 Cal. Code Regs. § 356.2 Annual Reports.** *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

**(b)** *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*

**(2)** *Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.*

Groundwater extractions are categorized by agricultural, municipal and exported. Being that the land use within the LTRID GSA Plan area is predominantly associated with agriculture, the majority of the groundwater extractions within the GSA Plan area are attributed to meeting crop demands that are not met through native precipitation, diverted surface and imported water supplies.

## 3.1 AGRICULTURAL

The process for determining agricultural groundwater pumping within the Tule Subbasin is described in Section 3.1 of the Tule Subbasin 2019/20 Annual Report (see **ATTACHMENT 1**).

In summary, total agricultural groundwater pumping is estimated as a function total agricultural water demand derived from remotely sensed ET data using Landsat satellites and applying irrigation efficiencies based on land use map, less surface water deliveries and effective precipitation.

Within the LTRID GSA Plan area estimated volume of groundwater pumped for agricultural purposes in 2019/20 water year amounted to approximately 226,000 acre-feet.

## 3.2 MUNICIPAL

Municipal groundwater pumping metered data was provided by the communities of Tipton and Woodville. The community Poplar municipal pumping was estimated based on population density and per capita water use as reported in Urban Water Master Plan.

Within the LTRID GSA Plan area volume of groundwater pumped for municipal purposes in 2019/20 water year amounted to approximately 890 acre-feet.

## 3.3 EXPORTED

Some of the groundwater pumping that occurs in the LTRID GSA Plan area is exported out of the Boswell/Creighton Ranch for use out of the Tule Subbasin. Total groundwater exports out of the GSA Plan area for the 2019/20 water year was 14,100 acre-ft, obtained through meter data from wells that extract the groundwater for exportation. This water is accounted for separately because the water is not applied within the subbasin and there is no associated return flow.

## 3.4 SUMMARY OF TOTAL GROUNDWATER EXTRACTIONS

Total groundwater extraction from the LTRID GSA Plan area for the 2019/20 water year was 240,990 acre-ft (see **TABLE 3-1**).

**TABLE 3-1: TOTAL GROUNDWATER EXTRACTIONS**

| Management Area | Agricultural (AF) | Municipal (AF) | Export (AF) | Total (AF) |
|---|---|---|---|---|
| LTRID | 223,000 | 0 | 14,100 | 237,100 |
| Municipal | 0 | 890 | 0 | 890 |
| Tulare County MOU | 3,000 | 0 | 0 | 3,000 |
| **Total** | **226,000** | **890** | **14,100** | **240,990** |

# 4 SURFACE WATER SUPPLY [§356.2(b)(3)]

**23 Cal. Code Regs. § 356.2 Annual Reports.** *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

**(b)** *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*

**(3)** *Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.*

Surface water is supplied to lands within the LTRID GSA Plan area through the Lower Tule River Irrigation District (LTRID, District) as diverted stream flow from native Tule River downstream as a downstream rights holder and imported Central Valley Project (CVP) Friant and Shasta Division contracts.

The District delivers the surface and imported water available to them to meet crop demands for landowners within the District as a first priority of use. During time surface water supplies are available in excess of crop demands, the supplies can be diverted to 4,516 acres of recharge basins owned by the District for future landowner in-lieu pumping of groundwater. The GSA and District also promote their landowners to develop on-farm recharge basins to maximize surface water supplies when available in large volumes during short periods of time.

## 4.1 DIVERTED TULE RIVER STREAMFLOW

Flow in the Tule River is controlled through releases from Lake Success. Stream flow entering Lake Success is measured and distributed to various water rights holders as allocated at Success Dam in accordance with the Tule River Water Diversion Schedule and Storage Agreement[1]. Releases of water from Lake Success and downstream diversions are documented in Tule River Association (TRA) annual reports.

For water year 2019/20, approximately 25,200 acre-ft of water was released to the Tule River from Success Reservoir and delivered within the LTRID service area to meet crop demands or as in-lieu pumping of groundwater to recharge basin owned by the District or landowners.

## 4.2 IMPORTED WATER

All of the water imported into the LTRID GSA Plan area is from the Central Valley Project (CVP) and delivered via the Friant-Kern Canal and later diverted into the LTRID's distribution system consisting of unlined canals for delivery to landowners and recharge basins within the District.

Imported water delivery data for 2019/20 was reported by LTRID staff and totaled approximately 71,200 acre-ft.

## 4.3 EFFECTIVE PRECIPITATION

Section 4.5 of the Tule Subbasin 2019/20 Annual Report describes the methodology used to estimate the effective for the Tule Subbasin (see **ATTACHMENT 1**).

[1] TRA, 1966

The total volume of effective precipitation available in 2019/20 was based on California Irrigation Management Information Systems (CIMIS)[2] estimated to be 55,300 acre-ft.

## 4.4 Summary of Total Surface Water Supplies

Total surface water supplied to the LTRID GSA Plan Area for the 2019/20 water year was estimated to be 152,900 acre-feet (**Table 4-1**).

**Table 4-1: Total Surface Water Supply**

| Management Area | Stream Diversions (AF) | Imported Water (AF) | Effective Precipitation (AF) | Total (AF) |
|---|---|---|---|---|
| LTRID | 25,200 | 71,200 | 55,300 | 151,700 |
| Municipal | 0 | 0 | 600 | 600 |
| Tulare County MOU | 0 | 0 | 600 | 600 |
| **Total** | **25,200** | **71,200** | **56,500** | **152,900** |

[2] CIMIS, 2020 (Irrigation Technology Research Center 2020)

# 5 TOTAL WATER USE [§356.2(b)(4)]

**23 Cal. Code Regs. § 356.2 Annual Reports.** *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

**(b)** *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*

**(4)** *Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.*

Total water use within the LTRID GSA Plan area during the water year 2019/20 consisted of water for meeting agricultural and municipal demand, along with groundwater exports. Agricultural demands were met through a combination of groundwater extractions, surface water deliveries and effective precipitation, while municipal and exported water was entirely from groundwater extractions. The total water use within the GSA Plan area was 393,690 acre-ft. **TABLE 5-1** describes the volumes of water use by use sector, source, method of measurement, and level of accuracy for the measurement method.

**TABLE 5-1:TOTAL WATER USE BY WATER USE SECTOR**

| Management Area | Groundwater (AF) | | | Surface Water (AF) | | Total (AF) |
|---|---|---|---|---|---|---|
| Source: | Ag. | Municipal | Exported | Ag[1]. | Recharged[2] | |
| LTRID | 223,000 | 0 | 14,100 | 99,600 | 52,000 | **388,700** |
| Municipal | 0 | 890 | 0 | 600 | 0 | **1,490** |
| Tulare County MOU | 3,000 | 0 | 0 | 600 | 0 | **3,600** |
| **Total** | **226,000** | **890** | **14,100** | **100,800** | **52,000** | **393,790** |

1) Includes effective precipitation to meet crop demands

2) Recharge volumes include channel losses

# 6 Groundwater Storage [§356.2(b)(5)]

**23 Cal. Code Regs. § 356.2 Annual Reports.** *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*

**(b)** *A detailed description and graphical representation of the following conditions of the basin managed in the Plan:*

**(4)** *Change in groundwater in storage shall include the following:*

**(A)** *Change in groundwater in storage maps for each principal aquifer in the basin.*

**(B)** *A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.*

In the Tule Subbasin Coordination Agreement two methodologies are identified as acceptable for determining the volume if groundwater storage within the Tule Subbasin. Each of the methods are described are further described below.

The first methodology uses Geographic Information System (GIS) mapping to spatially quantify gross groundwater storage volume as a function of specific yield and groundwater elevation data. While this methodology is useful for understanding total groundwater storage in the Subbasin, it is not intended to account for ownership of water in storage.

The second methodology uses the calibrated groundwater flow model of the Tule Subbasin to take the exported calibrated groundwater surface from one year and subtract it from the exported calibrated groundwater surface from a subsequent year. The difference in groundwater levels is multiplied by the specific yield distribution of the shallow aquifer in the model to obtain an estimate of the change in groundwater storage across the subbasin. For this methodology the model will be updated regularly, and include groundwater extractions, recharge values, and groundwater levels.

The change in groundwater storage from the 2018/19 to 2019/20 water years for the GSA Plan area was estimated for the time period between fall 2019 and fall 2020 using the GIS methodology and resulted in an approximately 362,000 acre-ft reduction change in groundwater in storage between fall 2019 and fall 2020. A description of the equation and methodology used for determining the change in groundwater storage throughout the Tule Subbasin is provided in Section 6 of the Tule Subbasin 2019/20 Annual Report (see **Attachment 1**).

A change in groundwater storage map within the GSA Plan area is displayed as Figure 12 in Appendix A of the Tule Subbasin 2019/20 Annual Report (see **Attachment 1**) using groundwater elevations as the basis for estimating groundwater change in storage.

It is noted that the groundwater storage change indicated on Figures 13 and 14 of **Attachment 1** was based, in part, on comparison of two different groundwater contour maps developed from different data sets. A more limited set of wells with groundwater elevation data was available for the Fall 2019 contour map relative to the Fall 2020 map. The magnitude of the estimate of storage change should be evaluated in the context of the uncertainty in these data sets. As consistent monitoring data will be available year to year in the future, it is anticipated that a more representative and, thus, more accurate storage change estimates will be available in future reports.

Figure 14 of the Tule Subbasin 2019/20 Annual Report utilizes a column chart depicting water year type, groundwater pumping, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the Tule Subbasin between 1986/1987 water year through the 2019/20 water year (see **ATTACHMENT 1**).

Several of the GSAs and irrigation districts also maintains a separate water accounting system to track the amount of groundwater that has been banked by the Irrigation Districts and/or individual landowners, which will be internally calculated from the gross groundwater storage volume for the GSA. This is necessary as surface or imported water banked by irrigation districts or landowners is not to be considered groundwater storage that is available to or be a part of other agencies or the subbasin as a whole quantification of sustainability but remain in ownership with the banker. This methodology uses **EQUATION 6-1** to determine change in groundwater storage based on total water use (ETc, metered) and total non-groundwater supply **TABLE 6-1** provides a summary of this accounting for the GSA.

$$\Delta\, \boldsymbol{GW\ Storage = Total\ Non\ Groundwater\ Supply - Total\ Water\ Use} \qquad \textbf{Eq.}\ 6\text{-}1$$

**TABLE 6-1: GSA ACCOUNTING OF GROUNDWATER STORAGE (OCTOBER 2019 THROUGH SEPTEMBER 2020)**

| October 2019 thru September 2020 | Volume (AF) | | | |
|---|---|---|---|---|
| | LTRID | Municipal | Tulare Co. MOU | Total |
| **Total Non-Groundwater Supply** | **159,500** | **650** | **880** | **161,030** |
| *Surface Water (streamflow, imported)* | *96,400* | *0* | *0* | *96,400* |
| *Applied Irrigation* | *44,400* | *0* | *0* | *444,500* |
| *Recharged*[1] | *52,000* | *0* | *0* | *52,000* |
| *Total Precipitation*[2] | *63,100* | *650* | *880* | *64,630* |
| **Total Consumptive Use** | **(272,900)** | **(890)** | **(2,800)** | **(276,590)** |
| *ETc (agricultural)* | *(258,800)* | *0* | *(2,800)* | *(261,600)* |
| *Metered (municipal, exported)* | *(14,100)* | *(890)* | *0* | *(14,990)* |
| **Water Balance ($\Delta$ GW Storage)** | **(110,300)** | **(240)** | **(1,920)** | **(115,560)** |

1) Recharge volumes include channel losses
2) Total precipitation is used rather than effective precipitation because portion that is not effective is accounted for in ETc

Based on the GSA's accounting of change in groundwater storage from the fall of 2019 to fall of 2020, groundwater decreased by 115,560 acre-feet.

The difference in the change in groundwater storage volumes between the GIS methodology and the GSA's accounting is approximately 246,440 acre-feet. This apparent discrepancy is noted and will be investigated further as more data become available. While the GIS methodology is representative of the physical groundwater storage conditions, the GSA relies on their accounting of groundwater storage for determining the volume of groundwater in storage as a result of their actions and available to their benefit for future extraction.

# 7 PROGRESS TOWARDS PLAN IMPLEMENTATION [§356.2(C)]

> **23 Cal. Code Regs. § 356.2 Annual Reports.** *Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:*
>
> **(c)** *A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.*

Progress of plan implementation will be evaluated through comparing monitoring data to sustainable management criteria (SMC) established in Section 3 of the GSP and the GSAs progress towards implementing projects and management actions compared to the schedules outlined in Section 5 of the GSP.

Since 2019/20 water year is prior to the GSP implementation period, many of the monitoring networks identified in the GSP and the Tule Subbasin Monitoring network were not fully established to evaluate the GSAs progress towards implementing. For this report, if data was available for the 2019/20 water year, it was included in the evaluation. Subsequent reports will include a more comprehensive evaluation as monitoring networks are finalized.

## 7.1 INTERIM MILESTONES, MEASURABLE OBJECTIVES, AND MINIMUM THRESHOLDS

Throughout this section measured data for the 2019/20 water year within the LTRID GSA Plan relating to the four (4) sustainability indicators identified as occurring within Tule Subbasin will be compared to the 2025-interim milestone, measurable objective, and minimum threshold established for each RMS feature in Section 3 of the LTRID GSA GSP to determine the GSAs progress toward successfully implementing its GSP.

With the exception of groundwater quality, the other three sustainability indicators relied on the Tule Subbasin Groundwater Flow Model (GFM) projections for establishing SMC's. By incorporating historical data, climate change, and GSAs proposed projects and management actions, the GFM predicted conditions relative to each sustainability indicators and is the basis for the established quantifiable interim milestones and measurable objectives. As the GSPs are implemented resulting in refined monitoring and data collection, the GFM will provide more accurate predictions of groundwater conditions and adjustments will be made to SMCs to reflect the best available data. The adjustments will be made during the first periodic evaluation of the GSP in 2025.

### 7.1.1 GROUNDWATER ELEVATIONS

There are ten (10) RMS wells in the LTRID GSA (see **FIGURE 1-3**). Of these wells, six are perforated in the Upper Aquifer, three are perforated in the Lower Aquifer, and one is a composite well perforated in two aquifers. Hydrographs for each of the wells are provided in Appendix A of the Tule Subbasin 2019/20 Annual Report as Figures 1 through 5 (see **ATTACHMENT 1**). Available groundwater level data for RMS wells from spring 2020 are summarized in **TABLE 7-1** and is the basis for comparing the measured data in RMS well to sustainable management criteria in Section 3 of the LTRID GSA GSP.

**TABLE 7-1: RMS WELL GROUNDWATER ELEVATION DATA**

| Well ID | Aquifer | Groundwater Elevation (ft amsl) | | | |
|---|---|---|---|---|---|
| | | Spring 2020 | 2025 Interim Milestone | Measurable Objective | Minimum Threshold |
| **LTRID Management Area** | | | | | |
| 21S/23E-32K01 | Upper | 107.8 | 93 | 60 | -40 |
| 21S/24E-35A01 | Upper | 110.9 | 94 | 57 | 44 |
| 21S/25E-03R01 | Upper | NM[1] | 136 | 92 | 58 |
| 21S/26E-32A01 | Upper | 172.3 | 158 | 140 | 71 |
| 21S/25E-36 | Lower | 92.9 | 19 | 1 | -52 |
| 22S/23E-09[2] | Lower | -128.1 | -182 | -195 | -230 |
| 20S/26E-32 | Composite | 169.1 | 85 | 53 | -6 |
| **Tipton CSD Management Area** | | | | | |
| 22S/24E-01Q01 | Lower | -1.1 | -21 | -39 | -154 |
| **Poplar CSD Management Area** | | | | | |
| 21S/26E-34 | Upper | 264.7 | 108 | 110 | 73 |
| **Tulare County MOU Management Area** | | | | | |
| 22S/23E-30J01 | Upper | NA[3] | 170 | 48 | 31 |

1: Locked pumphouse
2: Re-established SMCs based on first monitoring event occurring in 2020
3: Well disassembled, bad measurement. Well to be replaced in subsequent monitoring events

During the spring 2020 monitoring activities groundwater levels in Well 21S/25E-03R01 was not measured because the well not accessible. Well 22S/23E-30J01 was measured but found to be disassembled, resulting in the measurement to be neglected as a new well will need to be located to replace the RMS. For RMS wells 21S/26E-32A01 and 22S/23E-09, SMCs established in the GSP were strictly based on GFM modeled elevations because recent historical groundwater elevation data was not available at either wells. Being the case, SMCs were established for the RMS wells based on the spring 2020 groundwater elevations and are reflected in **Table 7-1**.

The remainder of the RMS wells did not exceed the established 2025 interim milestones or minimum thresholds.

### 7.1.2 GROUNDWATER STORAGE

Groundwater storage in 2019/20 WY was estimated according to the equation and methodology described in Section 6 of the Tule Subbasin 2019/20 Annual Report using available groundwater elevation data (see **ATTACHMENT 1**). Based on this estimation, approximately 62.342 million acre-feet of groundwater was stored within the aquifers beneath the LTRID GSA Plan area. Applying the loss of groundwater storage volume previously mentioned in **SECTION 6: GROUNDWATER STORAGE** of 362,000 acre-feet occurring between 2018/19 WY and 2019/20 WY, the volume of groundwater storage beneath the LTRID GSA Plan area amounts to approximately 61.979 million acre-feet. While this methodology is useful for understanding total groundwater storage in the Subbasin, it is not intended to account for ownership of water in storage. The volume of groundwater each GSA has access to will differ due to the accumulation of Net Water Balance contributions and extractions by the individual GSA over time.

The interim milestones/measurable objective and minimum threshold for volume of groundwater storage in the aquifers beneath the LTRID GSA Plan area were identified in Tables 3-3 and 3-8, respectively, in

Section 3 of the LTRID GSA GSP. **TABLE 2-1** provides a comparison of the 2020 groundwater storage conditions to the 2025 interim milestone, measurable objective and minimum threshold.

**TABLE 7-2: GROUNDWATER STORAGE DATA**

| Groundwater Storage (millions AF) | | | | |
|---|---|---|---|---|
| 2018/19 WY | 2019/20 WY | 2025 Interim Milestone | Measurable Objective | Minimum Threshold |
| **62.342** | **61.980** | 60.590 | 59.000 | 58.100 |
| Annual Δ in Storage: | **0.362**[1] | *0.278*[2] | *0.149*[3] | *0.194*[4] |

**Notes:**

1) [63.342million AF – 61.979 million AF]
2) [61.980 million AF –60.590 million AF] ÷ 5 years
3) [61.980 million AF – 59.000 million AF] ÷ 20 years
4) [61.980 million AF – 58.100 million AF] ÷ 20 years

The volume of groundwater storage in 2019 remains greater than the established 2025 interim milestone, measurable objective and minimum threshold volumes for the LTRID GSA Plan area. The average annual rate of decline in groundwater storage for LTRID GSA Plan area between 2018/19 WY to 2019/20 WY amounts to 362,000 acre-feet per year. Whereas the average annual rate of decline for groundwater storage between 2019/20 WY and the established 2025-interim milestone is 278,000 acre-feet per year, making the experienced change in groundwater storage annual average rate of decline greater than the acceptable rate for achieving the 2025 interim milestone.

It is noted that the groundwater storage change indicated on Figures 13 and 14 of **ATTACHMENT 1** was based, in part, on comparison of two different groundwater contour maps developed from different data sets. A more limited set of wells with groundwater elevation data was available for the Fall 2019 contour map relative to the Fall 2020 map. The magnitude of the estimate of storage change should be evaluated in the context of the uncertainty in these data sets. As consistent monitoring data will be available year to year in the future, it is anticipated that a more representative and, thus, more accurate storage change estimates will be available in future reports.

### 7.1.3 GROUNDWATER QUALITY

The GSA utilizes the Irrigated Lands Regulatory Program and community Consumer Confidence Reports as the existing regulatory water quality programs for monitoring water quality and setting baseline standards that are applicable to the overlying land uses and users of the groundwater.

There are three (3) water quality RMS wells within the LTRID GSA Plan area. Additionally, the GSA has will analyze water quality data from the communities of Tipton, Poplar, and Woodville municipal wells for monitoring water quality conditions throughout the implementation of its GSP. SMC's established for the RMS location are provided in Tables 3-5 and 3-9 of Section 3 of the LTRID GSP. The basis for setting SMC's at each RMS location as described in the LTRID GSA GSP is outlined below:

Interim Milestones/ Measurable Objective

*Establish interim milestones and the measurable objective at each RMS well with calculating a change above the baseline groundwater quality to not exceed 10% of long term 10 year running average.*

Minimum Threshold

*Establish minimum threshold for COCs associated at each RMS well with calculating a change above the baseline groundwater quality to not exceed 15% of long term 10 year running average*.

The GSP further states that the 10-year running average will be re-calculated each year based on monitoring data and the change in groundwater quality will be evaluated in comparison to lowering of groundwater elevations and groundwater recharge efforts. For RMS wells with that a change in the 10-year running average by 10-percent and 15-percent does not result in an MCL exceedance, the MCL is used for determining the SMCs.

Since most community's water systems are supplied groundwater through multiple production wells, the average concentration for COCs for a given year across all wells is used for determining the 10-year average and monitoring results relative the water year being reported.

The GSA 2019/20 water year water quality data at RMS wells is provided in **TABLE 7 3** compared the 10-year running average and re-established interim milestones, measurable objectives and minimum thresholds.

**TABLE 7-3: RMS WATER QUALITY DATA**

| Constituent | Period of Record | Results | | | |
|---|---|---|---|---|---|
| | | 2020 | 10-Year Average | Interim Milestone/ Measurable Objective | Minimum Threshold |
| RMS Well: **E0090245** | | | | | |
| Conductivity (*µm/cm*) | 2019-2020 | **385** | *332* | <700 | <700 |
| pH | 2019-2020 | **8.16** | *8.05* | >6.5, <8.3 | >6.5, <8.3 |
| Nitrate as N (*mg/L*) | 2019-2020 | **1.2** | *1.2* | <10 | <10 |
| RMS Well: **E049930** | | | | | |
| Conductivity (*µm/cm*) | 2018-2020 | **438** | *443* | <700 | <700 |
| pH | 2018-2020 | **7.68** | *7.62* | >6.5, <8.3 | >6.5, <8.3 |
| Nitrate as N (*mg/L*) | 2018-2020 | **6** | *5.4* | <10 | <10 |
| RMS Well: **E0047650** | | | | | |
| Conductivity (*µm/cm*) | 2019-2020 | **989** | *995* | 1,100 | 1,150 |
| pH | 2019-2020 | **7.97** | *7.95* | >6.5, <8.3 | >6.5, <8.3 |
| Nitrate as N (*mg/L*) | 2019-2020 | **ND** | *ND* | <10 | <10 |
| RMS Well: **Tipton CSD CCR**[3] | | | | | |
| Nitrate as N (*mg/L*) | 2016-2020 | **11.17** | *8.54* | <10 | <10 |
| Arsenic (*ppb*) | 2010-2020 | **6.13** | *5.25* | <10 | <10 |
| Chromium (*µg/L*) | 2010-2020 | **0** | *0* | <10 | <10 |
| RMS Well: **Poplar CSD CCR**[4] | | | | | |
| Nitrate as N (*mg/L*) | 2015-2019 | **5.23** | *6.02* | <10 | <10 |
| Arsenic (*ppb*) | 2010-2019 | **0** | *0* | <10 | <10 |
| Chromium (*µg/L*) | 2010-2019 | **0** | *0* | <10 | <10 |
| RMS Well: **Woodville PUD CCR**[5] | | | | | |
| Nitrate as N (*mg/L*) | 2015-2019 | **10.2** | *9.14* | 10.1 | 10.6 |
| Arsenic (*ppb*) | 2010-2019 | **0** | *0* | <10 | <10 |
| Chromium (*µg/L*) | 2010-2019 | **0** | *0* | <10 | <10 |

[3] https://sdwis.waterboards.ca.gov/PDWW/JSP/MonitoringResults.jsp?tinwsys_is_number=5944&tinwsys_st_code=CA&counter=0

[4] https://sdwis.waterboards.ca.gov/PDWW/JSP/MonitoringResults.jsp?tinwsys_is_number=5955&tinwsys_st_code=CA&counter=0

[5] https://sdwis.waterboards.ca.gov/PDWW/JSP/MonitoringResults.jsp?tinwsys_is_number=5954&tinwsys_st_code=CA&counter=0

From a review of the 2020 water quality data available at the RMS locations all are within the established SMCs. Data obtained from ILRP wells E0090245, E049930, and E0047650 ranges from 2018 through 2020 due to the program that monitors groundwater quality was first established in 2018. All three (3) ILRP wells within the establish 2025 interim milestones and minimum thresholds.

Community wells have a longer history of being monitored under State regulations allowing the 10-year running average to be used for establishing SMCs for arsenic and chromium. Results for nitrogen concentration in groundwater using nitrate as N started in 2015/2016, which resulted in a shorted period of record to determine running average to calculate SMCs. Of the three (3) communities, Tipton and Woodville show nitrate concentrations that exceed their established 2025 interim milestones, and Tipton's nitrate concentration exceeds its established minimum threshold.

Per the Tule Subbasin Coordination Agreement (see Section 4.3.3.2), exceedance of the minimum threshold at a single well does not trigger an undesirable result, unless 50% of the groundwater quality RMS wells within the GSA exceed their established minimum thresholds for two (2) consecutive years. Although the minimum threshold exceedance does not trigger corrective actions by the GSA, the GSA will continue to evaluate groundwater quality as it relates to the Tipton CSD wells to determine if the increase in nitrate contamination is a result of lowering of groundwater levels.

### 7.1.4 LAND SUBSIDENCE

As described in the 2018/19 Annual Report, RMS for subsidence were proposed and arbitrary locations were identified until RMS subsidence benchmark could be constructed. Using National Aeronautics and Space Administration (NASA) Interferometric Synthetic Aperture Radar (InSAR) Jet Propulsion laboratory historical ground surface elevation data, SMCs were established at each of the arbitrary subsidence RMSs using the GFM to project ground surface elevations (see Section 3.5.14 and Section 3.5.2.4 of the LTRID GSA GSP for process to establish subsidence SMC). During the first part of 2020, benchmarks were constructed throughout the subbasin to replace the arbitrary subsidence RMSs with physical subsidence RMS benchmarks. Baseline elevations were taken at each of the benchmarks during the summer of 2020. Using the baseline elevations and applying the same process used to for the arbitrary sites, SMC was established at each of the newly constructed subsidence RMSs benchmarks.

Eighteen (18) subsidence RMS benchmarks were constructed in 2020 within the LTRID GSA Plan area. Baseline elevations taken during the summer of 2020 at each of the RMS benchmarks are compared to the established 2025-interim milestones, measurable objectives, and minimum thresholds in **TABLE 7-4**.

**TABLE 7-4: RMS SUBSIDENCE DATA**

| RMS Benchmark ID | Ground Surface Elevation (ft amsl) | | | |
|---|---|---|---|---|
| | 2020 | 2025 Interim Milestone | Measurable Objective | Minimum Threshold |
| L0001_B_RMS | 252.975 | 250 | 239 | 236 |
| L0002_B_RMS | 228.884 | 228 | 222 | 217 |
| L0003_B_RMS | 228.690 | 228 | 223 | 217 |
| L0004_B_RMS | 197.263 | 197 | 193 | 186 |
| L0005_B_RMS | 190.245 | 189 | 182 | 178 |
| L0006_B_RMS | 192.263 | 191 | 184 | 179 |
| L0022_B_RMS | 180.046 | 177 | 170 | 166 |
| L0023_B_RMS | 190.843 | 190 | 185 | 181 |
| L0024_B_RMS | 254.855 | 254 | 250 | 249 |
| L0038_B_RMS | 321.584 | 321 | 320 | 316 |
| L0039_B_RMS | 307.48 | 307 | 304 | 302 |
| L0040_B_RMS | 308.990 | 308 | 304 | 302 |
| L0041_B_RMS | 307.348 | 307 | 303 | 301 |
| L0042_B_RMS | 306.541 | 306 | 302 | 301 |
| L0043_B_RMS | 348.618 | 348 | 346 | 345 |
| L0044_B_RMS | 370.560 | 371 | 370 | 368 |
| L0045_B_RMS | 346.292 | 346 | 344 | 341 |
| L0046_B_RMS | 371.003 | 371 | 370 | 368 |

## 7.2 IMPLEMENTATION OF PROJECTS OR MANAGEMENT ACTIONS

This section describes the projects and management actions that are being implemented by the GSA in order to achieve the groundwater sustainability in the GSA. The projects and management actions primarily consist of adaptive policies to define rules for extraction and management of groundwater to reduce the over drafting of the resource in the GSA and subbasin by 2040. These sorts of projects allow for the greatest benefit experienced in a shorter period of time with the least amount of capital being invested. The policies adopted by the governing board of the GSA are included as **ATTACHMENT 2 - LTRID GSA RULES AND OPERATING POLICIES** to this report.

The following projects and management actions were proposed by the GSA in the GSP:

1. Agency Groundwater Accounting Action
2. Existing Water Supply Optimization Projects
3. Surface Water Development Projects
4. Managed Aquifer Recharge and Banking Projects
5. Agricultural Land Retirement Projects
6. Municipal Management Area Projects

In parts or collectively the above-mentioned projects and management actions will help the GSA avoid undesirable results. Throughout implementation of the GSP the GSA will monitor the effectiveness of projects and management actions at maintaining a path toward sustainability, and when necessary adjust accordingly. The following sections briefly summarize and catalog progress towards implementing projects and management actions.

### 7.2.1 GROUNDWATER ACCOUNTING

The LTRID GSA began implementing the "Agency Groundwater Accounting Action", as described in Section 5.2.1 of the LTRID GSP, before GSP adoption. Many of the key components described under this Action were undertaken in the beginning stages of the GSP development both by the GSA and the Tule Subbasin GSAs collectively, as they were recognized as essential or required elements for defining a successful path to achieving sustainability.

The GSAs progress towards implementing the key components of this action are summarized below.

Identification of groundwater users and groundwater allocations

Status: partially *complete; ongoing*

The Groundwater Flow Model (GFM) for the Tule Subbasin established water budgets depicting water uses and users for the past, present, and future. Based on the water budgets, Sustainable Yield allocation of groundwater consumption was determined to be 0.09 acre-feet per acre. Precipitation was all recognized as an allocation of groundwater that was available to landowners for consumption, with allocation amounts varying throughout the subbasin. Within the GSA this amounted to 0.71 acre-feet per acre based on the 27-year average.

The governing board to the GSA has also adopted the *District Allocated Groundwater Credits* policy to define rules for groundwater allocations and is attached to this report as Policy 6 in **ATTACHMENT 2**.

Regarding identifying domestic water users, the GSP acknowledges a data gap in this regard, and includes a description of future actions to correct this data gap. These potential actions to identify data gaps and to plan for potential drought mitigation on behalf of domestic users within the GSA continues to be monitored. The GSP identifies Representative Monitoring Sites for each management zone to continue to monitor the changes in groundwater levels. The GSA has added the additional monitoring to address lack of data available. As a part of implementation, collection of the available data within the GSA in addition to the monitoring data, will be coordinated with the County of Tulare (well permits), and the online databases established by DWR. Furthermore, coordinated efforts with other regulatory programs (such as the Irrigated Lands Regulatory Program) has taken place to help fill any remaining data gaps.

Accurate accounting groundwater extractions

Status: *complete*

The Tule Subbasin and GSA have hired consultants to provide groundwater extractions data in the form of remotely sensed crop evapotranspiration (ET) data using satellite imagery. This technology coupled with the Districts detailed records of surface water deliveries to landowners allows for the GSA to spatially determine the greater majority of groundwater extractions, being agriculture it the primary user of groundwater in the GSA Plan area. Meters will be used to account for groundwater users that are not associated with agriculture, such as municipalities.

The governing board to the GSA has also adopted the *Water Measurement and Metering* policy to define the accounting of groundwater consumption and is attached to this report as Policy 1 in **ATTACHMENT 2**.

Gradually reduce total groundwater consumption

Status: *complete*

The governing board to the GSA has adopted the *Transitional Groundwater Consumption* policy to define rules for groundwater use above sustainable yield and is attached to this report as Policy 4 in **ATTACHMENT 2**.

The rampdown schedule described in Policy 4 (see **TABLE 7-5**), was adopted by the GSA governing board to gradually reduce groundwater consumption to sustainable levels by 2040.

**TABLE 7-5: RAMP DOWN SCHEDULE**

| Groundwater Consumptive Use Allowed Above Sustainable Yield (AF) | | | |
|---|---|---|---|
| **2021-2025** | **2026-2030** | **2031-2035** | **2035-2040** |
| 2 | 1.5 | 1.0 | 0.5 |

By adopting the schedule, the GSA is allowing landowners to not feel the economic impacts of reducing groundwater use "overnight" to sustainable levels, but also enforces immediate actions for achieving sustainability, by making consumptions restrictions in effect as of February 2020.

As noted in the GSP, the rules for transitional pumping will require adaptive management to include an accounting of usage to ensure that overall pumping levels will not increase during transitional pumping and that over time groundwater pumping will decrease under the GSP. The GSA also identified potential management actions to not cause an undesirable result resulting from subsidence to key infrastructure such as the Friant Kern Canal (FKC), including, but not limited to using collected fees to strategically retire land or implement (and adjust if necessary) fees to reduce groundwater pumping.

The water accounting system to track transitional pumping to collect fees per rules and policies has been established. Additionally, the Tule Subbasin Groundwater Flow Model is being updated to incorporate data through water year 2019 which will provide a more accurate analysis of future subsidence based on the GSA management actions. Lastly, the Tule Subbasin monitoring program defined in the Coordination Agreement baseline groundwater depth and land subsidence benchmarks have been established, including in the area of LTRIDGSA.

The subsidence along the FKC continues to be evaluated with more specific analysis within the neighboring Eastern Tule GSA. As this further analysis continues to identify the causes of subsidence along the FKC and relative impacts from LTRIDGSA, adaptive updates to management actions as outlined in the GSP will take place, while monitoring continues and tracking transitional pumping.

Water accounting

Status: *complete, on-going refinement*

All of the previous and after-mentioned key components of the Groundwater Accounting Action rely on accurate water accounting for them to be successfully be implemented. The GSA recognized this in the early stages of GSP development and begin working with a consultant to build a system that incorporated both subbasin and GSA policies for tracking groundwater use. As of February 2020, the GSA water accounting system is operational and being utilized by the GSA to support implement its GSP.

The accounting system is designed to give landowners the ability to view and track annual allocations, monthly water consumption based on remotely sensed ET data, daily surface water deliveries, and volumes of surface water recharged or banked for future in-lieu use, among other features that give the landowners the tools to successfully manage their operation in a sustainable manner.

Develop policy for crediting groundwater recharge and banking activities

Status: *complete, on-going refinement*

The governing board for the GSA has adopted the *Groundwater Banking at the Landowner Level* policy to define rules for developing groundwater consumption credits from landowner and District recharge and banking activities and is attached to this report as Policy 4 (see **ATTACHMENT 2**). The policy incentivizes landowners to user groundwater for recharge and banking when it is available in excess of what's needed for crop demands by crediting the landowners water account with a percentage of the total volume surface water recharged as a groundwater credit. As a result, many landowners have constructed and operate recharge basins on their farms.

Develop policy for transferring groundwater credits

Status: *complete, on-going refinement*

The governing board for the GSA has adopted the *Water Accounting and Water Transfers* and *Landowner Surface Water Imported* into the GSA policies to define rules for movement of groundwater credits from one landowner to another within the GSA Plan area and for surface water imported into the GSA by landowners and are attached to this report as Policy 4 and Policy 5, respectively, in **ATTACHMENT 2**.

These policies are intended to allow landowners all opportunities available to feasibly and economically manage groundwater resources during the implementation of the GSP.

Adjustment of policies for groundwater allocations and transfers

Status: *subject to future consideration*

The GSA has included this component in the Groundwater Accounting Action understanding that all options for transferring and allocating groundwater credits will be based on the best available data. Adjustment of policies for groundwater allocations or transfers are intended to continue granting landowners all opportunities available to feasibly and economically manage groundwater resources to the extent undesirable results are not experienced within the GSA Plan area or the subbasin. As a result, the GSA reserves its right to increase or reduce groundwater allocations and expand or limit transferring of groundwater credits based on the GSA progress toward reaching its sustainability goal.

Create revenue for financing GSA operation, mitigation, monitoring, and projects

Status: *complete, future implementation*

Although the GSA has established a fee structure for consumption of groundwater above sustainable amounts, also known as transition groundwater consumption. During the first year of implementation of the groundwater accounting action the GSA waived fees associated with first two (2) feet of transitional groundwater consumption, while landowners will still be charged for districted allocated groundwater credits. Full implementation of groundwater consumption fee's, including all amounts of consumed transitional will be collected by the GSA starting in 2021.

The fee structure for transitional groundwater consumption is included as part of the *Transitional Groundwater Consumption* policy and is attached to this report as Policy 4 in **ATTACHMENT 2**.

Develop policy for enforcement to ensure compliance with rules established to achieve sustainability.

Status: *complete, subject to future refinement*

The governing board to the LTRID GSA has adopted the *Implementation and Enforcement of Plan Actions* policy to clearly outlines the process the GSA will use to enforce compliance with the policies adopted in order to achieve sustainability.

The rules for GSP implementation and enforcement are included as part of the Policy 8 within ERROR! REFERENCE SOURCE NOT FOUND. of this report.

### 7.2.2 WATER SUPPLY OPTIMIZATION

Projects for optimization of existing surface supplies is discussed in Section 5.2.2 of the LTRID GSA GSP and has been a joint implementation between the LTRID and the landowners within the District.

Modify existing key water control structures

Annually the district performs maintenance on the distribution systems when the system is not in use. This includes nature water way and district owned channels routine maintenance. Additionally, the district has received grant funding to install meters at all recharge facilities to more accurately track volumes of surface water diverted for recharge activities. This project was completed in 2020.

Modify existing District recharge basins

As previously mentioned, the district received a grant for purchasing and installed meters at all recharge facilities during the year 2020.

Expand Supervisory Control and Data Acquisition (SCADA) system

Status: *on-going*

As part of the Groundwater Accounting Action, the LTRID has expanded its SCADA system for tracking and managing the delivery of surface within its distribution system and to landowners. Upgrades to the system allows the district to utilize real time data to remotely monitor and adjust target flow rates at key bifurcation points. The meters being installed at the recharge facilities is a component of the Districts expansion of the SCADA system.

Replace open channel canals with pipeline distribution systems

Status: *in-progress*

Since 2016, the District has successfully obtained WaterSMART and Department of Water Resources grants to install the Riparian Pipeline for replacing open channel distribution system with a pipeline distribution system. The first phase of the project was completed in 2019 and the second is under construction in 2020. It is anticipated that phase 2 construction will be complete in the summer of 2021. This would complete the project. Prior to installation of the pipeline, approximately 5,750 acres within LTRID was served surface water though existing open the channels of the Tule River resulting in significant channel loss. The pipeline project relocated the distribution system from the Tule River channel to a pipeline distribution system and enhances in-lieu recharge for water that was previously lost to seepage. The project also expanded the District's ability to deliver surface water to lands that previously did not have direct access. With the completion of this project, nearly all of the lands within the District now have access to surface water.

The District will continue to utilize funding made available for similar open channel replacement projects to increase efficiency of surface water delivers to members of its district.

<u>Maintain existing pipeline distribution systems</u>

Status: *on-going*

Maintaining existing pipeline distribution systems in an on-going project the districts perform as part of their annual maintenance activities and in real time as issues arise.

<u>Upgrade on-farm irrigation distribution systems</u>

Status: *on-going*

Upgrading of on-farm irrigation distribution systems are implemented at the landowner level to ensure the most efficient practices for irrigating crops is used to maximum resources available. This is an on-going project and will occur throughout the implementation of the GSP.

### 7.2.3 SURFACE WATER DEVELOPMENT

Surface water development projects are discussed in Section 5.2.3 of the LTRID GSA GSP and include additional supplies made available through the Success Reservoir Enlargement Project (SREP), surface water infrastructure development, and delivery or increased deliveries of Central Valley Project (CVP) contracts. Progress towards implementing these projects is summarized below.

<u>Success Reservoir Enlargement Project</u>

Status: *on-going*

During the water year 2019, the Success Reservoir Enlargement Project made significant progress in moving forward with design. The Army Corps of Engineers completed Phase 1 Construction documents to relocate a road and complete the initial blasting and demolition. Phase 1 construction began in 2020 and is expected to be complete in 2021. The Army Corps. Of Engineers is currently finalizing bid documents for Phase 2 and will be sending them out soon. Phase 2 construction contracts are expected to be awarded and construction beginning by the end of 2021. Additionally, the process to acquire the additional property due to the raised spillway is underway. The project will provide additional flexibility in management of the Tule River water, particularly during the Spring and Summer water runs. The project is on schedule to be completed in 2024.

Surface water infrastructure development

Status: *on-going*

The Riparian Pipeline Project previously described also applies to the surface water infrastructure development component of the surface water development project.

Delivery of CVP Shasta Division Contract

Status: *on-going*

While the District endeavors to find ways to deliver this water directly into the District, during 2018, 2019 and 2020 short term exchange agreements were put in place to exchange this water for water supplies available out of watersheds and reservoirs on the East side of the Valley.

Additional deliveries of CVP Friant Division Contract

Status: *on-going*

As the District and landowners continue to develop more land for groundwater recharge capability, it will allow the district to increase deliveries of CVP Friant Division Contract supplies during wet years.

### 7.2.4 Managed Aquifer Recharge and Banking

Managed aquifer recharge and banking projects are discussed in Section 5.2.4 of the LTRID GSA GSP and in **Section 7.2.1** of this report and consists of both expansion of the LTRID recharge operations and development of landowner recharge projects. As previously mentioned, The governing board for the GSA has adopted the *Groundwater Banking at the Landowner Level* policy and is attached to this report as Policy 4 in **Attachment 2**.

A summary of progress towards implementing these projects is provided below.

Expansion of District recharge basins

Status: *on-going*

The District currently owns and operates over 4,500 acres of recharge basins for conjunctively manage water resources. Since adoption of the GSP, the District has not developed additional acreage of recharge facilities but continues to assess potential opportunities for doing so in the future.

Development of landowner recharge basins

Status: *on-going*

Since adoption of the *Groundwater Banking at the Landowner Level* policy, 544 acres of recharge basins have been developed by landowners within the LTRID. As a result, the District is able to increase its capacity for taking on surface water when available in short windows of time.

### 7.2.5 Agriculture Land Retirement Projects

Agriculture land retirement projects are discussed in Section 5.2.5 of the LTRID GSA GSP and consists of the LTRID purchasing land for permanent retirement, landowners taking a portion of their farm permanently out of production, and landowners taking a portion of their farm annually out of production depending on water supplies available.

To date the GSA has not implemented any agriculture retirement programs. Although, some lands within the district have been converted uses from crop production to manage recharge basins by landowners, resulting in dual benefit of reduced groundwater consumption and increased managed recharge and banking. This was previously discussed in **Section 7.2.4**.

The LTRIDGSA was also a funding contributor of the Tule Basin Land & Water Conservation Trust in 2020. The Trust was formed in part as a means of supporting the GSA in the work being done to meet plans and objectives outlined in the GSP. The Trust is working with landowners in the GSA to retire and/or fallow active farmland into conservation easements that will have numerous ecosystems and groundwater benefits. The Tule Basin Land & Water Conservation Trust will also interface with the Watershed Coordinator described in Section 7.2.6 regarding the plans outlined in the Tule Subbasin GSPs.

### 7.2.6 Municipal Management Area Projects and Management Actions

Municipal management area projects and management actions are described under Section 5.2.6 of the LTRID GSA GSP and describes the municipalities apart of the GSA to right to participate in any of the projects and management actions described within Section of the GSP as well as rules for working cooperatively with the GSA to ensure the GSA meets its sustainability goal. These rules include reporting of community water use and measurable objective and minimum thresholds required by the communities. These rules can be found in *Policy 7 – CSD and PUD Water Use* within the GSA adopted by the GSA governing board and is included as **Attachment 2** to this report.

The LTRIDGSA continues to believe that the most effective representation of domestic and municipal water users within the planning area is through the existing and longstanding governmental agencies that directly serve domestic water, all which have established governance structures. Post adoption, the LTRIDGSA has continued working with these agencies.

At the outset of the SGMA planning process, the Lower Tule River Irrigation District formed a Groundwater Planning Commission to assist in the development of the GSP for the region. The Planning Commission was modeled after a typical City or County Planning Commission doing the detailed work of planning and developing the GSP and providing recommendations to the Irrigation District and GSA Board. Five landowners with specific terms were appointed to the Planning Commission in 2016. The Planning Commission continues to meet and provide guidance in the GSP implementation.

The Lower Tule River Irrigation District entered into a cooperative Memorandum of Understanding (MOU) with the Poplar Community Services District, the Woodville Public Utility District and the Tipton Community Services District. Under the MOU, Lower Tule agreed to cooperate with the PUD and CSDs on the development of the Groundwater Sustainability Plans for the region. The PUD and CSDs were included in the Lower Tule River Irrigation District GSA and were given a seat on the Groundwater Planning Commission formed by the GSA to coordinate and draft the GSP. The intent behind the MOU was to assist the PUD and CSDs in the SGMA process using the resources and coordination of the LTRIDGSA. The PUD and CSDs named a representative to the Planning Commission. To say there was no outreach to the local PUD and CSDs would be to ignore the above-described process wherein the GSA executed a cooperation agreement with the PUD and CSD who were then also given a seat at the planning table.

To augment this already strong track record of coordination with the domestic water user community, the LTRIDGSA is cooperating with the Pixley Irrigation District GSA which submitted for and was awarded a grant through the Department of Conservation to create a Watershed Coordinator position to further assist in identifying data gaps and to develop strong working connection with local stakeholders and communities throughout the planning area.

Key anticipated Watershed Coordinator tasks and objectives, including those related to DACs are:

1. Develop site-specific projects with benefits to critically underserved communities (DACs) in the Tule Subbasin.
2. Assist underserved communities in the Tule Subbasin to engage and participate in scoping and development of projects that align with community needs and groundwater sustainability goals within the watershed.
3. Ensure continuity with the existing MOUs between LTRID GSA and the communities of Poplar, Woodville and Tipton.
4. Working with Disadvantage Communities to identify projects up-gradient from domestic well-fields to protect water quality.
5. Evaluate effects of GSP implementation on Groundwater Dependent Ecosystems (GDE) in collaboration with the California Department of Fish and Wildlife.
6. Assist with development of multi-benefit projects with local community, ecosystem, and wildlife habitat benefits.
7. Lead upland habitat restoration efforts with partners.
8. Working with willing landowners, identify potential agricultural lands coming out of production to meet groundwater sustainability goals.
9. Coordinate on-farm recharge with landowners. Collaborate with Fresno State, UC Davis and Sustainable Conservation on monitoring and evaluation of effects of recharge.

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# ATTACHMENT 1 - TULE SUBBASIN 2019/2020 ANNUAL REPORT

# Tule Subbasin 2019/20 Annual Report

**April 1, 2021**

**Prepared for**

**Tule Subbasin Technical Advisory Committee**

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# Executive Summary

This is the second annual report of the Tule Subbasin, identified by the California Department of Water Resources (CDWR) as No. 5-22-13 of the Tulare Lake Hydrologic Region (see Figure 1). This report is being submitted in compliance with Title 23 of the California Code of Regulations, Division 2, Chapter 1.5, Subchapter 2, Article 7, Section 356.2, as required under the Sustainable Groundwater Management Act (SGMA). As per Section 356.2, this report addresses data collected for the preceding water year, which covers October 1, 2019 through September 30, 2020.

The Tule Subbasin includes seven Groundwater Sustainability Agencies (GSAs; see Figure 2):

1. Eastern Tule Groundwater Sustainability Agency (ETGSA),
2. Tri-County Water Authority Groundwater Sustainability Agency (TCWA GSA),
3. Pixley Irrigation District Groundwater Sustainability Agency (Pixley GSA),
4. Lower Tule River Irrigation District Groundwater Sustainability Agency (LTGSA),
5. Delano-Earlimart Irrigation District Groundwater Sustainability Agency (DEID GSA)
6. Alpaugh Groundwater Sustainability Agency (Alpaugh GSA), and
7. Tulare County Groundwater Sustainability Agency (Tulare County GSA).

Six of the seven GSAs within the Tule Subbasin have developed and submitted to the CDWR independent Groundwater Sustainability Plans (GSPs) pursuant to 23 CCR §353.6. Tulare County GSA has entered into Memoranda of Understanding (MOUs) concerning coverage of territories under adjacent GSPs. As such, their jurisdictional areas are included in the other six GSPs. DEID GSA has identified four separate management areas (MAs) within their boundary: DEID Management Area, Annex Management Area, Richgrove Management Area, and Earlimart Management Area.

## Groundwater Elevation Data

Two primary aquifers have been identified within the Tule Subbasin: an upper unconfined to semi-confined aquifer (the Upper Aquifer) and a lower semi-confined to confined aquifer (the Lower Aquifer). Groundwater elevation contour maps and hydrographs have been developed for each of these two primary aquifers.

Groundwater in the Upper Aquifer of the Tule Subbasin flows from areas of natural recharge along major streams at the base of the Sierra Nevada Mountains on the eastern boundary towards a groundwater pumping depression in the central portion of the subbasin. Groundwater flow patterns did not change significantly between the spring and fall 2020. In the Lower Aquifer, groundwater generally flows from the northeast to the southwest towards groundwater level depressions in the northwestern and western portions of the subbasin. The same groundwater level conditions and flow patterns were observed from Lower Aquifer contour maps generated from both the spring and fall of 2020.

Groundwater levels in the Tule Subbasin vary seasonally. Since 2017, groundwater levels have generally risen across much of the eastern portion of the subbasin, dropped in the center of the subbasin, and risen in the western subbasin.

### Groundwater Extractions

Total groundwater extraction from the Tule Subbasin for water year 2019/20 was 755,640 acre-ft, as summarized by water use sector in the following table:

**Table ES-1**
**Tule Subbasin Groundwater Extraction for Water Year 2019/20**

| | Agricultural Pumping | Municipal Pumping | Pumping for Export | Total |
|---|---|---|---|---|
| Agricultural MA | 223,000 | 0 | 14,100 | 237,100 |
| Municipal MA | 0 | 890 | 0 | 890 |
| Tulare County MOU MA | 3,000 | 0 | 0 | 3,000 |
| **LTRID GSA** | 226,000 | 890 | 14,100 | 240,990 |
| Greater Tule MA | 173,000 | 0 | 0 | 173,000 |
| Porterville Community MA | 0 | 11,040 | 0 | 11,040 |
| Ducor Community MA | 0 | 200 | 0 | 200 |
| Terra Bella Community MA | 0 | 0 | 0 | 0 |
| Kern-Tulare WD MA | 10,000 | 0 | 0 | 10,000 |
| **ETGSA** | 183,000 | 11,240 | 0 | 194,240 |
| DEID MA | 39,000 | 0 | 0 | 39,000 |
| Western MA | 16,000 | 0 | 0 | 16,000 |
| Richgrove CSD MA | 0 | 870 | 0 | 870 |
| Earlimart PUD MA | 0 | 2,930 | 0 | 2,930 |
| **DEID GSA Total** | 55,000 | 3,800 | 0 | 58,800 |
| Pixley ID MA | 157,000 | 0 | 0 | 157,000 |
| Pixley PUD MA | 0 | 580 | 0 | 580 |
| Teviston CSD MA | 0 | 220 | 0 | 220 |
| **Pixley GSA** | 157,000 | 800 | 0 | 157,800 |
| North MA | 9,500 | 0 | 13,960 | 23,460 |
| Southeast MA | 58,000 | 100 | 0 | 58,100 |
| **TCWA GSA** | 67,500 | 100 | 13,960 | 81,560 |
| **Alpaugh GSA** | 22,000 | 250 | 0 | 22,250 |
| **Totals** | **710,500** | **17,080** | **28,060** | **755,640** |

Note: All values are in acre-ft.
MA = Management Area.

## Surface Water Use

Total surface water available for use within the Tule Subbasin for water year 2019/20 was 624,840 acre-ft as summarized by water use sector in the following table:

**Table ES-2**
**Tule Subbasin Surface Water Supplies for Water Year 2019/20**

| | Stream Diversions[1] | Imported Water | Recycled Water | Oilfield Produced Water | Precipitation | Total |
|---|---|---|---|---|---|---|
| Agricultural MA | 25,000 | 71,200 | 0 | 0 | 55,300 | 151,500 |
| Municipal MA | 0 | 0 | 0 | 0 | 600 | 600 |
| Tulare County MOU MA | 0 | 0 | 0 | 0 | 600 | 600 |
| **LTRID GSA** | 25,000 | 71,200 | 0 | 0 | 56,500 | 152,700 |
| Greater Tule MA | 15,600 | 57,900 | 0 | 0 | 93,400 | 166,900 |
| Porterville Community MA | 0 | 0 | 3,000 | 0 | 11,900 | 14,900 |
| Ducor Community MA | 0 | 0 | 0 | 0 | 200 | 200 |
| Terra Bella Community MA | 0 | 1,040 | 0 | 0 | 900 | 1,940 |
| Kern-Tulare WD MA | 0 | 9,700 | 0 | 900 | 6,100 | 16,700 |
| **ETGSA** | 15,600 | 68,640 | 3,000 | 900 | 112,500 | 200,640 |
| DEID MA | 0 | 137,900 | 0 | 0 | 30,000 | 167,900 |
| Western MA | 0 | 0 | 0 | 0 | 3,100 | 3,100 |
| Richgrove CSD MA | 0 | 0 | 0 | 0 | 200 | 200 |
| Earlimart PUD MA | 0 | 0 | 0 | 0 | 500 | 500 |
| **DEID GSA Total** | 0 | 137,900 | 0 | 0 | 33,800 | 171,700 |
| Pixley ID MA | 0 | 31,600 | 0 | 0 | 32,200 | 63,800 |
| Pixley PUD MA | 0 | 0 | 0 | 0 | 1,100 | 1,100 |
| Teviston CSD MA | 0 | 0 | 0 | 0 | 700 | 700 |
| **Pixley GSA** | 0 | 31,600 | 0 | 0 | 34,000 | 65,600 |
| North MA | 0 | 2,400 | 0 | 0 | 5,100 | 7,500 |
| Southeast MA | 0 | 0 | 0 | 0 | 20,700 | 20,700 |
| **TCWA GSA** | 0 | 2,400 | 0 | 0 | 25,800 | 28,200 |
| **Alpaugh GSA** | 0 | 0 | 0 | 0 | 6,000 | 6,000 |
| **Totals** | **40,600** | **311,740** | **3,000** | **900** | **268,600** | **624,840** |

Note: All values are in acre-ft.
[1]Provisional data subject to revision.

## Total Water Use

Total water use in the Tule Subbasin for water year 2019/20, including both groundwater extractions and surface water supplies, was 1,380,480 acre-ft as shown in the following table:

### Table ES-3

### Tule Subbasin Total Water Use for Water Year 2019/20

| | Groundwater Extraction | Surface Water Supplies | Total |
|---|---|---|---|
| Agricultural MA | 237,100 | 151,500 | 388,600 |
| Municipal MA | 890 | 600 | 1,490 |
| Tulare County MOU MA | 3,000 | 600 | 3,600 |
| **LTRID GSA** | 240,990 | 152,700 | 393,690 |
| Greater Tule MA | 173,000 | 166,900 | 339,900 |
| Porterville Community MA | 11,040 | 14,900 | 25,940 |
| Ducor Community MA | 200 | 200 | 400 |
| Terra Bella Community MA | 0 | 1,940 | 1,940 |
| Kern-Tulare WD MA | 10,000 | 16,700 | 26,700 |
| **ETGSA** | 194,240 | 200,640 | 394,880 |
| DEID MA | 39,000 | 167,900 | 206,900 |
| Western MA | 16,000 | 3,100 | 19,100 |
| Richgrove CSD MA | 870 | 200 | 1,070 |
| Earlimart PUD MA | 2,930 | 500 | 3,430 |
| **DEID GSA Total** | 58,800 | 171,700 | 230,500 |
| Pixley ID MA | 157,000 | 63,800 | 220,800 |
| Pixley PUD MA | 580 | 1,100 | 1,680 |
| Teviston CSD MA | 220 | 700 | 920 |
| **Pixley GSA** | 157,800 | 65,600 | 223,400 |
| North MA | 23,460 | 7,500 | 30,960 |
| Southeast MA | 58,100 | 20,700 | 78,800 |
| **TCWA GSA** | 81,560 | 28,200 | 109,760 |
| **Alpaugh GSA** | 22,250 | 6,000 | 28,250 |
| **Totals** | **755,640** | **624,840** | **1,380,480** |

Note: All values are in acre-ft.

## Change in Groundwater in Storage

Since 1986/87, the volume of groundwater in storage in the Tule Subbasin has decreased by approximately 3,800,000 acre-ft. However, since 2015/16, the volume of groundwater in storage has been relatively stable. This has been due to a reduction in groundwater pumping, a relatively wet precipitation year in 2016/17, and an average precipitation year in 2018/19.

Results of the change in groundwater in storage analysis showed that between fall 2019 and fall 2020, groundwater in storage decreased by approximately 1,331,000 acre-ft.

# 1. Introduction

This is the second annual report of the Tule Subbasin, identified by the California Department of Water Resources (CDWR) as No. 5-22-13 of the Tulare Lake Hydrologic Region (see Figure 1). This report is being submitted in compliance with Title 23 of the California Code of Regulations, Division 2, Chapter 1.5, Subchapter 2, Article 7, Section 356.2, as required under the Sustainable Groundwater Management Act (SGMA). As per Section 356.2, this report addresses data collected for the preceding water year, which covers October 1, 2019 through September 30, 2020.

The Tule Subbasin includes seven Groundwater Sustainability Agencies (GSAs; see Figure 2):

1. Eastern Tule Groundwater Sustainability Agency (ETGSA),
2. Tri-County Water Authority Groundwater Sustainability Agency (TCWA GSA),
3. Pixley Irrigation District Groundwater Sustainability Agency (Pixley GSA),
4. Lower Tule River Irrigation District Groundwater Sustainability Agency (LTGSA),
5. Delano-Earlimart Irrigation District Groundwater Sustainability Agency (DEID GSA)
6. Alpaugh Groundwater Sustainability Agency (Alpaugh GSA), and
7. Tulare County Groundwater Sustainability Agency (Tulare County GSA).

Six of the seven GSAs within the Tule Subbasin have developed and submitted to the CDWR independent Groundwater Sustainability Plans (GSPs) pursuant to 23 CCR §353.6. Tulare County GSA has entered into Memoranda of Understanding (MOUs) concerning coverage of territories under adjacent GSPs. As such, their jurisdictional areas are included in the other six GSPs.

The six GSPs for the Tule Subbasin have been developed and submitted under a Coordination Agreement. The purpose of the Coordination Agreement is to fulfill all statutory and regulatory requirements related to intra-basin coordination agreements pursuant to SGMA. The Coordination Agreement includes two attachments: Attachment 1 describes the subbasin-wide monitoring network that all Tule Subbasin GSAs shall utilize for the collection of data to be used in annual reports. Attachment 2 describes the subbasin setting, which represents the coordinated understanding of the physical characteristics of the subbasin.

## 1.1 Tule Subbasin Description

The Tule Subbasin is in the southern portion of the San Joaquin Valley Groundwater Basin in the Central Valley of California. The area of the Tule Subbasin is defined by the latest version of CDWR Bulletin 118[1] and is approximately 744 square miles (475,895 acres). The lateral boundaries of the subbasin include both natural and political boundaries (see Figure 2). The eastern boundary of the Tule Subbasin is defined by the surface contact between crystalline rocks

California Department of Water Resources, 2016. Final 2016 Bulletin 118 Groundwater Basin Boundaries shapefile. http://www.water.ca.gov/groundwater/sgm/basin_boundaries.cfm of the Sierra Nevada and surficial alluvial sediments that make up the groundwater basin. The northern boundary is defined by the Lower Tule River Irrigation District (LTRID) and Porterville Irrigation District boundaries. The western boundary is defined by the Tulare County/Kings County boundary, except for a portion of the Tulare Lake Basin Water Storage District that extends east across the county boundary and is excluded from the subbasin. The southern boundary is defined by the Tulare County/Kern County boundary except for the portion of the Delano-Earlimart Irrigation District (DEID) that extends south of the county boundary and is included in the subbasin. Communities within the subbasin include Allensworth, Alpaugh, Porterville, Tipton, Woodville, Poplar, Teviston, Pixley, Earlimart, Richgrove, Ducor and Terra Bella. Neighboring DWR Bulletin 118 subbasins include the Kern County Subbasin to the south, the Tulare Lake Subbasin to the west, and the Kaweah Subbasin to the north.

## 1.2 Hydrogeologic Setting

The Tule Subbasin is located on a series of coalescing alluvial fans that extend toward the center of the San Joaquin Valley from the Sierra Nevada Mountains (see Figure 3). The alluvial fans merge with lacustrine deposits of the Tulare Lakebed in the western portion of the subbasin. Land surface elevations within the Tule Subbasin range from approximately 850 ft above mean sea level (amsl) along the eastern margins of the subbasin to approximately 180 ft amsl at the western boundary (see Figure 3).

Where saturated in the subsurface, the permeable sand and gravel layers form the principal aquifers in the Tule Subbasin and adjacent areas to the north, south and west. Individual aquifer layers consist of lenticular sand and gravel deposits of varying thickness and lateral extent. The aquifer layers are interbedded with low permeability silt and clay confining layers. In general, there are five aquifer/aquitard units in the subsurface beneath the Tule Subbasin (see Figure 4):

1. Upper Aquifer
2. The Corcoran Clay Confining Unit
3. Lower Aquifer
4. Pliocene Marine Deposits (generally considered an aquitard)
5. Santa Margarita Formation and Olcese Formation of the Southeastern Subbasin

Two primary aquifers have been identified within the Tule Subbasin: an upper unconfined to semi-confined aquifer and a lower semi-confined to confined aquifer. The upper and lower aquifers are separated by the Corcoran Clay confining unit in the western portion of the subbasin. Groundwater within the southeastern portion of the subbasin is also produced from the Santa Margarita Formation, which is located stratigraphically below the lower aquifer.

In general, groundwater in the Tule Subbasin flows from areas of natural recharge along major streams at the base of the Sierra Nevada Mountains on the eastern boundary towards the western-central portion of the subbasin.

## 1.3 Tule Subbasin Monitoring Network

The Tule Subbasin Technical Advisory Committee has developed a subbasin-wide monitoring plan, which describes the monitoring network and monitoring methodologies to be used to collect the data to be included in Tule Subbasin GSPs and annual reports. The subbasin-wide monitoring plan is included as Attachment 1 to the Coordination Agreement. The groundwater level monitoring network from the monitoring plan is shown on Figure 5 and includes monitoring features to enable collection of data from the Upper Aquifer, Lower Aquifer and Santa Margarita Formation aquifer. Groundwater levels are collected in the late winter/early spring (March) and in the fall to account for seasonal high and low groundwater conditions.

A subset of groundwater level monitoring features in the monitoring plan have been identified as representative monitoring sites to be relied on for the purpose of assessing progress with respect to groundwater level sustainability in the subbasin. The representative groundwater level monitoring sites are shown on Figure 5.

## 1.4 Purpose and Scope of this Annual Report

The purpose of this annual report is to document groundwater level conditions, groundwater extractions, surface water supply, and changes in groundwater storage in the Tule Subbasin for the 2019/20 water year, in accordance with CCR §356.2. The annual report also provides a description of progress toward implementing the collective GSPs for the six GSAs in the subbasin.

# 2. Groundwater Elevation Data §356.2 (b)(1)

## 2.1 Groundwater Elevation Contour Maps §356.2 (b)(1)(A)

### Upper Aquifer

Groundwater in the Upper Aquifer of the Tule Subbasin flows from areas of natural recharge along major streams at the base of the Sierra Nevada Mountains on the eastern boundary towards a groundwater pumping depression in the central portion of the subbasin (see Figures 6 and 7). The pumping depression has reversed the natural groundwater flow direction in the western portion of the subbasin. The pumping depression is most pronounced between the Tule River and Deer Creek near Highway 99. The groundwater level depression was observed from data collected in both the spring and fall of 2020. Groundwater flow patterns in the upper aquifer did not change significantly between the spring and fall of 2020.

The Upper Aquifer in the southeastern portion of the Tule Subbasin has been largely dewatered since the 1960s.[2]

### Lower Aquifer

In the Lower Aquifer, groundwater generally flows from the northeast to the southwest towards groundwater level depressions in the northwestern and western portions of the subbasin (see Figures 8 and 9). Lower Aquifer pumping depressions are observed in the Lower Tule River Irrigation District GSA, Tri-County GSA and Alpaugh GSA. A slight groundwater high is observed in the southern DEID GSA area. The same groundwater level conditions and flow patterns were observed from Lower Aquifer contour maps generated from both the spring and fall of 2020.

## 2.2 Groundwater Level Hydrographs §356.2 (b)(1)(B)

Groundwater level hydrographs for Representative Monitoring Site (RMS) wells in each GSA are provided in Appendices A through F. Spring and fall 2020 groundwater levels for the RMS wells are summarized in Tables 1 through 6 of the following sections.

### 2.2.1. Lower Tule River Irrigation District GSA

There are ten RMS wells in the LTRID GSA (see Figure 5). Of these wells, six are perforated in the Upper Aquifer, three are perforated in the Lower Aquifer, and one is a composite well perforated in two aquifers. Hydrographs for each of the wells are provided in Appendix A.

[2] Lofgren, B.E., and Klausing, R.L., 1969. Land Subsidence Due to Groundwater Withdrawal Tulare-Wasco Area California. United States Geological Survey Professional Paper 437-B.

Available groundwater level data for LTRID GSA RMS wells from the spring and fall of 2020 are summarized in the following table:

**Table 1**
**Lower Tule River Irrigation District GSA**
**2019/20 Groundwater Levels at Representative Monitoring Site Wells**

| Well | Groundwater Elevation (ft amsl) | | | |
|---|---|---|---|---|
| | Spring 2020 | Fall 2020 | Measurable Objective | Minimum Threshold |
| **Upper Aquifer** | | | | |
| 21S/23E-32K01 | 107.8 | 104.3 | 71 | 56 |
| 21S/24E-35A01 | 105.0 | 182.6 | 57 | 44 |
| 21S/25E-03R01 | N/A[1] | N/A | 92 | 58 |
| 21S/26E-32B02 | 172.3 | 170.1 | 131 | 83 |
| 22S/23E-30J01 | N/A | N/A | 48 | 31 |
| 21S/26E-34 | 264.7 | 261.1 | 110 | 73 |
| LTRID TSS U | N/A | 184.8 | N/A | N/A |
| **Lower Aquifer** | | | | |
| 20S/26E-32 | 169.1 | 142.9 | 53 | -6 |
| 21S/25E-36 | 92.9 | N/A | 1 | -52 |
| 22S/23E-07 | -128.1 | -168.3 | -139 | -174 |
| LTRID TSS M | N/A | 104.9 | N/A | N/A |
| LTRID TSS L | N/A | 19.0 | N/A | N/A |
| **Composite Aquifer** | | | | |
| 22S/24E-01Q01 | -1.1 | -63.4 | -39 | -154 |

[1]N/A = Not Available

For Upper Aquifer monitoring wells, groundwater levels in Well 21S/23E-32K01 varied from 107.8 feet above mean sea level (ft amsl) to 104.3 ft amsl. Groundwater levels in Well 21S/24E-35A01 varied from 105.0 ft amsl to 182.6 ft amsl. Groundwater levels in Well 21S/26E-32B02 varied from 172.3 ft amsl to 170.1 ft amsl. Groundwater levels in Well 21S/26E-34 varied from 264.7 ft amsl to 261.1 ft amsl. Groundwater levels in all wells remain above their respective measurable objectives and are more than 50 feet above their respective minimum thresholds.

For Lower Aquifer monitoring wells, groundwater levels in Well 20S/26E-32 varied from 169.1 ft amsl to 142.9 ft amsl (26.2 feet) between spring and fall 2020. Groundwater levels in Well 22S/23E-07 varied from -128.1 ft amsl to -168.3 ft amsl. Groundwater levels in Well 20S/26E-32 remain above the measurable objective and are more than 50 feet above the minimum threshold. The Spring groundwater level in Well 22S/23E-07 remains above the measurable objective and the minimum threshold, and the Fall groundwater level in Well 22S/23E-07 is below the measurable objective and just above the minimum threshold.

For the composite aquifer monitoring Well 22S/24E-01Q01, groundwater levels in the well varied from -1.1 ft amsl to -63.4 ft amsl (62.3 feet) between spring and fall 2020. The fall 2020 groundwater level is below the measurable objective and is more than 50 feet above the minimum threshold.

### 2.2.2. Eastern Tule GSA

There are nine RMS wells in the ETGSA (see Figure 5). Of these wells, four are perforated in the Upper Aquifer, three are perforated in the Lower Aquifer and two are composite wells perforated in both aquifers. Hydrographs for each of the wells are provided in Appendix B. Available groundwater level data for ETGSA RMS wells from the spring and fall of 2020 are summarized in the following table:

**Table 2**
**Eastern Tule GSA**
**2019/20 Groundwater Levels at Representative Monitoring Site Wells**

| Well | Groundwater Elevation (ft amsl) | | | |
|---|---|---|---|---|
| | Spring 2020 | Fall 2020 | Measurable Objective | Minimum Threshold |
| **Upper Aquifer** | | | | |
| 22S/27E-13A01 | 371.2 | 367.7 | 331 | 259 |
| 23S/26E-09C01 | N/A[1] | N/A | 110 | 74 |
| R-11 | 357.4 | N/A | 376 | 264 |
| C-1 | 376.0 | N/A | 377 | 317 |
| 22S/26E-13R01 | 251.9 | 250.5 | N/A | N/A |
| **Lower Aquifer** | | | | |
| 23S/27E-27 | 124.2 | 31.7 | 112 | -87 |
| 23S/26E-23R01 | N/A | N/A | -2 | -66 |
| 22S/26E-24 | 110.7 | 33.9 | 26 | -47 |
| TSMW 6L | N/A | 219.3 | N/A | N/A |
| **Santa Margarita Formation** | | | | |
| 24S/27E-32M01 | 84.5 | -1.2 | N/A | N/A |
| TSMW 6SM | NA | 7 | N/A | N/A |
| **Composite Aquifer** | | | | |
| C-16 | 248.0 | N/A | 111 | 2 |
| 23S/27E-03 | N/A | N/A | 219 | 181 |

[1]N/A = Not Available

For the Upper Aquifer wells, groundwater levels in Well 22S/27E-13A01 (Porterville Area) varied from 371.2 ft amsl to 367.7 ft amsl. These groundwater levels are above the measurable objective and minimum threshold. It is noted that groundwater levels in the Porterville Area are predicted to rise with implementation of the ETGSA GSP. For the lower aquifer monitoring wells, groundwater levels in Well 23S/27E-27 varied from 124.2 ft amsl to 31.7 ft amsl, and groundwater levels in 22S/26E-24 varied from 110.7 ft amsl to 33.90ft amsl. Groundwater levels in both of the wells remain above their respective minimum thresholds. Groundwater levels in 23S/27E-27 were above the measurable objective in Spring of 2020 and below the measurable objective in Fall of 2020.

### 2.2.3. Delano-Earlimart GSA

There are 13 RMS wells in the DEID GSA (see Figure 5). Of these wells, five are perforated in the Upper Aquifer and five are perforated in the Lower Aquifer and three are composite wells perforated in both aquifers. Hydrographs for each of the wells are provided in Appendix C. Available groundwater level data for DEID GSA RMS wells from the spring and fall of 2020 are summarized in the following table:

**Table 3**
**Delano-Earlimart Irrigation District GSA**
**2019/20 Groundwater Levels at Representative Monitoring Site Wells**

| Well | Groundwater Elevation (ft amsl) | | | |
|---|---|---|---|---|
| | Spring 2020 | Fall 2020 | Measurable Objective | Minimum Threshold |
| **Upper Aquifer** | | | | |
| 24S/26E-32G01 | 154.0 | 150.5 | 85 | -19 |
| 24S/26E-04P01 | N/A[1] | N/A | 84 | -4 |
| 24S/25E-35H01 | 175.3 | 173.7 | 152 | 93 |
| 24S/26E-11 | N/A | N/A | 84 | 66 |
| M-19 | N/A | N/A | 143 | 85 |
| **Lower Aquifer** | | | | |
| 23S/26E-29D01 | 203.8 | 72.3 | 45 | -15 |
| M-19 | N/A | N/A | 128 | 63 |
| 25S/26E-8D | N/A | N/A | 142 | 36 |
| 25S/26E-9C01 | N/A | N/A | 109 | 61 |
| 24S/24E-03A01 | 104.3 | 106.3 | -25 | -163 |
| **Composite Aquifer** | | | | |
| 24S/27E-31 | 158.4 | 136.6 | 60 | -7 |
| 23S/25E-27 | 24.3 | -8.0 | -6 | -191 |
| 23S/25E-36H01 | N/A | N/A | 26 | -95 |

[1]N/A = Not Available

Of the Upper Aquifer monitoring wells, Well 24S/26E-32G01 groundwater levels varied from 154.0 ft amsl in spring 2020 to 150.5 ft amsl in fall 2020. For Well 24S/25E-35 groundwater levels varied from 175.3 ft amsl in spring 2020 to 173.7 ft amsl in fall 2020. Groundwater levels in both of the wells remain above their respective measurable objectives and are more than 50 feet above their respective minimum thresholds.

Of the Lower Aquifer monitoring wells, well 23S/26E-29D01 groundwater levels varied from 203.8 ft amsl to 72.3 ft amsl between spring and fall 2020. In well 24S/24E-03A01 groundwater levels varied from 104.3 ft amsl to 160.3 ft amsl between spring and fall 2020. Groundwater levels in both of the wells remain above their respective measurable objectives and are more than 50 feet above their respective minimum thresholds.

For the composite aquifer monitoring Well 24S/27E-31, groundwater levels varied from 158.4 ft amsl to 136.6 ft amsl between spring and fall 2020. Both spring and fall groundwater levels remain above the measurable objective and are more than 50 feet above the respective minimum thresholds. For well 23S/25E-27 groundwater levels varied from 24.3 ft amsl to -8.0 ft amsl between spring and fall 2020. The spring 2020 groundwater level remains above the measurable objective and minimum threshold, and the fall 2020 groundwater level is below the measurable objective but above the minimum threshold.

### 2.2.4. Pixley Irrigation District GSA

There are five RMS wells in the Pixley GSA (see Figure 5). Of these wells, three are perforated in the Upper Aquifer and two are perforated in the Lower Aquifer. Hydrographs for each of the wells are provided in Appendix D. Available groundwater level data for Pixley GSA RMS wells from the spring and fall of 2020 are summarized in the following table:

**Table 4**
**Pixley Irrigation District GSA**
**2019/20 Groundwater Levels at Representative Monitoring Site Wells**

| Well | Groundwater Elevation (ft amsl) | | | |
|---|---|---|---|---|
| | Spring 2020 | Fall 2020 | Measurable Objective | Minimum Threshold |
| **Upper Aquifer** | | | | |
| 22S/24E-23J01 | N/A[1] | -40.8 | -13 | -68 |
| 23S/24E-28J02 | N/A | N/A | 78 | 54 |
| 23S/25E-16N04 | -19.9 | -68.8 | 62 | 14 |
| **Lower Aquifer** | | | | |
| 22S/25E-32K01 | N/A | N/A | -18 | -46 |
| 22S/25E-25N01 | 19.2 | 9.7 | -8 | -54 |

[1]N/A = Not Available

Of the Upper Aquifer monitoring wells, spring and fall 2020 groundwater levels were available for Well 23S/25E-16N04. Groundwater levels at this well varied from -19.9 ft amsl to -68.8 amsl between spring and fall 2020. Groundwater levels are below both the measurable objective and minimum threshold.

Of the Lower Aquifer monitoring wells, spring and fall 2020 groundwater levels were available for Well 22S/25E-25N01. Groundwater levels varied from 19.9 ft amsl to 9.7 amsl between spring and fall 2020. Groundwater levels remain above their respective measurable objective and are more than 50 feet above their respective minimum threshold.

### 2.2.5. Tri-County Water Authority GSA

There are eight RMS wells in the TCWA GSA (see Figure 5). Of these wells, three are perforated in the Upper Aquifer and five are perforated in the Lower Aquifer. Hydrographs for each of the wells are provided in Appendix E. Available groundwater level data for TCWA GSA RMS wells from the spring and fall of 2020 are summarized in the following table:

**Table 5**
**Tri-County Water Authority GSA**
**2019/20 Groundwater Levels at Representative Monitoring Site Wells**

| Well | Groundwater Elevation (ft amsl) | | | |
|---|---|---|---|---|
| | Spring 2020 | Fall 2020 | Measurable Objective | Minimum Threshold |
| **Upper Aquifer** | | | | |
| E20 | N/A[1] | N/A | 45 | -40 |
| 24S/24E-25J01 | -5.5 | -28.2 | 185 | 125 |
| 24S/23E-22E01 | N/A | N/A | 130 | 40 |
| TSMU 5U | N/A | 120.6 | N/A | N/A |
| **Lower Aquifer** | | | | |
| G-13 | N/A | N/A | -85 | -210 |
| 24S/23E-22R02 | N/A | 77.0 | 15 | -175 |
| 23S/23E-25N01 | N/A | N/A | -5 | -110 |
| 24S/23E-15R01 | N/A | N/A | -20 | -150 |
| 24S/24E-04R01 | N/A | N/A | 60 | -40 |
| TSMW 5L | N/A | -139.0 | N/A | N/A |

[1]N/A = Not Available

For the Upper Aquifer monitoring wells, spring and fall 2020 groundwater levels at Well 24S/24E-25J01 varied from -5.5 ft amsl to -28.2 ft amsl. Both groundwater levels at this well are below the measurable objective and minimum threshold. Of the Lower Aquifer monitoring wells, spring and fall 2020 groundwater levels were not available for any wells.

### 2.2.6. Alpaugh GSA

The Alpaugh GSA has one RMS well – Well 55 (see Figure 5). This well is perforated in the Lower Aquifer. The hydrograph for Well 55 is provided in Appendix F. There is no available groundwater level data for Well 55 from spring or fall of 2020. Available groundwater level data for Alpaugh GSA RMS well from the spring and fall of 2020 is summarized in the following table:

**Table 6**
**Alpaugh Irrigation District GSA**
**2019/20 Groundwater Levels at the Representative Monitoring Site Well**

| Well | Groundwater Elevation (ft amsl) | | | |
|---|---|---|---|---|
| | Spring 2020 | Fall 2020 | Measurable Objective | Minimum Threshold |
| **Lower Aquifer** | | | | |
| Well 55 | -114.5 | N/A | -92 | -209 |

[1]N/A = Not Available

The Spring 2020 groundwater level in Well 55 was -114.5, which is below the measurable objective but more than 50 feet above the minimum threshold.

# 3. Groundwater Extraction for Water Year 2019/2020 §356.2 (b)(2)

## 3.1 Agricultural Groundwater Pumping

Agricultural groundwater pumping in the Tule Subbasin is estimated as a function of the total agricultural water demand, surface water deliveries, and precipitation. The total agricultural water demand (i.e. applied water demand) is estimated as follows:

$$W_d = \frac{A_i \ x \ ET}{I_{eff}}$$

Where:

$W_d$ = Total Agricultural Water Demand (acre-ft)

$A_i$ = Irrigated Area (acres)

ET = Evapotranspiration (acre-ft/acre)

$I_{eff}$ = Irrigation Efficiency (unitless)

Crop evapotranspiration (ET) is estimated using remote sensing data from Landsat satellites. The satellite data is entered into a model, which is used to estimate the ET rate and ET spatial distribution of an area in any given time period. When appropriately calibrated to land-based ET and/or climate stations and validated with crop surveys, the satellite-based model provides an estimate of crop ET (i.e. consumptive use). For the 2019/20 water year, crop evapotranspiration was estimated using METRIC.

Irrigation efficiency ($I_{eff}$) is estimated for any given area based on the irrigation method for that area (e.g. drip irrigation, flood irrigation, micro sprinkler, etc.). Irrigation methods are correlated with crop types based on either CDWR land use maps or field surveys. The following irrigation efficiencies will be applied to the different irrigation methods based on California Energy Commission (2006):

- Border Strip Irrigation – 77.5 percent
- Micro Sprinkler – 87.5 percent
- Surface Drip Irrigation – 87.5 percent
- Furrow Irrigation – 67.5 percent

Agricultural groundwater extraction is estimated as the total applied water demand ($W_d$) minus surface water deliveries and effective precipitation. Effective precipitation is the portion of precipitation that becomes evapotranspiration.

Estimated Tule Subbasin 2019/20 agricultural groundwater production for each of the six GSAs is summarized in Table 7. Total agricultural groundwater production for the Tule Subbasin in 2019/20 was approximately 710,500 acre-ft.

**Table 7**
**Tule Subbasin Groundwater Extraction for Water Year 2019/20**

| | Agricultural Pumping | Municipal Pumping | Pumping for Export | Total |
|---|---|---|---|---|
| Agricultural MA | 223,000 | 0 | 14,100 | 237,100 |
| Municipal MA | 0 | 890 | 0 | 890 |
| Tulare County MOU MA | 3,000 | 0 | 0 | 3,000 |
| **LTRID GSA** | 226,000 | 890 | 14,100 | 240,990 |
| Greater Tule MA | 173,000 | 0 | 0 | 173,000 |
| Porterville Community MA | 0 | 11,040 | 0 | 11,040 |
| Ducor Community MA | 0 | 200 | 0 | 200 |
| Terra Bella Community MA | 0 | 0 | 0 | 0 |
| Kern-Tulare WD MA | 10,000 | 0 | 0 | 10,000 |
| **ETGSA** | 183,000 | 11,240 | 0 | 194,240 |
| DEID MA | 39,000 | 0 | 0 | 39,000 |
| Western MA | 16,000 | 0 | 0 | 16,000 |
| Richgrove CSD MA | 0 | 870 | 0 | 870 |
| Earlimart PUD MA | 0 | 2,930 | 0 | 2,930 |
| **DEID GSA Total** | 55,000 | 3,800 | 0 | 58,800 |
| Pixley ID MA | 157,000 | 0 | 0 | 157,000 |
| Pixley PUD MA | 0 | 580 | 0 | 580 |
| Teviston CSD MA | 0 | 220 | 0 | 220 |
| **Pixley GSA** | 157,000 | 800 | 0 | 157,800 |
| North MA | 9,500 | 0 | 13,960 | 23,460 |
| Southeast MA | 58,000 | 100 | 0 | 58,100 |
| **TCWA GSA** | 67,500 | 100 | 13,960 | 81,560 |
| **Alpaugh GSA** | 22,000 | 250 | 0 | 22,250 |
| **Totals** | **710,500** | **17,080** | **28,060** | **755,640** |

Note: All values are in acre-ft.
MA = Management Area.

## 3.2 Municipal Groundwater Pumping

Groundwater pumping for municipal supply is conducted by the City of Porterville and small municipalities for the local communities in the Tule Subbasin. The City of Porterville groundwater pumping is metered and reported by the city. Municipal groundwater pumping by the other small communities within the Tule Subbasin is estimated based on population density and per capita water use as reported in Urban Water Master Plans. Total estimated municipal pumping in the Tule Subbasin for the 2019/20 water year was approximately 17,080 acre-ft (see Table 7).

It is noted that there are some households in the rural portions of the Tule Subbasin that rely on private wells to meet their domestic water supply needs. However, given the low population density of these areas, the volume of pumping from private domestic wells is considered negligible compared to the other pumping sources.

## 3.3 Groundwater Pumping for Export Out of the Tule Subbasin

Some of the groundwater pumping that occurs on the west side of the Tule Subbasin is exported out of the subbasin for use elsewhere. Angiola Water District and the Boswell/Creighton Ranch have historically exported pumped groundwater out of the Tule Subbasin. Total groundwater exports out of the Tule Subbasin for the 2019/20 water year was 28,060 acre-ft (see Table 7). This water is accounted for separately because the water is not applied within the subbasin and there is no associated return flow.

## 3.4 Total Groundwater Extraction

Total groundwater extraction from the Tule Subbasin for water year 2019/20 was 755,640 acre-ft (see Table 7). The distribution of groundwater production across the subbasin is shown on Figure 10.

# 4. Surface Water Use for Water Year 2019/2020 §356.2 (b)(3)

## 4.1 Diverted Streamflow

Surface water inflow to the Tule Subbasin occurs primarily via three native streams: Tule River, Deer Creek, and the White River. Flow in the Tule River is controlled through releases from Lake Success. Stream flow entering Lake Success is measured and distributed to various water rights holders as allocated at Success Dam in accordance with the Tule River Water Diversion Schedule and Storage Agreement.[3] Releases of water from Lake Success and downstream diversions are documented in Tule River Association (TRA) annual reports. For water year 2019/2020, 60,300 acre-ft of water was released to the Tule River from Success Reservoir. Tule River diversions occur in the ETGSA and LTRID GSA (see Table 8). In water year 2019/20, no water flowed out of the Tule Subbasin via the Tule River. Channel infiltration and ET losses account for the balance of Tule River water that was not diverted or did not flow out of the subbasin. No surface water diversions from Deer Creek or White River were reported in 2019/20. Total stream diversions in the Tule Subbasin for 2019/20 totaled 40,600 acre-ft as summarized in Table 8.

[3] TRA, 1966. Tule River Diversion Schedule and Storage Agreement. Dated February 1, 1966; revised June 16, 1966.

**Table 8**
**Tule Subbasin Surface Water Supplies for Water Year 2019/20**

| | Stream Diversions[1] | Imported Water | Recycled Water | Oilfield Produced Water | Precipitation | Total |
|---|---|---|---|---|---|---|
| Agricultural MA | 25,000 | 71,200 | 0 | 0 | 55,300 | 151,500 |
| Municipal MA | 0 | 0 | 0 | 0 | 600 | 600 |
| Tulare County MOU MA | 0 | 0 | 0 | 0 | 600 | 600 |
| **LTRID GSA** | 25,000 | 71,200 | 0 | 0 | 56,500 | 152,700 |
| Greater Tule MA | 15,600 | 57,900 | 0 | 0 | 93,400 | 166,900 |
| Porterville Community MA | 0 | 0 | 3,000 | 0 | 11,900 | 14,900 |
| Ducor Community MA | 0 | 0 | 0 | 0 | 200 | 200 |
| Terra Bella Community MA | 0 | 1,040 | 0 | 0 | 900 | 1,940 |
| Kern-Tulare WD MA | 0 | 9,700 | 0 | 900 | 6,100 | 16,700 |
| **ETGSA** | 15,600 | 68,640 | 3,000 | 900 | 112,500 | 200,640 |
| DEID MA | 0 | 137,900 | 0 | 0 | 30,000 | 167,900 |
| Western MA | 0 | 0 | 0 | 0 | 3,100 | 3,100 |
| Richgrove CSD MA | 0 | 0 | 0 | 0 | 200 | 200 |
| Earlimart PUD MA | 0 | 0 | 0 | 0 | 500 | 500 |
| **DEID GSA Total** | 0 | 137,900 | 0 | 0 | 33,800 | 171,700 |
| Pixley ID MA | 0 | 31,600 | 0 | 0 | 32,200 | 63,800 |
| Pixley PUD MA | 0 | 0 | 0 | 0 | 1,100 | 1,100 |
| Teviston CSD MA | 0 | 0 | 0 | 0 | 700 | 700 |
| **Pixley GSA** | 0 | 31,600 | 0 | 0 | 34,000 | 65,600 |
| North MA | 0 | 2,400 | 0 | 0 | 5,100 | 7,500 |
| Southeast MA | 0 | 0 | 0 | 0 | 20,700 | 20,700 |
| **TCWA GSA** | 0 | 2,400 | 0 | 0 | 25,800 | 28,200 |
| **Alpaugh GSA** | 0 | 0 | 0 | 0 | 6,000 | 6,000 |
| **Totals** | **40,600** | **311,740** | **3,000** | **900** | **268,600** | **624,840** |

Note: All values are in acre-ft.
[1]Provisional data subject to revision.

## 4.2 Imported Water Deliveries

Most of the water imported into the Tule Subbasin is from the Central Valley Project (CVP) and delivered via the Friant-Kern Canal. Angiola Water District also imports water from other various sources including the King's River and State Water Project. The water is delivered to farmers and recharge basins via the Tule River and Deer Creek channels, unlined canals, and pipeline distribution systems of Porterville Irrigation District, LTRID, Pixley Irrigation District, Terra Bella Irrigation District, Teapot Dome Water District, DEID, and Saucelito Irrigation District.

Imported water is delivered to eleven water agencies within the Tule Subbasin from the Friant-Kern Canal. Imported water delivery data for 2019/20 was obtained from United States Bureau of Reclamation (USBR) Central Valley Operation Annual Reports. Imported water deliveries to TCWA GSA were obtained from the Angiola Water District. Imported water deliveries for 2019/20 totaled 311,740 acre-ft as summarized in Table 8.

## 4.3 Recycled Water Deliveries

A portion of the treated effluent from the City of Porterville's wastewater treatment plant is delivered to farmers for agricultural irrigation. Recycled water deliveries for agricultural irrigation are reported by the City. Recycled water deliveries for 2019/20 totaled 3,000 acre-ft, as summarized in Table 8.

## 4.4 Oilfield Produced Water

The Kern-Tulare Water District receives water generated as a byproduct of oil production but suitable for agricultural irrigation. The total volume of oilfield produced water received for agricultural irrigation in the portion of the Kern-Tulare Water District that is within the Tule Subbasin in 2019/20 was 900 acre-ft.

## 4.5 Precipitation

The volume of water entering the Tule Subbasin as precipitation was estimated based on the long-term average annual isohyetal map and the 2019/20 precipitation data reported for the Porterville precipitation station. An isohyetal map showing the estimated 2019/20 precipitation distribution across the subbasin is shown on Figure 11. Total precipitation at the Porterville precipitation station for water year 2019/20 was 8.1 inches, which is slightly less than average precipitation for the area (see Figure 12). It was assumed that the relative precipitation distribution for each year was the same as that shown on the long-term average annual isohyetal map. The magnitude of annual precipitation within each isohyetal zone was varied from year to year based on the ratio of annual precipitation at the Porterville Station (see Figure 12) to annual average precipitation at the Porterville isohyetal zone multiplied by the isohyetal zone average annual precipitation. The total volume of precipitation available for crops in 2019/20 was estimated to be 268,600 acre-ft.

## 4.6 Total Surface Water Use

Total surface water available for use within the Tule Subbasin for water year 2019/20 was 624,840 acre-ft (see Table 8).

# 5. Total Water Use for Water Year 2019/2020 §356.2 (b)(4)

Total water use in the Tule Subbasin for water year 2019/20, including both groundwater extractions and surface water supplies, was 1,380,480 acre-ft (see Table 9).

**Table 9**
**Tule Subbasin Total Water Use for Water Year 2019/20**

| | Groundwater Extraction | Surface Water Supplies | Total |
|---|---|---|---|
| Agricultural MA | 237,100 | 151,500 | 388,600 |
| Municipal MA | 890 | 600 | 1,490 |
| Tulare County MOU MA | 3,000 | 600 | 3,600 |
| **LTRID GSA** | 240,990 | 152,700 | 393,690 |
| Greater Tule MA | 173,000 | 166,900 | 339,900 |
| Porterville Community MA | 11,040 | 14,900 | 25,940 |
| Ducor Community MA | 200 | 200 | 400 |
| Terra Bella Community MA | 0 | 1,940 | 1,940 |
| Kern-Tulare WD MA | 10,000 | 16,700 | 26,700 |
| **ETGSA** | 194,240 | 200,640 | 394,880 |
| DEID MA | 39,000 | 167,900 | 206,900 |
| Western MA | 16,000 | 3,100 | 19,100 |
| Richgrove CSD MA | 870 | 200 | 1,070 |
| Earlimart PUD MA | 2,930 | 500 | 3,430 |
| **DEID GSA Total** | 58,800 | 171,700 | 230,500 |
| Pixley ID MA | 157,000 | 63,800 | 220,800 |
| Pixley PUD MA | 580 | 1,100 | 1,680 |
| Teviston CSD MA | 220 | 700 | 920 |
| **Pixley GSA** | 157,800 | 65,600 | 223,400 |
| North MA | 23,460 | 7,500 | 30,960 |
| Southeast MA | 58,100 | 20,700 | 78,800 |
| **TCWA GSA** | 81,560 | 28,200 | 109,760 |
| **Alpaugh GSA** | 22,250 | 6,000 | 28,250 |
| **Totals** | **755,640** | **624,840** | **1,380,480** |

Note: All values are in acre-ft.

# 6. Change in Groundwater in Storage §354.16 (b)

For this annual report, the change in groundwater in storage for the Tule Subbasin was estimated for the time period between fall 2019 and fall 2020. The change in storage was estimated based on the following equation:

$$V_w = S_y A \, \Delta h$$

Where:

| | | |
|---|---|---|
| $V_w$ | = | the volume of groundwater storage change (acre-ft). |
| $S_y$ | = | specific yield of aquifer sediments (unitless). |
| $A$ | = | the surface area of the aquifer within the Tule Subbasin/GSA (acres). |
| $\Delta h$ | = | the change in hydraulic head (i.e. groundwater level) (feet). |

The change in storage estimate is specific to the shallow aquifer as the groundwater level in the deep aquifer does not drop below the top of the aquifer. The calculations were made using a Geographic Information System (GIS) map of the Tule Subbasin discretized into 600-foot by 600-foot grids to allow for spatial representation of aquifer specific yield and groundwater level change.

The areal and vertical distribution of specific yield for the shallow aquifer is based on the values obtained from the calibrated groundwater flow model of the Tule Subbasin.[4] For the areal distribution of change in hydraulic head within the Tule Subbasin, groundwater contours for fall 2019 were digitized and overlain on the grid map of the Tule Subbasin in GIS. Groundwater levels were then be assigned to each grid. A contour map with groundwater elevation contours from fall 2020 were also digitized and overlain on the grid map. Change in hydraulic head (groundwater level) at each grid was calculated as the difference in groundwater level between the two years. The change in groundwater storage was estimated for each grid cell by multiplying the change in groundwater level by the specific yield and then by the area of the cell.

Results of the change in groundwater in storage analysis showed that between fall 2019 and fall 2020, groundwater in storage decreased by approximately 1,331,000 acre-ft (see Figure 13). It is noted that the change in groundwater in storage in some GSAs (e.g. DEID GSA) show a decrease, based on analysis of groundwater levels, despite the fact that water supplies exceeded demand in those areas and the data suggest a net addition of water to the groundwater system. This apparent discrepancy is noted and will be investigated further as more data become available.

[4] Thomas Harder & Co., 2020. Groundwater Flow Model of the Tule Subbasin. Prepared for the Tule Subbasin MOU Group. January 2020.

Since 1986/87, the volume of groundwater in storage in the Tule Subbasin has decreased by approximately 3,800,000 acre-ft (see Figure 14). Recent dry conditions have resulted in more limited surface water supplies and higher groundwater pumping relative to previous years, which has resulted in the negative groundwater storage change in the 2019/20 water year.

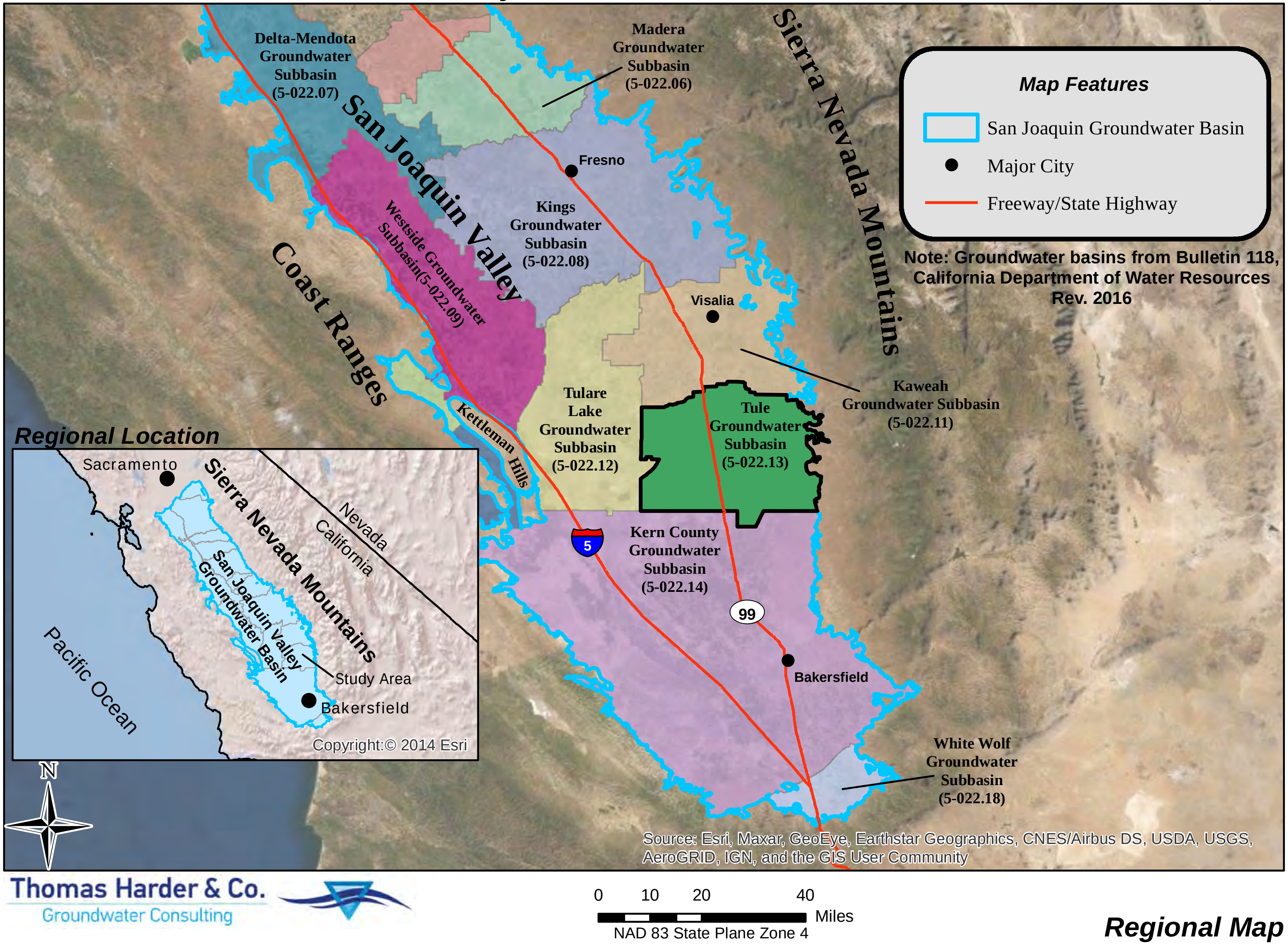
It is noted that the groundwater storage change indicated on Figures 13 and 14 was based, in part, on comparison of two different groundwater contour maps developed from different data sets. A more limited set of wells with groundwater elevation data was available for the Fall 2019 contour map relative to the Fall 2020 map. Further, many of the wells available for monitoring in 2019 were not available for monitoring in 2020. The magnitude of the estimate of storage change should be evaluated in the context of the uncertainty in these data sets. As consistent monitoring data are available year to year, it is anticipated that more representative storage change estimates will be available.

# Figures

**Tule Subbasin Technical Advisory Committee**

**2019/2020 Annual Report**

April 2021

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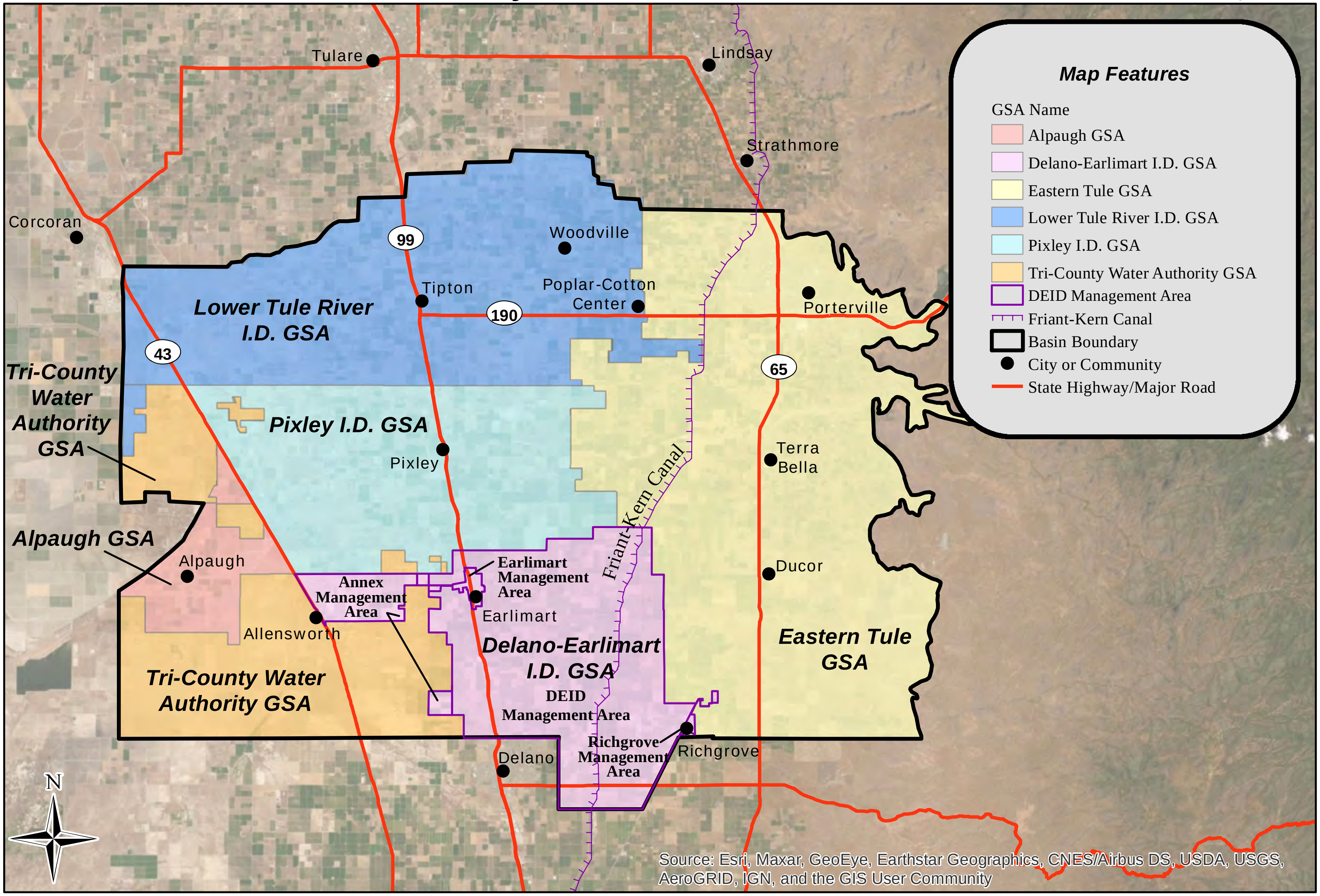
**Regional Map**

**Figure 1**

# Tule Subbasin Technical Advisory Committee

**2019/2020 Annual Report**
April 2021




0 2.5 5 10 Miles
NAD 83 State Plane Zone 4

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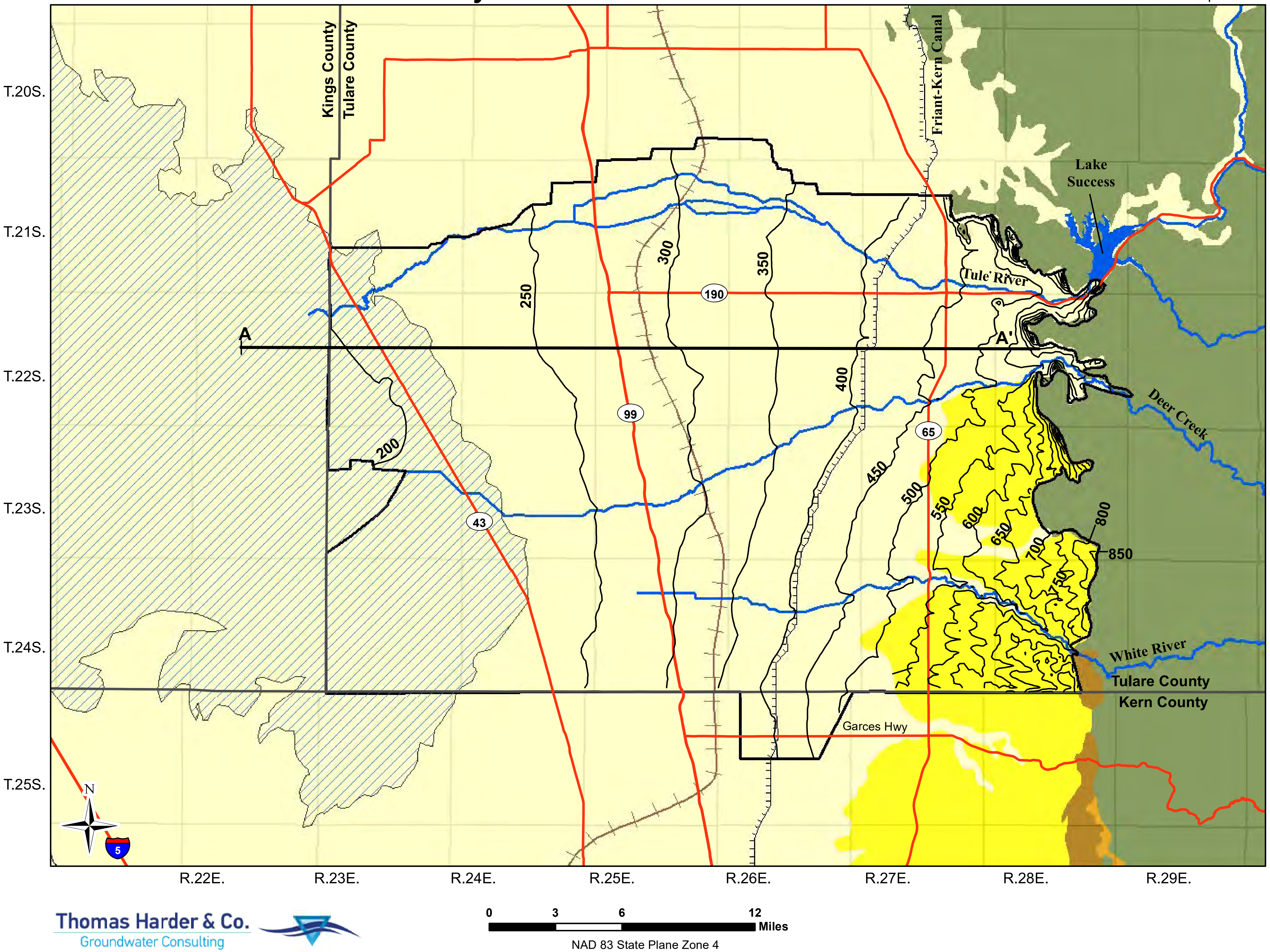
**GSA Boundaries**
**Figure 2**

# Tule Subbasin Technical Advisory Committee

April 2021

## 2019/2020 Annual Report




### Map Features

- Land Surface Elevation Contour (ft amsl)
- Cross Sections
- County Boundary
- Surficial Deposits
- Tertiary Loosely Consolidated Deposits
- Non-Marine Sedimentary Rocks
- Marine Sedimentary Rocks
- Crystalline Basement
- Approximate Eastern Extent of the Corcoran Clay
- Tulare Lake Surface Deposits
- Friant-Kern Canal
- Basin Boundary
- Major Hydrologic Feature
- State Highway/Major Road

Corcoran Clay from USGS Professional Paper 1766, http://water.usgs.gov/GIS/dsdl/pp1766_CorcoranClay.zip

Geologic units modified from USGS Open-File Report 2005-1305

Lake Deposits from California Geological Survey Geologic Atlas of California Map No. 002 1:250,000 scale, Compiled by A.R. Smith, 1964 and Geologic Atlas of California Map No. 005, 1:250,000 scale, Compiled by: R.A. Matthews and J.L. Burnett

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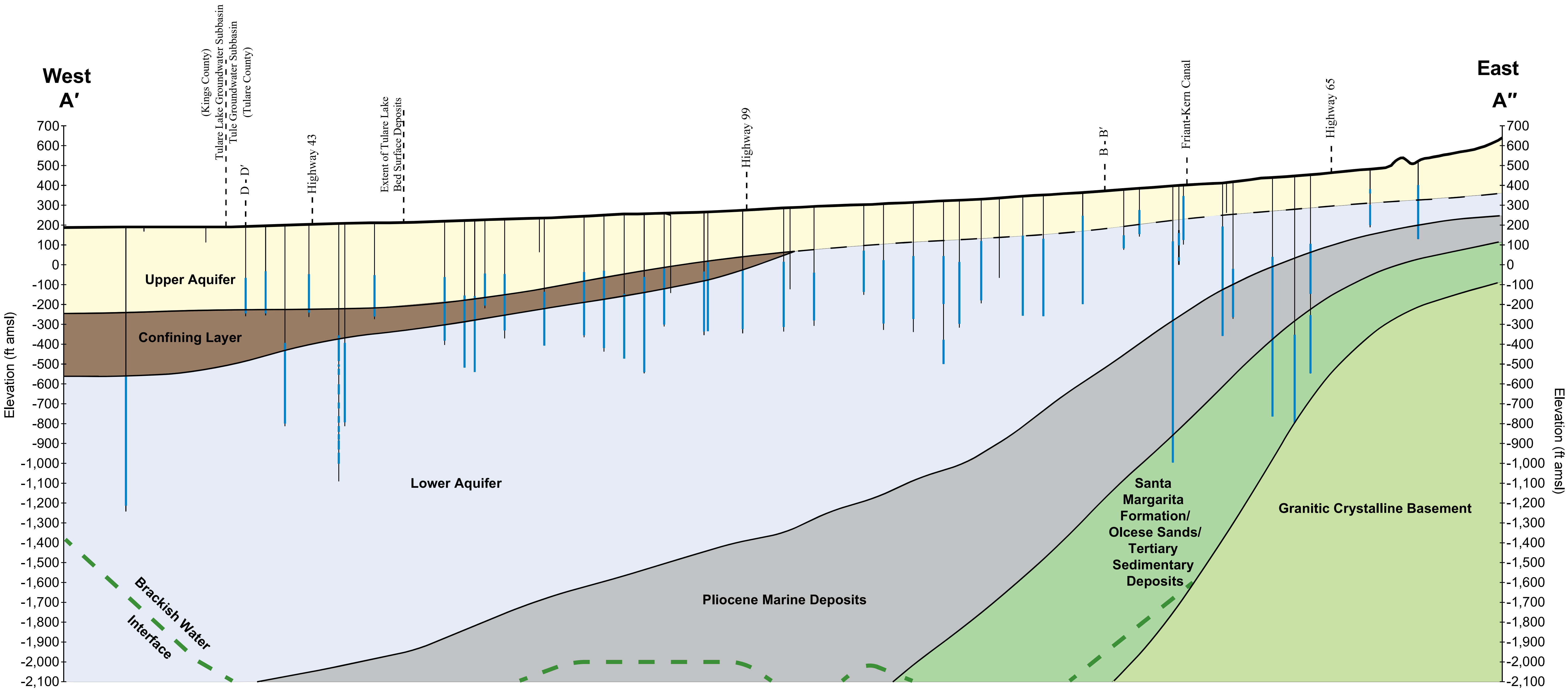
Groundwater Consulting

## Geology and Cross Section Locations

Figure 3




Vertical Scale
0
100
200
400
Feet

Horizontal Scale
0 1/2 1 2 Miles

***Notes:*** Lithologic data from Department of Water Resources Well Compeletion Reports.
Wells within one half mile from cross section line unless otherwise noted by " * ".
Corcoran Clay from USGS Professional Paper 1766,
http://water.usgs.gov/GIS/dsdl/pp1766_CorcoranClay.zip

Brackish Water Interface based on Planert and Williams, 1995 and Page, 1973 USGS Atlas HA-489

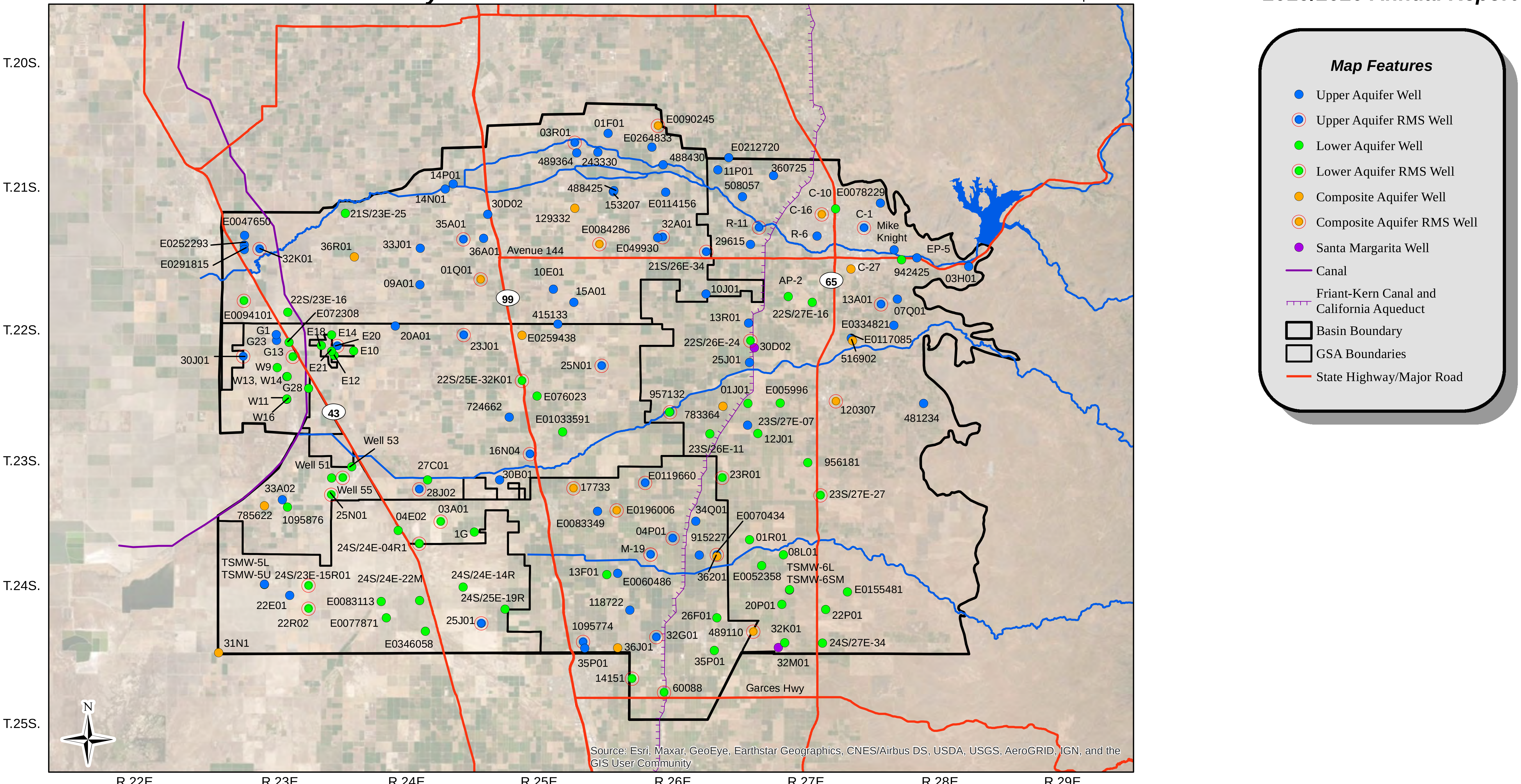
= Indicates well perforation interval

***Hydrogeologic Cross Section A'-A"***
***Tule Groundwater Subbasin***
**Figure 4**

## Tule Subbasin Technical Advisory Committee

April 2021



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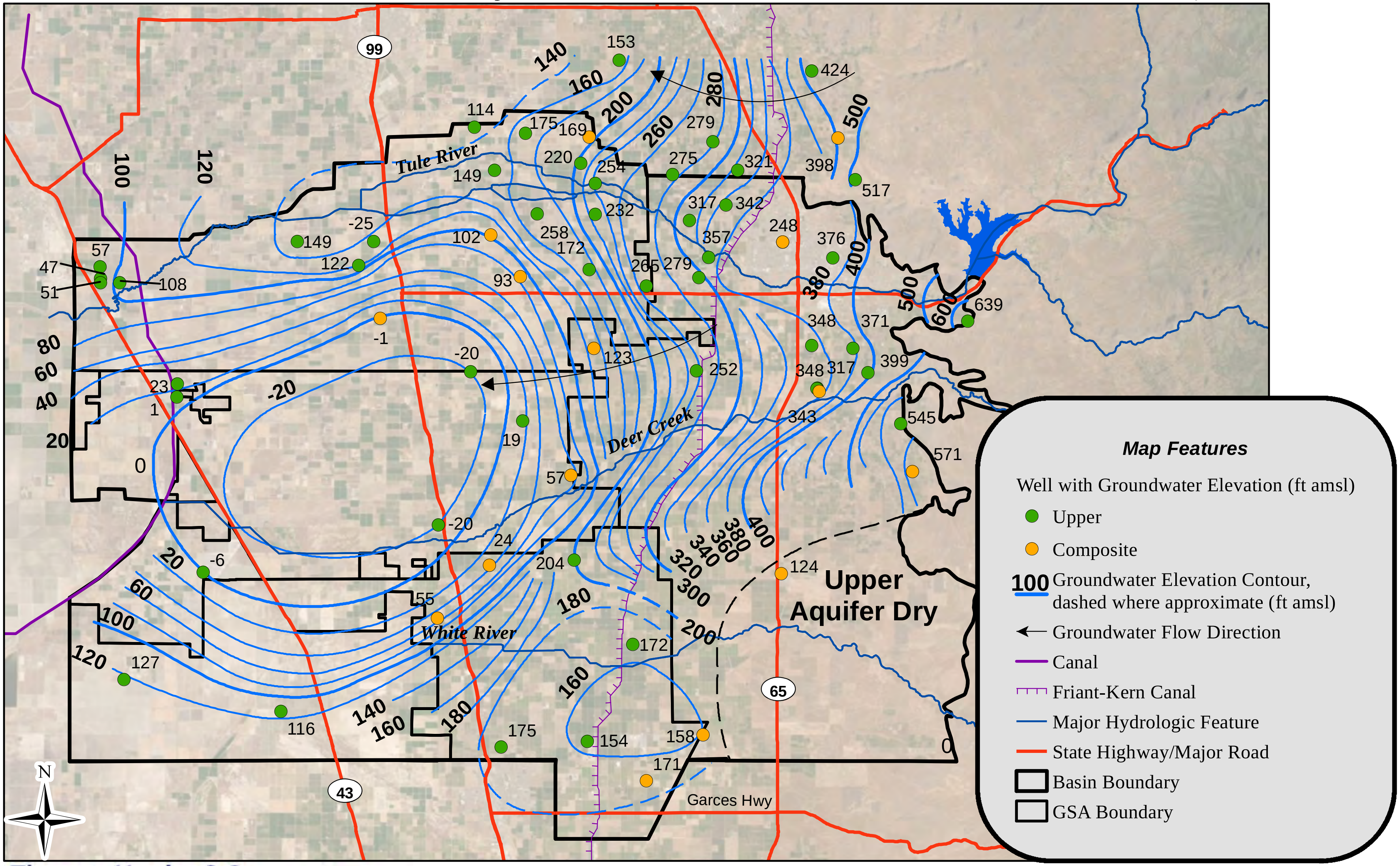
**Groundwater Level Monitoring Network**

**Figure 5**

## Tule Subbasin Technical Advisory Committee

**2019/2020 Annual Report**

April 2021

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0 2.5 5 10 Miles

NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

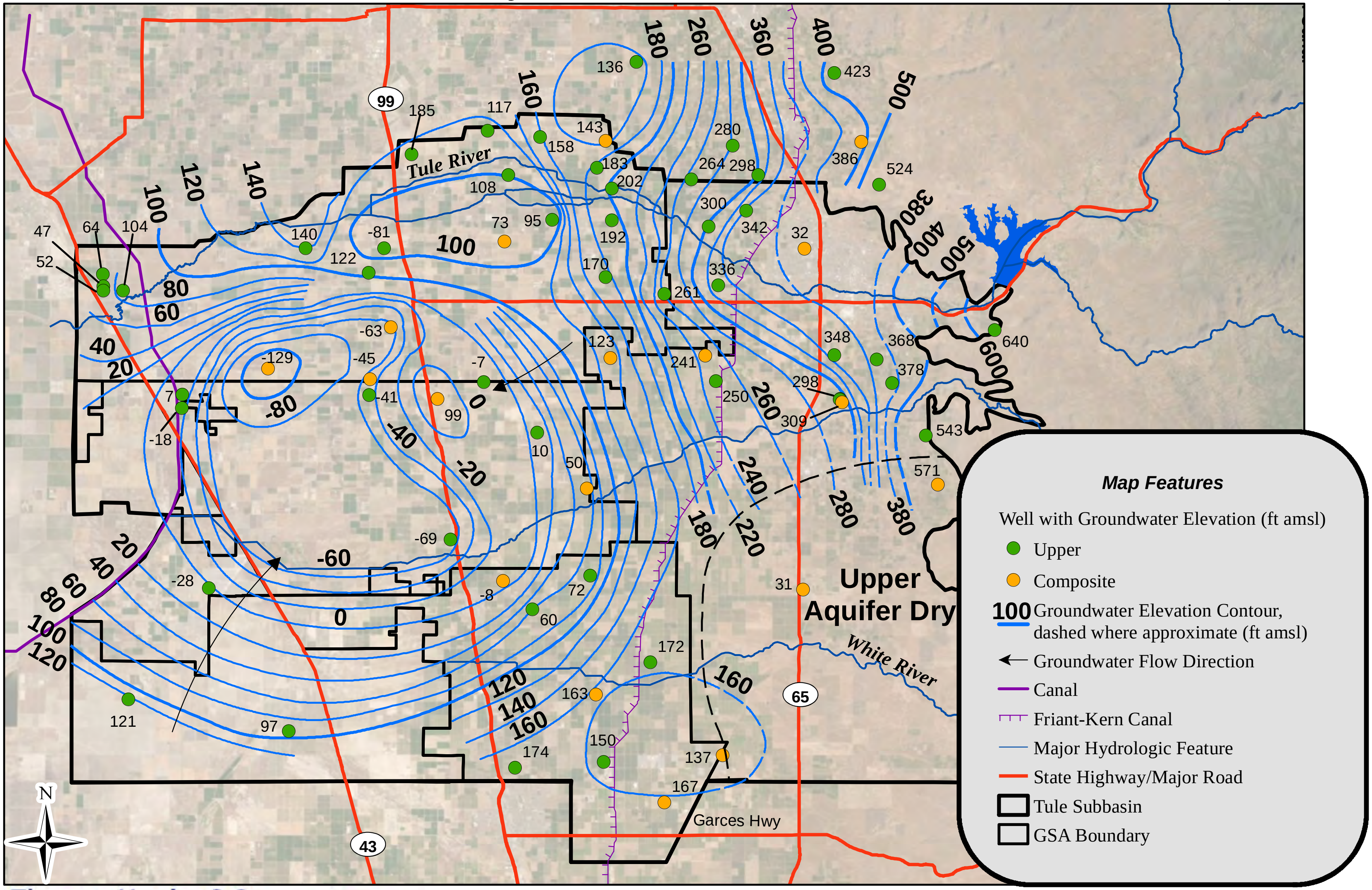
**Spring 2020 Upper Aquifer Groundwater Elevation Contours**

**Figure 6**

2019/2020 Annual Report

April 2021

## Tule Subbasin Technical Advisory Committee

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0 2.5 5 10 Miles

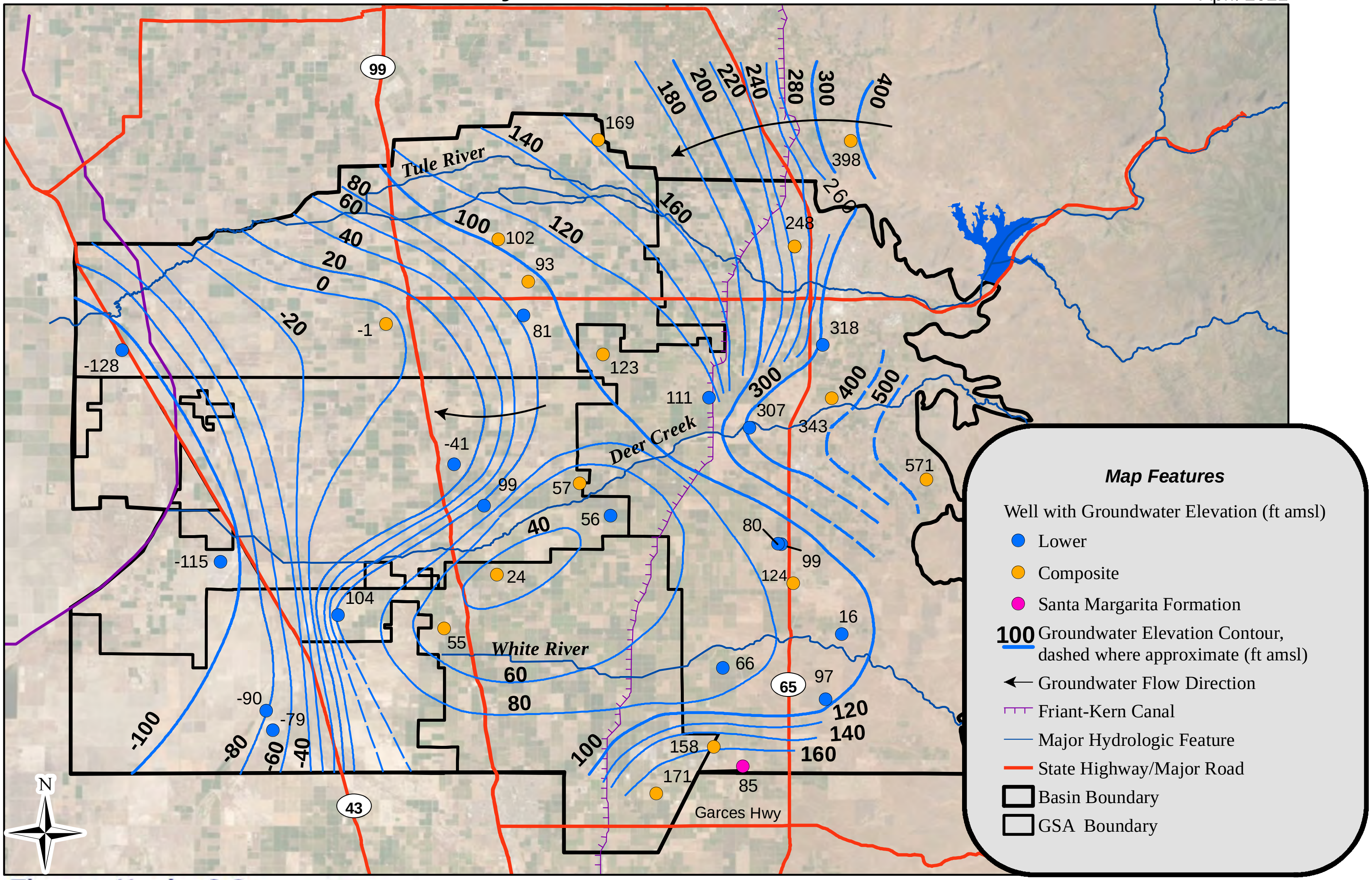
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

## Fall 2020 Upper Aquifer Groundwater Elevation Contours

Figure 7

## Tule Subbasin Technical Advisory Committee

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0 2.5 5 10 Miles

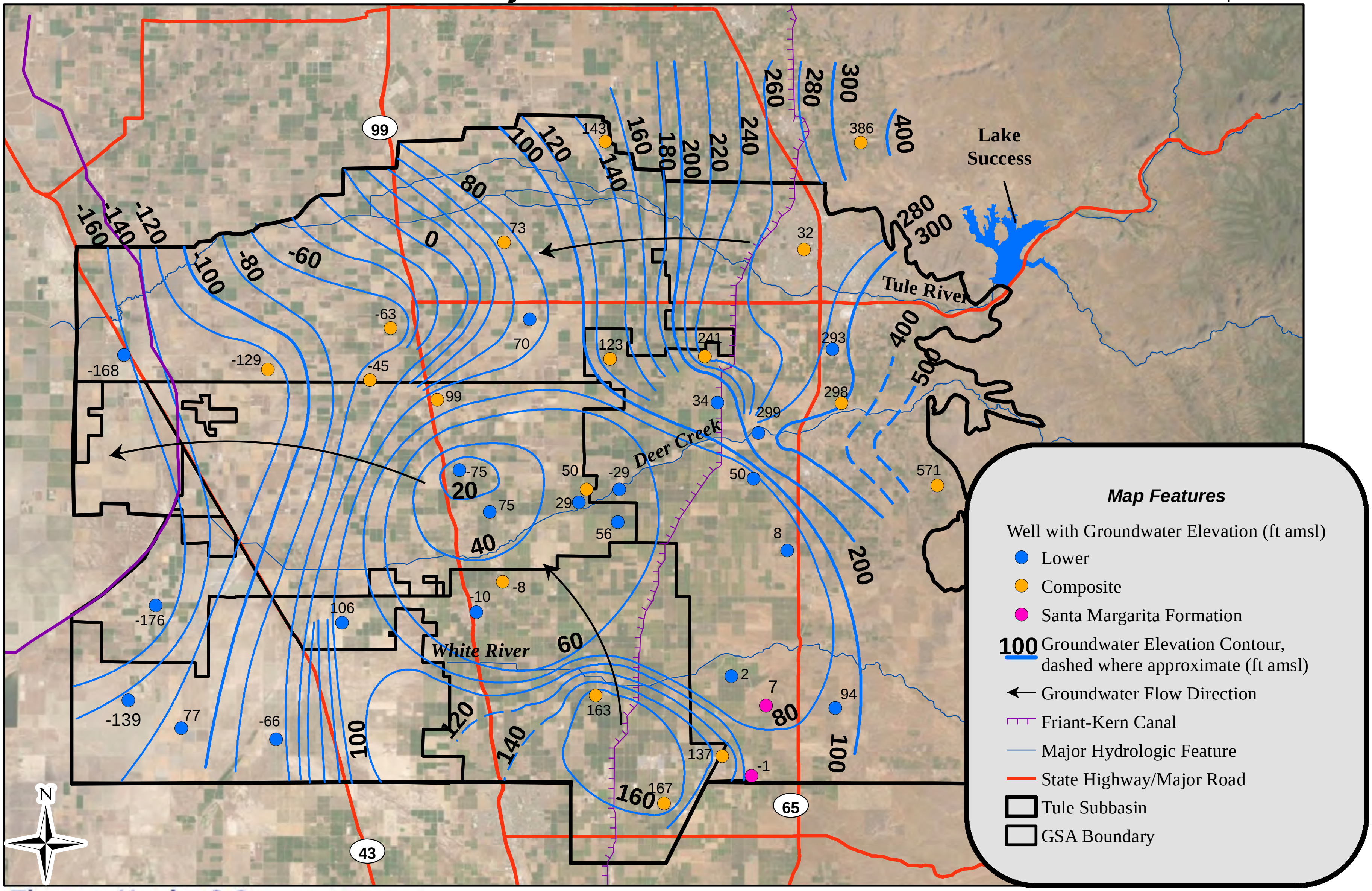
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Spring 2020 Lower Aquifer Groundwater Elevation Contours**

**Figure 8**

## Tule Subbasin Technical Advisory Committee

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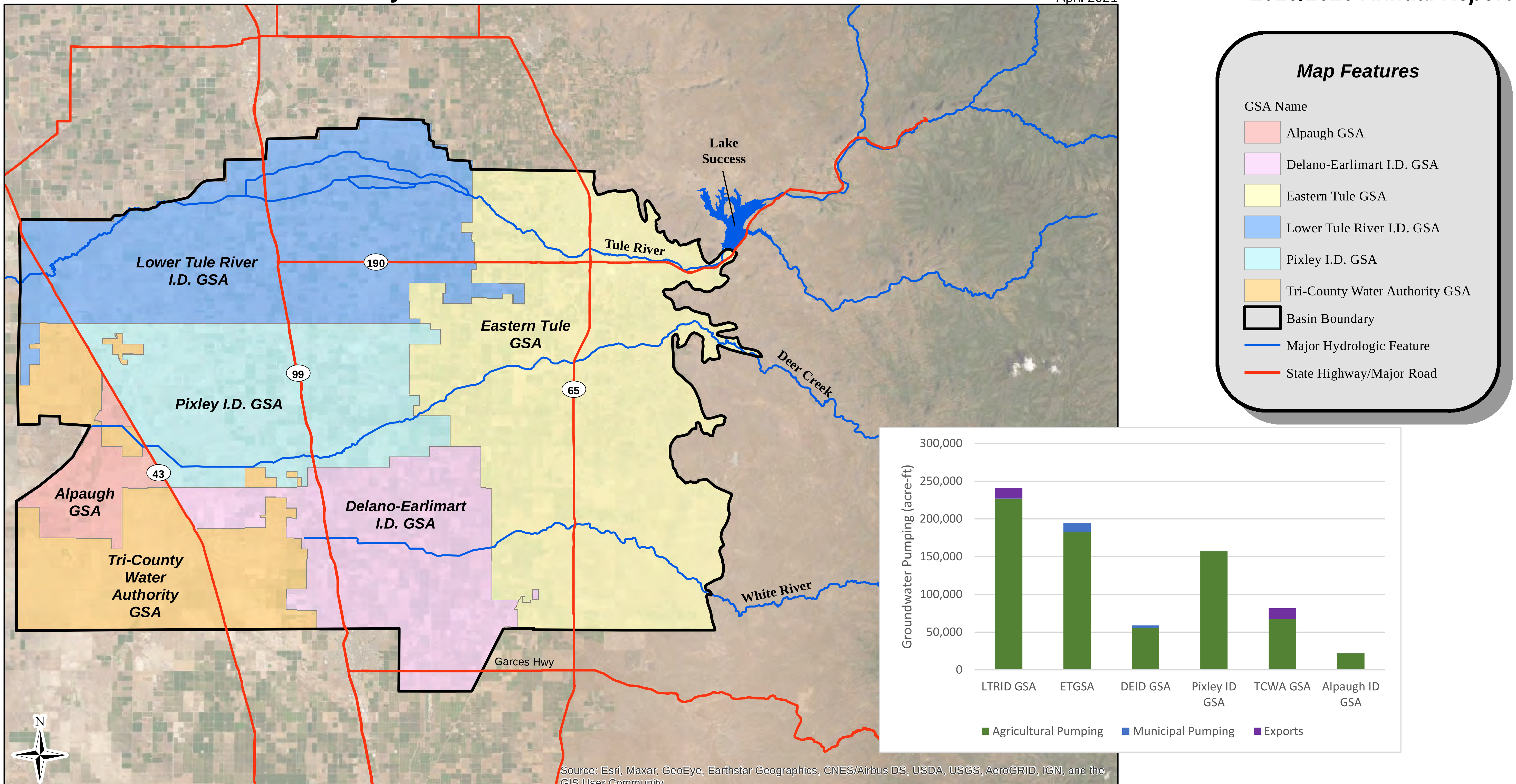
Note: All groundwater elevations are in feet above mean sea level.

## Fall 2020 Lower Aquifer Groundwater Elevation Contours

**Figure 9**

April 2021





NAD 83 State Plane Zone 4

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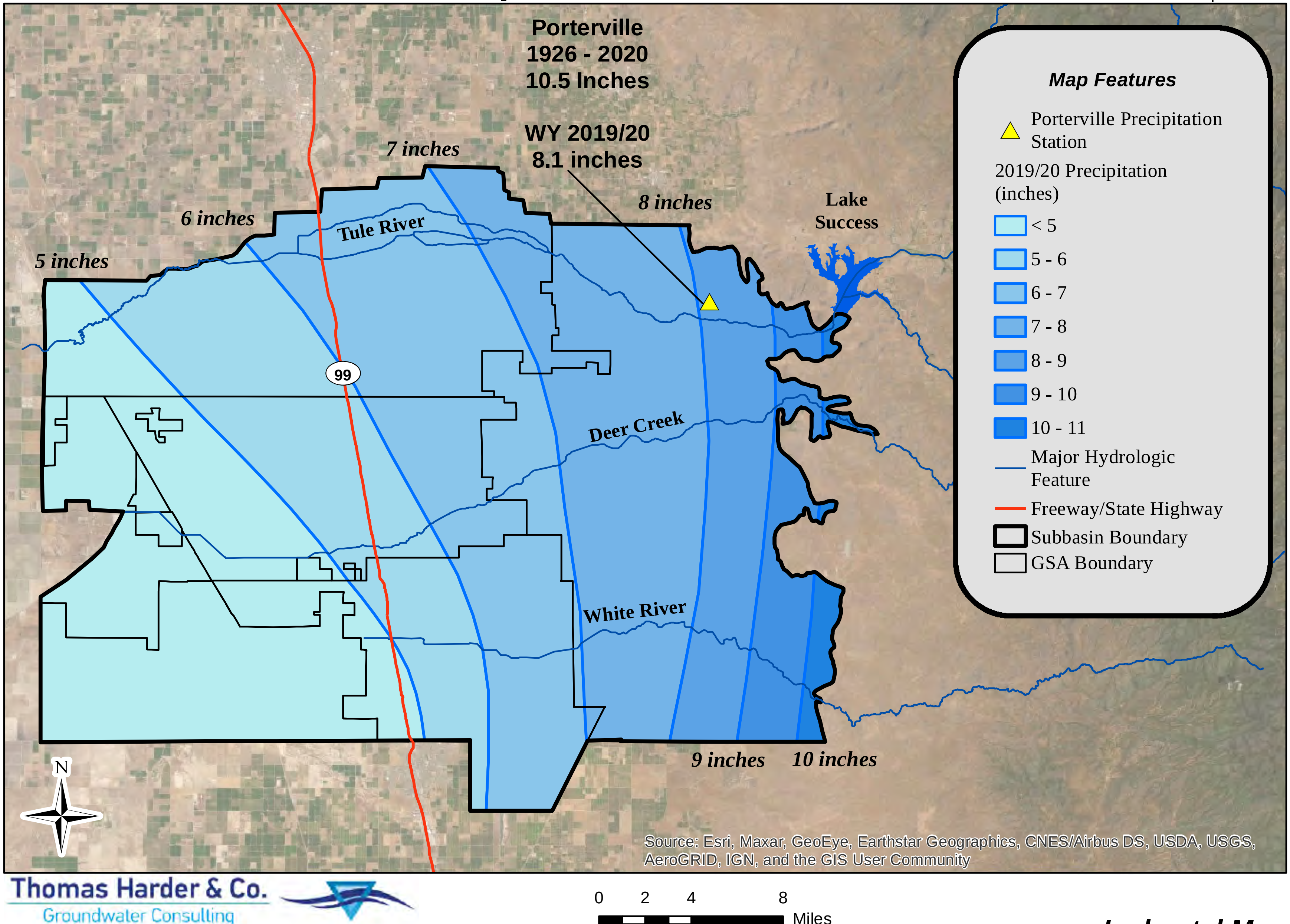
**Groundwater Pumping**

**Figure 10**

## Tule Subbasin Technical Advisory Committee



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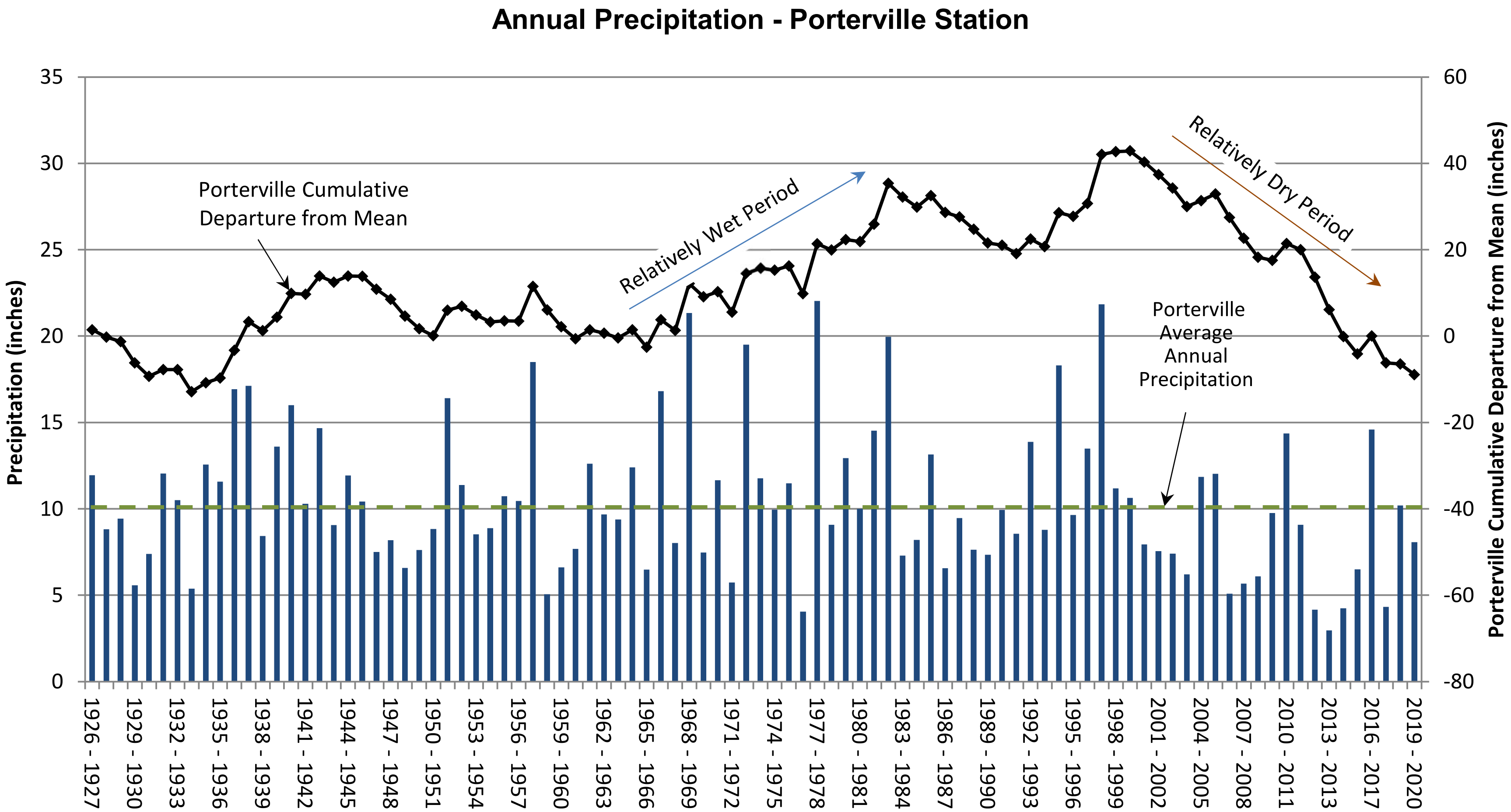
Notes: See Figure 12 for Porterville Station Precipitation Information.

**Isohyetal Map**
**Figure 11**

**Figure 12**




***Notes:***

Data in water years (October 1 to September 30).
Data from Western Regional Climate Center (1926-2001), California Irrigation Management Information System (2002-2020).

## Tule Subbasin Technical Advisory Committee

**2019/2020 Annual Report**
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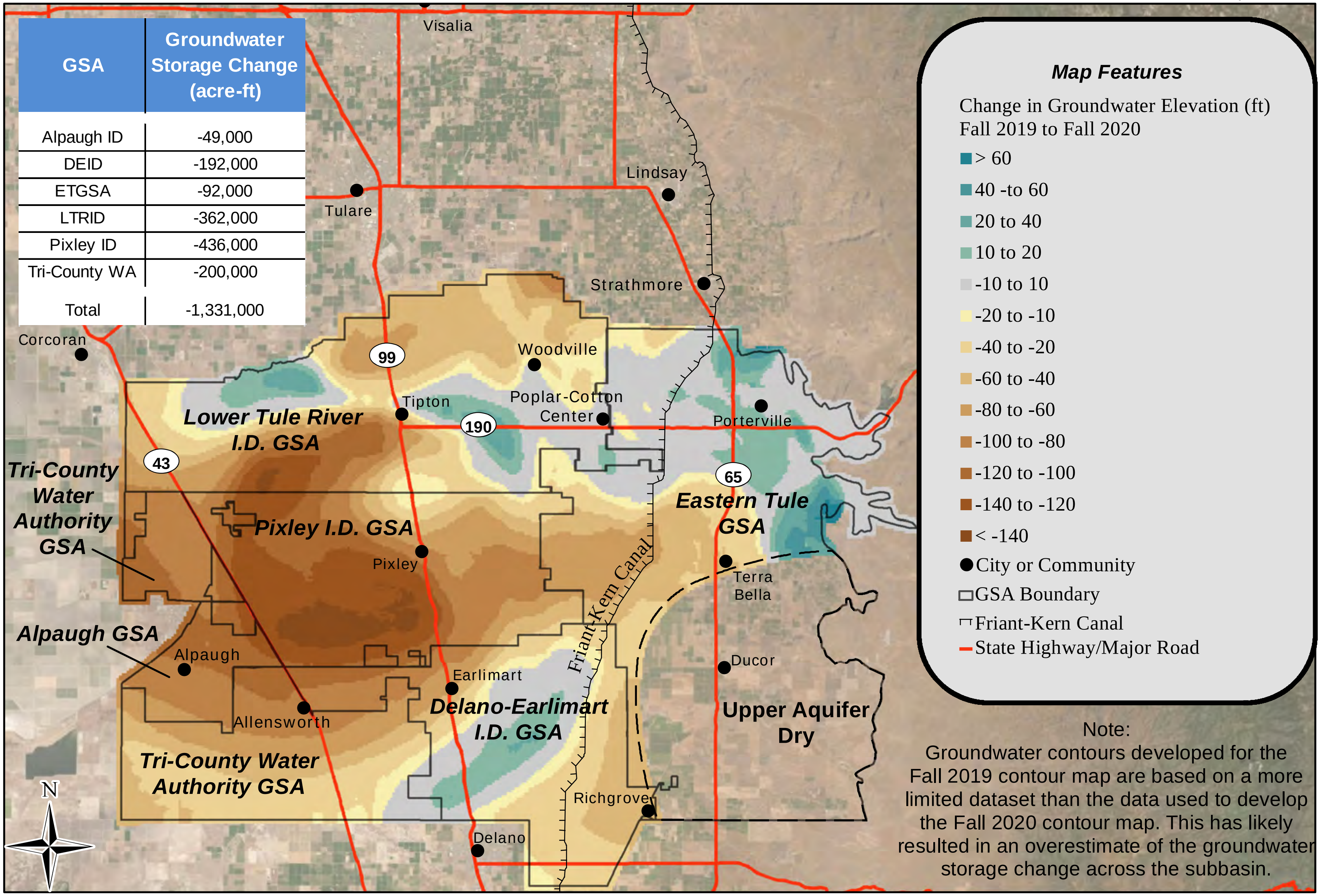
| GSA | Groundwater Storage Change (acre-ft) |
|---|---|
| Alpaugh ID | -49,000 |
| DEID | -192,000 |
| ETGSA | -92,000 |
| LTRID | -362,000 |
| Pixley ID | -436,000 |
| Tri-County WA | -200,000 |
| Total | -1,331,000 |

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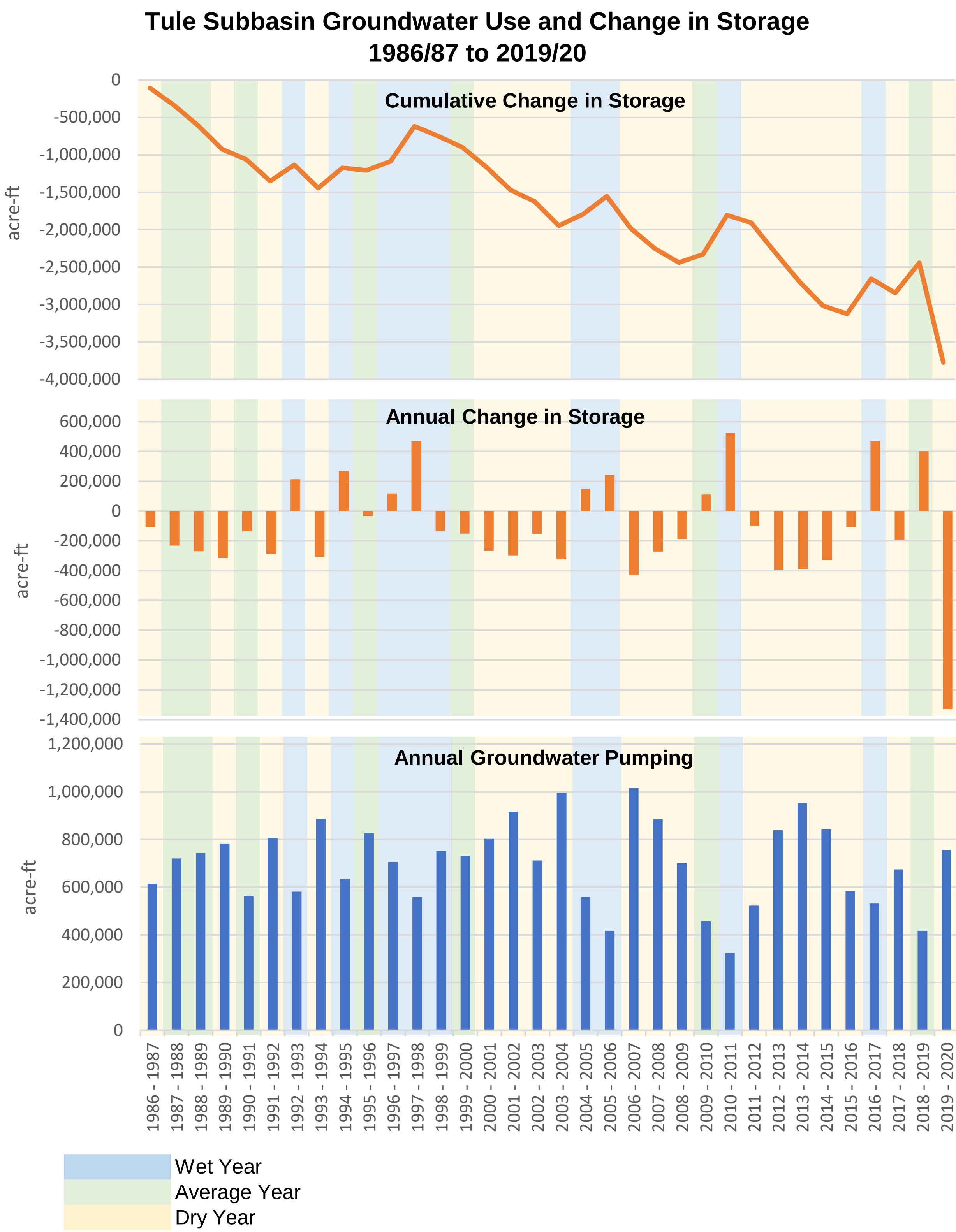
**Change in Groundwater Elevation Fall 2019 to Fall 2020**
**Figure 13**

Figure 14


Tule Subbasin Groundwater Use and Change in Storage
1986/87 to 2019/20
Cumulative Change in Storage
Annual Change in Storage
Annual Groundwater Pumping
acre-ft
Wet Year
Average Year
Dry Year

# Appendix A

# Lower Tule River Irrigation District GSA 2019/20 Annual Data

## Lower Tule River Irrigation District GSA
## Groundwater Extraction for Water Year 2019/20

| GSA | Management Area | Agricultural Pumping | Municipal Pumping | Pumping for Export | Total |
|---|---|---|---|---|---|
| LTRID GSA | Agricultural | 223,000 | 0 | 14,100 | 237,100 |
| | Municipal | 0 | 890 | 0 | 890 |
| | Tulare County MOU | 3,000 | 0 | 0 | 3,000 |
| | ***Total*** | ***226,000*** | ***890*** | ***14,100*** | ***240,990*** |

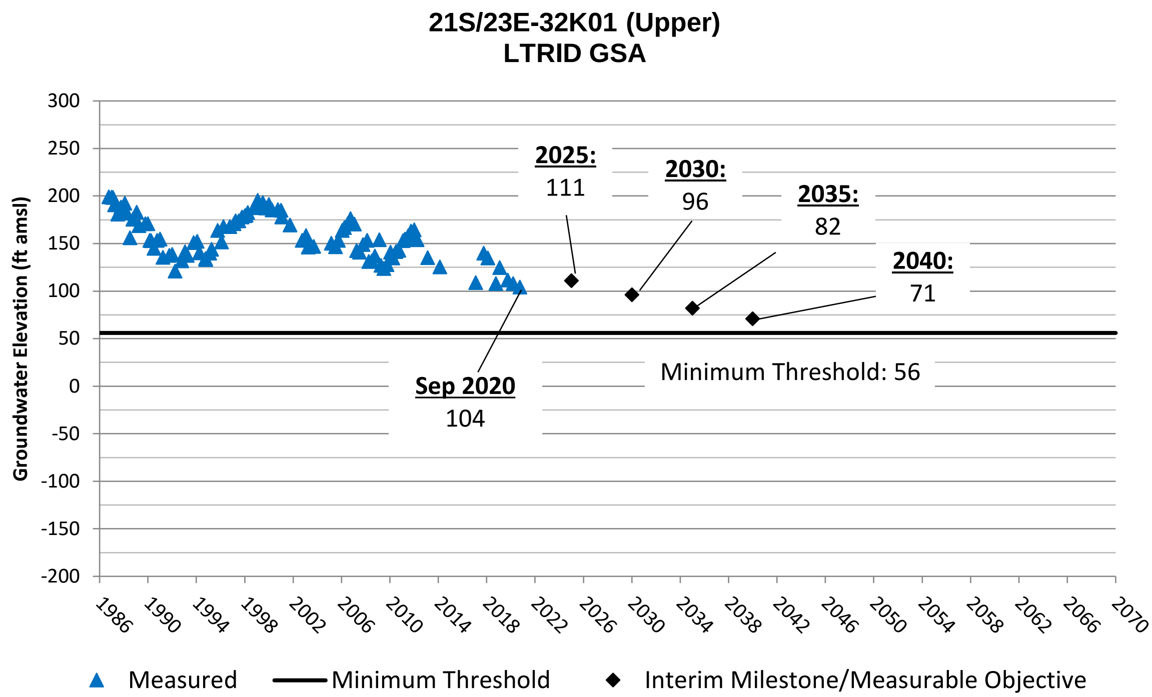
## Lower Tule River Irrigation District GSA
## Surface Water Supplies for Water Year 2019/20

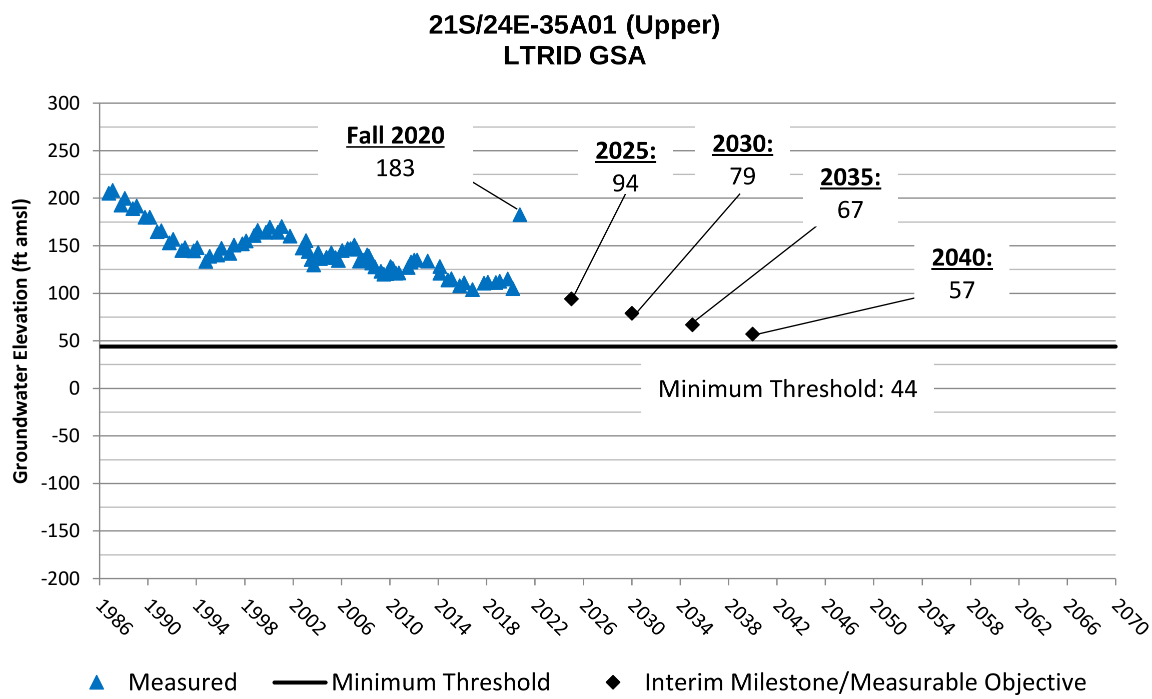
| GSA | Management Area | Stream Diversions | Imported Water | Recycled Water | Oilfield Produced Water | Precipitation | Total |
|---|---|---|---|---|---|---|---|
| LTRID GSA | Agricultural | 25,000 | 71,200 | 0 | 0 | 55,300 | 151,500 |
| | Municipal | 0 | 0 | 0 | 0 | 600 | 600 |
| | Tulare County MOU | 0 | 0 | 0 | 0 | 600 | 600 |
| | ***Total*** | ***25,000*** | ***71,200*** | ***0*** | ***0*** | ***56,500*** | ***152,700*** |

## Lower Tule River Irrigation District GSA
## Tule Subbasin Total Water Use for Water Year 2019/20

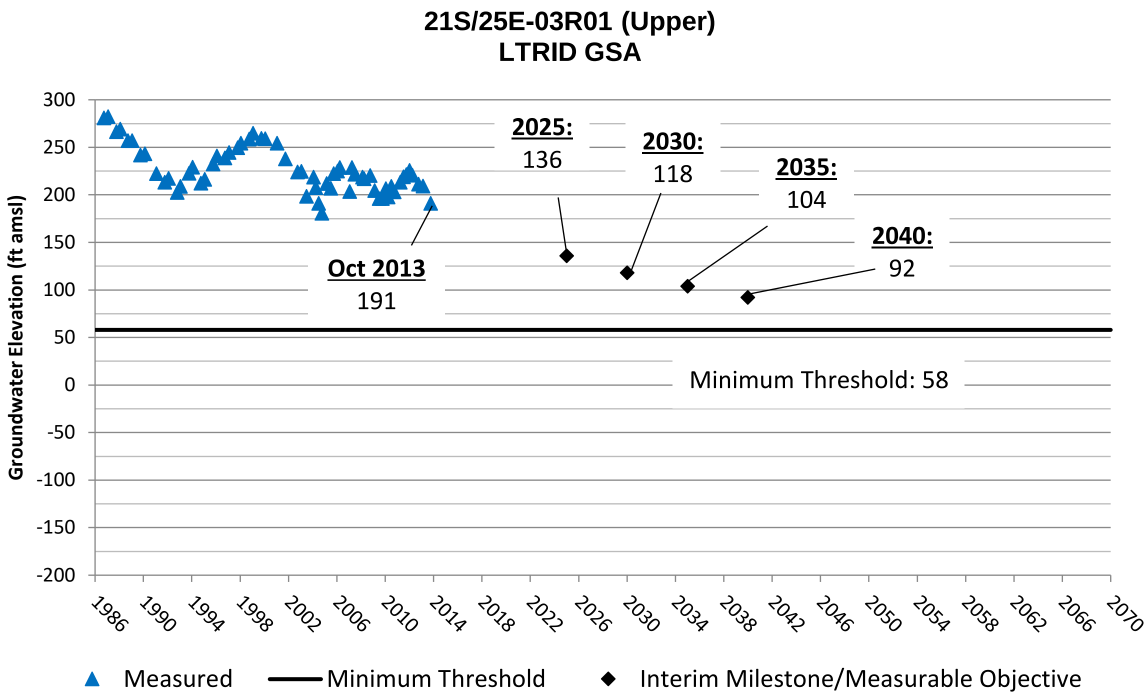
| GSA | Management Area | Groundwater Extraction | Surface Water Supplies | Total |
|---|---|---|---|---|
| **LTRID GSA** | Agricultural | 237,100 | 151,500 | 388,600 |
| | Municipal | 890 | 600 | 1,490 |
| | Tulare County MOU | 3,000 | 600 | 3,600 |
| | ***Total*** | ***240,990*** | ***152,700*** | ***393,690*** |

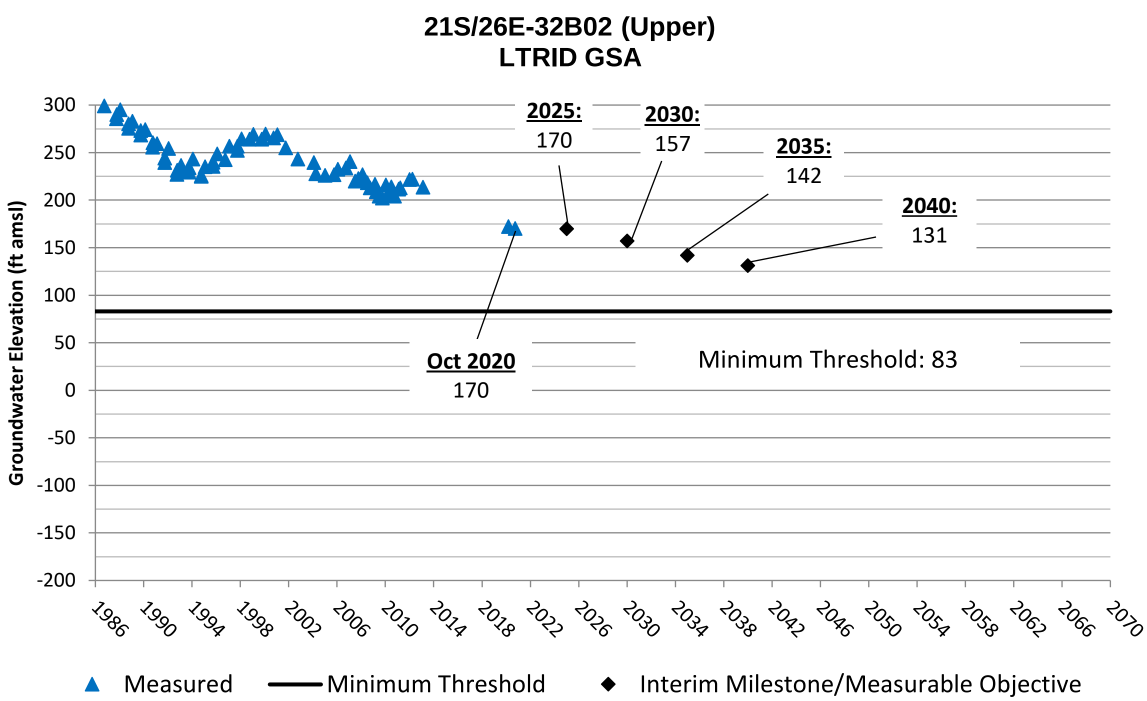
# Lower Tule River Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



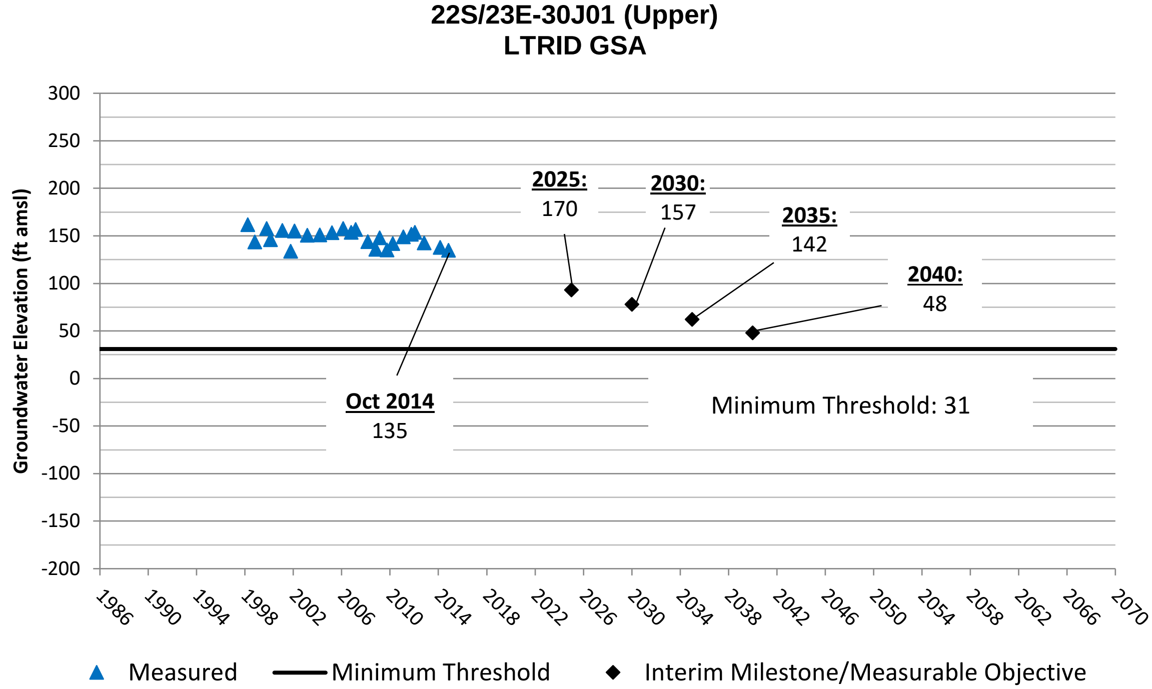



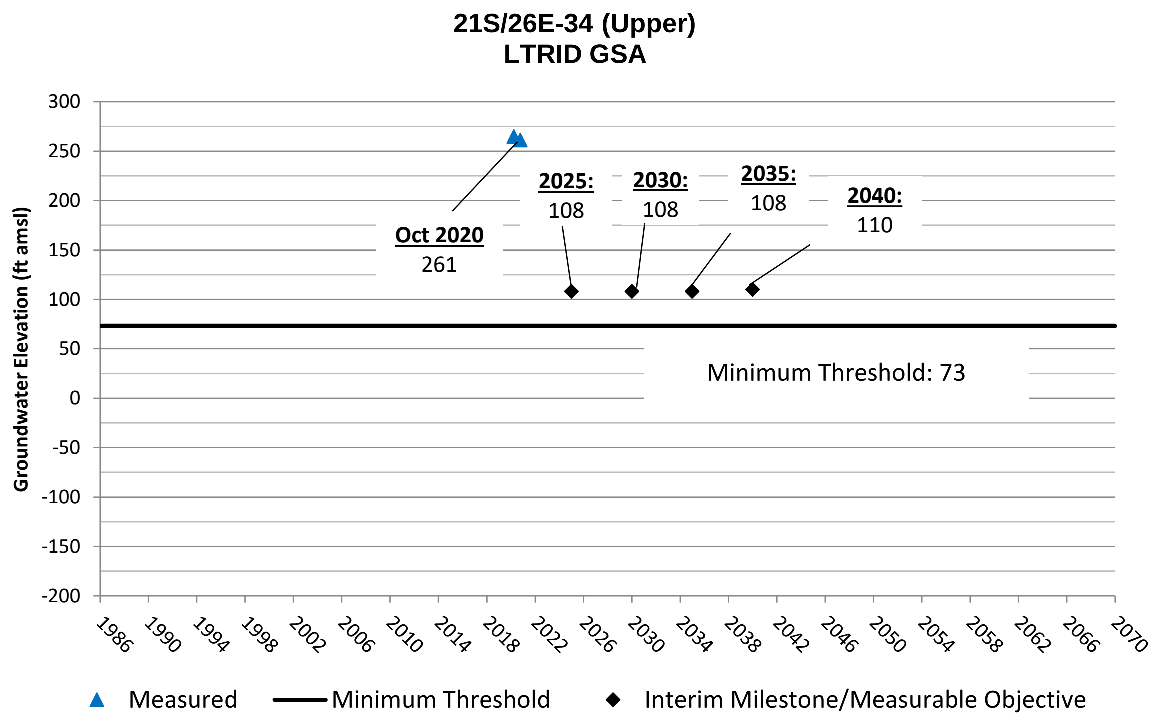
# Lower Tule River Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



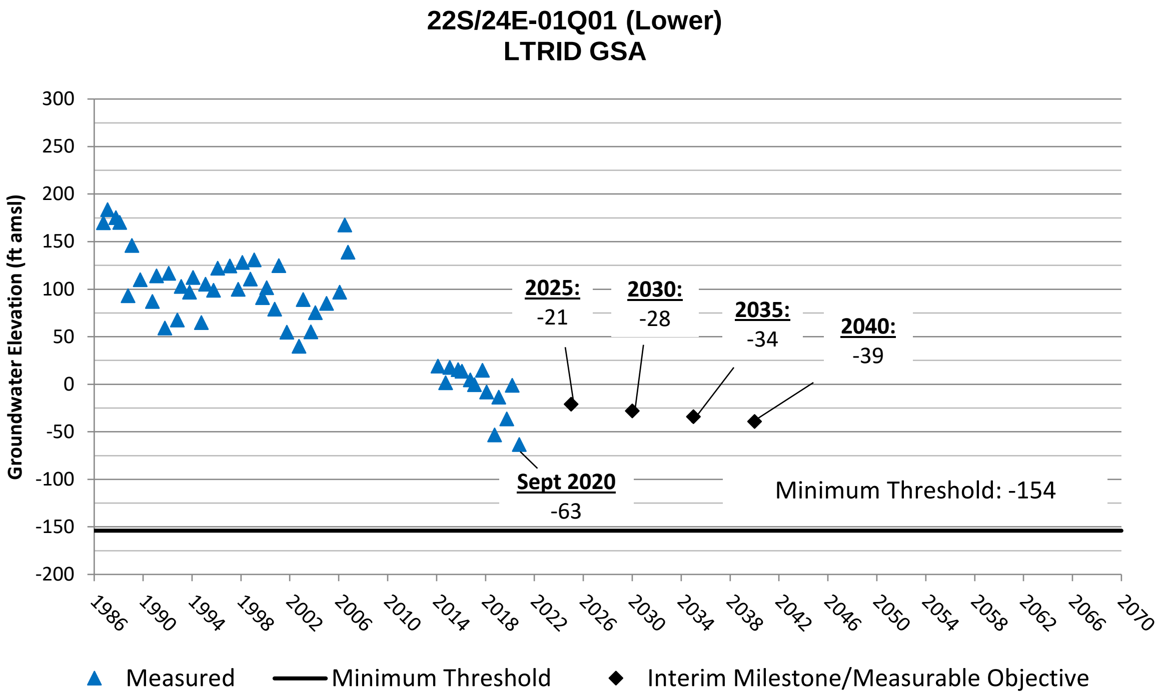



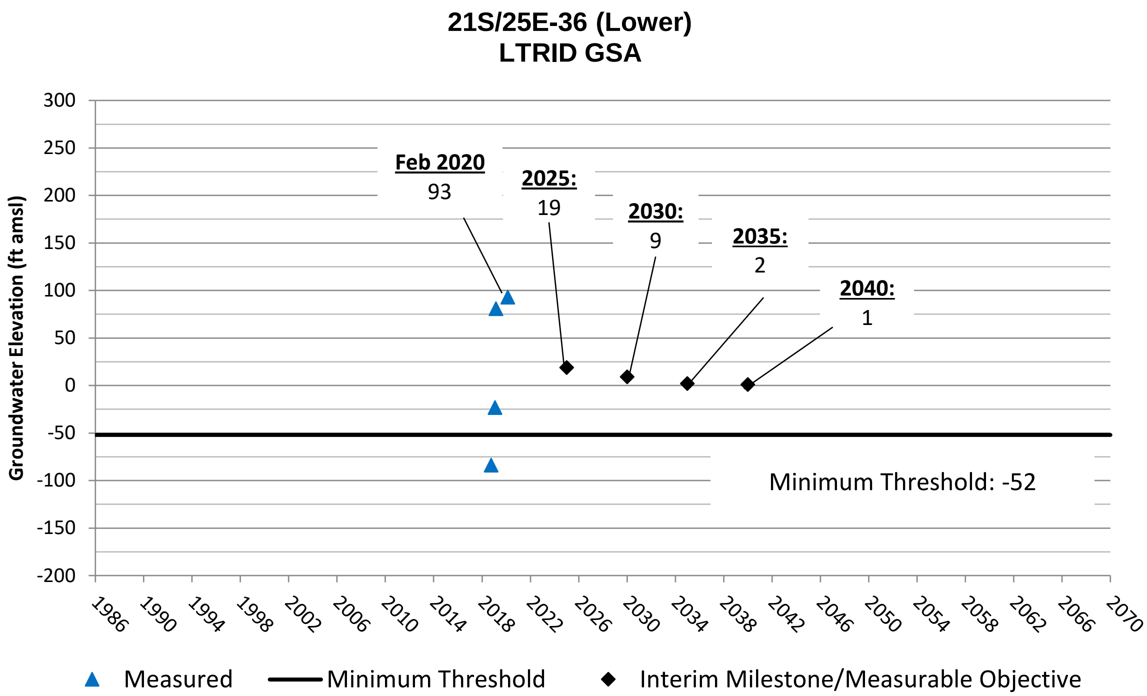
# Lower Tule River Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



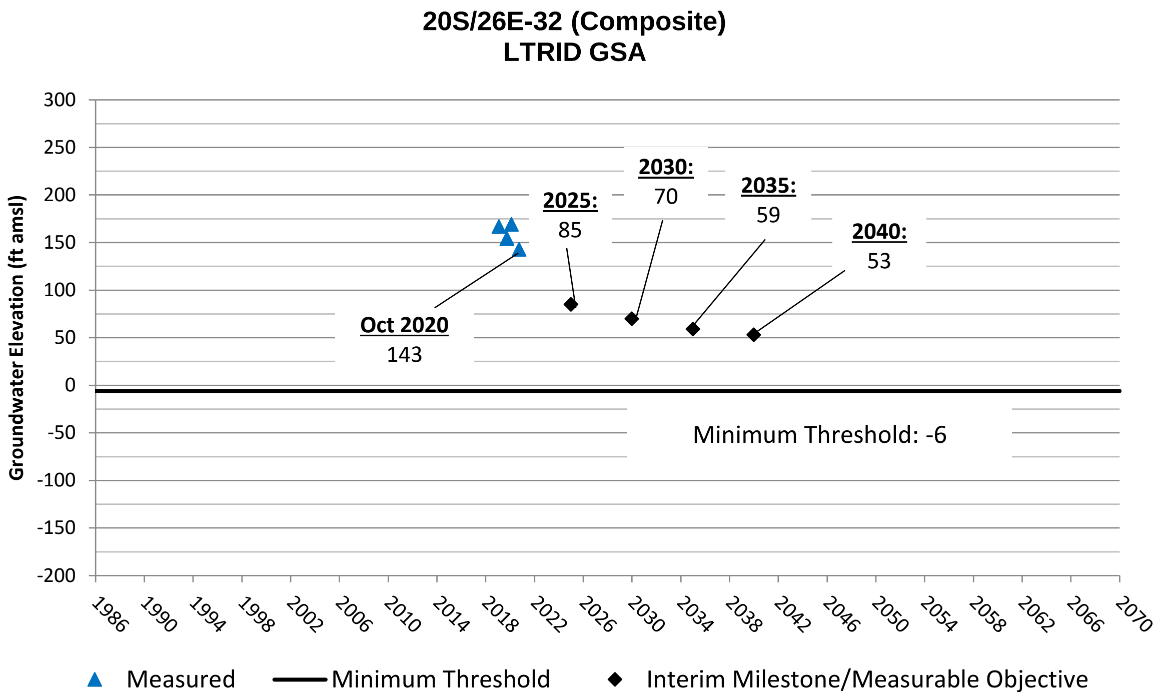



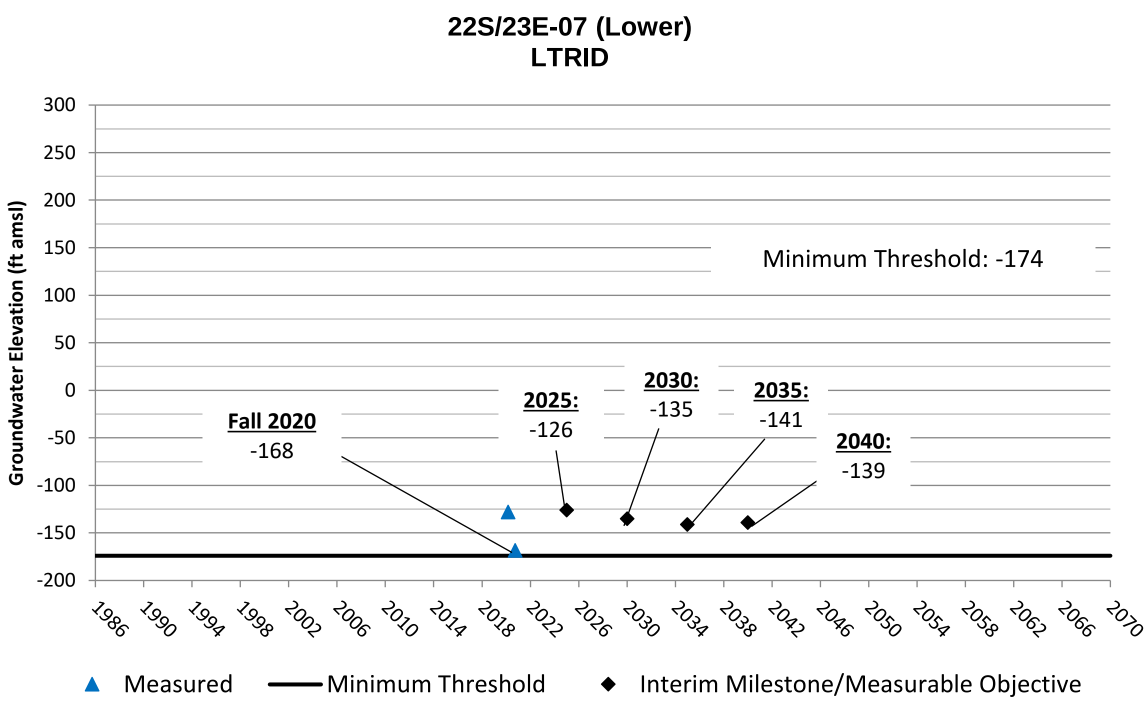
## Lower Tule River Irrigation District GSA
## RMS Groundwater Elevation Hydrographs



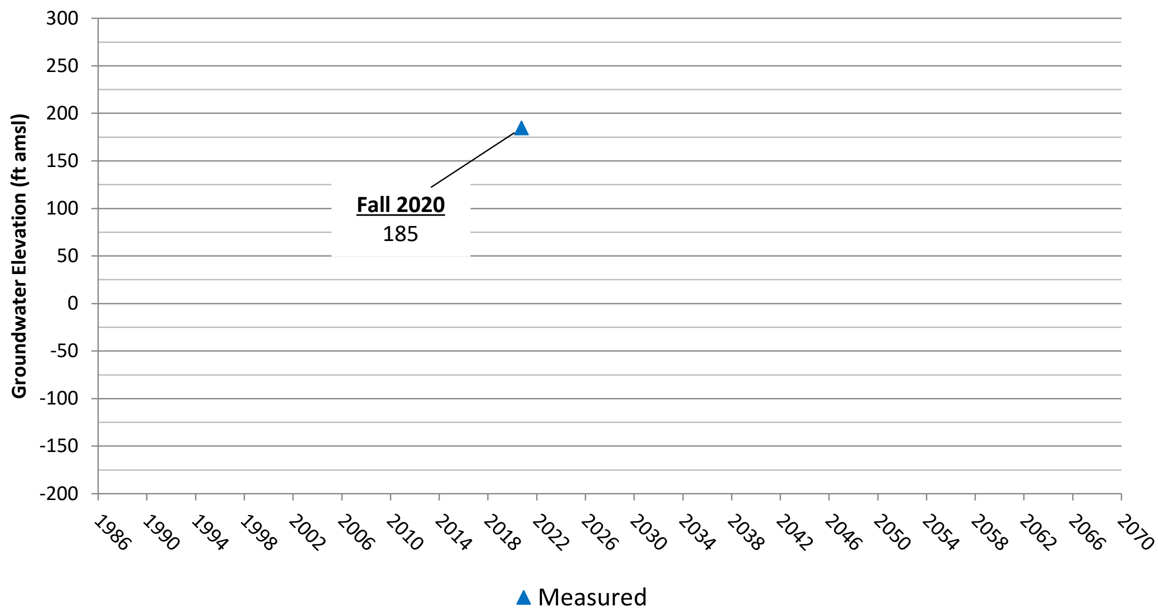
# Lower Tule River Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



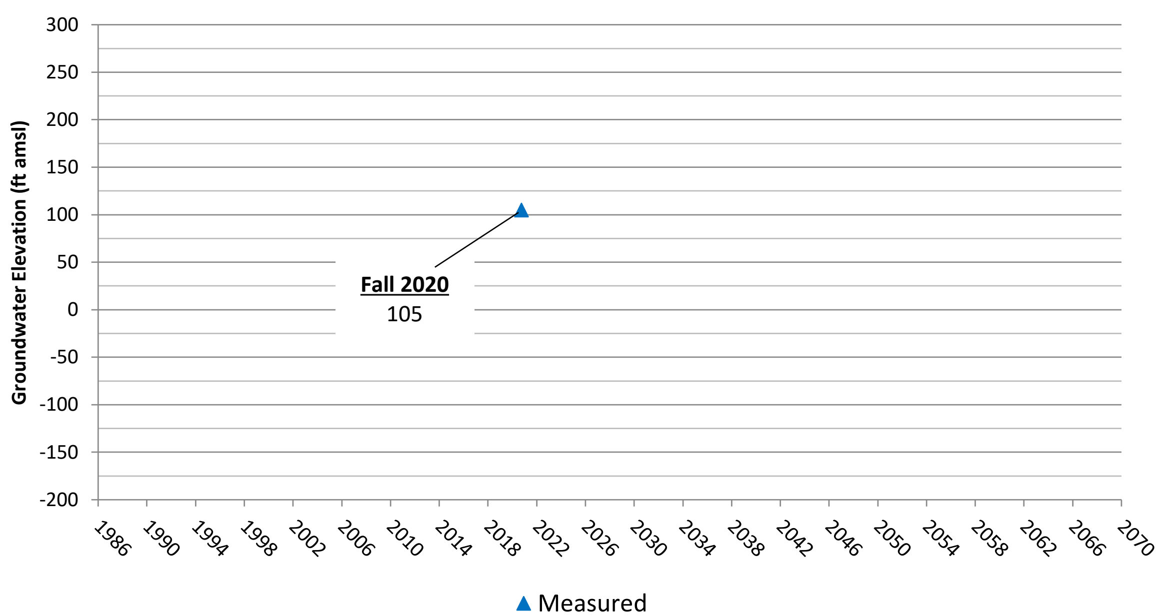



# Lower Tule River Irrigation District GSA
# RMS Groundwater Elevation Hydrographs

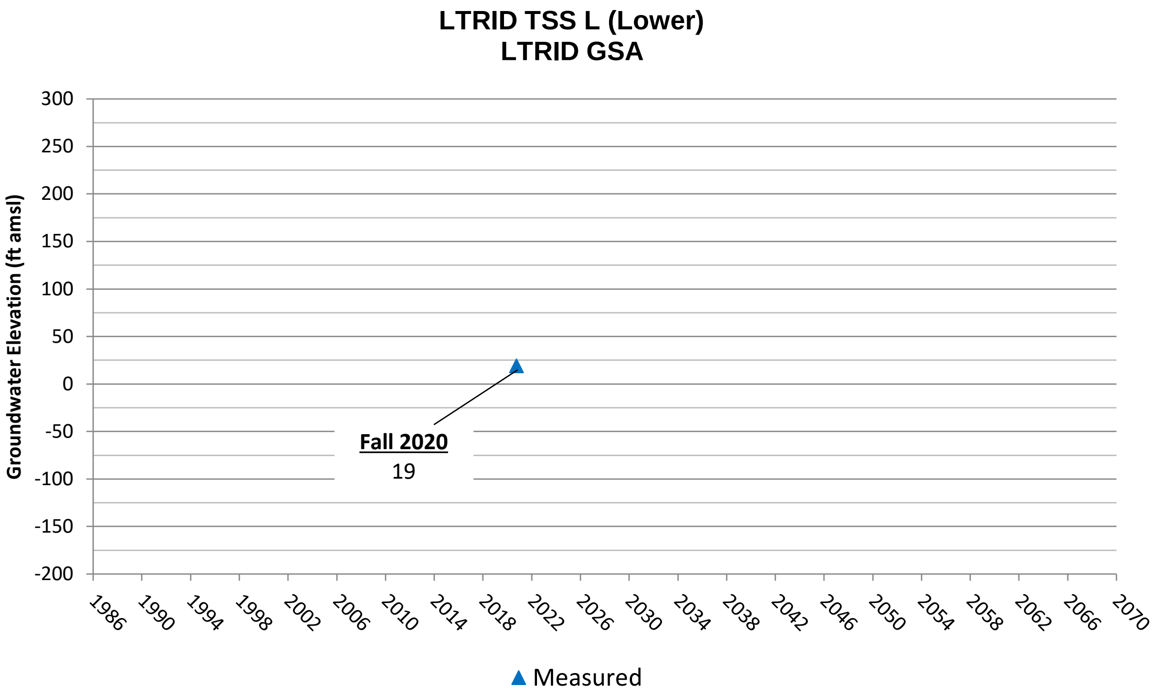
## LTRID TSS U (Upper)
## LTRID GSA



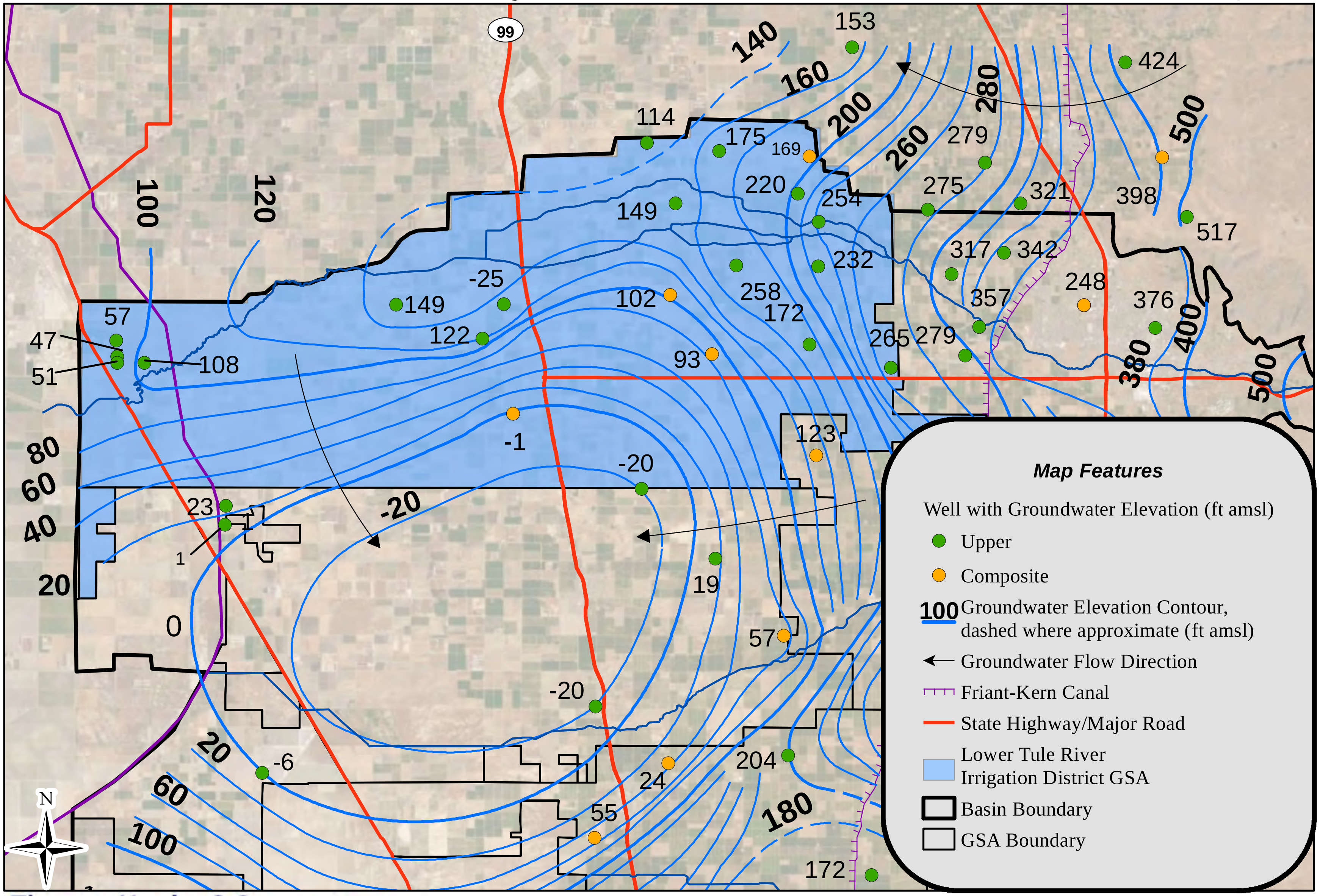

## LTRID TSS M (Lower)
## LTRID GSA



# Lower Tule River Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



Tule Subbasin Technical Advisory Committee

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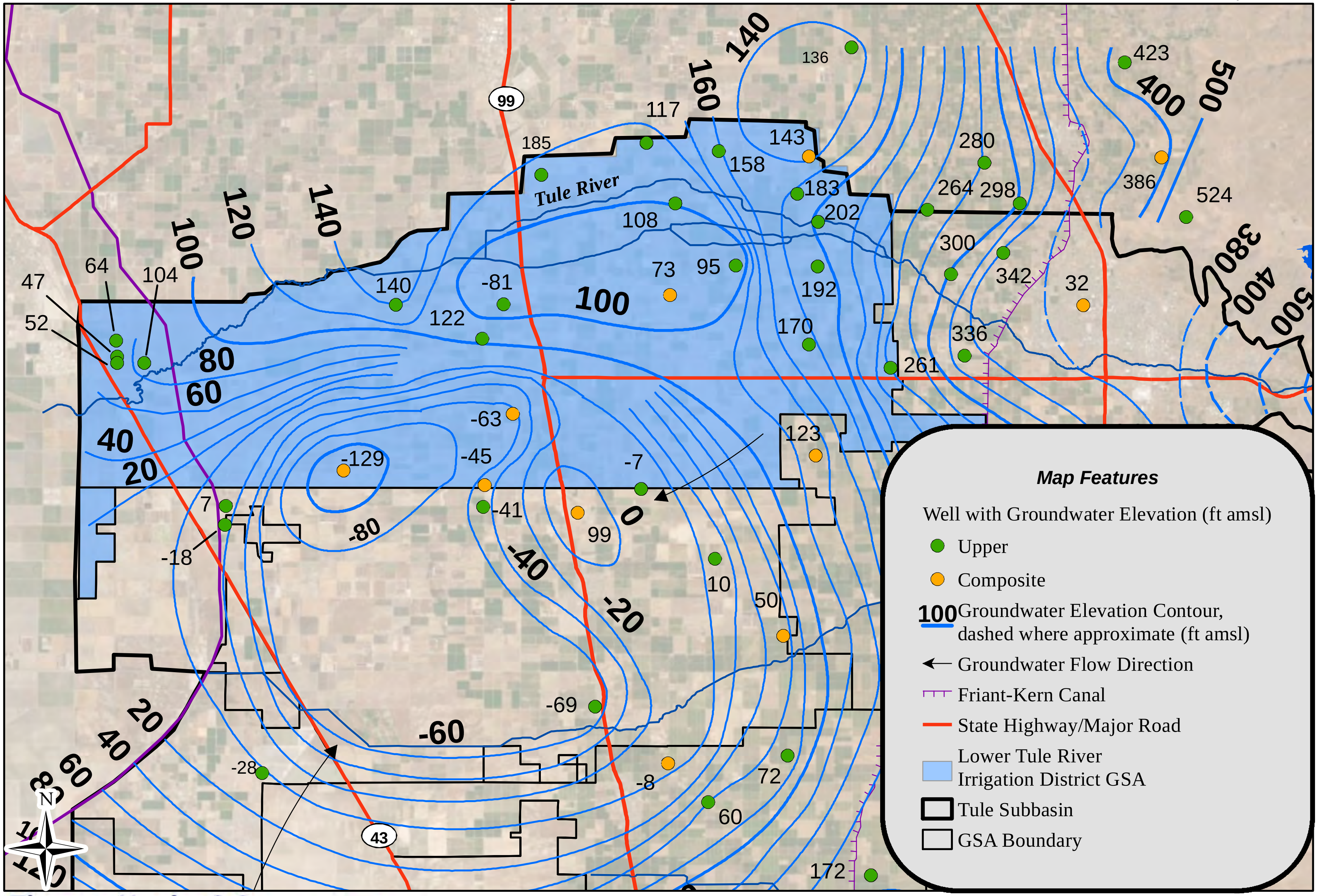
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

Spring 2020 Upper Aquifer
Lower Tule River I.D. GSA
Appendix A
Figure 8

## Tule Subbasin Technical Advisory Committee

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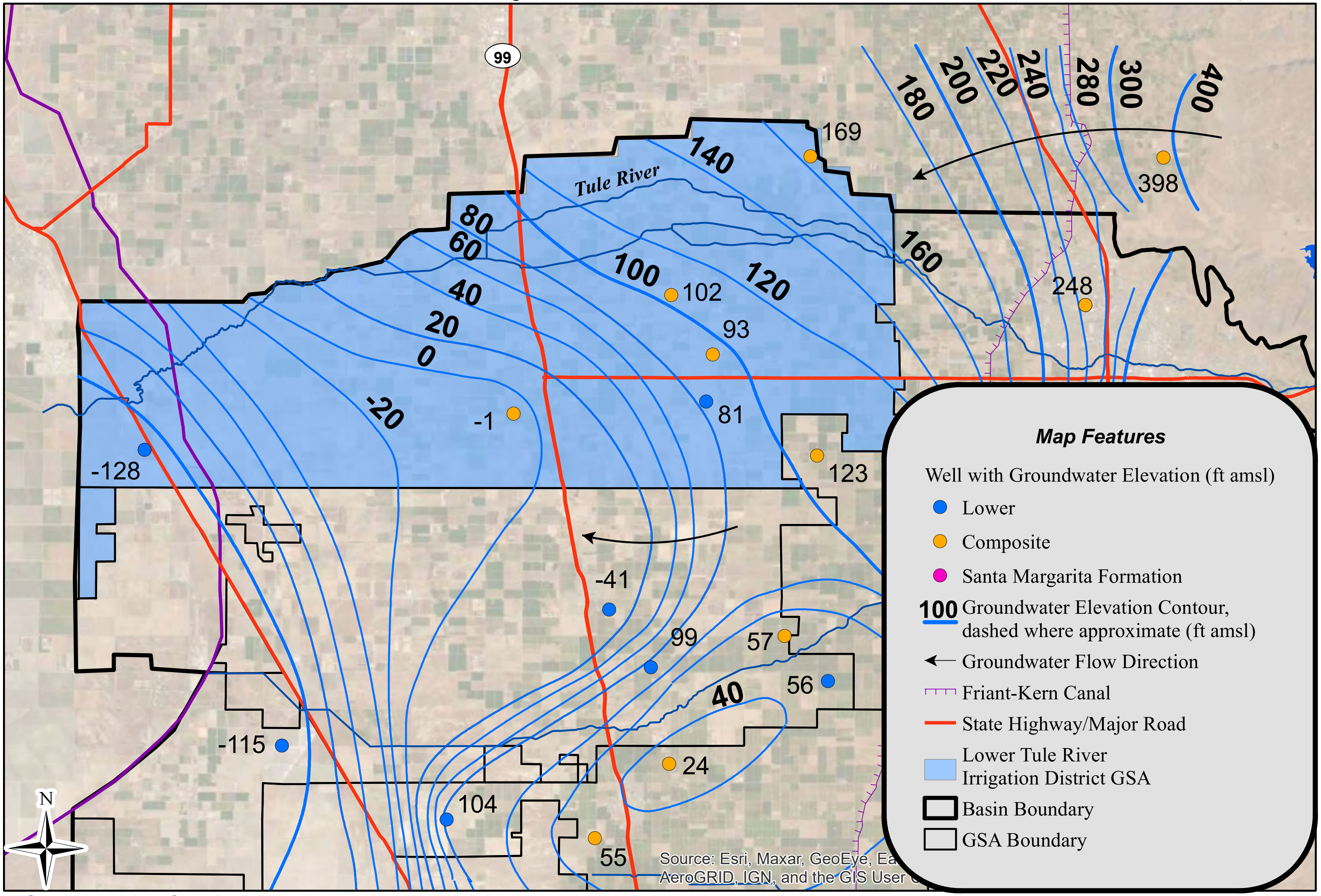
0 1.5 3 6 Miles

NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Fall 2020 Upper Aquifer**
**Lower Tule River I.D. GSA**
**Appendix A**
**Figure 9**

Tule Subbasin Technical Advisory Committee

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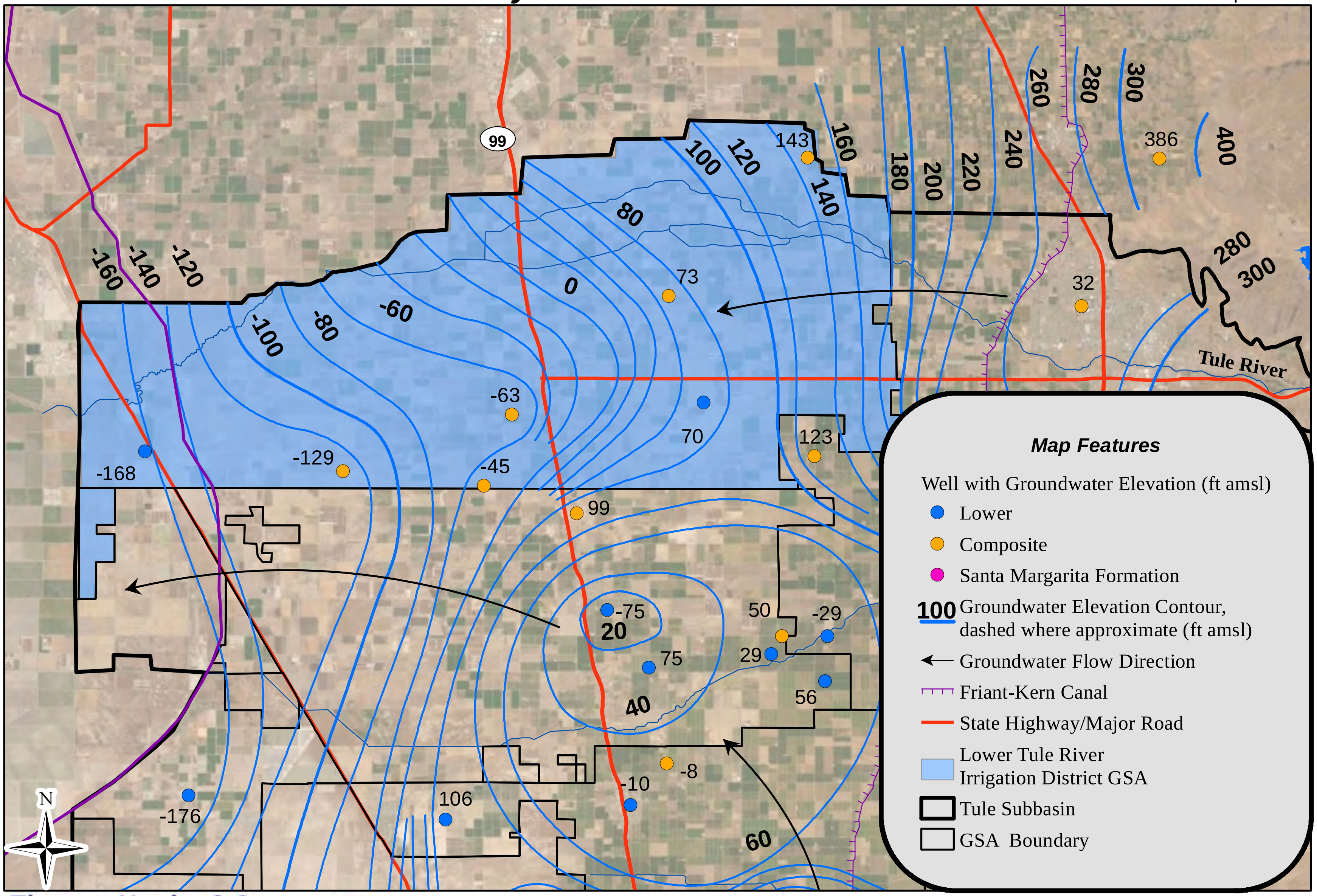
Note: All groundwater elevations are in feet above mean sea level.

Spring 2020 Lower Aquifer
Lower Tule River I.D. GSA
Appendix A
Figure 10

## Tule Subbasin Technical Advisory Committee

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Groundwater Consulting

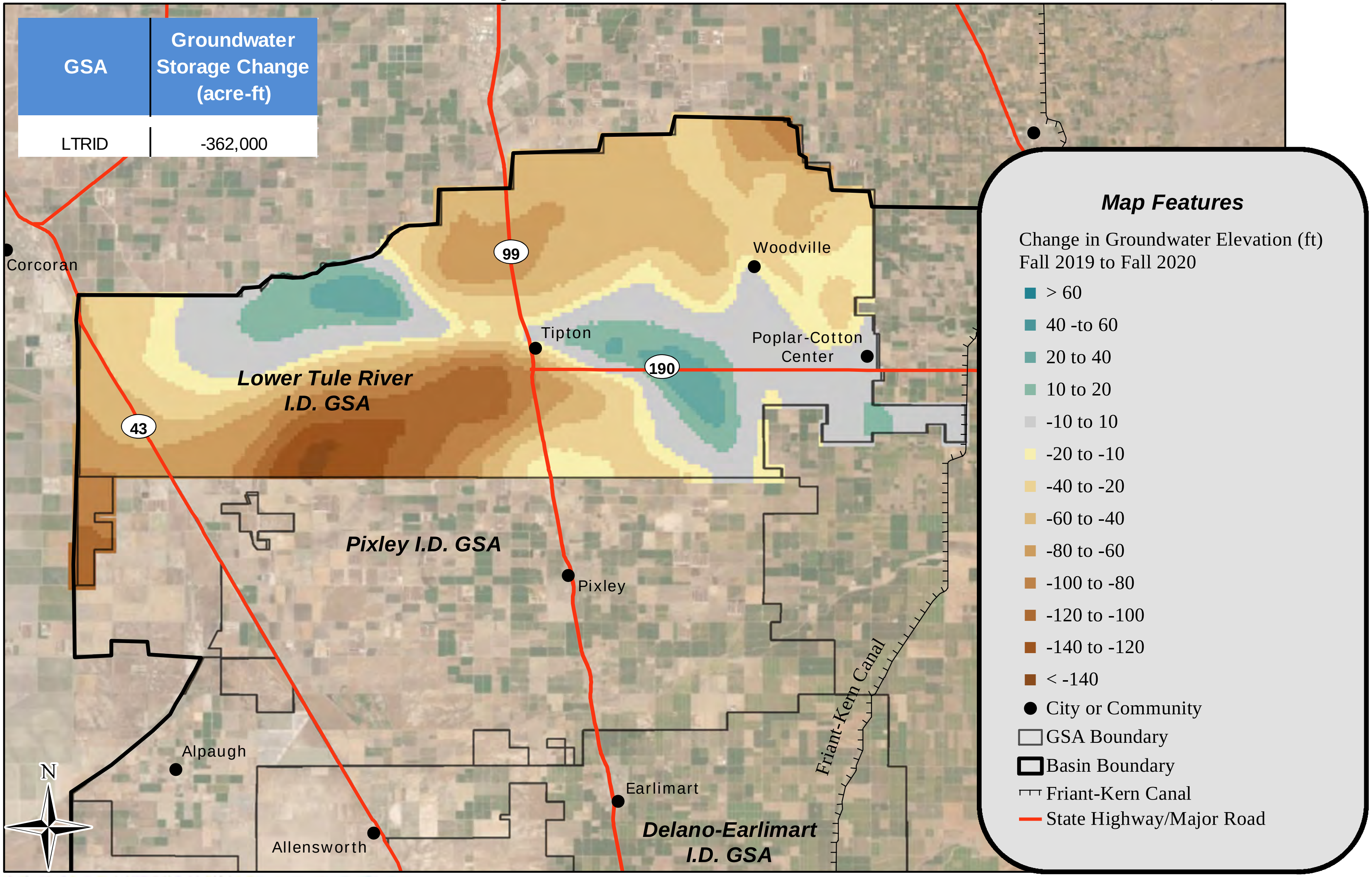
0 1.75 3.5 7 Miles

NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Fall 2020 Lower Aquifer**
**Lower Tule River I.D. GSA**
**Appendix A**
**Figure 11**

## Tule Subbasin Technical Advisory Committee

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0 1 2 4 Miles
NAD 83 State Plane Zone 4

## Change in Groundwater Elevation Fall 2019 to Fall 2020
## Lower Tule River I.D. GSA
### Appendix A
### Figure 12

# Appendix B

# Eastern Tule GSA
# 2019/20 Annual Data

## Eastern Tule GSA
## Groundwater Extraction for Water Year 2019/20

| GSA | Management Area | Agricultural Pumping | Municipal Pumping | Pumping for Export | Total |
|---|---|---|---|---|---|
| ETGSA | Greater Tule | 173,000 | 0 | 0 | 173,000 |
| | Porterville Community | 0 | 11,040 | 0 | 11,040 |
| | Ducor Community | 0 | 200 | 0 | 200 |
| | Terra Bella Community | 0 | 0 | 0 | 0 |
| | Kern-Tulare WD | 10,000 | 0 | 0 | 10,000 |
| | ***Total*** | ***183,000*** | ***11,240*** | ***0*** | ***194,240*** |

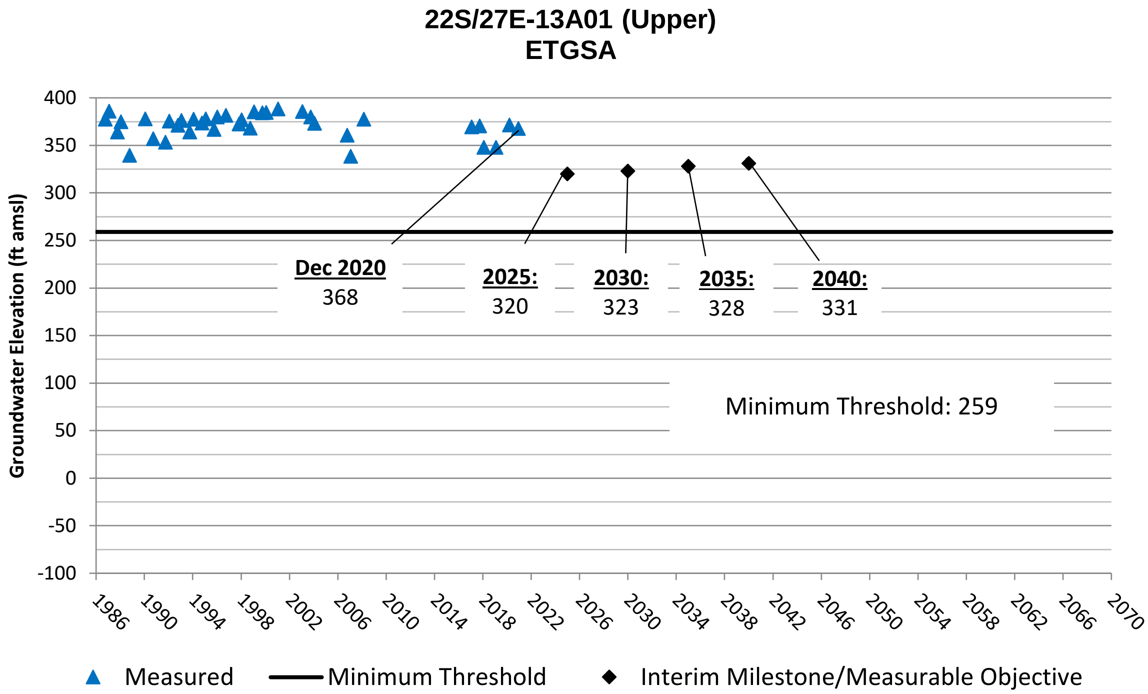
## Eastern Tule GSA
## Surface Water Supplies for Water Year 2019/20

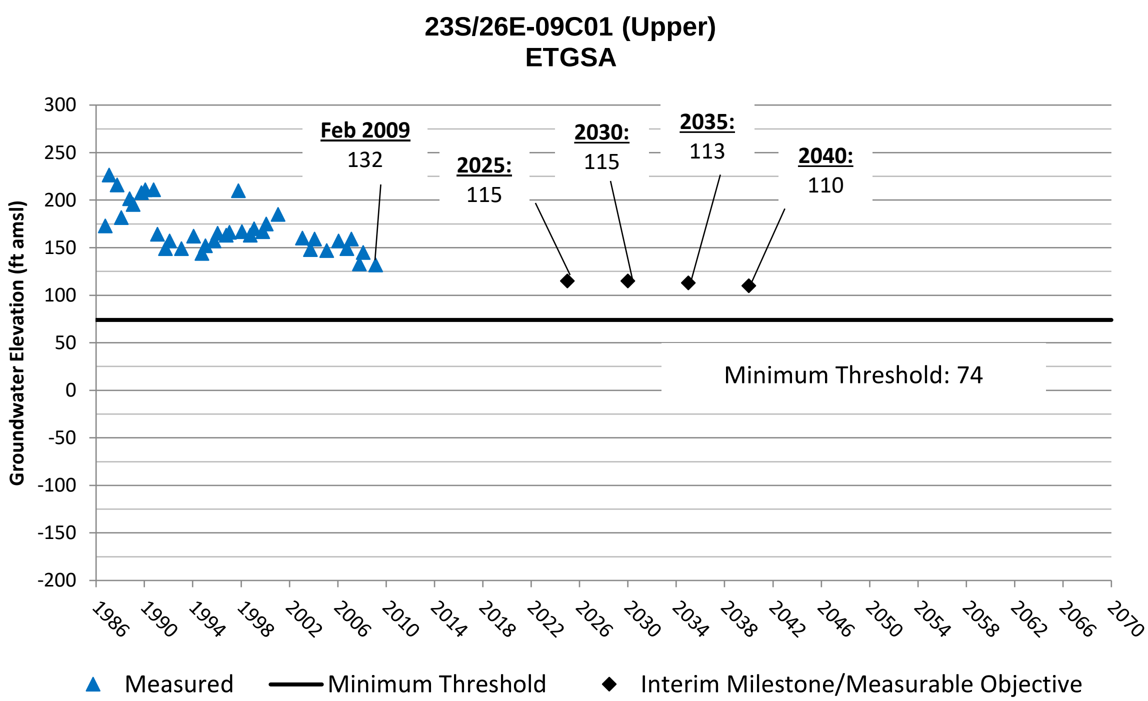
| GSA | Management Area | Stream Diversions | Imported Water | Recycled Water | Oilfield Produced Water | Precipitation | Total |
|---|---|---|---|---|---|---|---|
| ETGSA | Greater Tule | 15,600 | 57,900 | 0 | 0 | 93,400 | 166,900 |
| | Porterville Community | 0 | 0 | 3,000 | 0 | 11,900 | 14,900 |
| | Ducor Community | 0 | 0 | 0 | 0 | 200 | 200 |
| | Terra Bella Community | 0 | 1,040 | 0 | 0 | 900 | 1,940 |
| | Kern-Tulare WD | 0 | 9,700 | 0 | 900 | 6,100 | 16,700 |
| | ***Total*** | ***15,600*** | ***68,640*** | ***3,000*** | ***900*** | ***112,500*** | ***200,640*** |

## Eastern Tule GSA
## Tule Subbasin Total Water Use for Water Year 2019/20

| GSA | Management Area | Groundwater Extraction | Surface Water Supplies | Total |
|---|---|---|---|---|
| ETGSA | Greater Tule | 173,000 | 166,900 | 339,900 |
| | Porterville Community | 11,040 | 14,900 | 25,940 |
| | Ducor Community | 200 | 200 | 400 |
| | Terra Bella Community | 0 | 1,940 | 1,940 |
| | Kern-Tulare WD | 10,000 | 16,700 | 26,700 |
| | ***Total*** | ***194,240*** | ***200,640*** | ***394,880*** |

# Eastern Tule GSA
# RMS Groundwater Elevation Hydrographs

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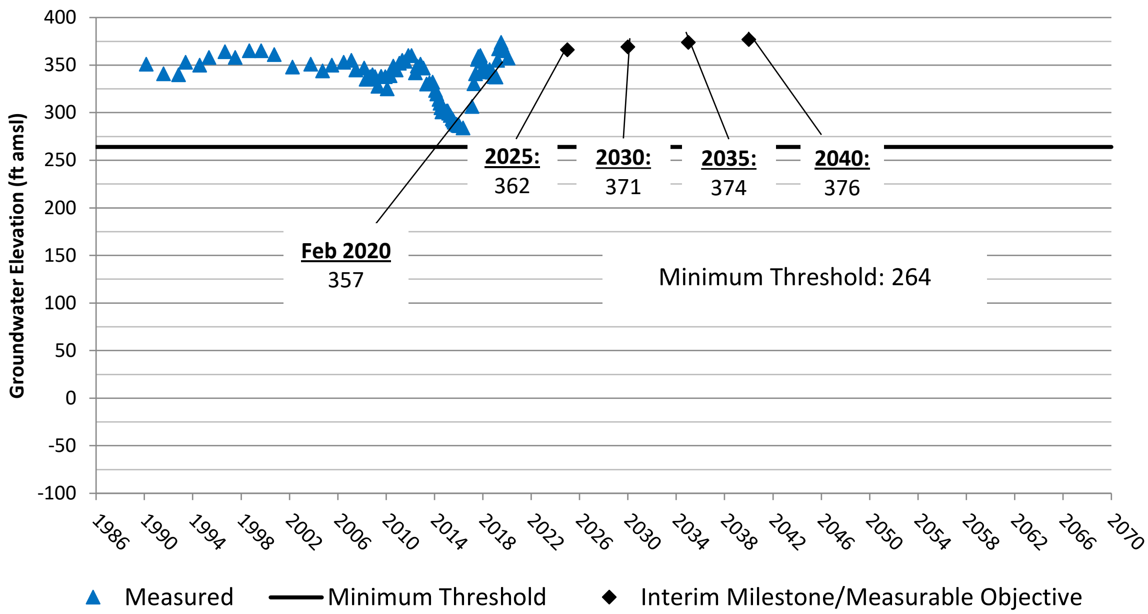
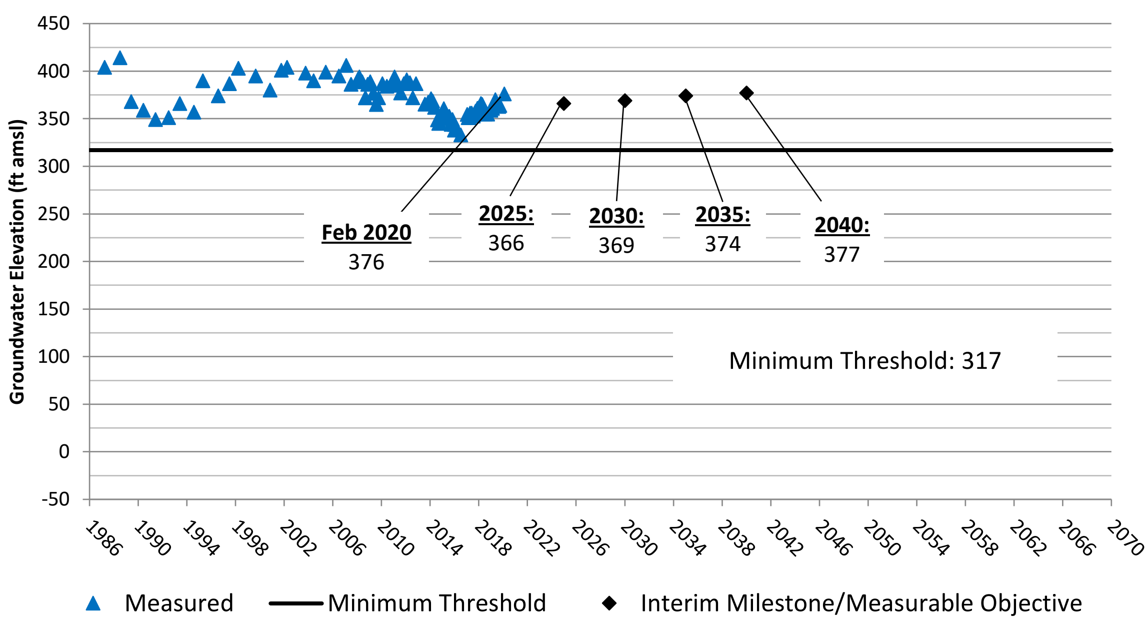
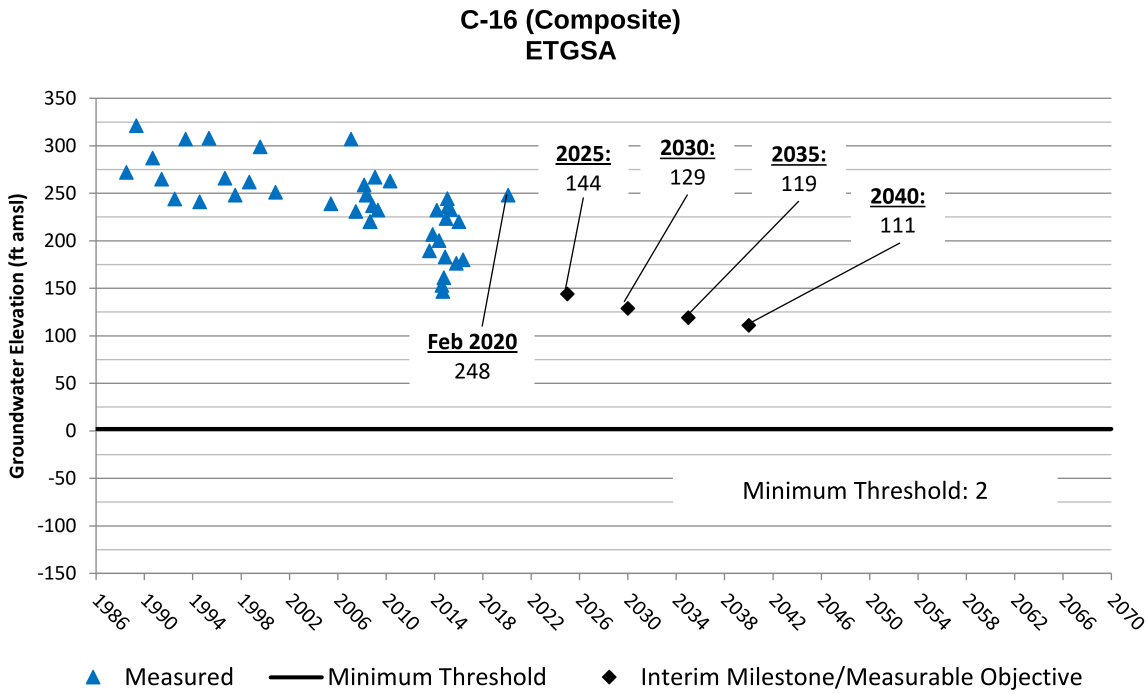
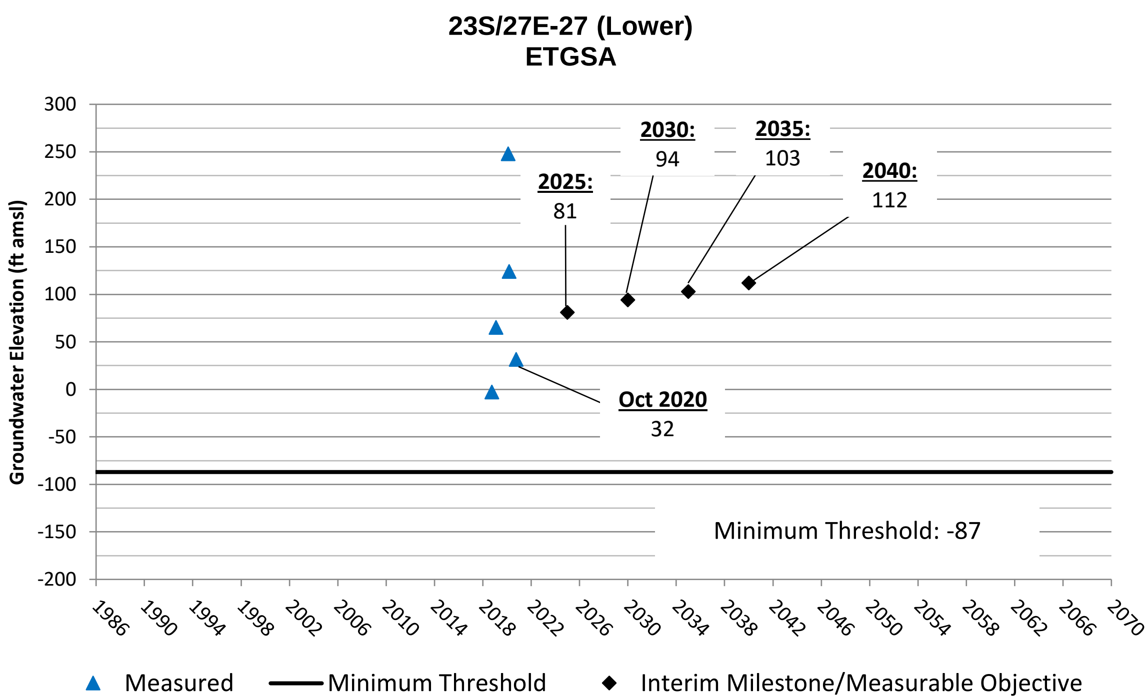
# Eastern Tule GSA
# RMS Groundwater Elevation Hydrographs



# Eastern Tule GSA
# RMS Groundwater Elevation Hydrographs

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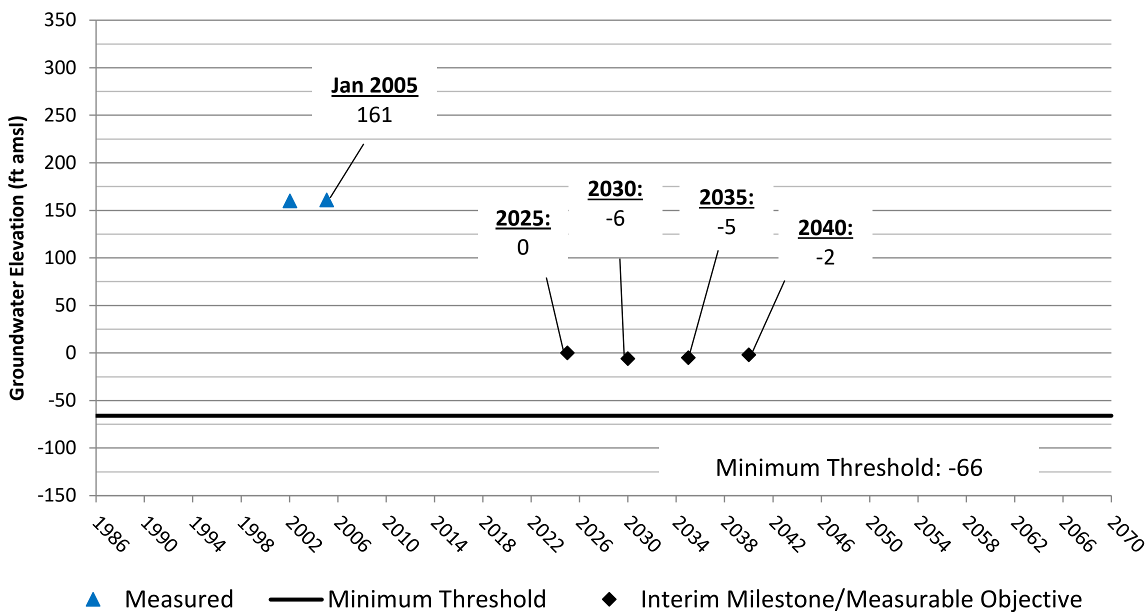
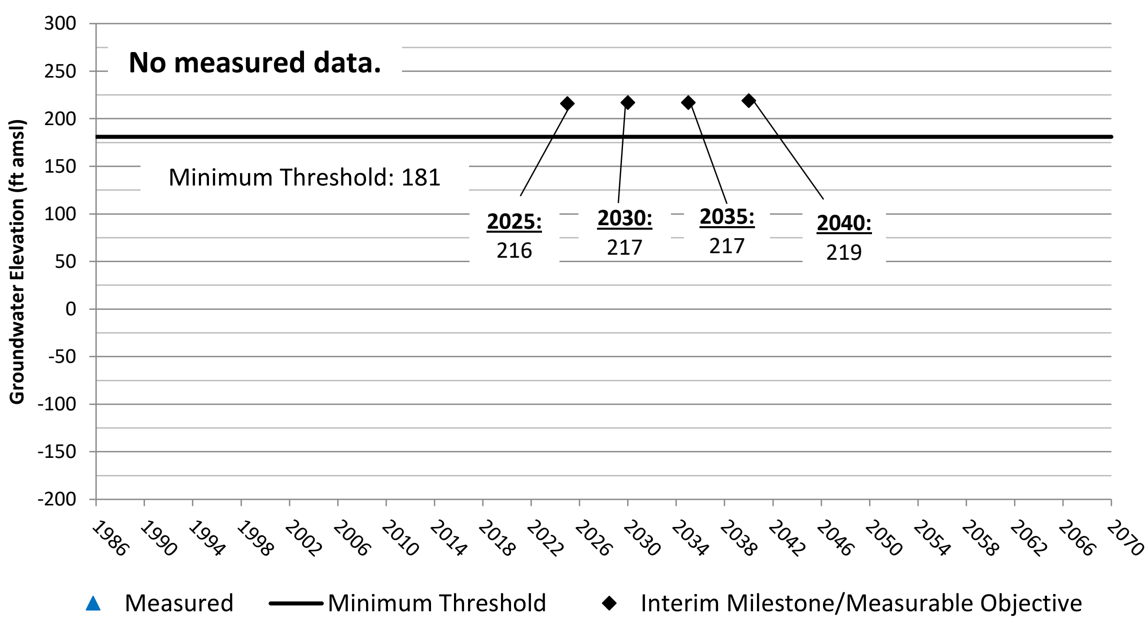
# Eastern Tule GSA
# RMS Groundwater Elevation Hydrographs

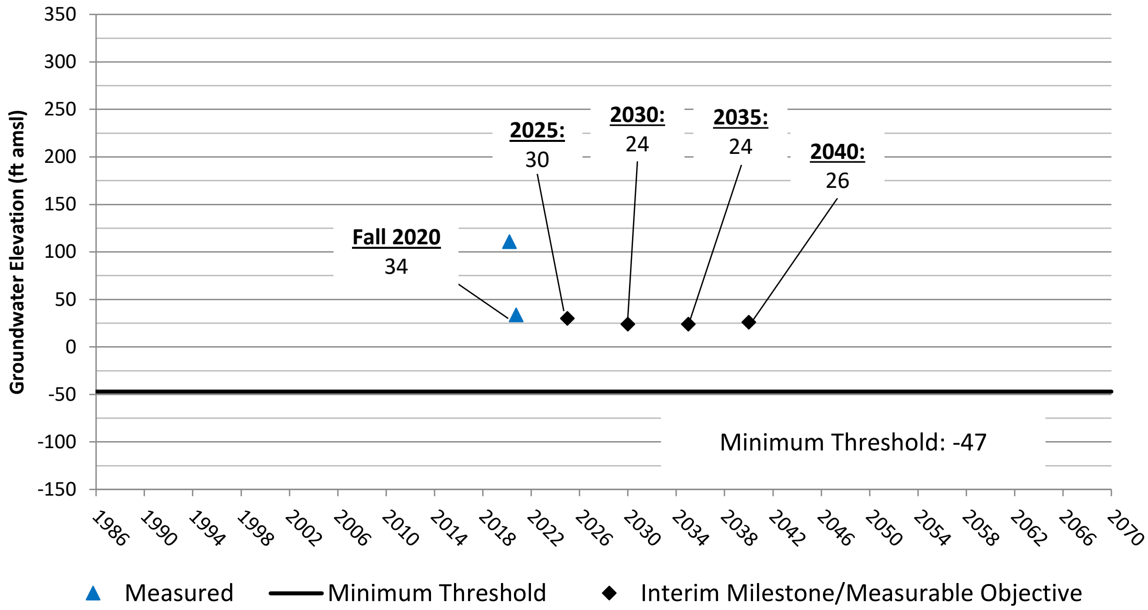
## 23S/26E-23R01 (Lower)
## ETGSA

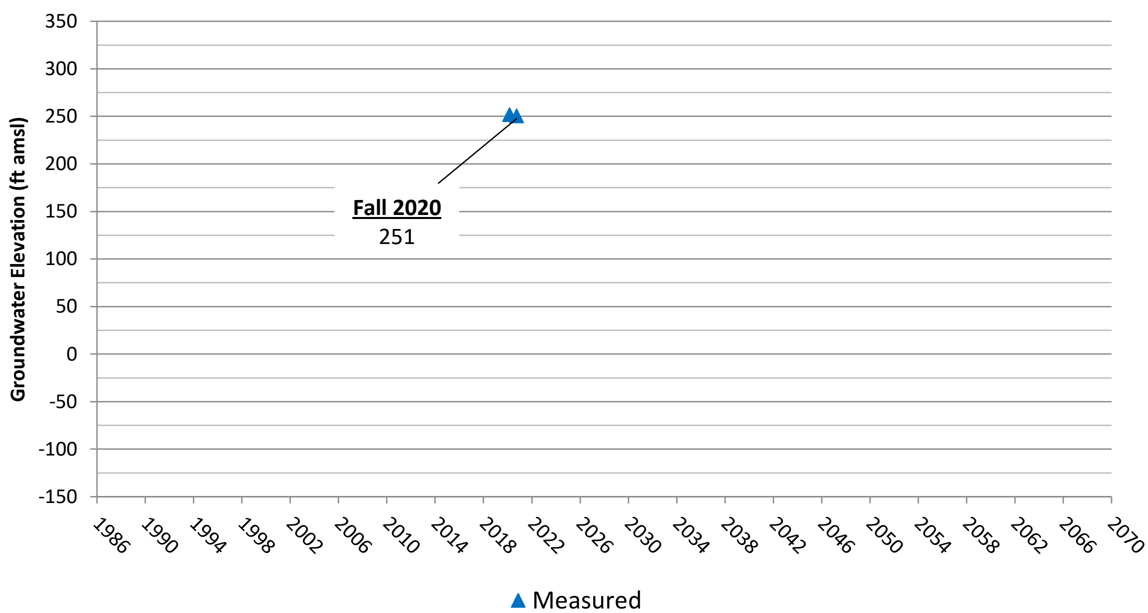



## 23S/27E-03 (Composite)
## ETGSA

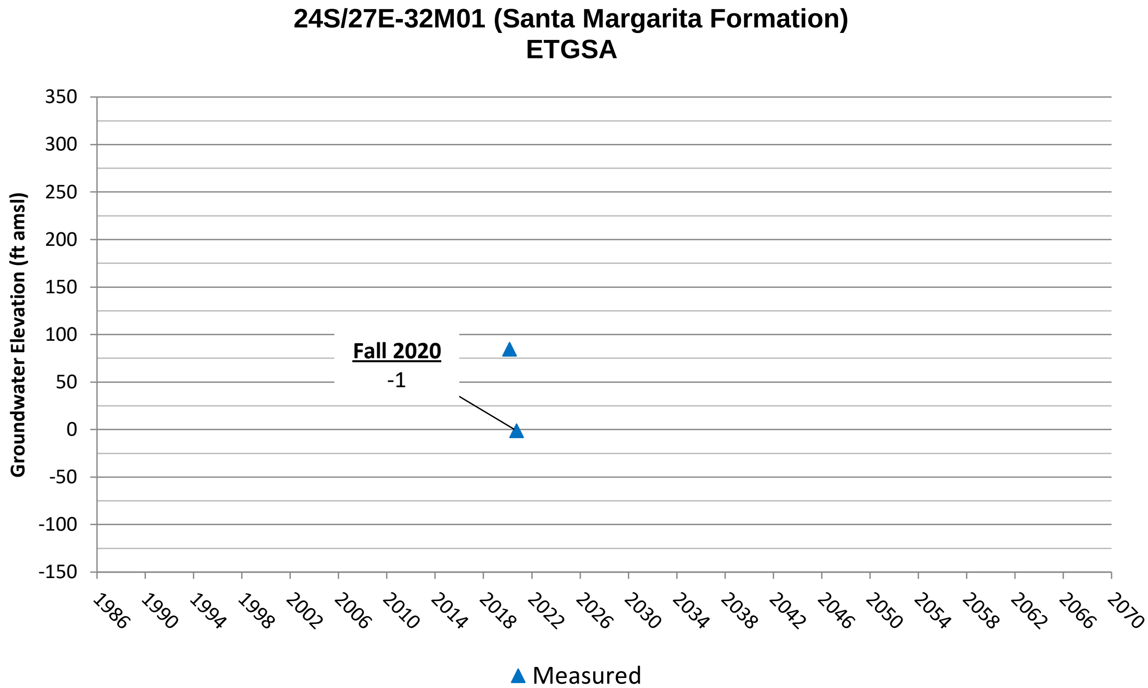


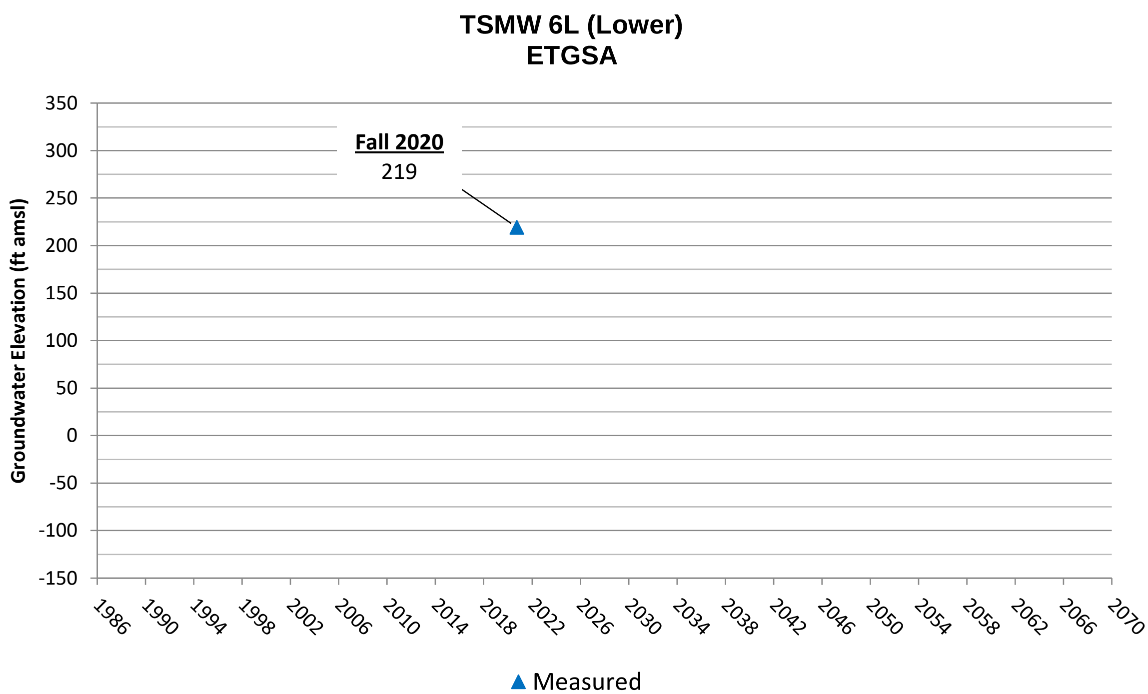
# Eastern Tule GSA
# RMS Groundwater Elevation Hydrographs



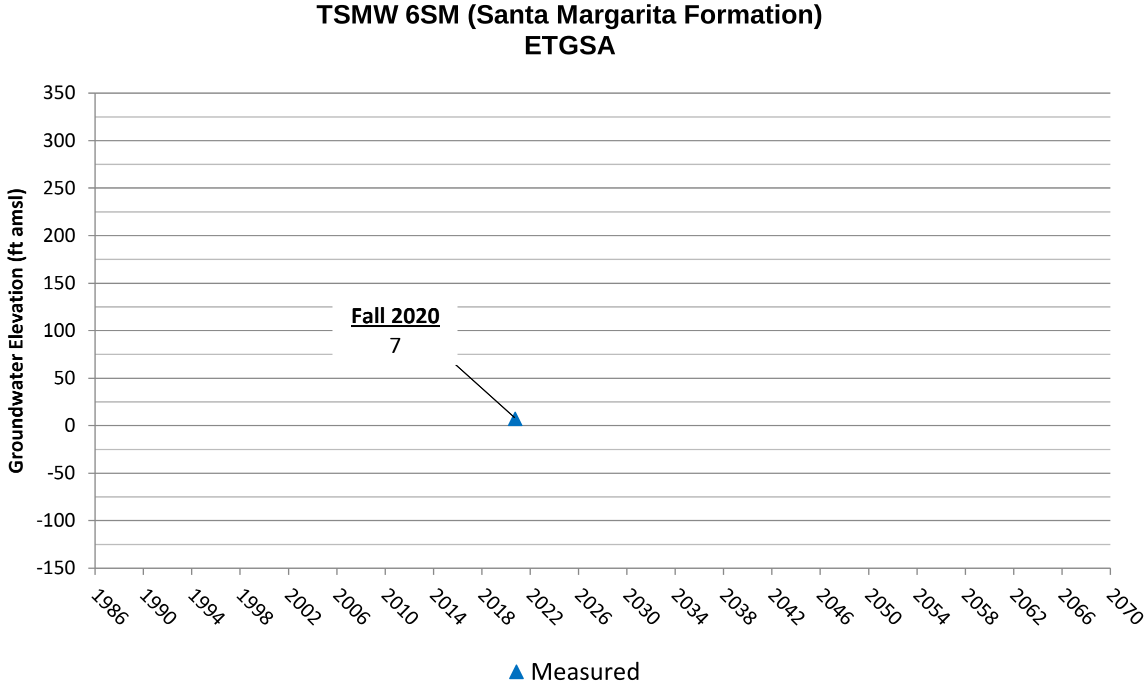



# Eastern Tule GSA
# RMS Groundwater Elevation Hydrographs

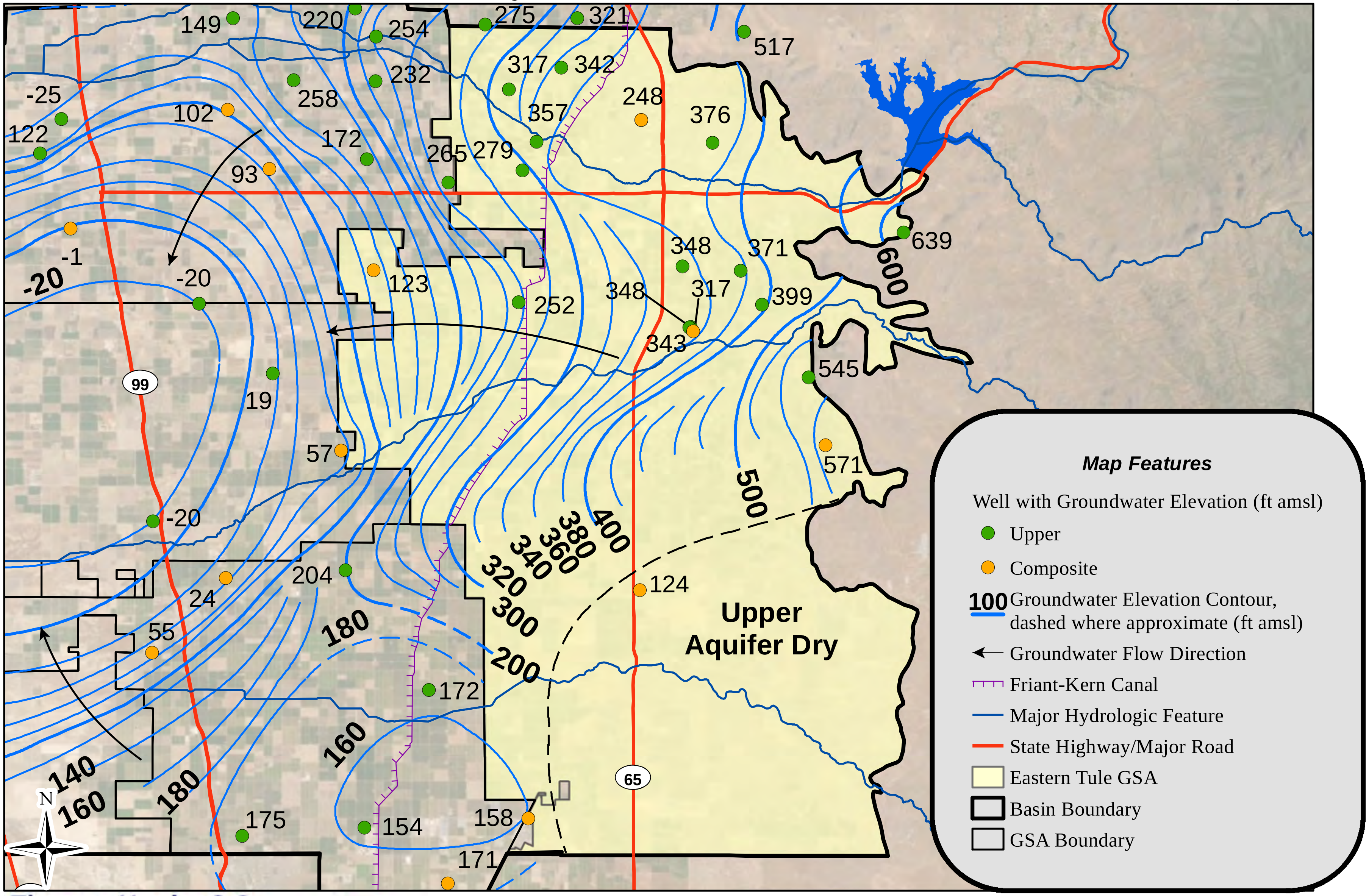


# Eastern Tule GSA
# RMS Groundwater Elevation Hydrographs



Tule Subbasin Technical Advisory Committee

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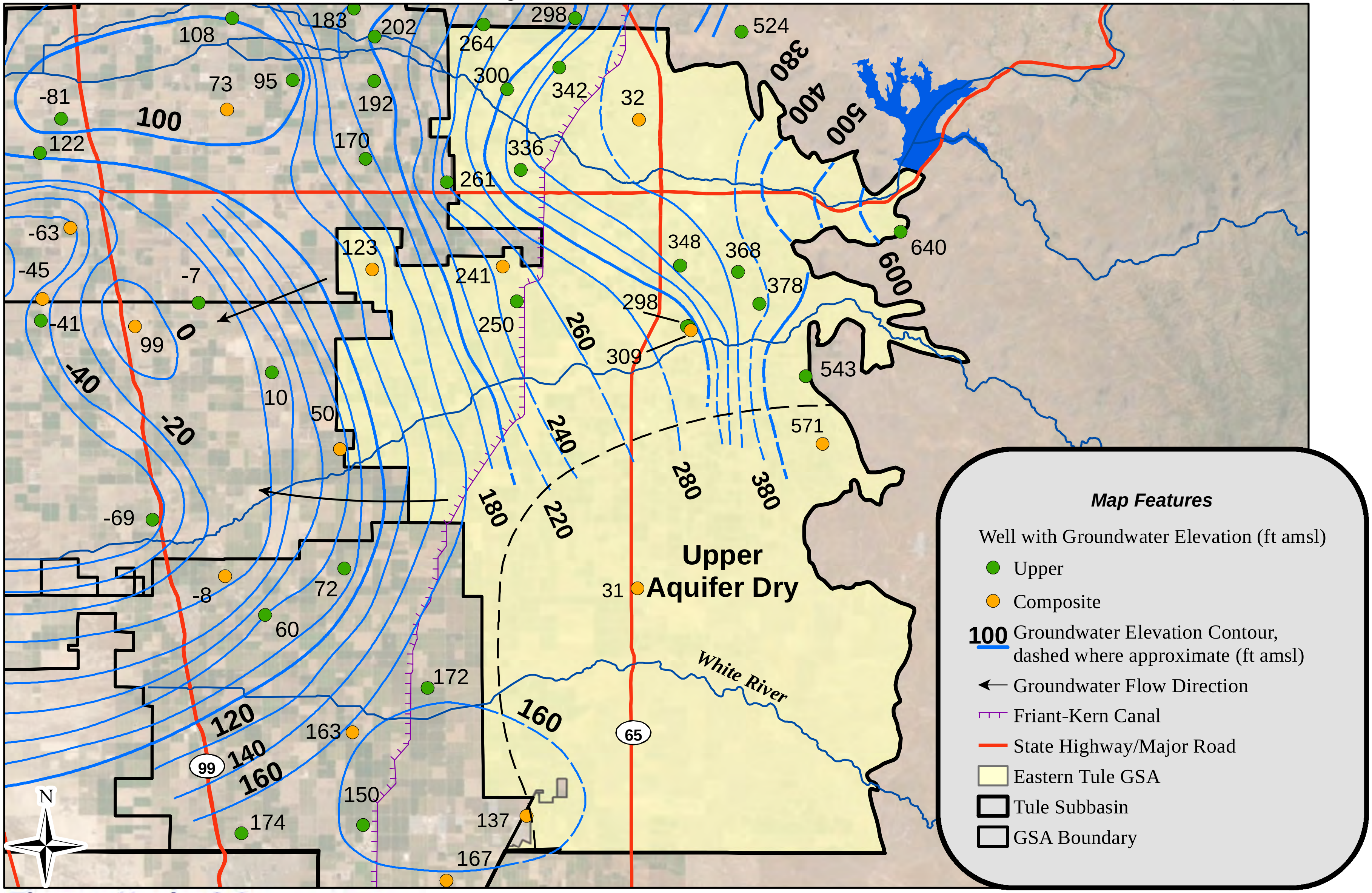
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Spring 2020 Upper Aquifer**
**Eastern Tule GSA**
**Appendix B**
**Figure 8**

## Tule Subbasin Technical Advisory Committee

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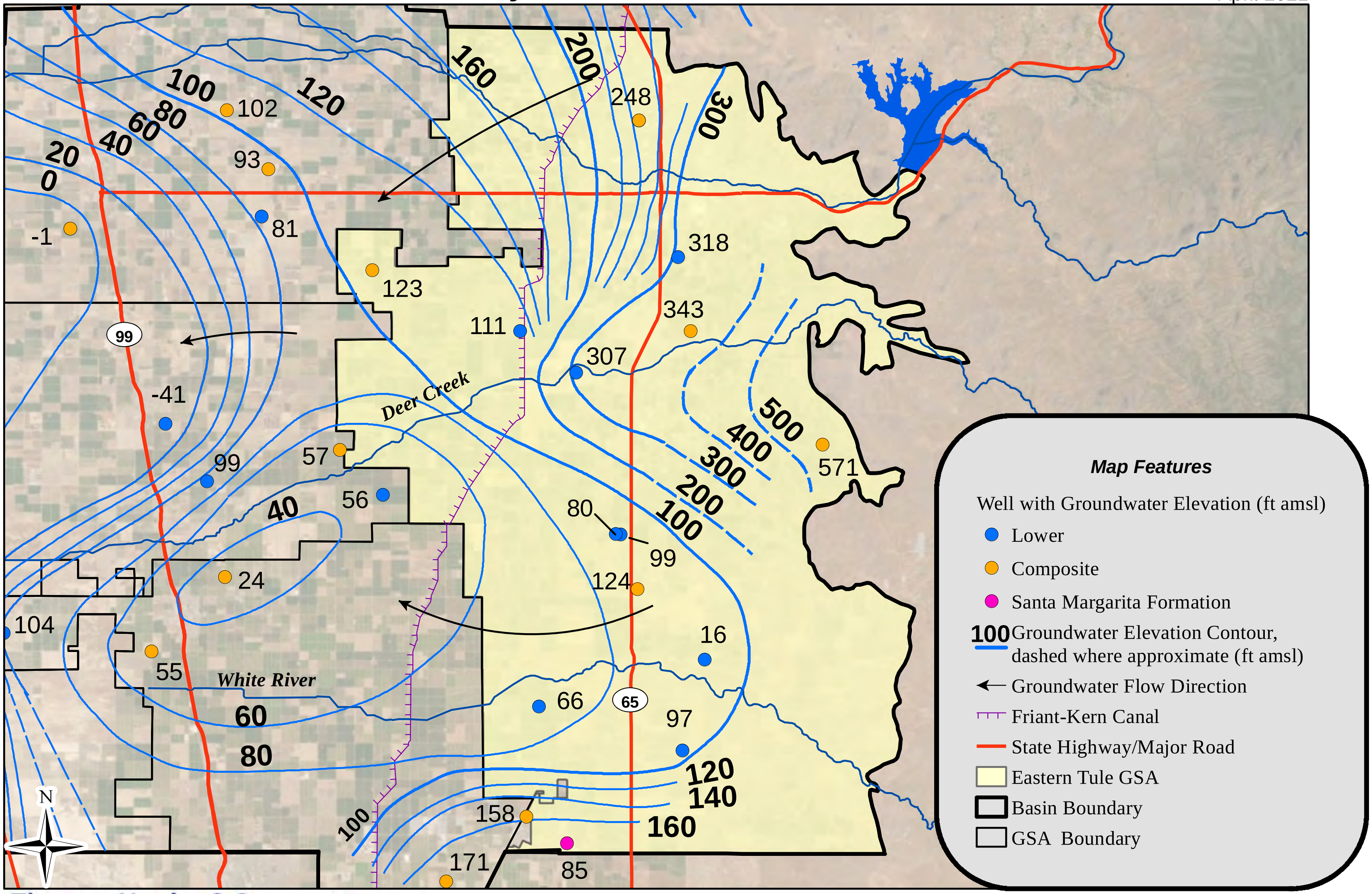
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Fall 2020 Upper Aquifer**
**Eastern Tule GSA**
**Appendix B**
**Figure 9**

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Groundwater Consulting

0 1.5 3 6 Miles

NAD 83 State Plane Zone 4

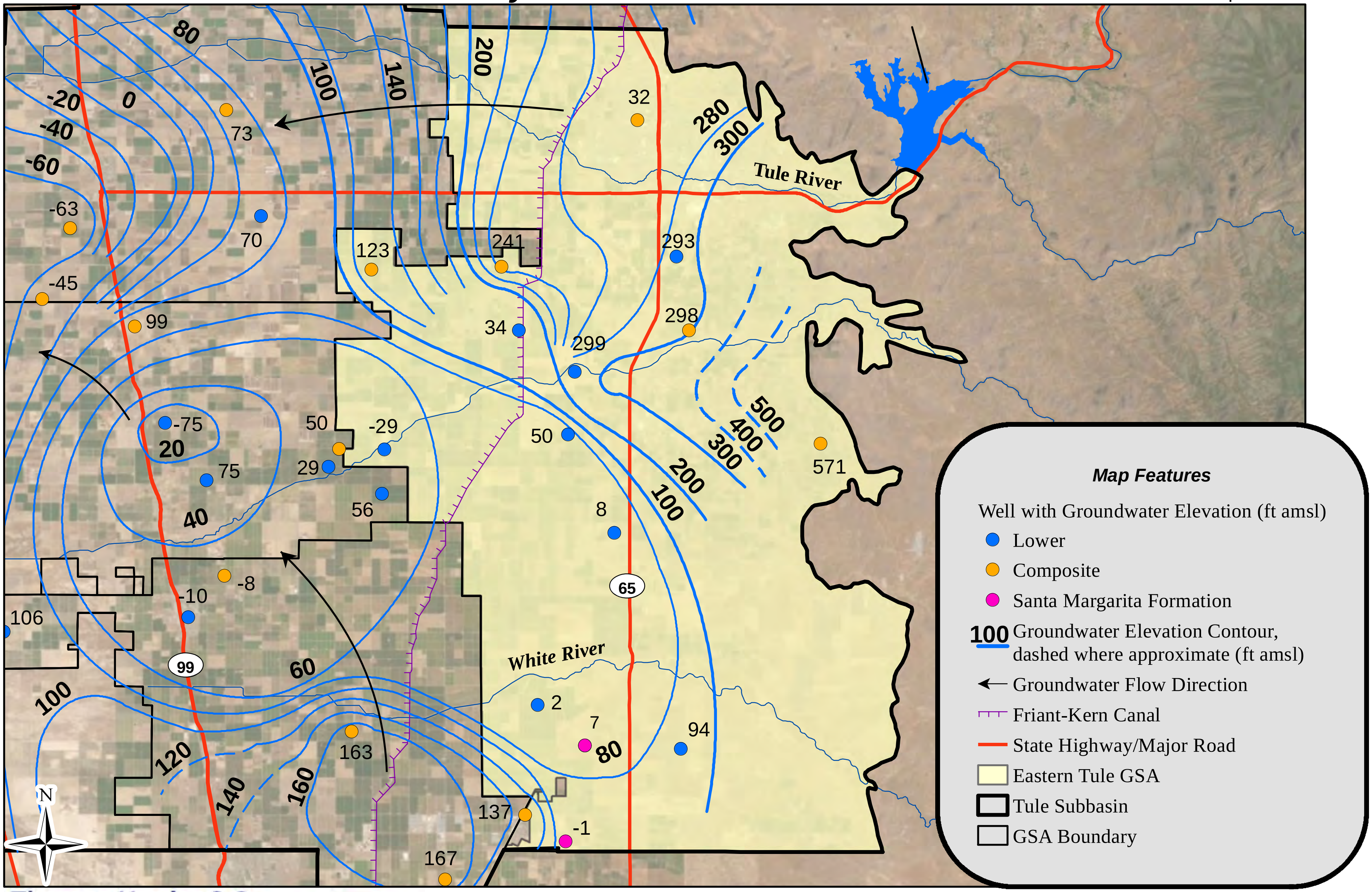
Note: All groundwater elevations are in feet above mean sea level.

**Spring 2020 Lower Aquifer**
**Eastern Tule GSA**
**Appendix B**
**Figure 10**

Tule Subbasin Technical Advisory Committee

**2019/2020 Annual Report**

April 2021




Thomas Harder & Co. Groundwater Consulting

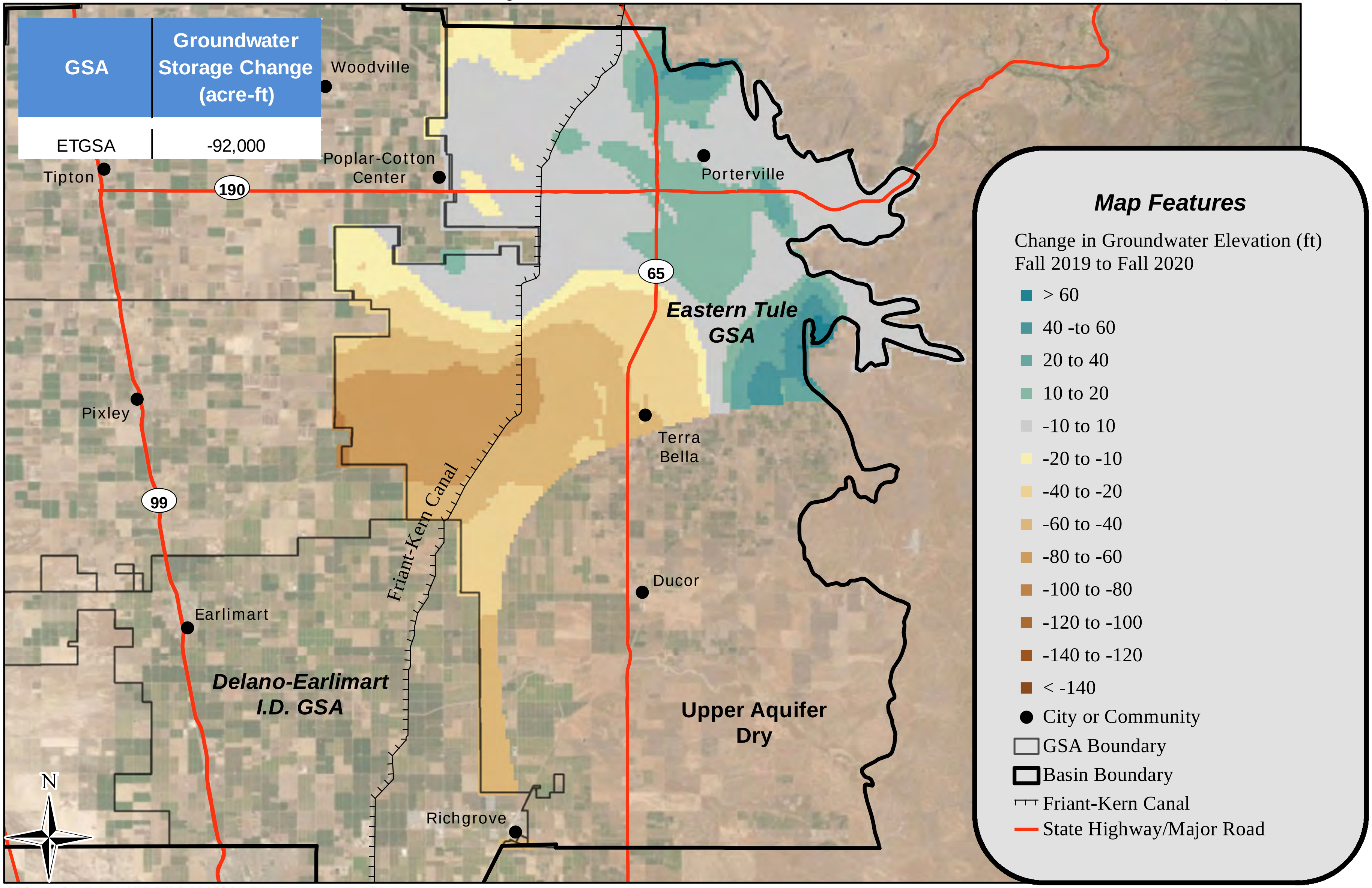
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Fall 2020 Lower Aquifer**
**Eastern Tule GSA**
**Appendix B**
**Figure 11**

## Tule Subbasin Technical Advisory Committee

| GSA | Groundwater Storage Change (acre-ft) |
|---|---|
| ETGSA | -92,000 |

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Groundwater Consulting

0 1 2 4 Miles
NAD 83 State Plane Zone 4

**Change in Groundwater Elevation Fall 2019 to Fall 2020**
**Eastern Tule GSA**
**Appendix B**
**Figure 12**

# Appendix C

# Delano-Earlimart Irrigation District GSA 2019/20 Annual Data

## Delano-Earlimart Irrigation District GSA
## Groundwater Extraction for Water Year 2019/20

| GSA | Management Area | Agricultural Pumping | Municipal Pumping | Pumping for Export | Total |
|---|---|---|---|---|---|
| **DEID GSA** | DEID | 39,000 | 0 | 0 | 39,000 |
| | Western | 16,000 | 0 | 0 | 16,000 |
| | Richgrove CSD | 0 | 870 | 0 | 870 |
| | Earlimart PUD | 0 | 2,930 | 0 | 2,930 |
| | ***Total*** | ***55,000*** | ***3,800*** | ***0*** | ***58,800*** |

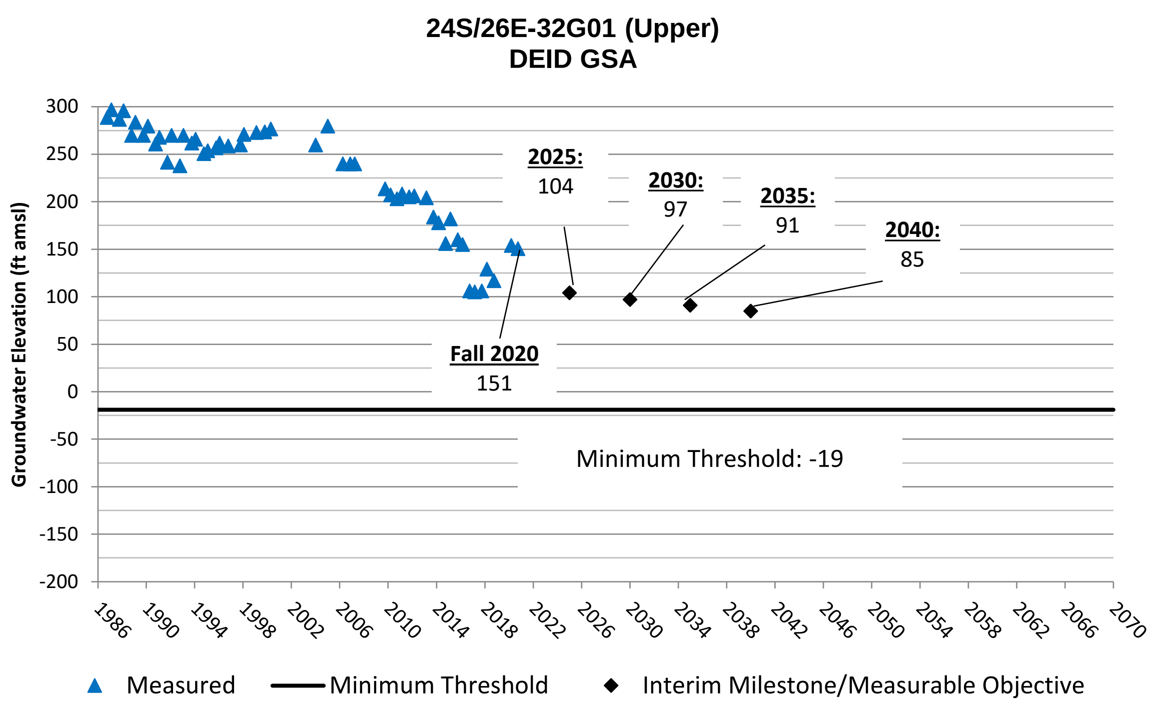
## Delano-Earlimart Irrigation District GSA
## Surface Water Supplies for Water Year 2019/20

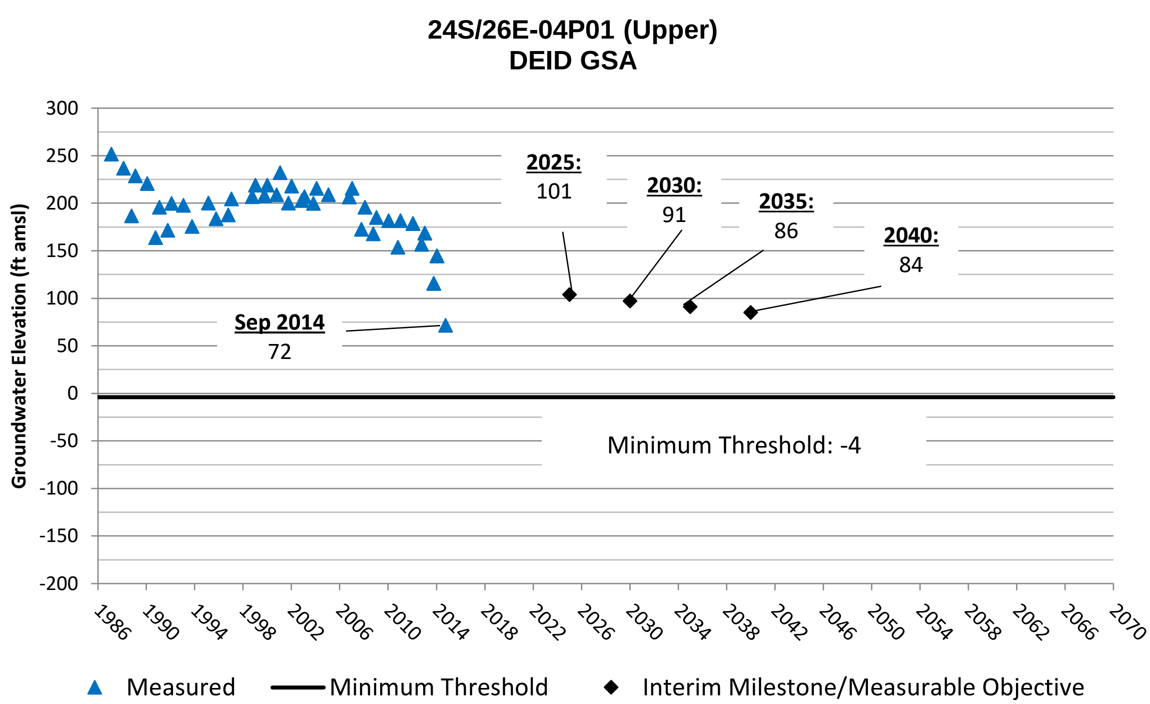
| GSA | Management Area | Stream Diversions | Imported Water | Recycled Water | Oilfield Produced Water | Precipitation | Total |
|---|---|---|---|---|---|---|---|
| DEID GSA | DEID | 0 | 137,900 | 0 | 0 | 30,000 | 167,900 |
| | Western | 0 | 0 | 0 | 0 | 3,100 | 3,100 |
| | Richgrove CSD | 0 | 0 | 0 | 0 | 200 | 200 |
| | Earlimart PUD | 0 | 0 | 0 | 0 | 500 | 500 |
| | ***Total*** | ***0*** | ***137,900*** | ***0*** | ***0*** | ***33,800*** | ***171,700*** |

## Delano-Earlimart Irrigation District GSA
## Tule Subbasin Total Water Use for Water Year 2019/20

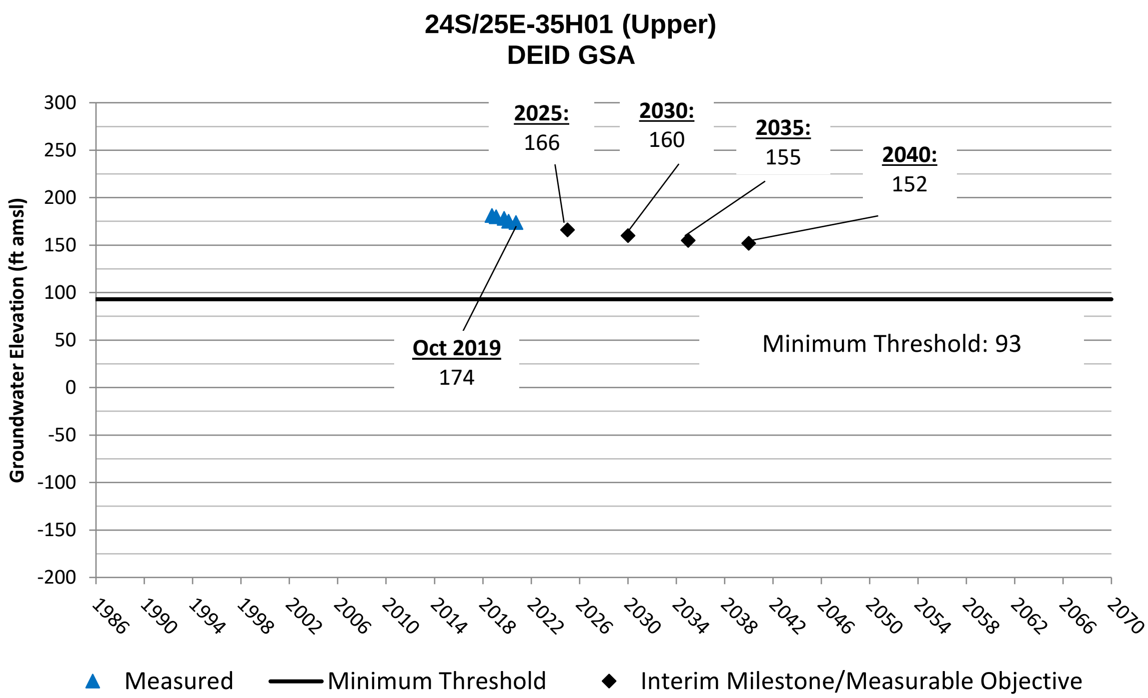
| GSA | Management Area | Groundwater Extraction | Surface Water Supplies | Total |
|---|---|---|---|---|
| DEID GSA | DEID | 39,000 | 167,900 | 206,900 |
| | Western | 16,000 | 3,100 | 19,100 |
| | Richgrove CSD | 870 | 200 | 1,070 |
| | Earlimart PUD | 2,930 | 500 | 3,430 |
| | ***Total*** | ***58,800*** | ***171,700*** | ***230,500*** |

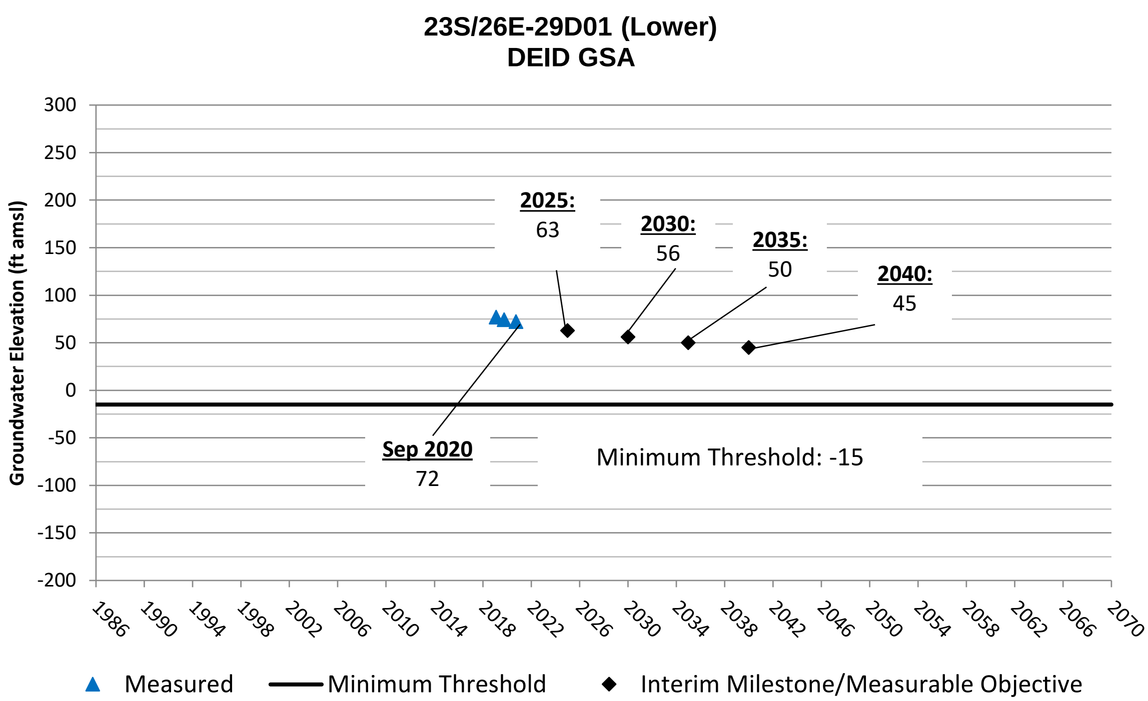
# Delano-Earlimart Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



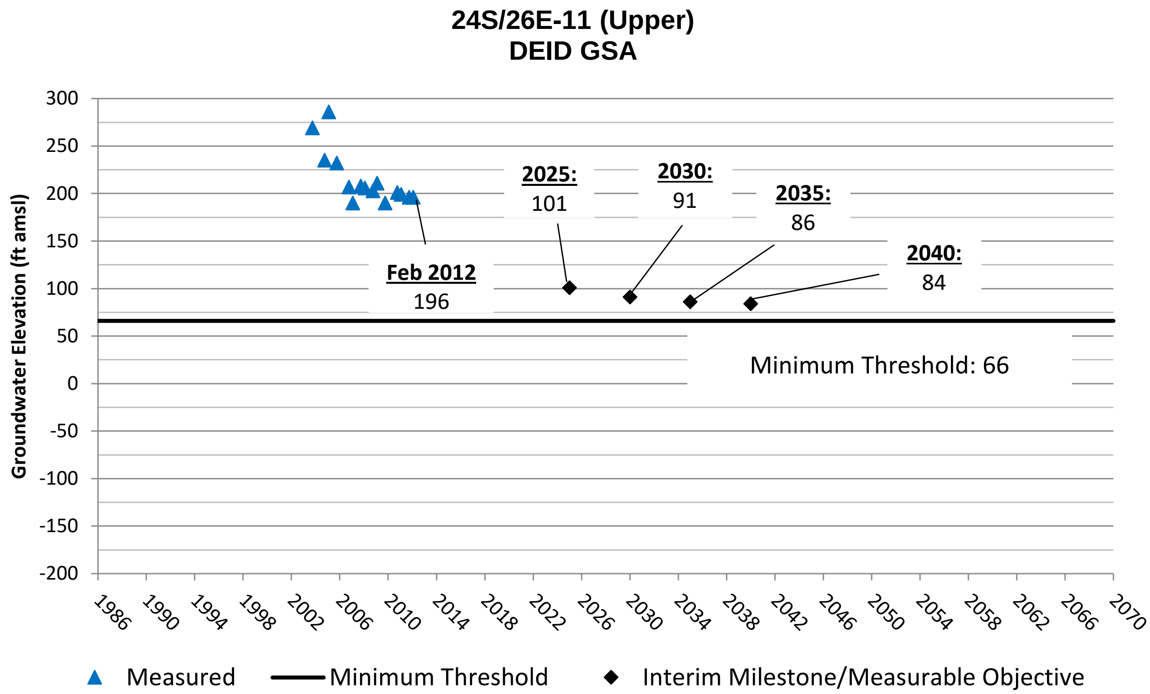



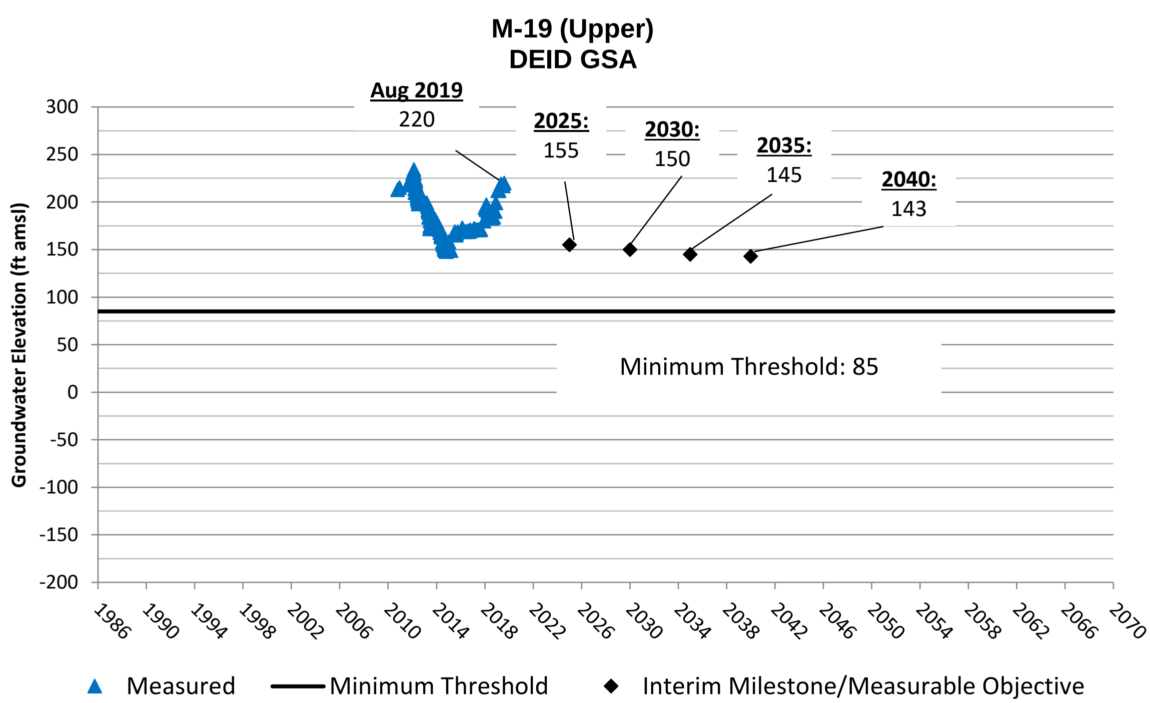
# Delano-Earlimart Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



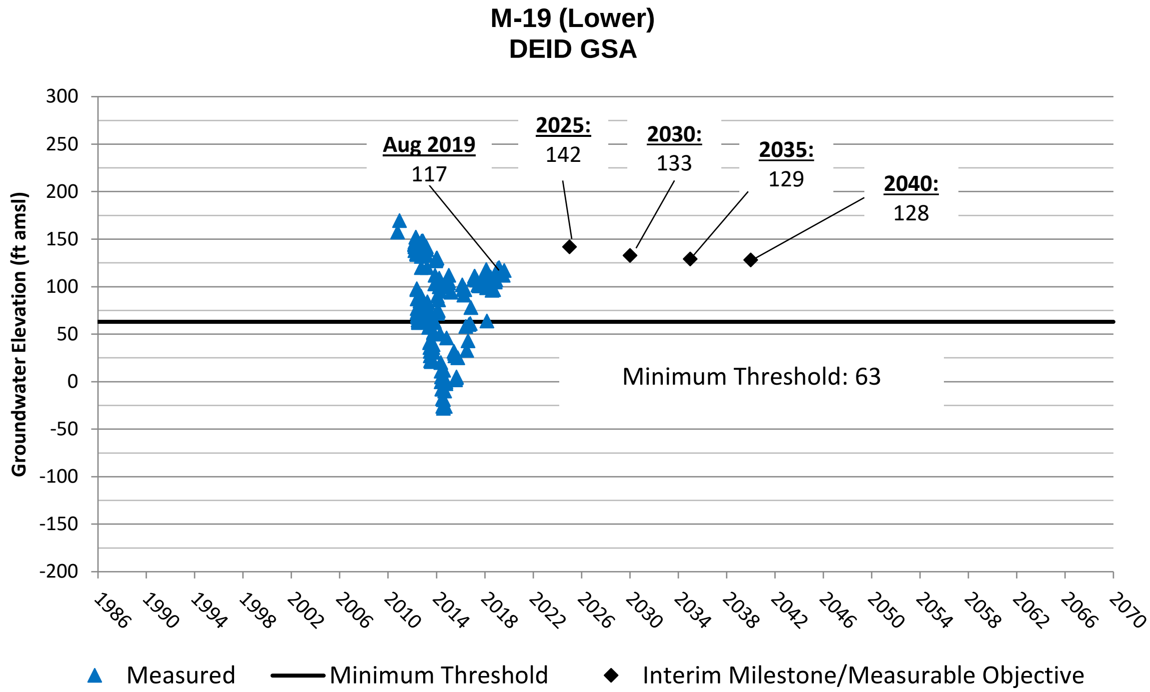



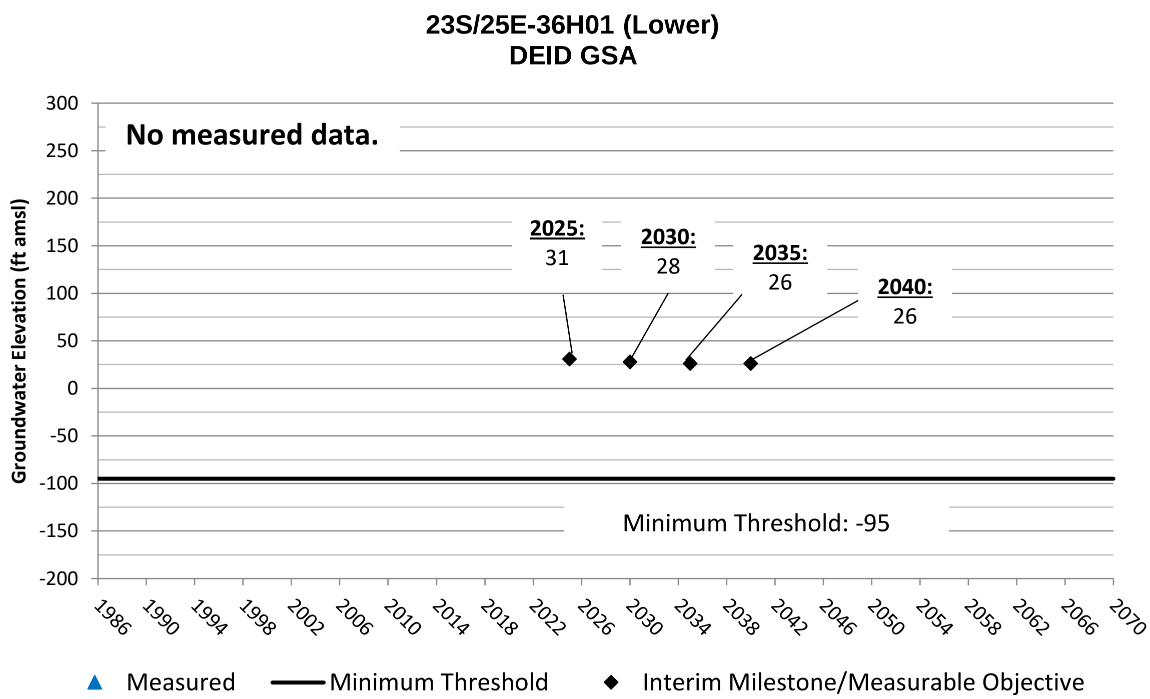
# Delano-Earlimart Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



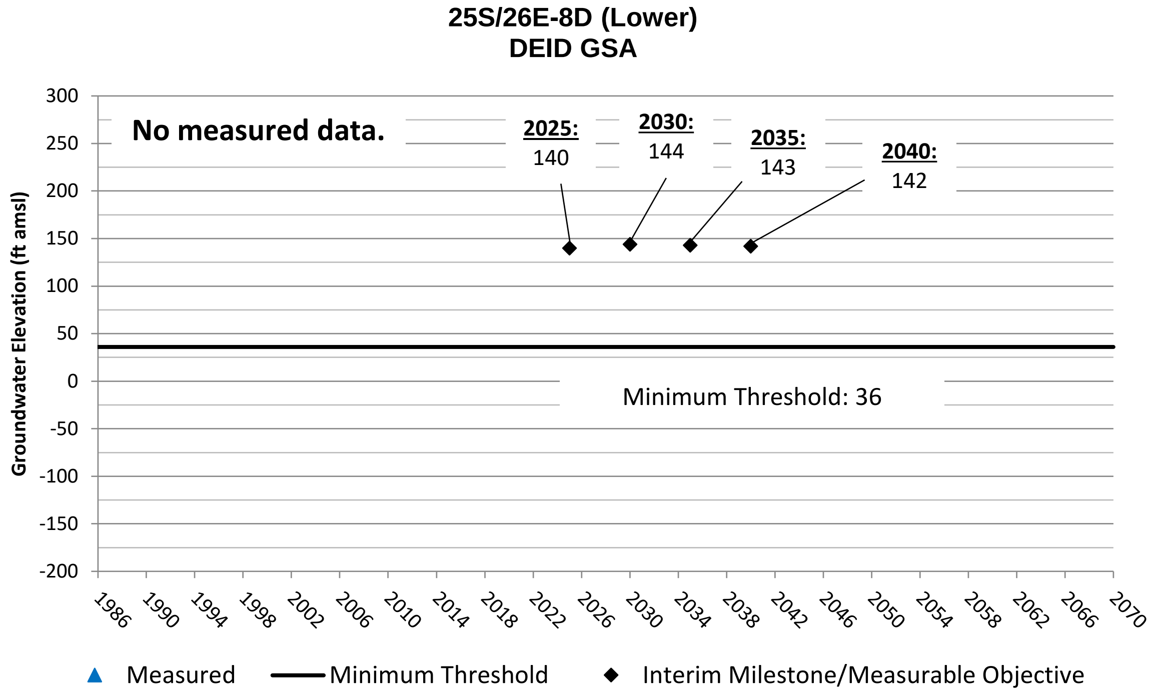



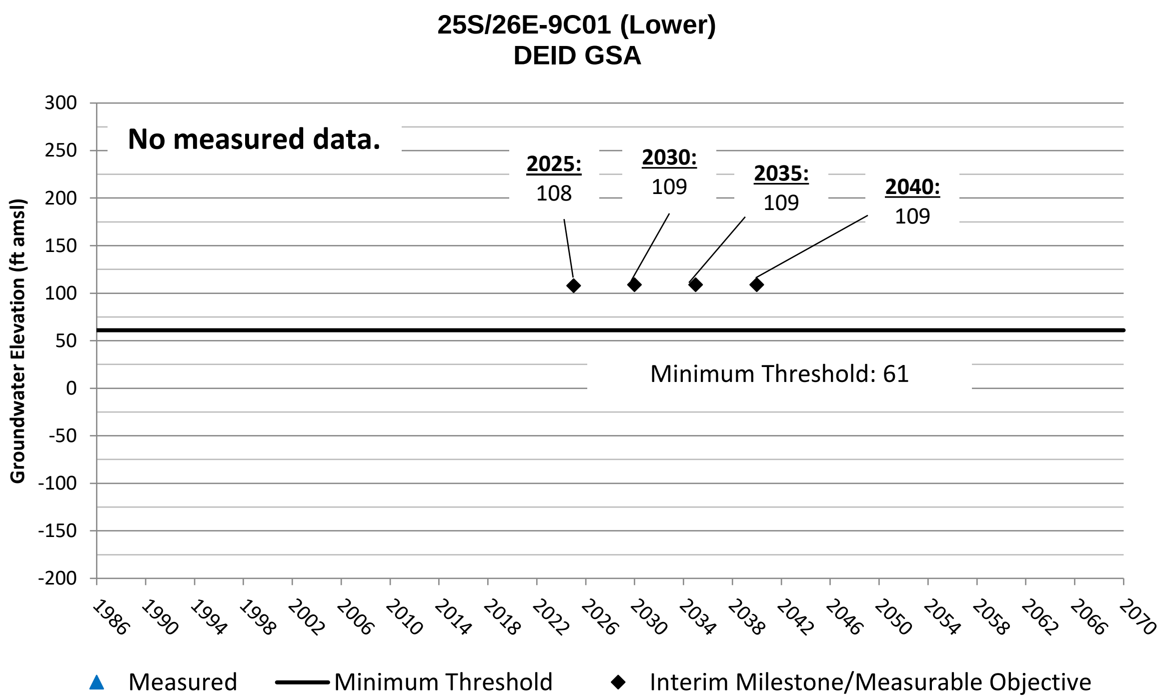
# Delano-Earlimart Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



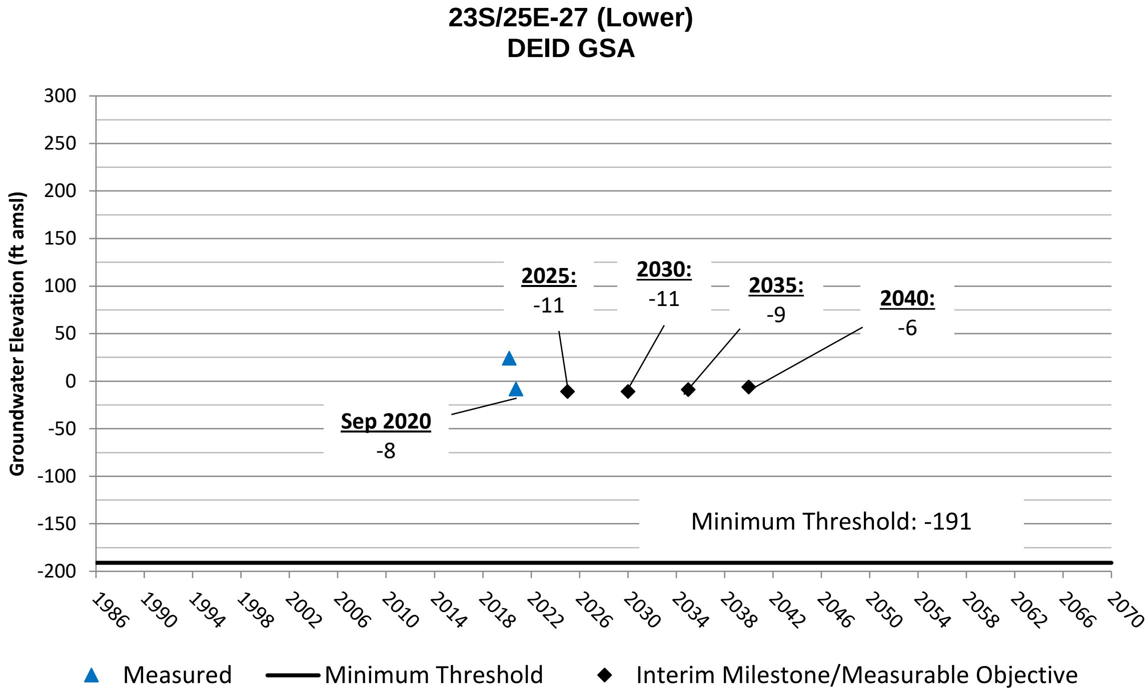



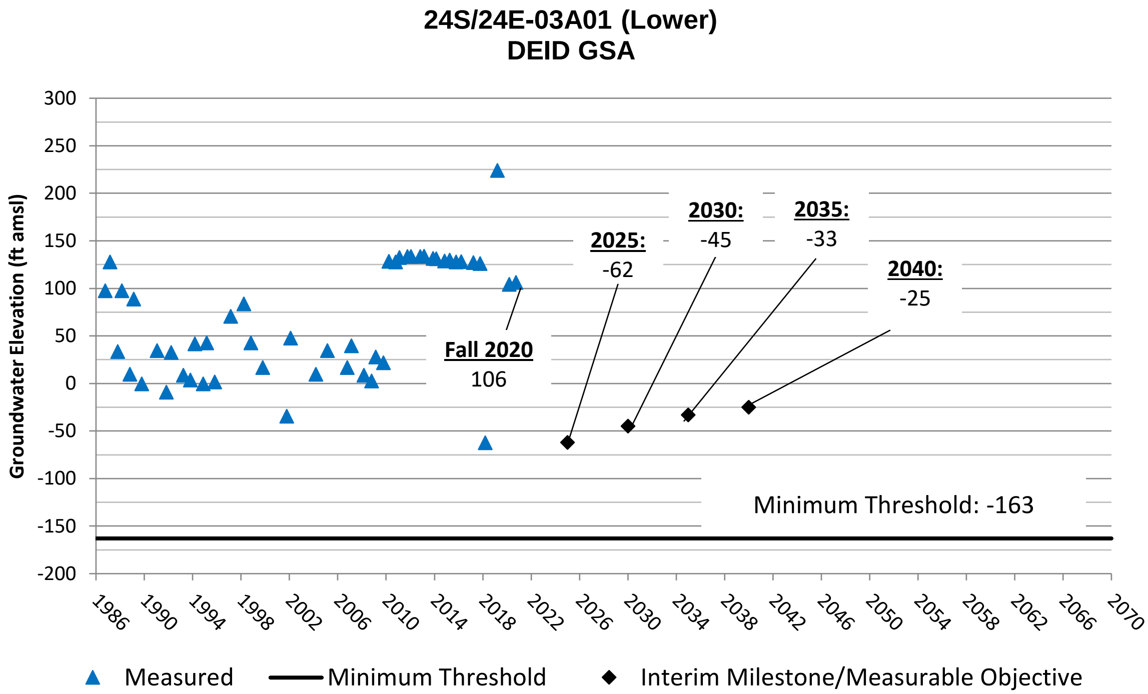
# Delano-Earlimart Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



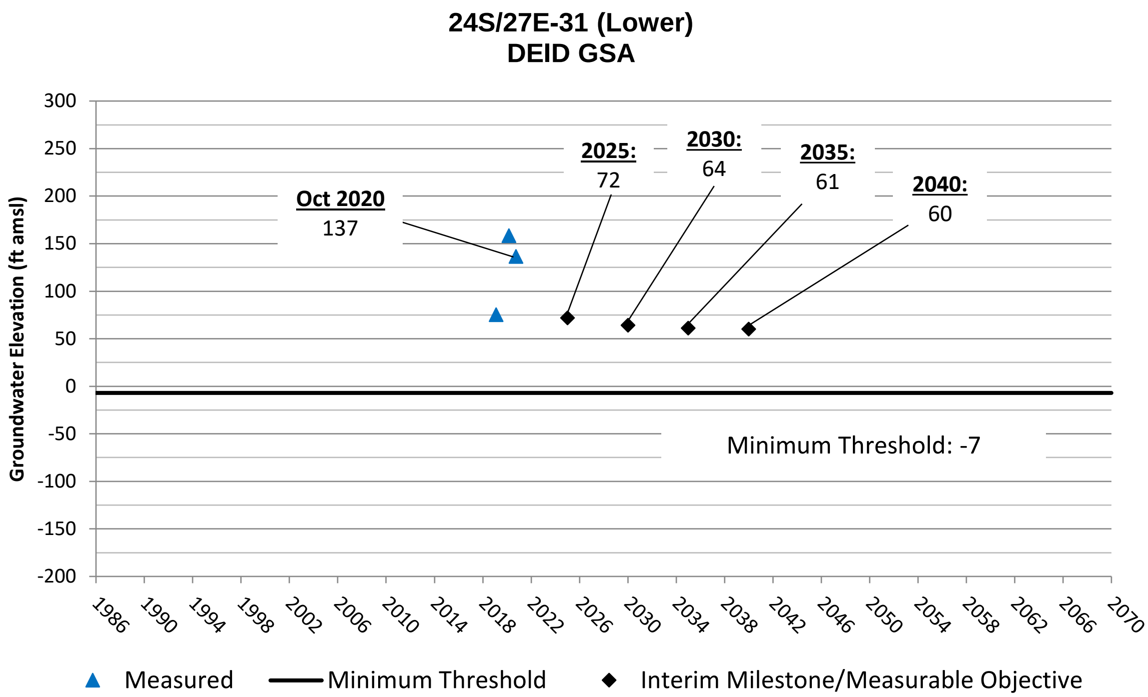



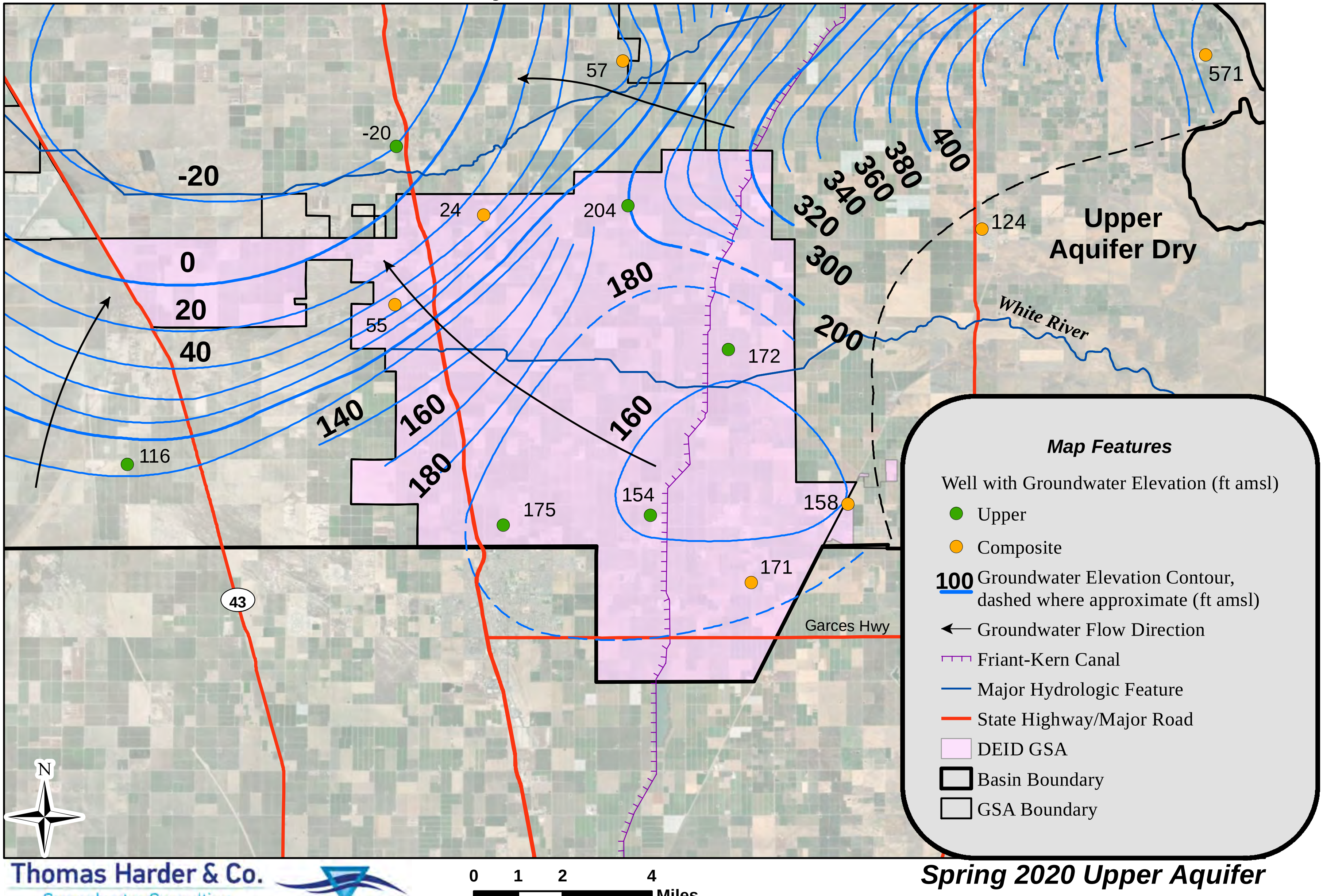
# Delano-Earlimart Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



## Delano-Earlimart Irrigation District GSA
## RMS Groundwater Elevation Hydrographs



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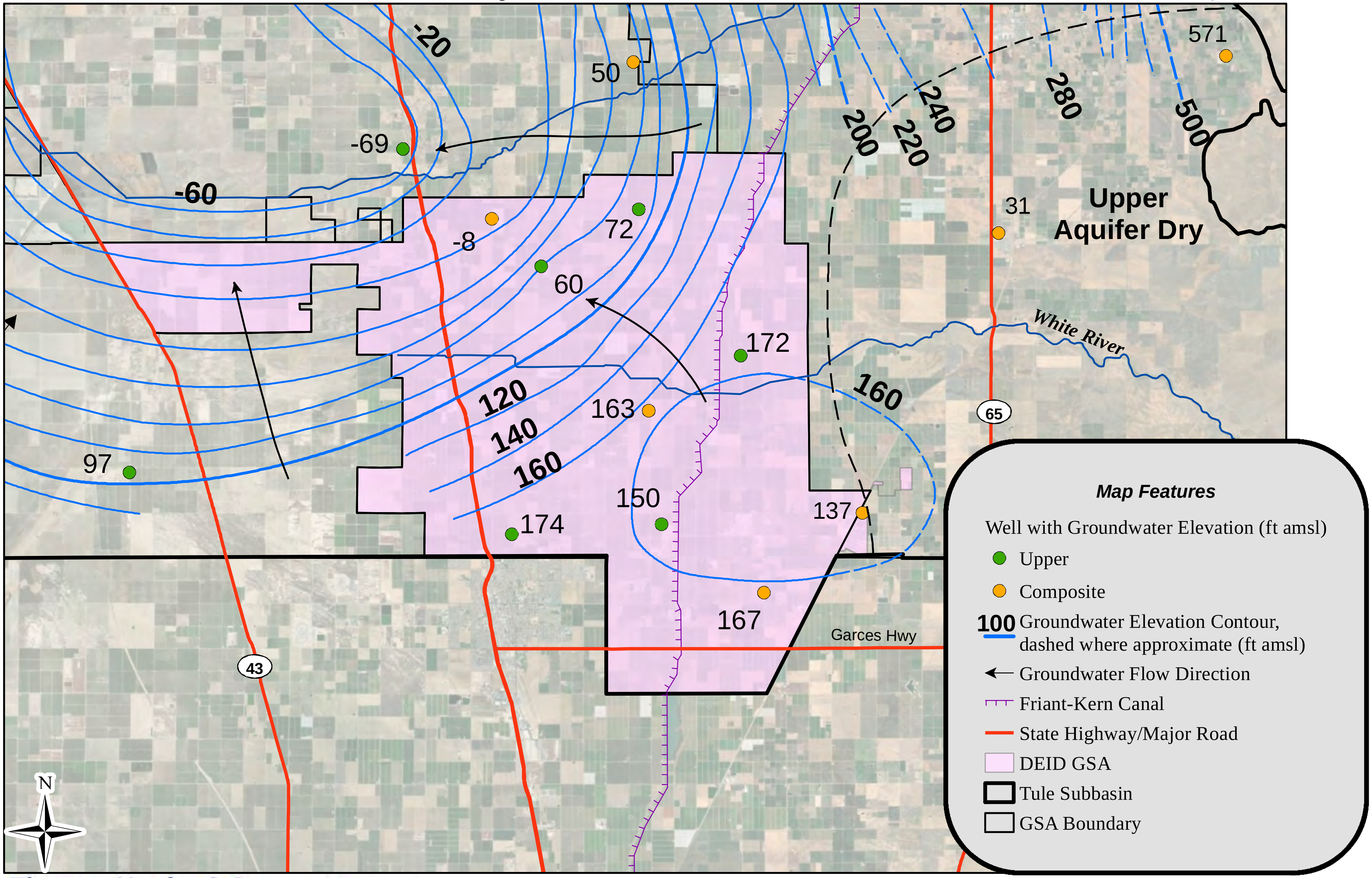
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Spring 2020 Upper Aquifer**
**DEID GSA**
**Appendix C**
**Figure 8**

## Tule Subbasin Technical Advisory Committee

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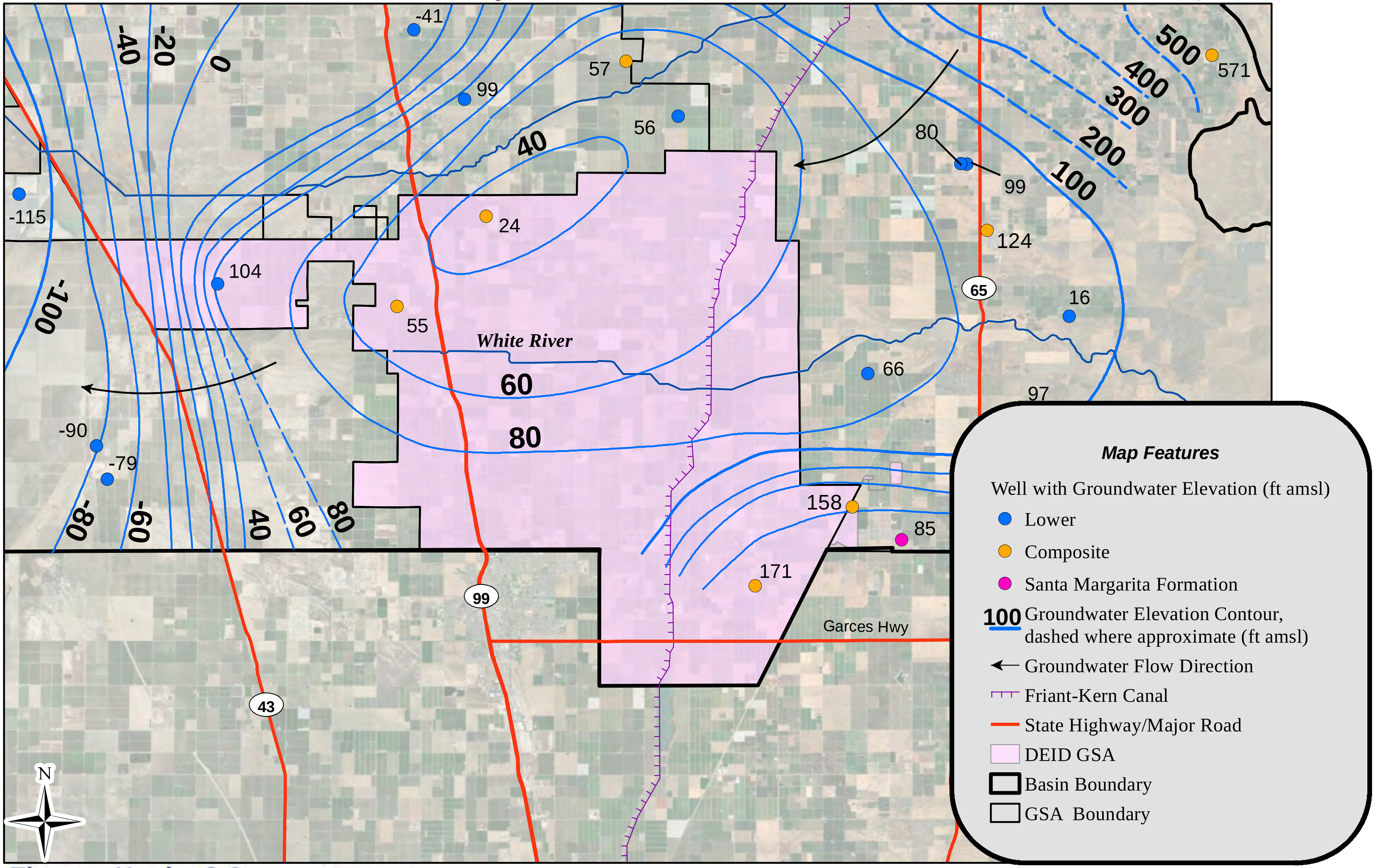
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Fall 2020 Upper Aquifer**
**DEID GSA**
**Appendix C**
**Figure 9**

2019/2020 Annual Report
April 2021

# Tule Subbasin Technical Advisory Committee

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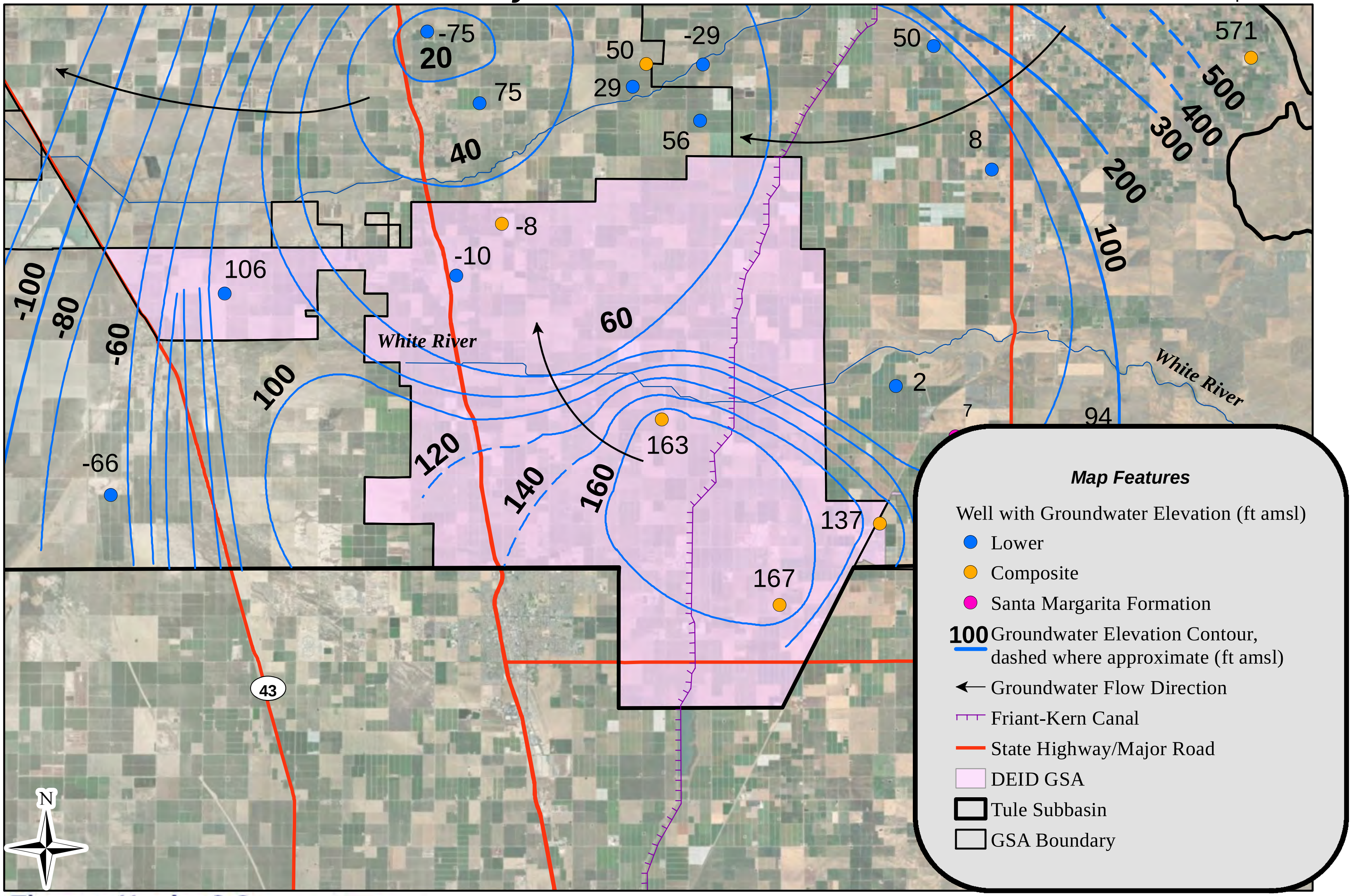
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Spring 2020 Lower Aquifer**
**DEID GSA**
**Appendix C**
**Figure 10**

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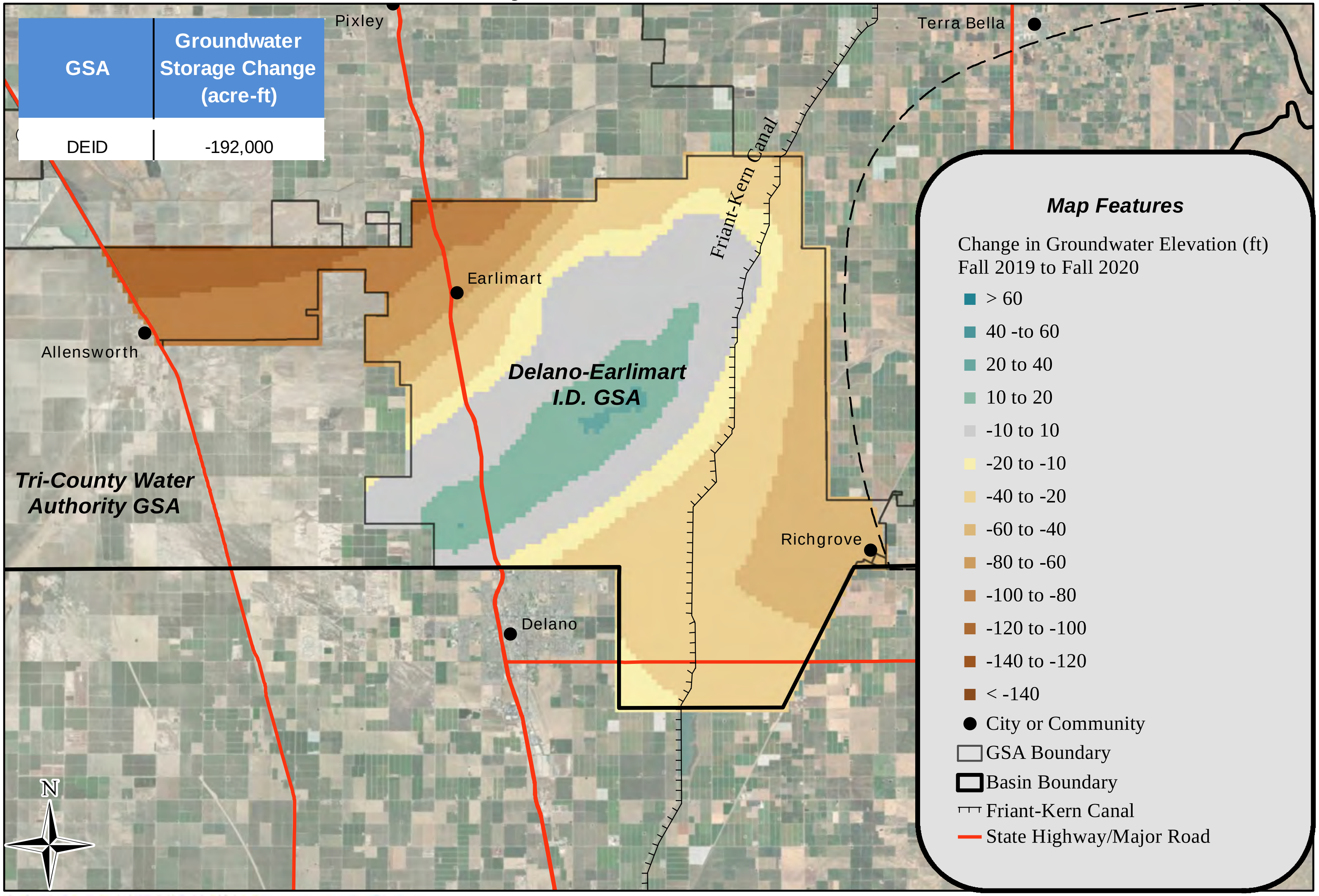
0 1 2 4 Miles

NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Fall 2020 Lower Aquifer**
**DEID GSA**
**Appendix C**
**Figure 11**

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**Change in Groundwater Elevation Fall 2019 to Fall 2020**
**DEID GSA**

**Appendix C**
**Figure 12**

# Appendix D

# Pixley Irrigation District GSA 2019/20 Annual Data

## Pixley Irrigation District GSA
## Groundwater Extraction for Water Year 2019/20

| GSA | Management Area | Agricultural Pumping | Municipal Pumping | Pumping for Export | Total |
|---|---|---|---|---|---|
| Pixley ID GSA | Pixley ID | 157,000 | 0 | 0 | 157,000 |
| | Pixley PUD | 0 | 580 | 0 | 580 |
| | Teviston CSD | 0 | 220 | 0 | 220 |
| | ***Total*** | ***157,000*** | ***800*** | ***0*** | ***157,800*** |

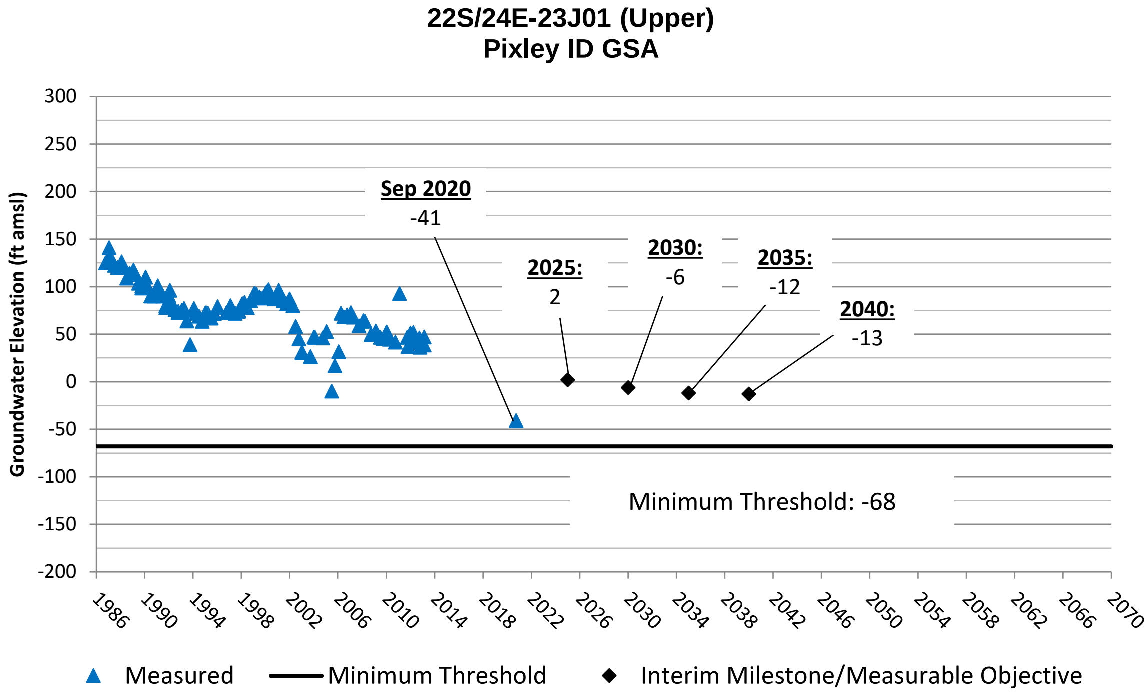
## Pixley Irrigation District GSA
## Surface Water Supplies for Water Year 2019/20

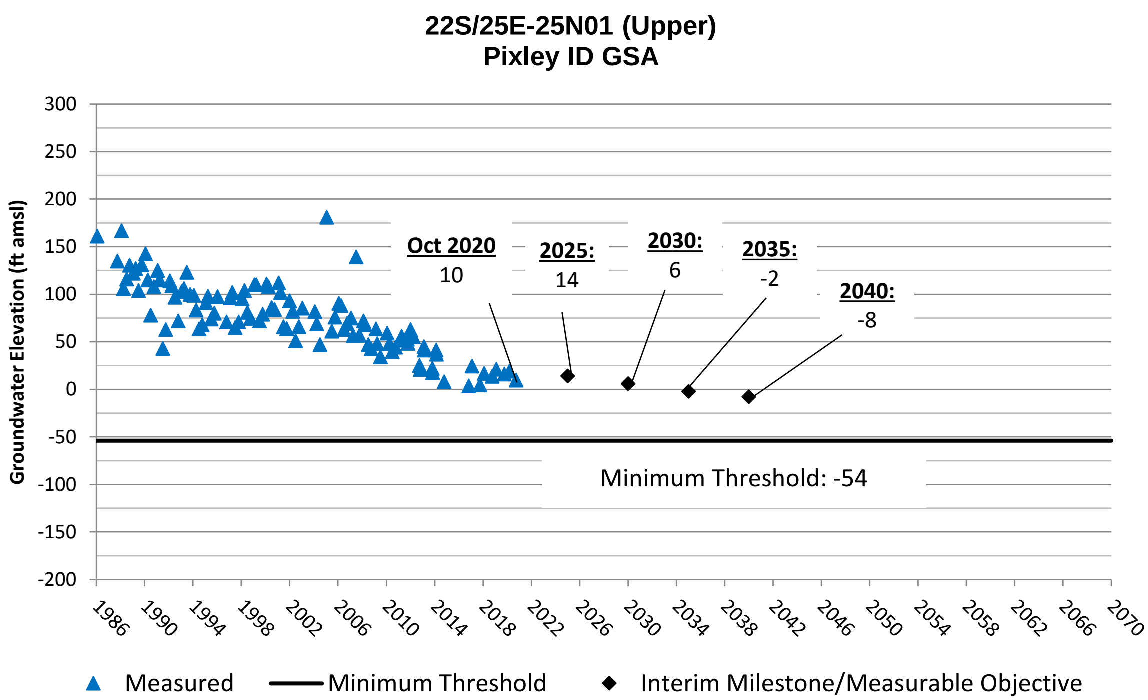
| GSA | Management Area | Stream Diversions | Imported Water | Recycled Water | Oilfield Produced Water | Precipitation | Total |
|---|---|---|---|---|---|---|---|
| Pixley ID GSA | Pixley ID | 0 | 31,600 | 0 | 0 | 32,200 | 63,800 |
| | Pixley PUD | 0 | 0 | 0 | 0 | 1,100 | 1,100 |
| | Teviston CSD | 0 | 0 | 0 | 0 | 700 | 700 |
| | ***Total*** | ***0*** | ***31,600*** | ***0*** | ***0*** | ***34,000*** | ***65,600*** |

## Pixley Irrigation District GSA
## Tule Subbasin Total Water Use for Water Year 2019/20

| GSA | Management Area | Groundwater Extraction | Surface Water Supplies | Total |
|---|---|---|---|---|
| Pixley ID GSA | Pixley ID | 157,000 | 63,800 | 220,800 |
| | Pixley PUD | 580 | 1,100 | 1,680 |
| | Teviston CSD | 220 | 700 | 920 |
| | ***Total*** | ***157,800*** | ***65,600*** | ***223,400*** |

# Pixley Irrigation District GSA
# RMS Groundwater Elevation Hydrographs

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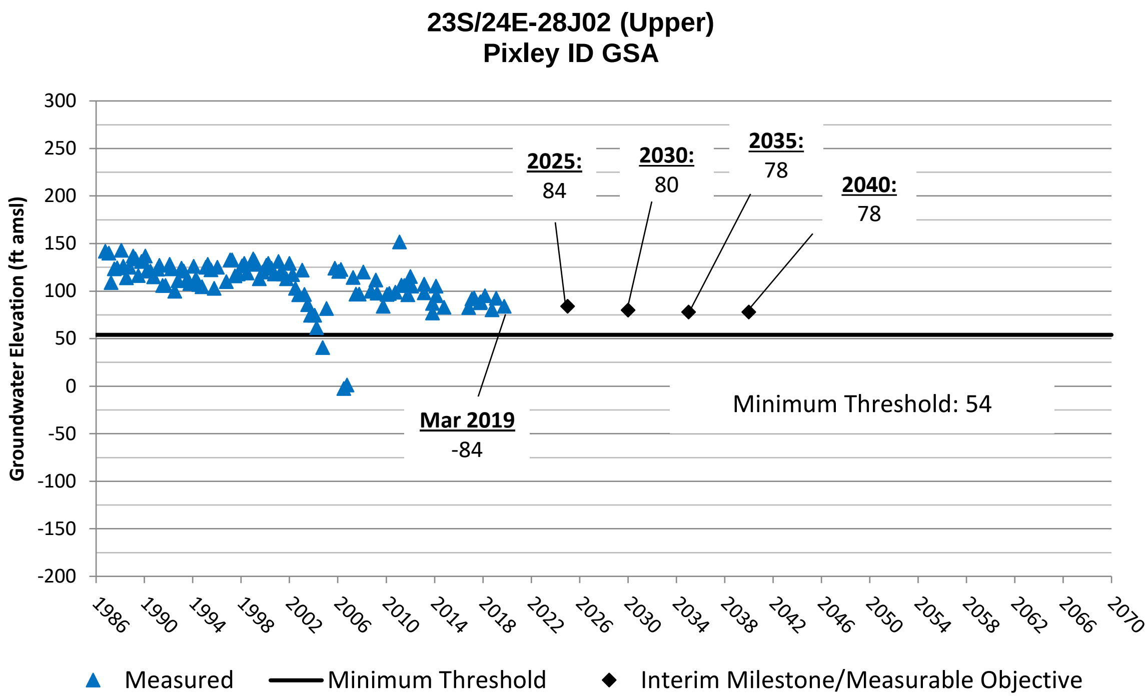
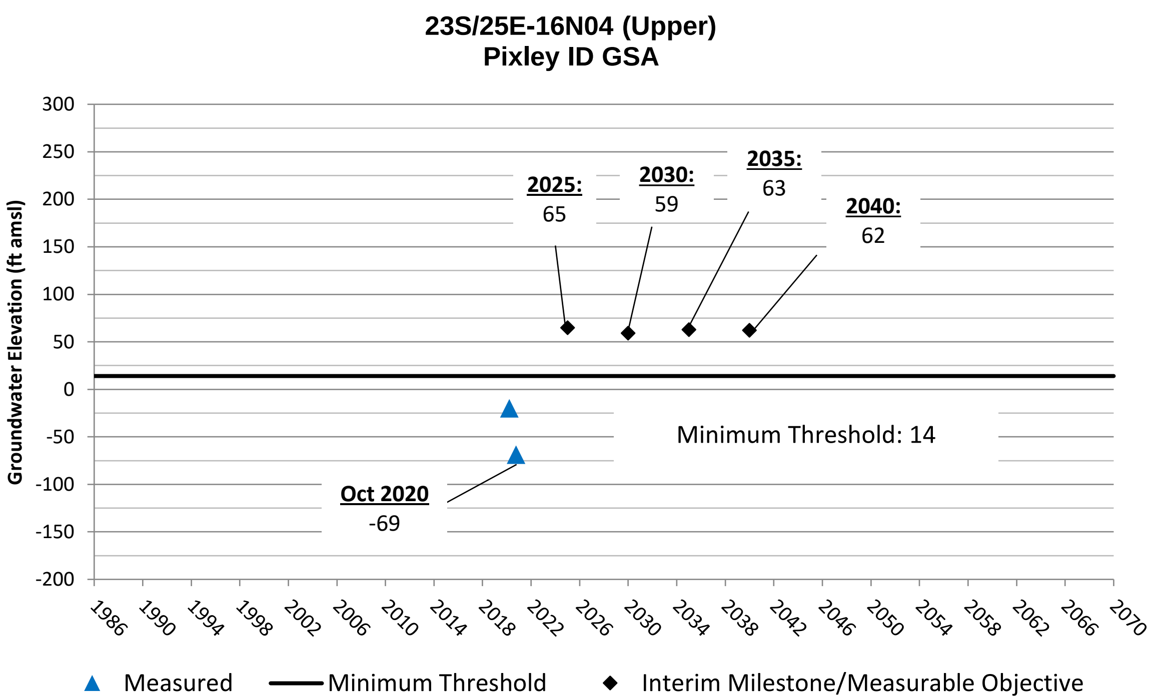
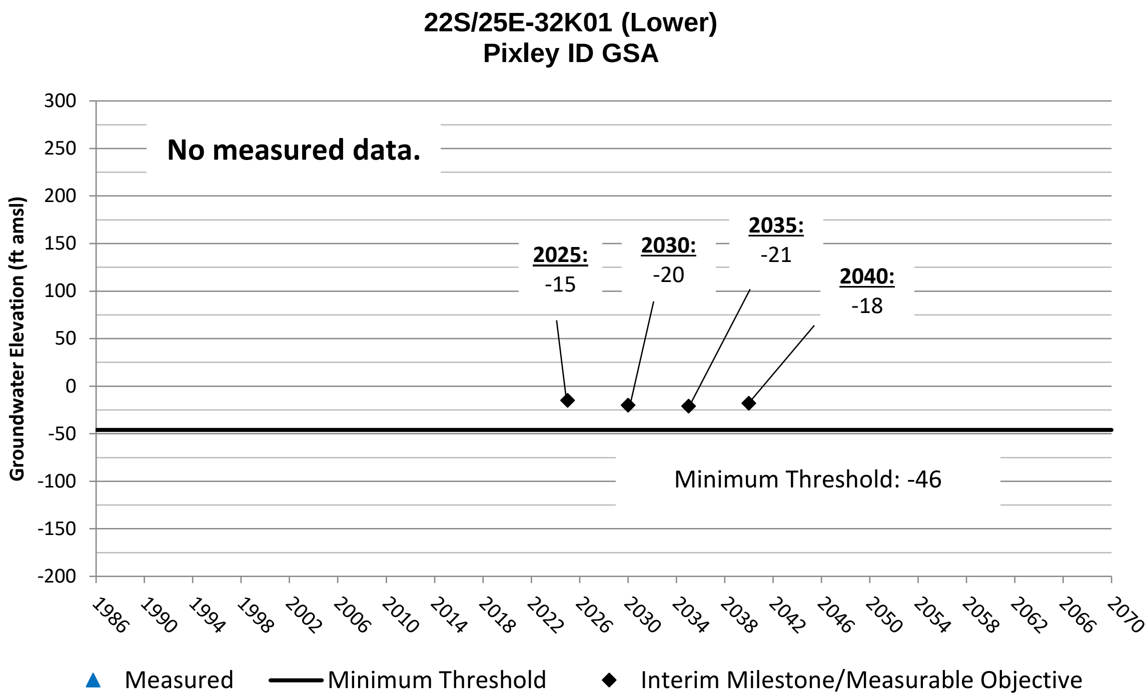
# Pixley Irrigation District GSA
# RMS Groundwater Elevation Hydrographs

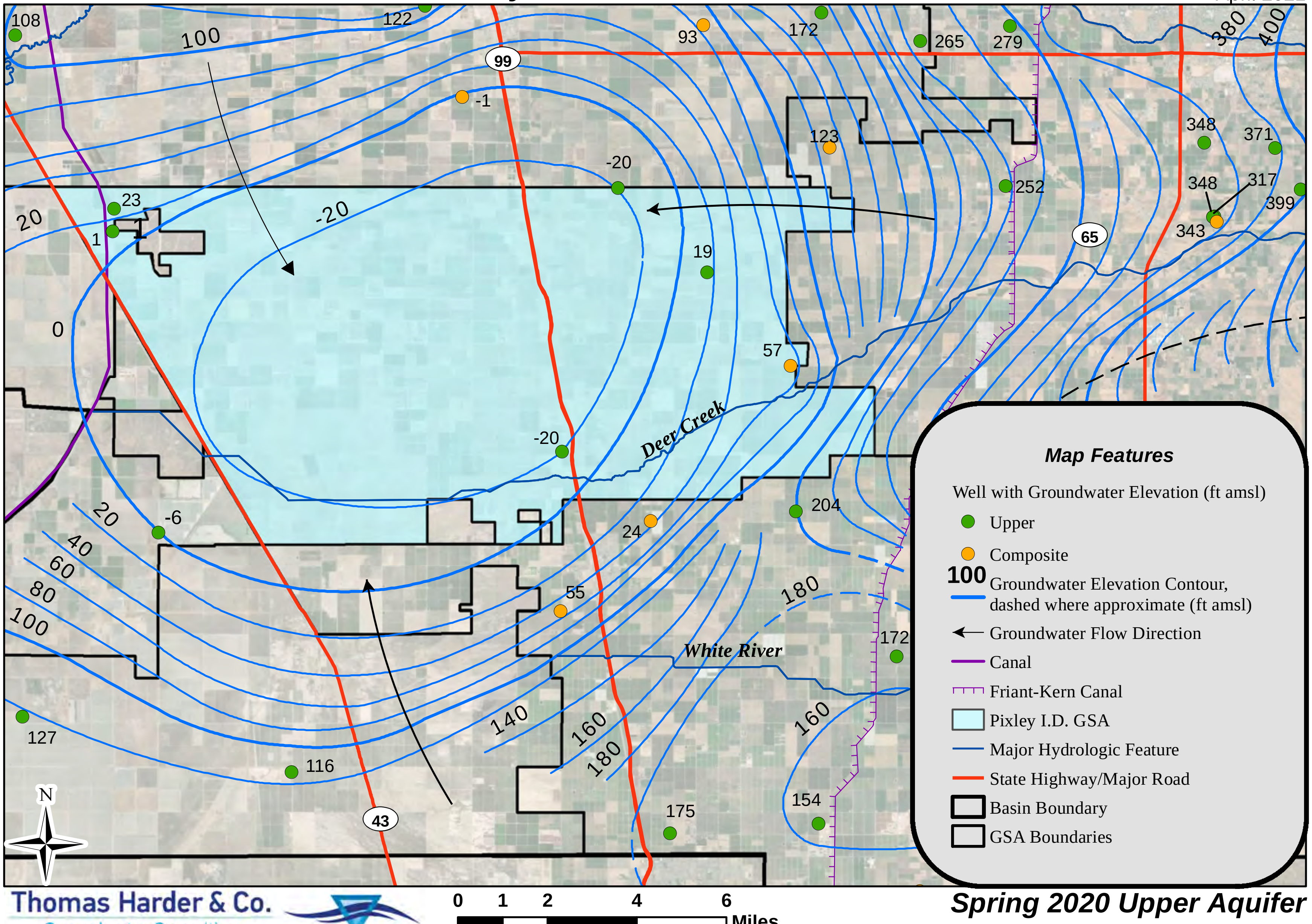


## Pixley Irrigation District GSA
## RMS Groundwater Elevation Hydrographs



# Tule Subbasin Technical Advisory Committee

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Groundwater Consulting

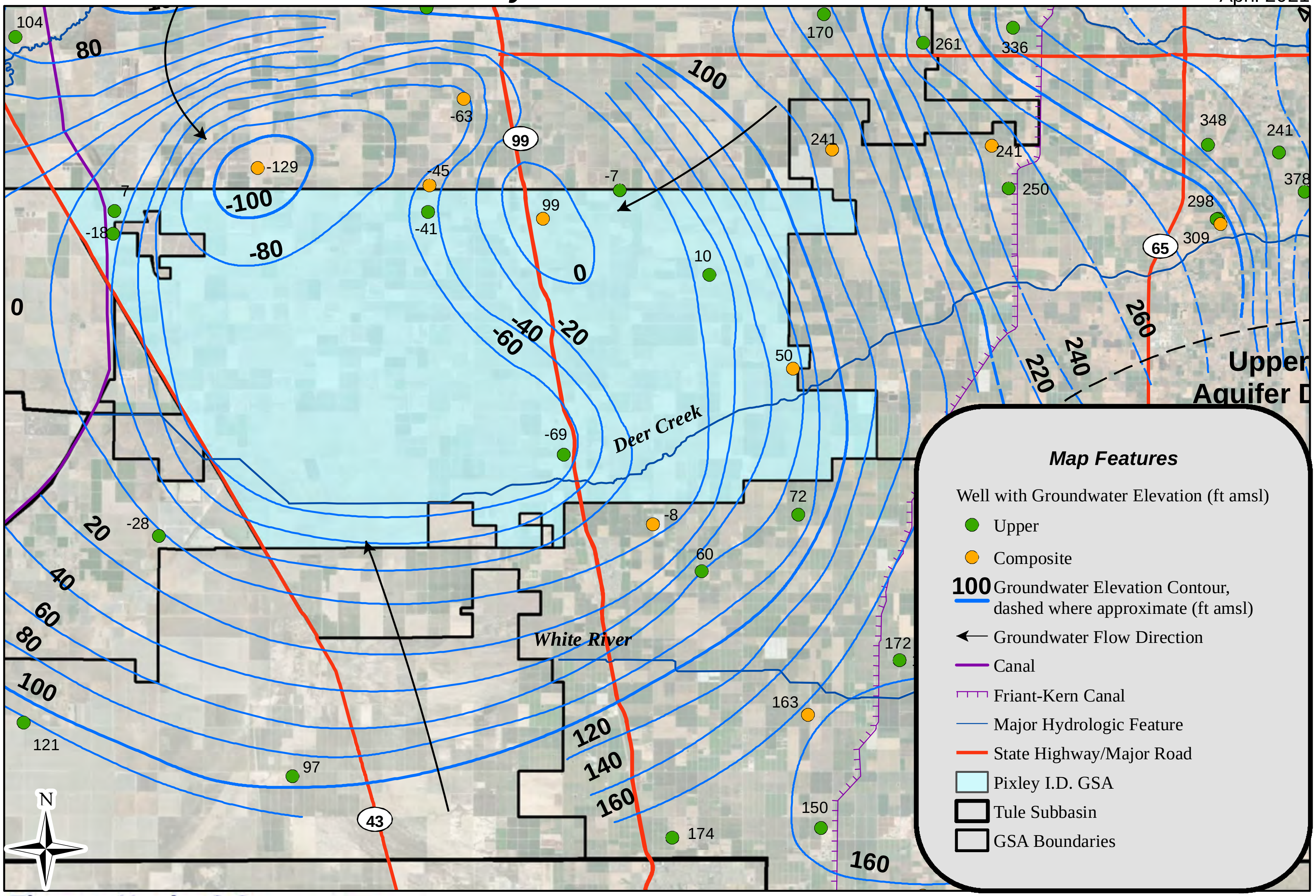
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

## Spring 2020 Upper Aquifer
## Pixley I.D. GSA

Appendix D
FIgure 4

## Tule Subbasin Technical Advisory Committee

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NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

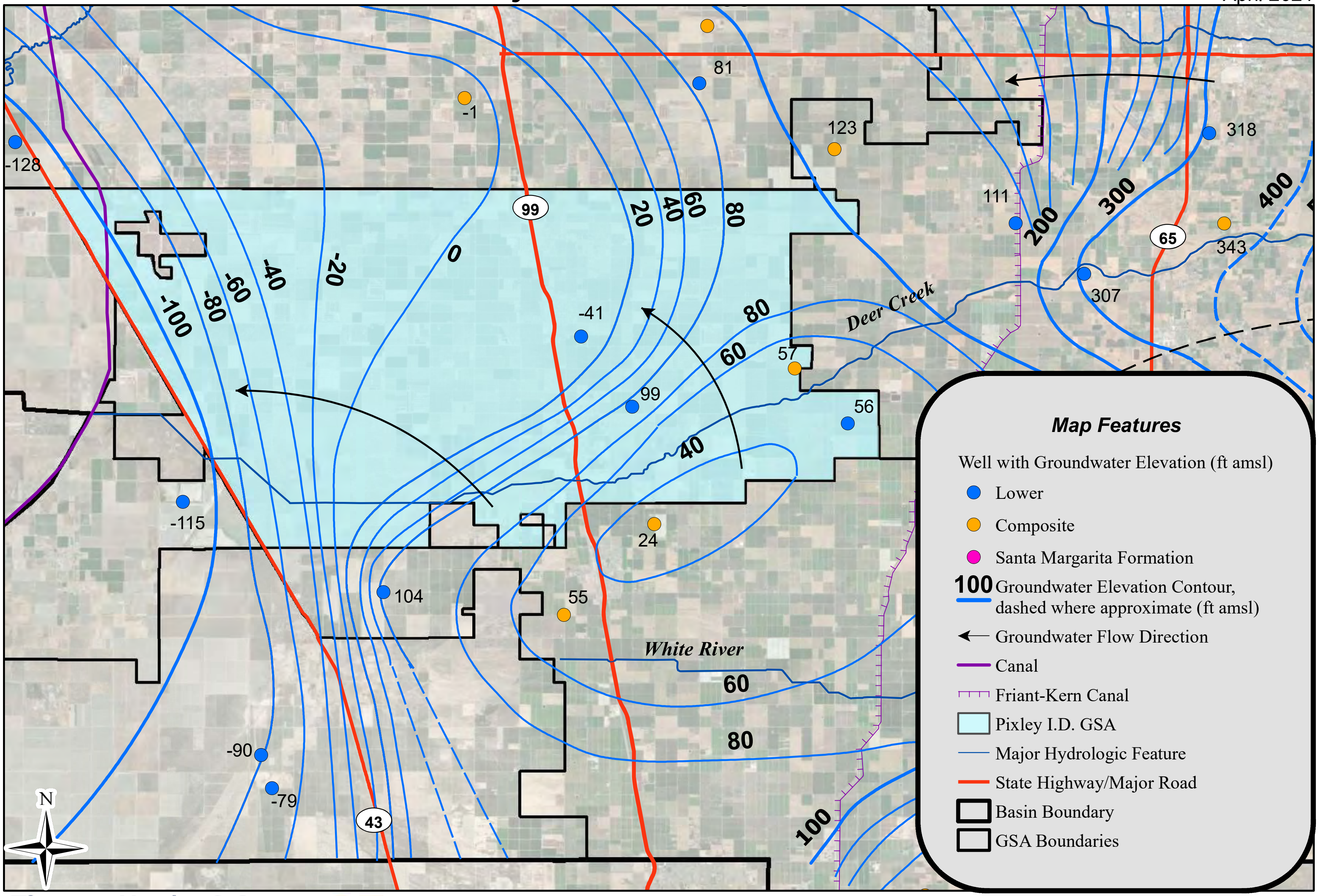
**Fall 2020 Upper Aquifer**
**Pixley I.D. GSA**

**Appendix D**
**FIgure 5**

## Tule Subbasin Technical Advisory Committee

**2019/2020 Annual Report**

April 2021

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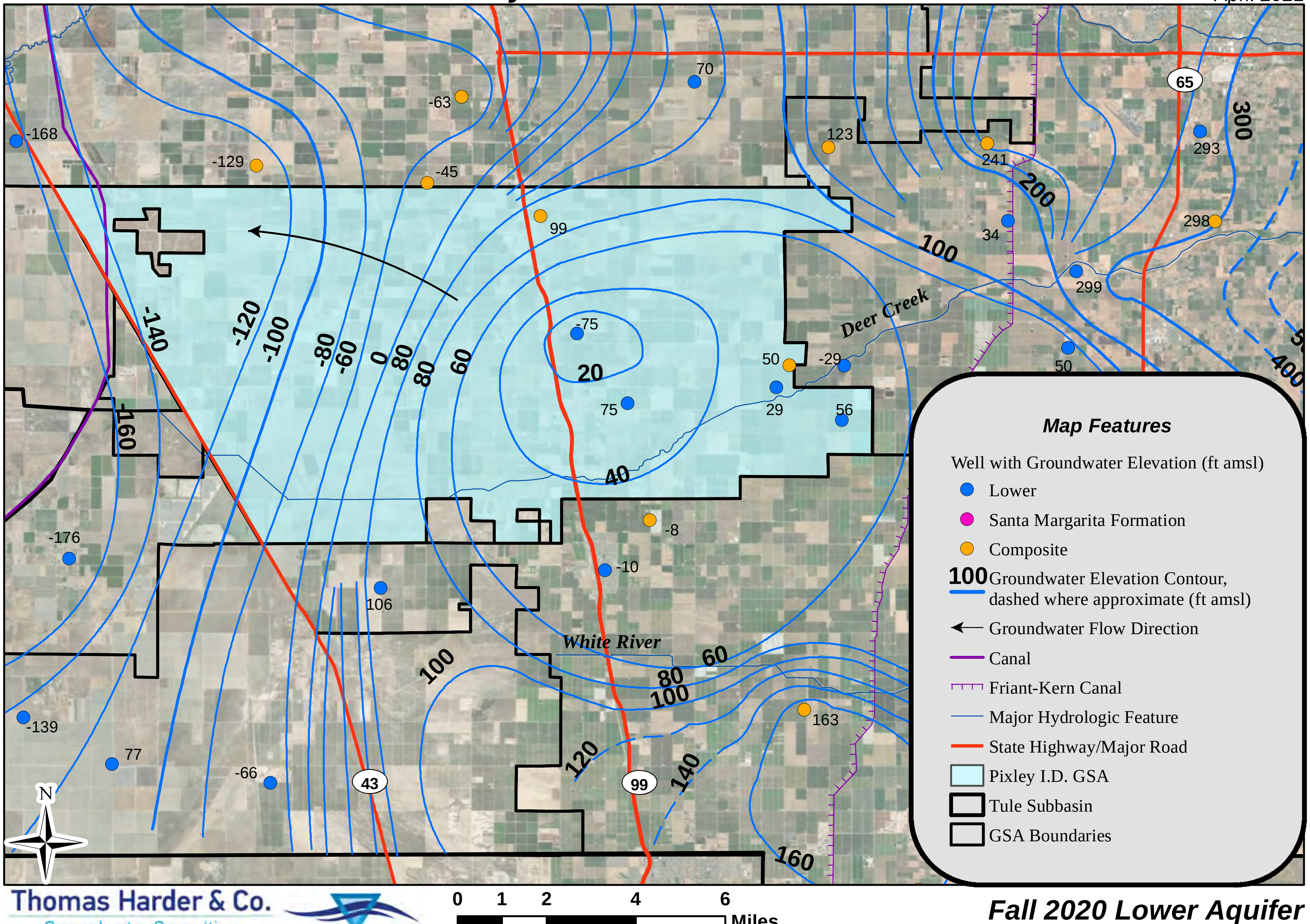
0 1 2 4 6 Miles

NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Spring 2020 Lower Aquifer**
**Pixley I.D. GSA**
**Appendix D**
**Figure 6**

Tule Subbasin Technical Advisory Committee




Thomas Harder & Co.
Groundwater Consulting

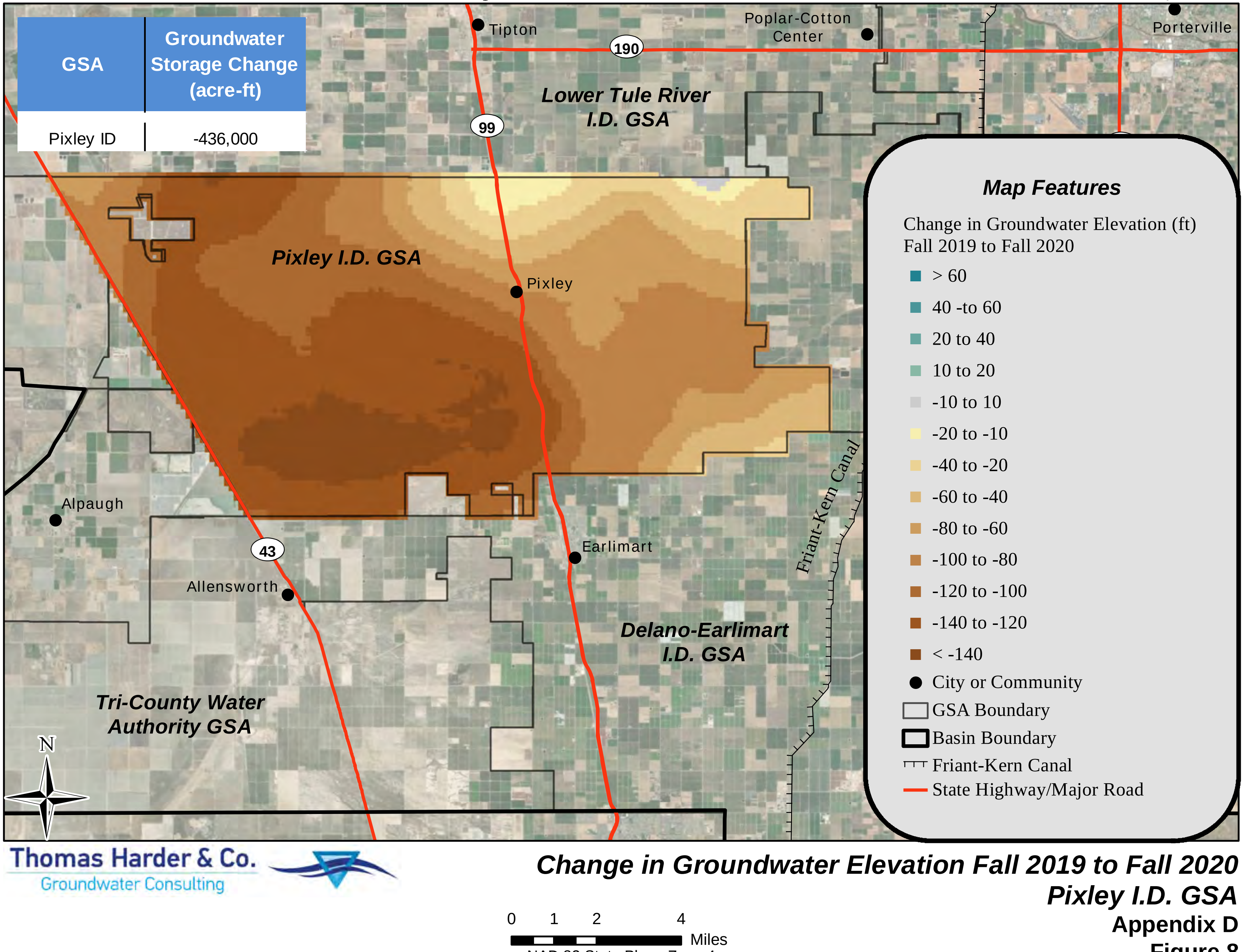
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

Fall 2020 Lower Aquifer
Pixley I.D. GSA
Appendix D
FIgure 7

# Tule Subbasin Technical Advisory Committee

| GSA | Groundwater Storage Change (acre-ft) |
| --- | --- |
| Pixley ID | -436,000 |




Thomas Harder & Co.
Groundwater Consulting

## Change in Groundwater Elevation Fall 2019 to Fall 2020
## Pixley I.D. GSA
Appendix D
Figure 8

# Appendix E

# Tri-County Groundwater Authority GSA 2019/20 Annual Data

## Tri-County Water Authority GSA
## Groundwater Extraction for Water Year 2019/20

| GSA | Management Area | Agricultural Pumping | Municipal Pumping | Pumping for Export | Total |
|---|---|---|---|---|---|
| **TCWA GSA** | North | 9,500 | 0 | 13,960 | 23,460 |
| | Southeast | 58,000 | 100 | 0 | 58,100 |
| | ***Total*** | ***67,500*** | ***100*** | ***13,960*** | ***81,560*** |

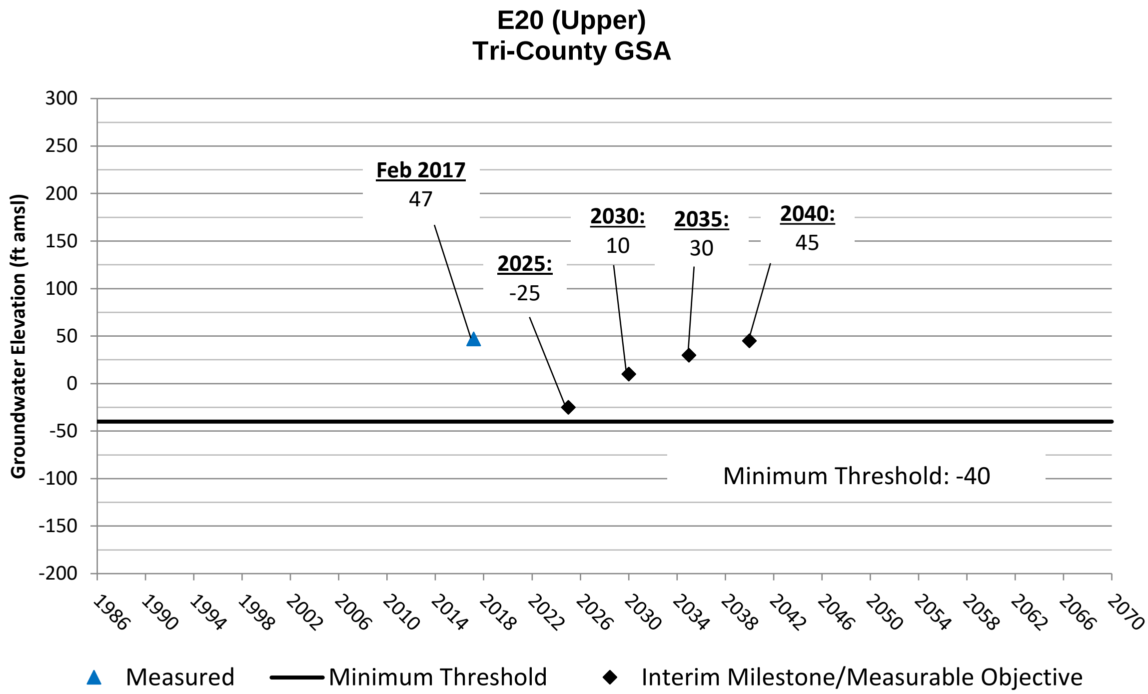
## Tri-County Water Authority GSA
## Surface Water Supplies for Water Year 2019/20

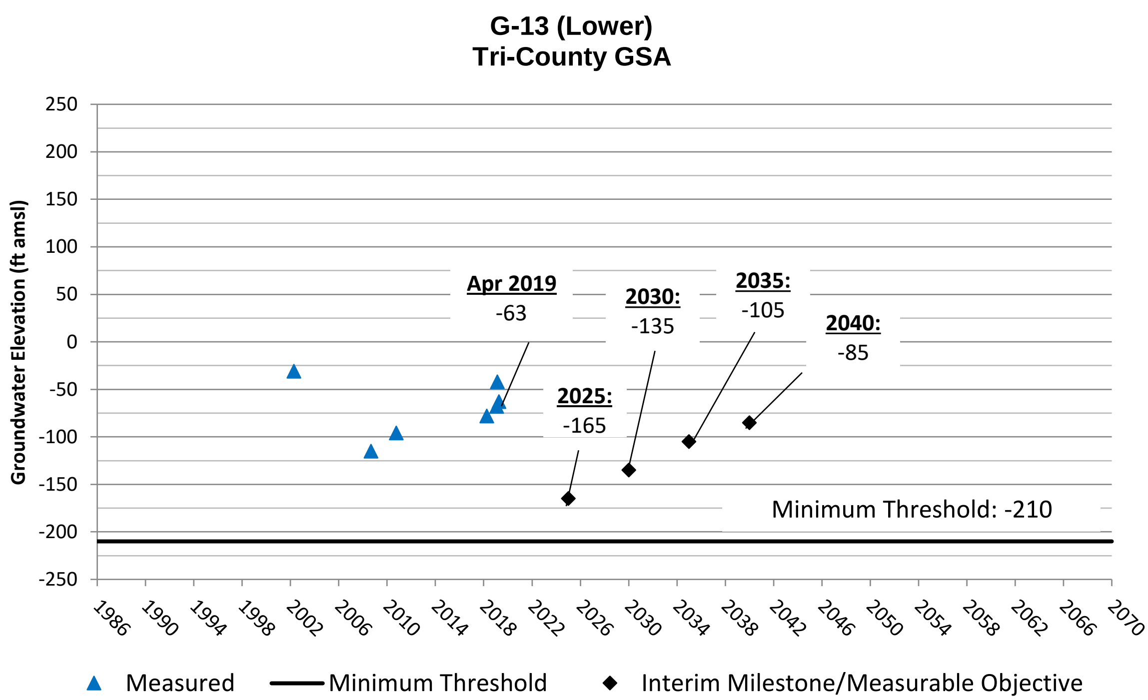
| GSA | Management Area | Stream Diversions | Imported Water | Recycled Water | Oilfield Produced Water | Precipitation | Total |
|---|---|---|---|---|---|---|---|
| **TCWA GSA** | North | 0 | 2,400 | 0 | 0 | 5,100 | 7,500 |
| | Southeast | 0 | 0 | 0 | 0 | 20,700 | 20,700 |
| | ***Total*** | ***0*** | ***2,400*** | ***0*** | ***0*** | ***25,800*** | ***28,200*** |

## Tri-County Water Authority GSA
## Tule Subbasin Total Water Use for Water Year 2019/20

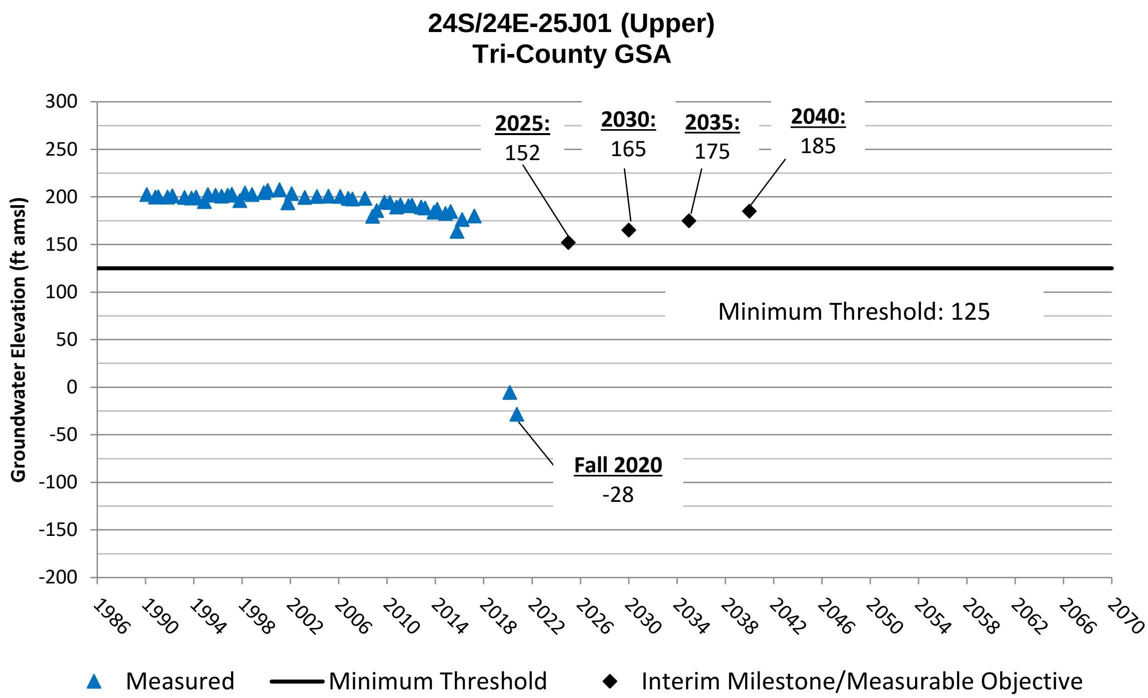
| GSA | Management Area | Groundwater Extraction | Surface Water Supplies | Total |
|---|---|---|---|---|
| TCWA GSA | North | 23,460 | 7,500 | 30,960 |
| | Southeast | 58,100 | 20,700 | 78,800 |
| | ***Total*** | ***81,560*** | ***28,200*** | ***109,760*** |

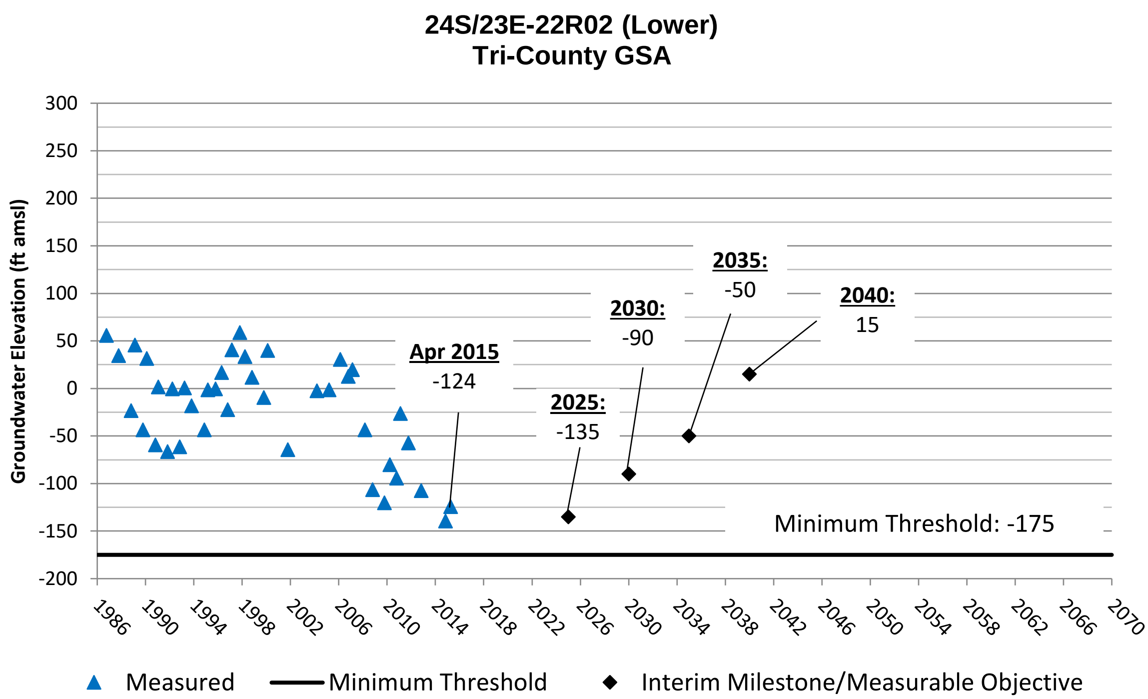
# Tri-County Water Authority GSA
# RMS Groundwater Elevation Hydrographs



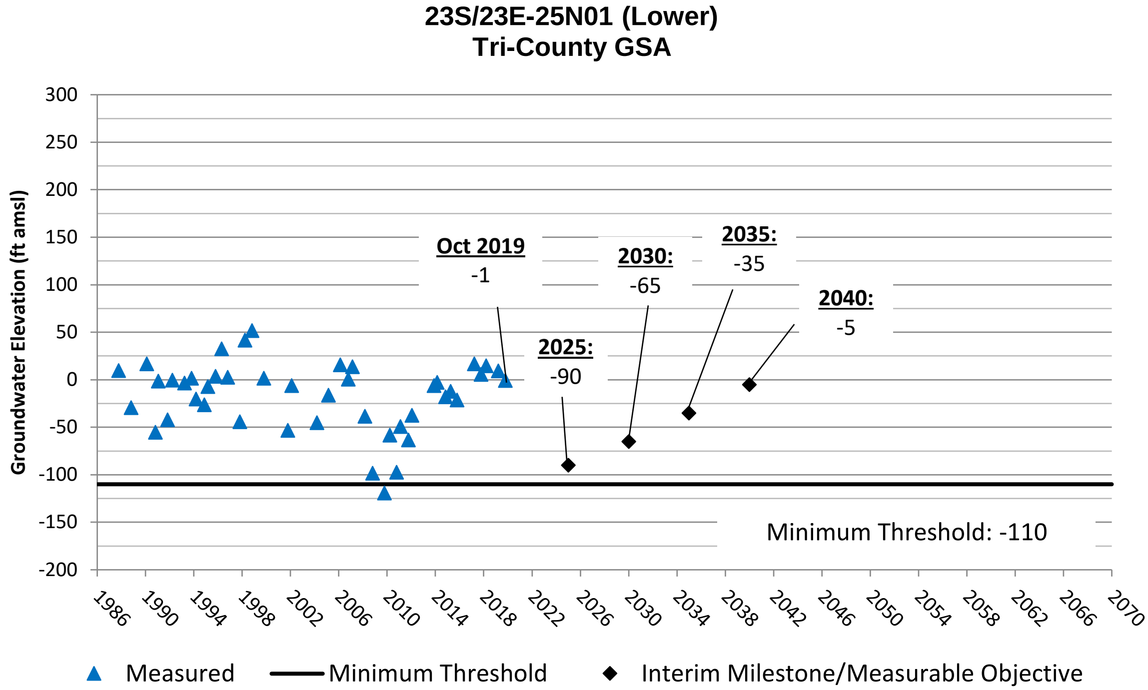



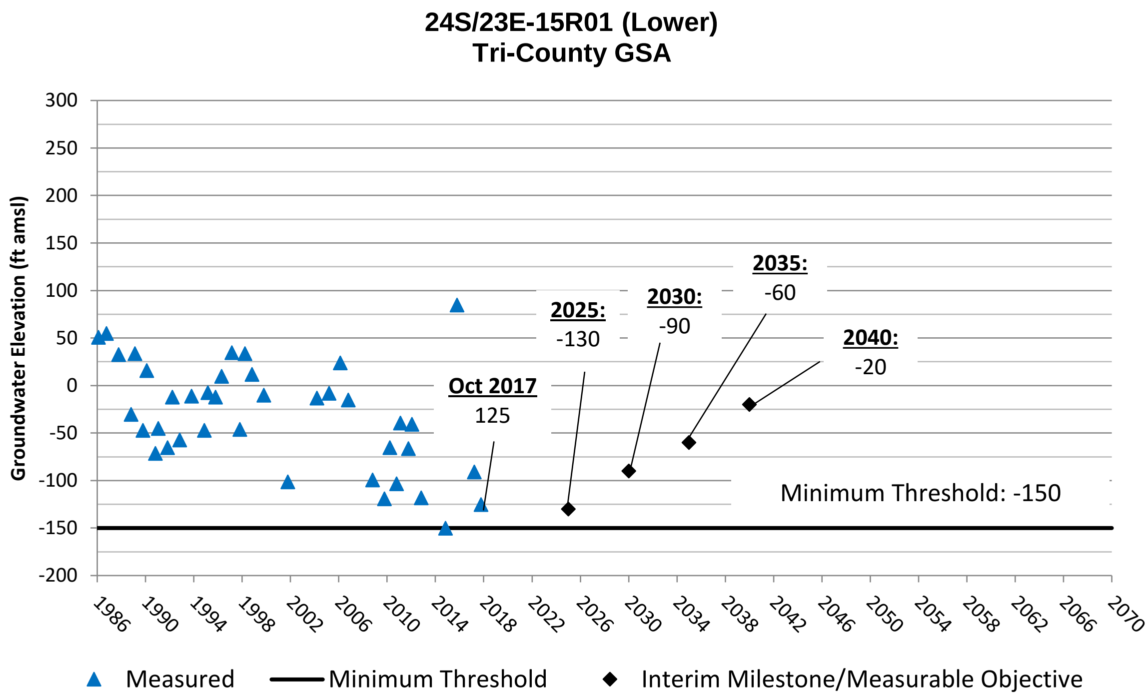
# Tri-County Water Authority GSA
# RMS Groundwater Elevation Hydrographs



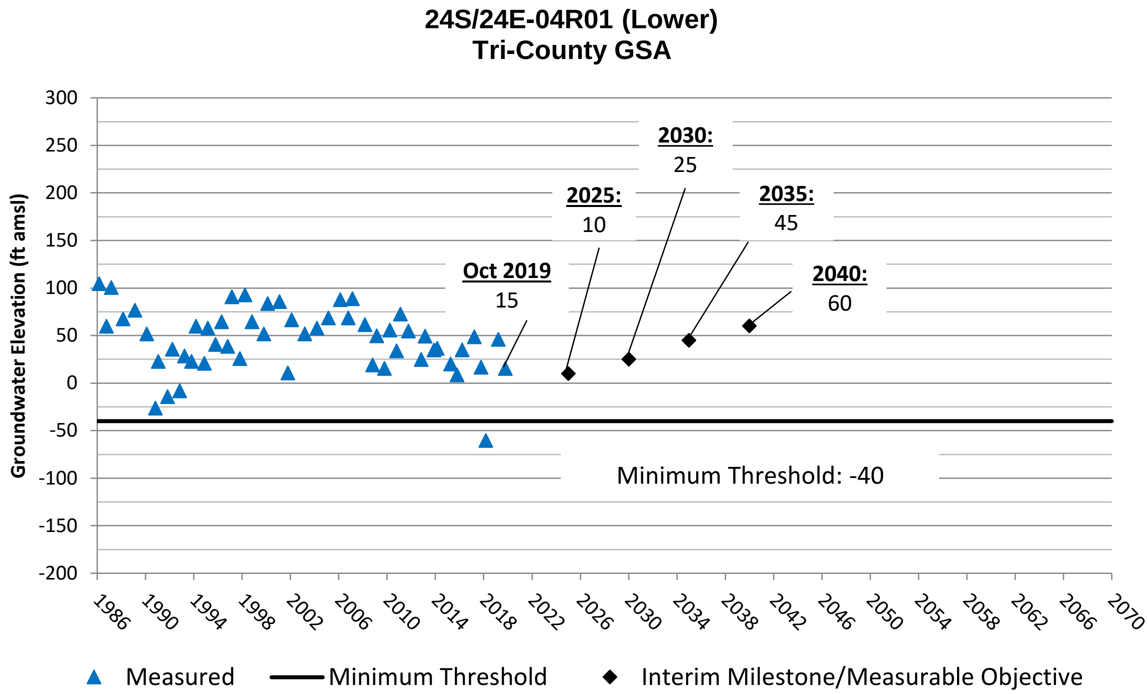



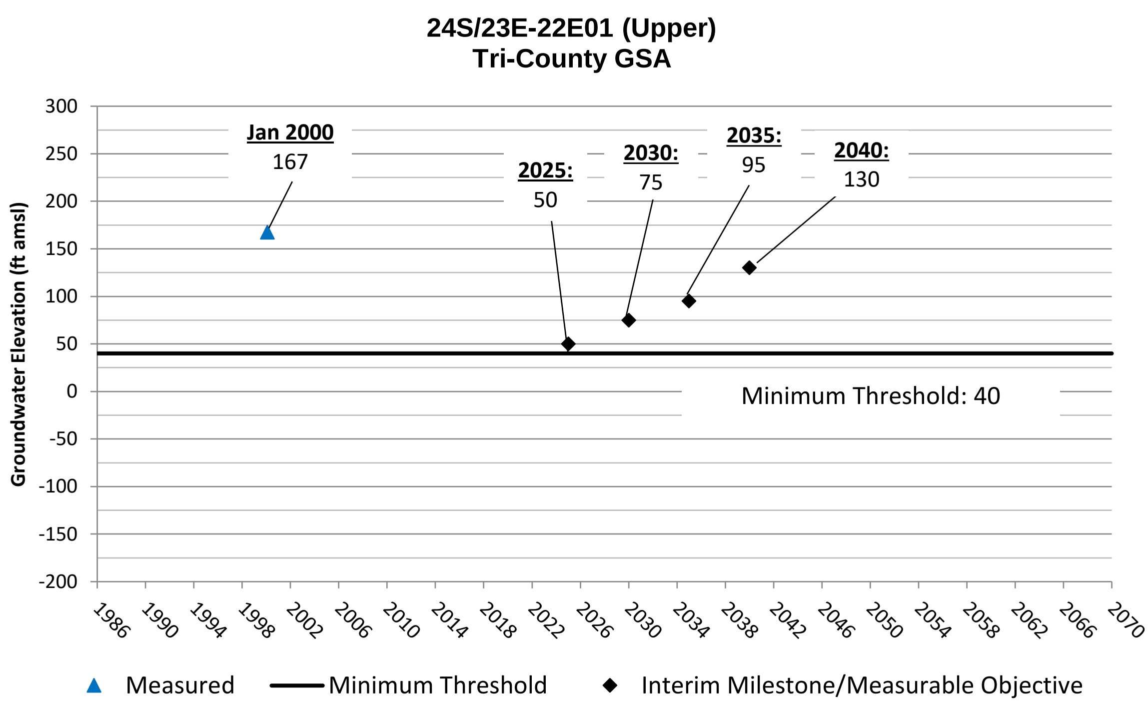
# Tri-County Water Authority GSA
# RMS Groundwater Elevation Hydrographs



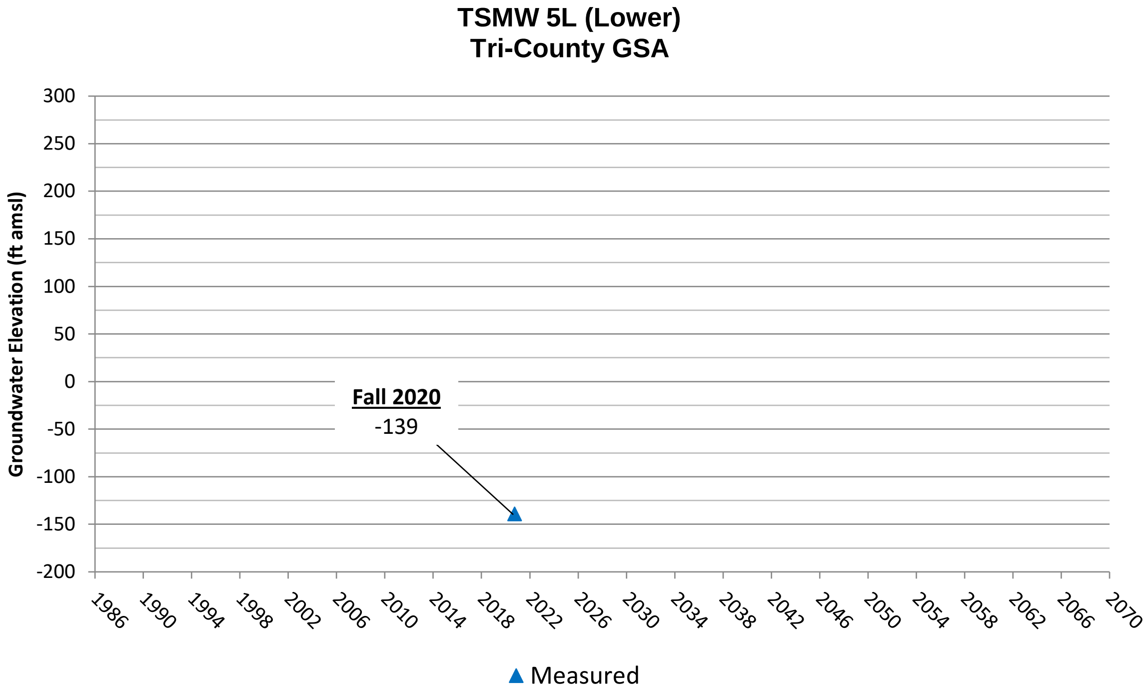



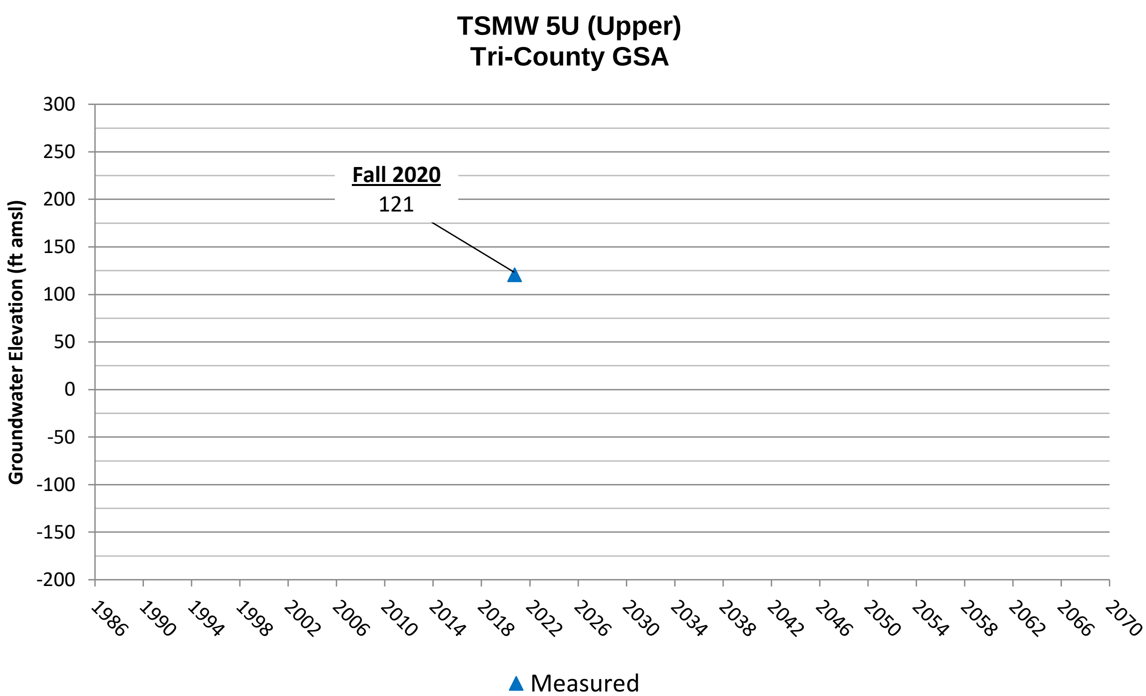
# Tri-County Water Authority GSA
# RMS Groundwater Elevation Hydrographs

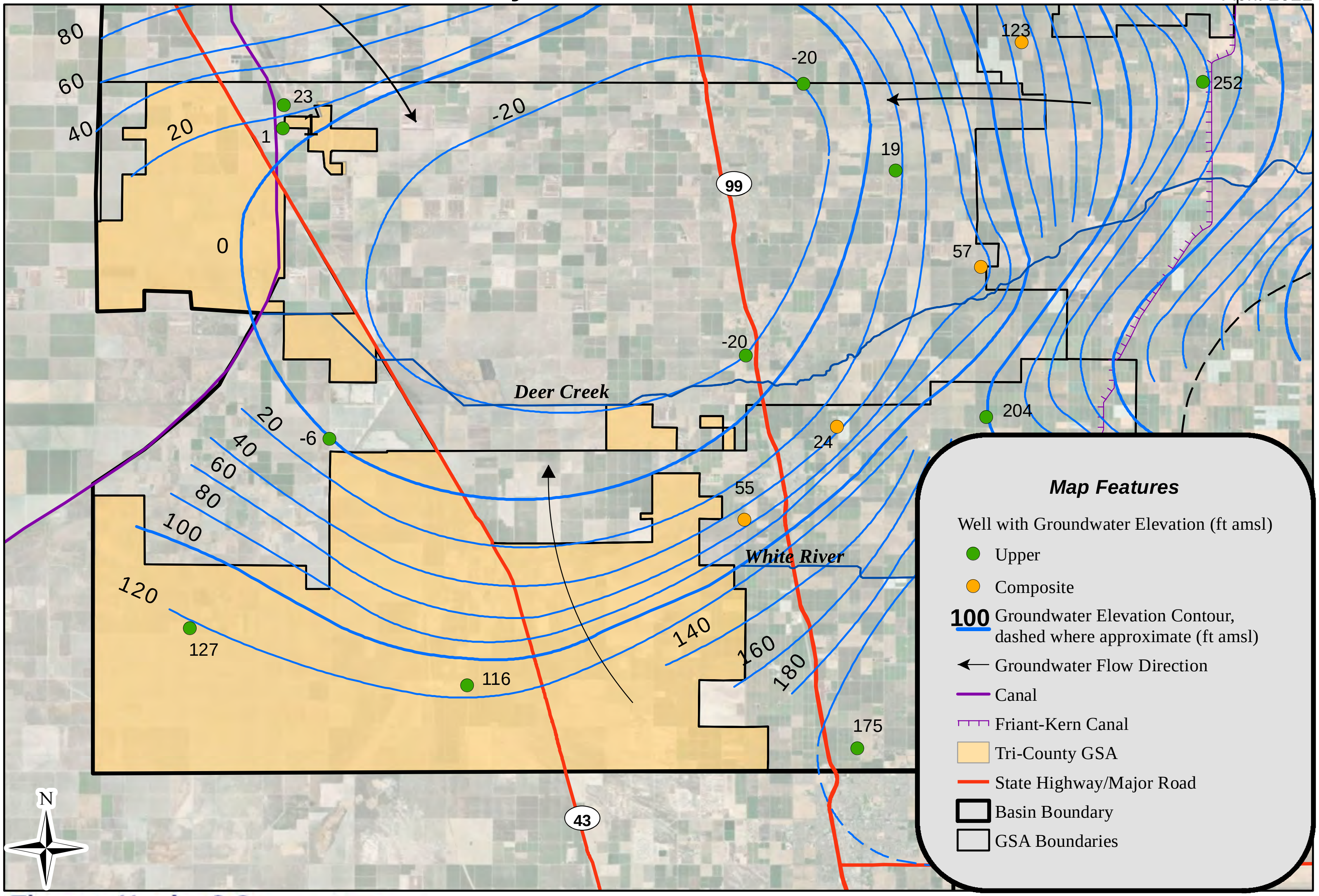


## Tri-County Water Authority GSA
## RMS Groundwater Elevation Hydrographs






Thomas Harder & Co.
Groundwater Consulting

NAD 83 State Plane Zone 4

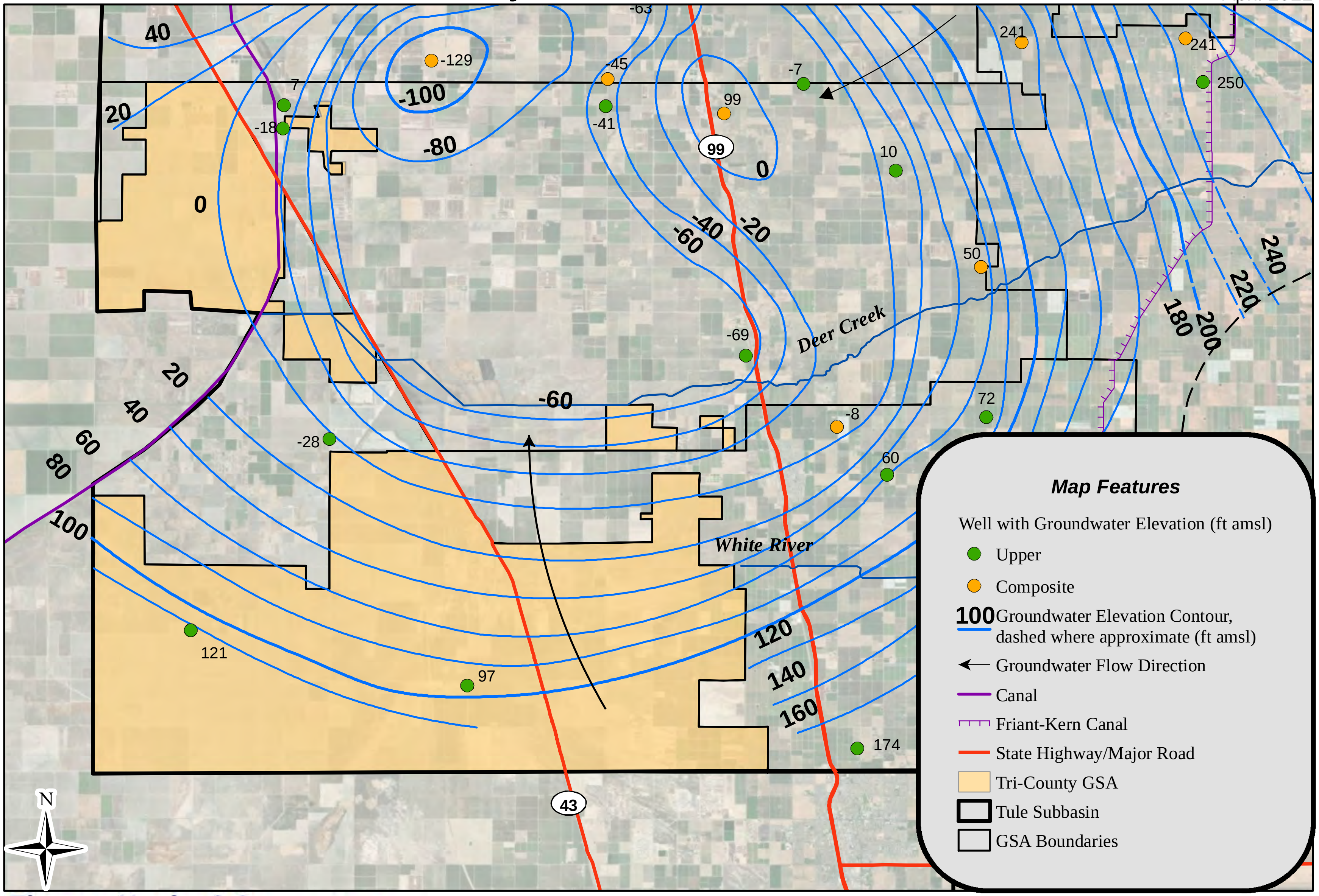
Note: All groundwater elevations are in feet above mean sea level.

**Spring 2020 Upper Aquifer**
**Tri-County Water Authority GSA**
**Appendix E**
**FIgure 6**

2019/2020 Annual Report

April 2021

Tule Subbasin Technical Advisory Committee




Thomas Harder & Co. Groundwater Consulting

0 1 2 4 6 Miles

NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

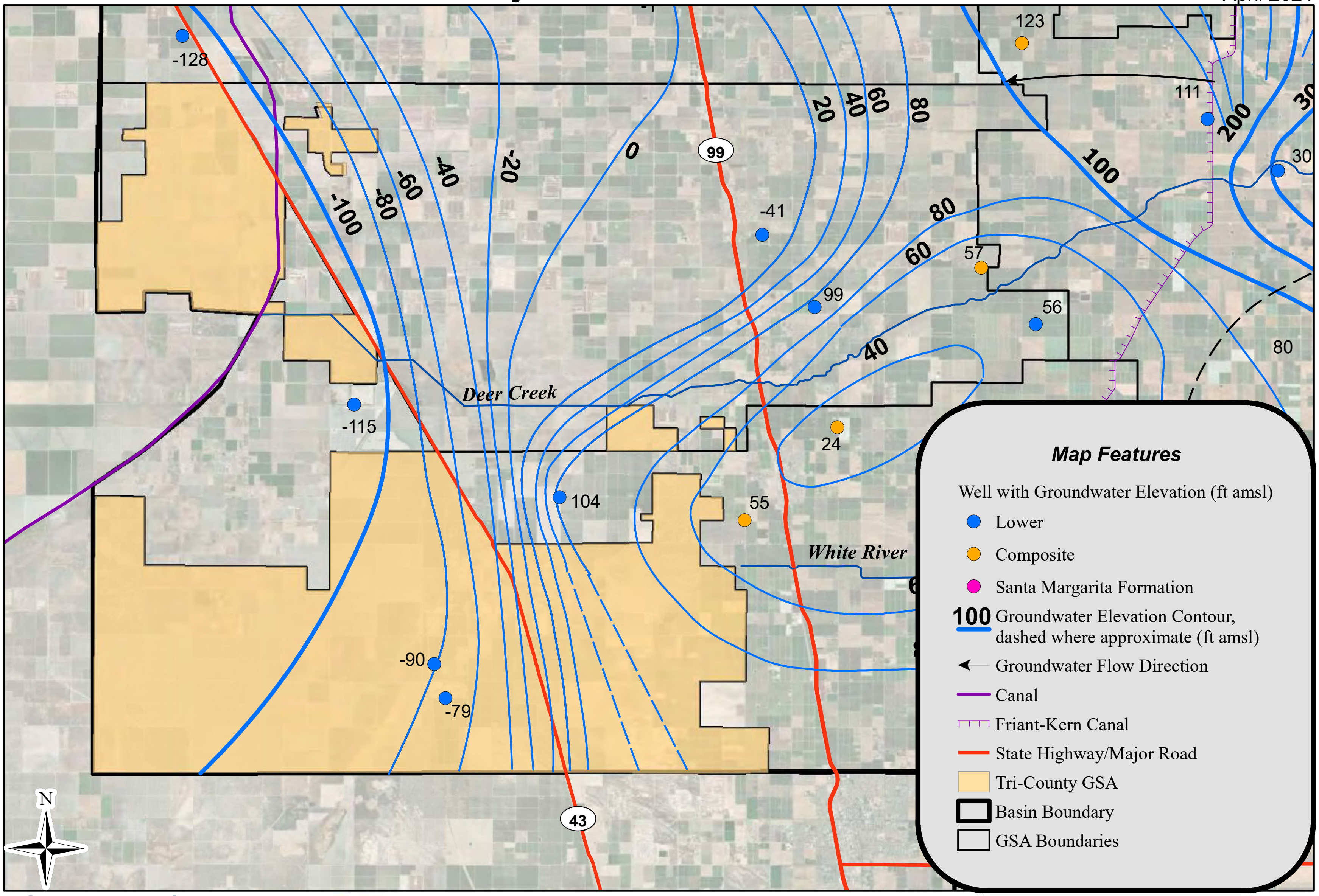
**Fall 2020 Upper Aquifer**

**Tri-County Water Authority GSA**

**Appendix E**

**FIgure 7**

## Tule Subbasin Technical Advisory Committee




Thomas Harder & Co.
Groundwater Consulting

0 1 2 4 6 Miles

NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

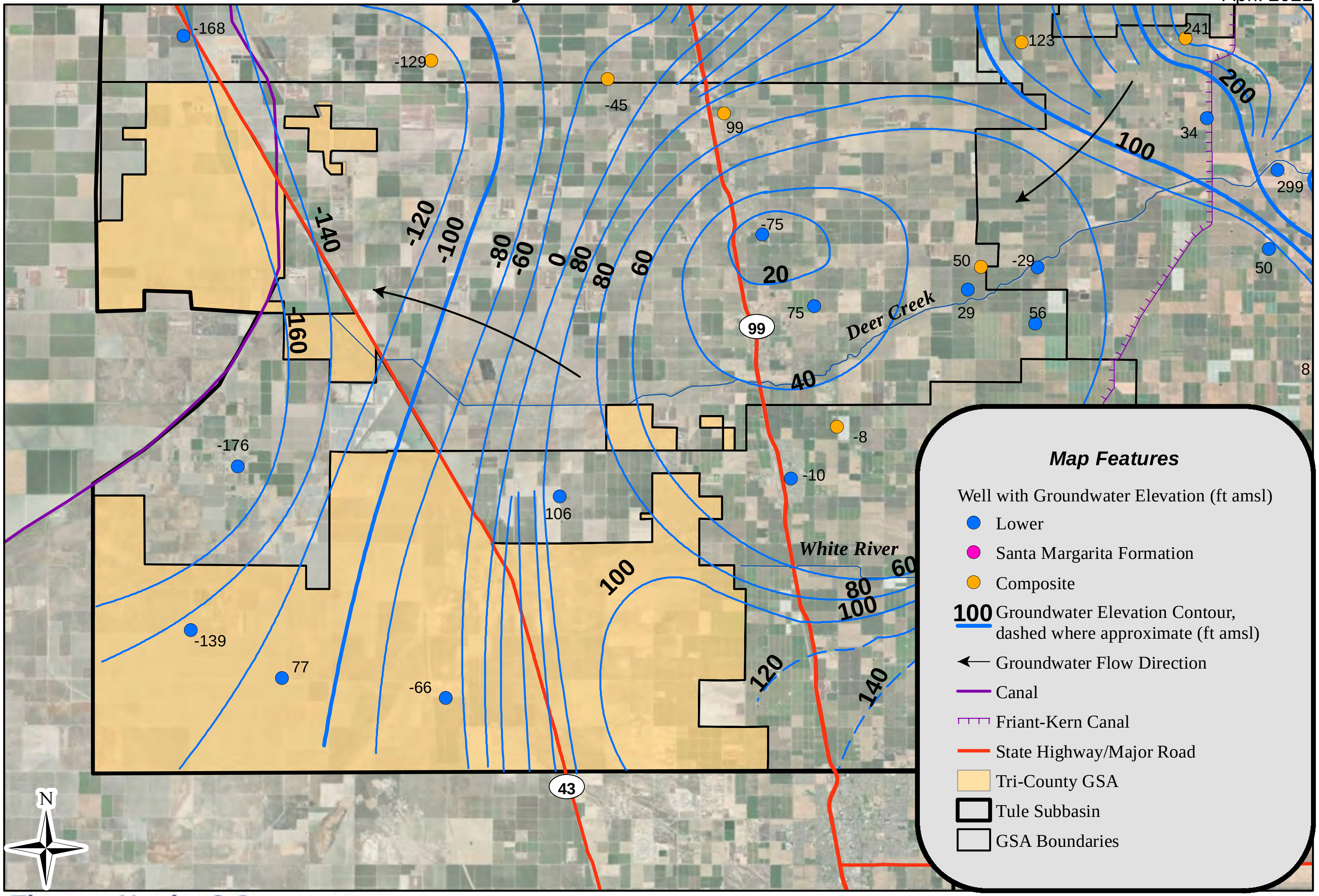
## Spring 2020 Lower Aquifer
## Tri-County Water Authority GSA

Appendix E
FIgure 8

# Tule Subbasin Technical Advisory Committee

**2019/2020 Annual Report**

April 2021




Thomas Harder & Co.
Groundwater Consulting

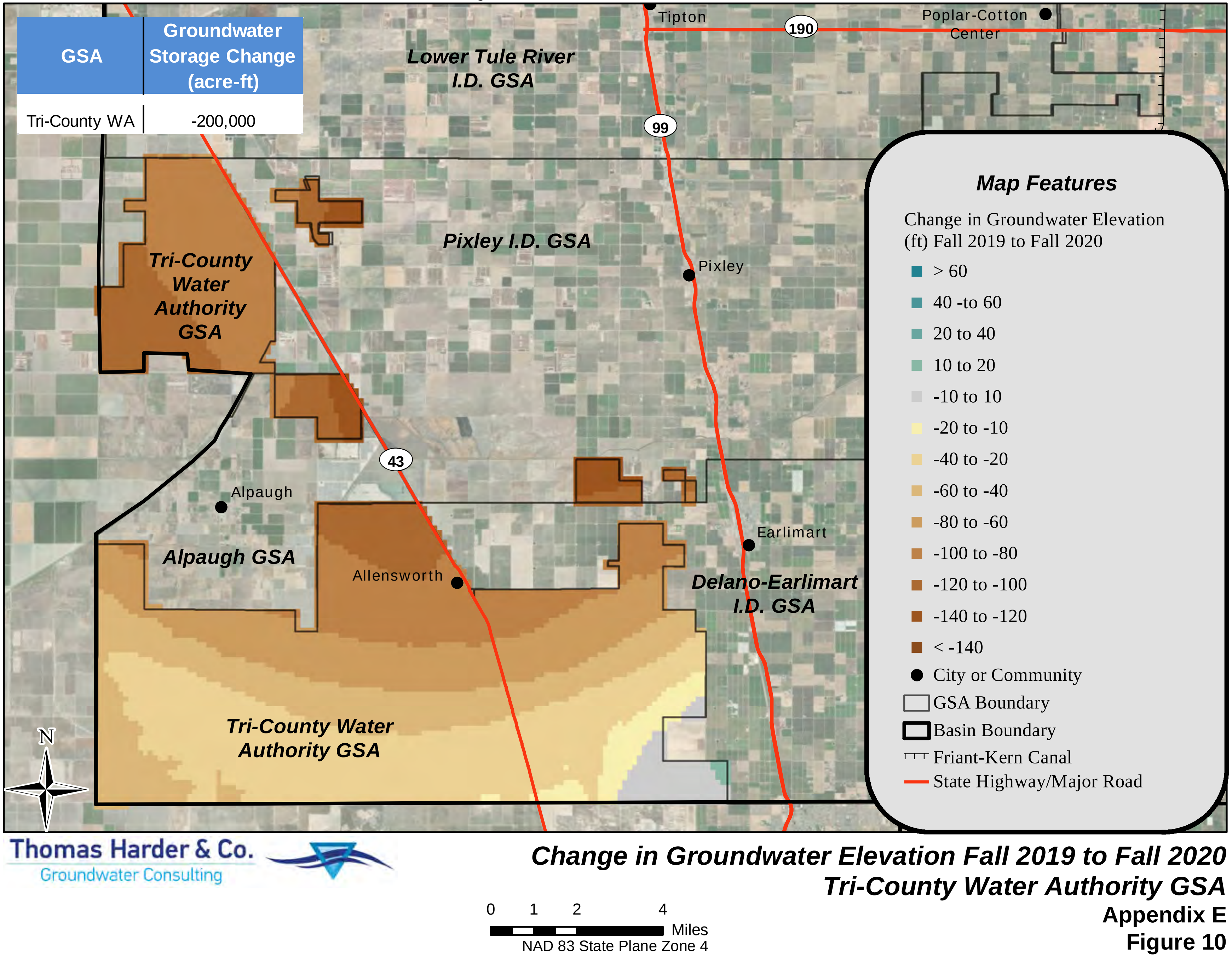
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Fall 2020 Lower Aquifer**
**Tri-County Water Authority GSA**

**Appendix E**
**Figure 9**

**Tule Subbasin Technical Advisory Committee**




Thomas Harder & Co.
Groundwater Consulting

**Change in Groundwater Elevation Fall 2019 to Fall 2020**
**Tri-County Water Authority GSA**
**Appendix E**
**Figure 10**

# Appendix F

# Alpaugh Irrigation District GSA
# 2019/20 Annual Data

## Alpaugh Irrigation District GSA
## Groundwater Extraction for Water Year 2019/20

| GSA | Management Area | Agricultural Pumping | Municipal Pumping | Pumping for Export | Total |
|---|---|---|---|---|---|
| **Alpaugh ID GSA** | ***Total*** | ***22,000*** | ***250*** | ***0*** | ***22,250*** |

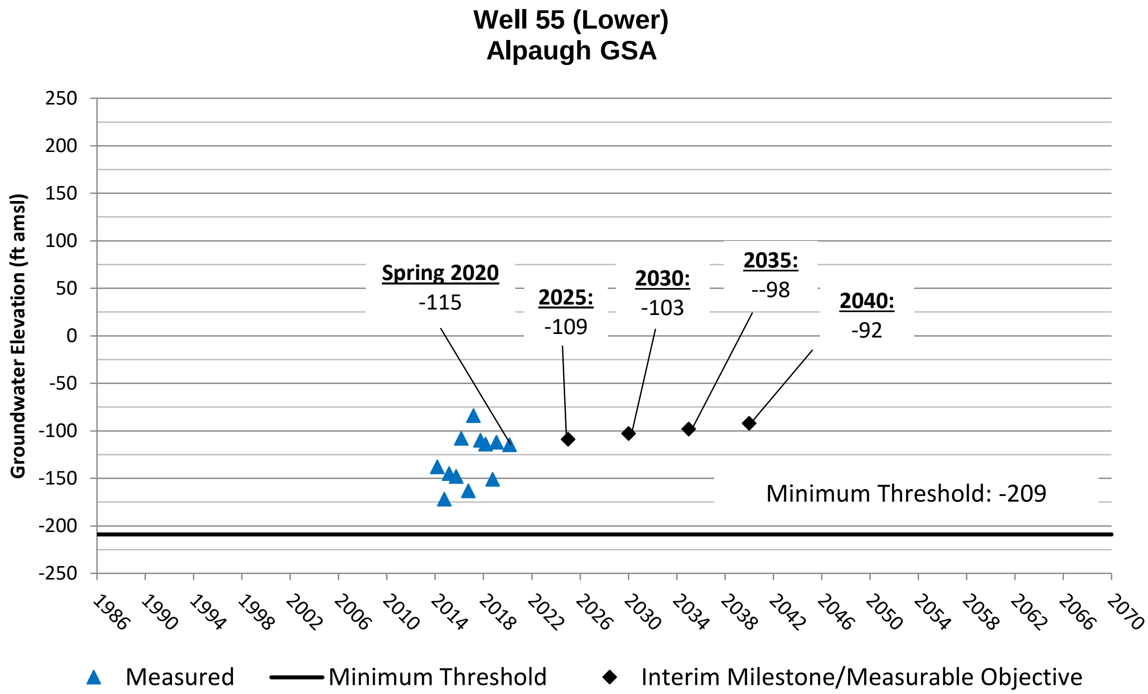
## Alpaugh Irrigation District GSA
## Surface Water Supplies for Water Year 2019/20

| GSA | Management Area | Stream Diversions | Imported Water | Recycled Water | Oilfield Produced Water | Precipitation | Total |
|---|---|---|---|---|---|---|---|
| **Alpaugh ID GSA** | ***Total*** | ***0*** | ***0*** | ***0*** | ***0*** | ***6,000*** | ***6,000*** |

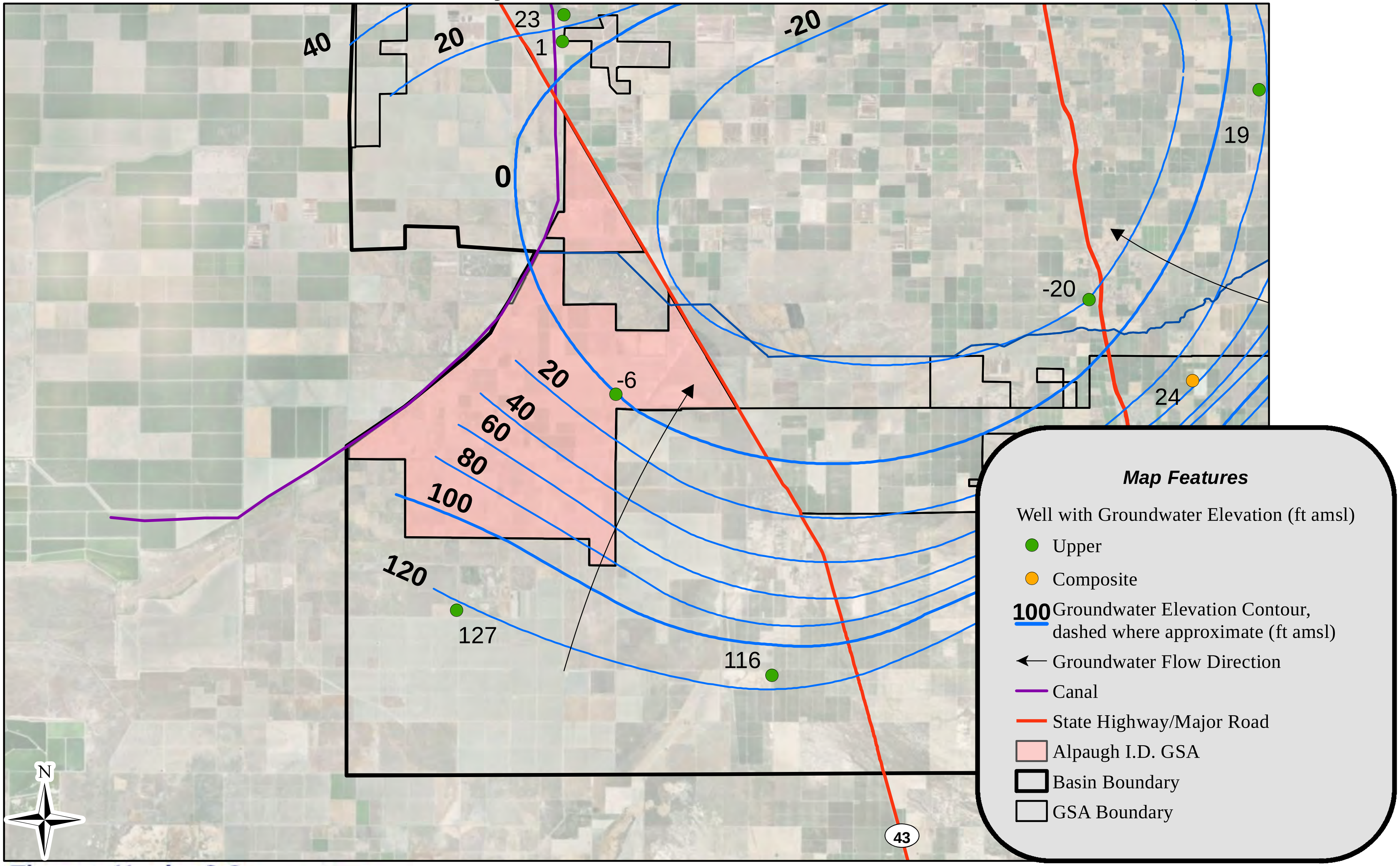
## Alpaugh Irrigation District GSA
## Tule Subbasin Total Water Use for Water Year 2019/20

| GSA | Management Area | Groundwater Extraction | Surface Water Supplies | Total |
|---|---|---|---|---|
| **Alpaugh ID GSA** | ***Total*** | ***22,250*** | ***6,000*** | ***28,250*** |

# Alpaugh Irrigation District GSA
# RMS Groundwater Elevation Hydrographs



## Tule Subbasin Technical Advisory Committee




Thomas Harder & Co.
Groundwater Consulting

0 1 2 4 Miles

NAD 83 State Plane Zone 4

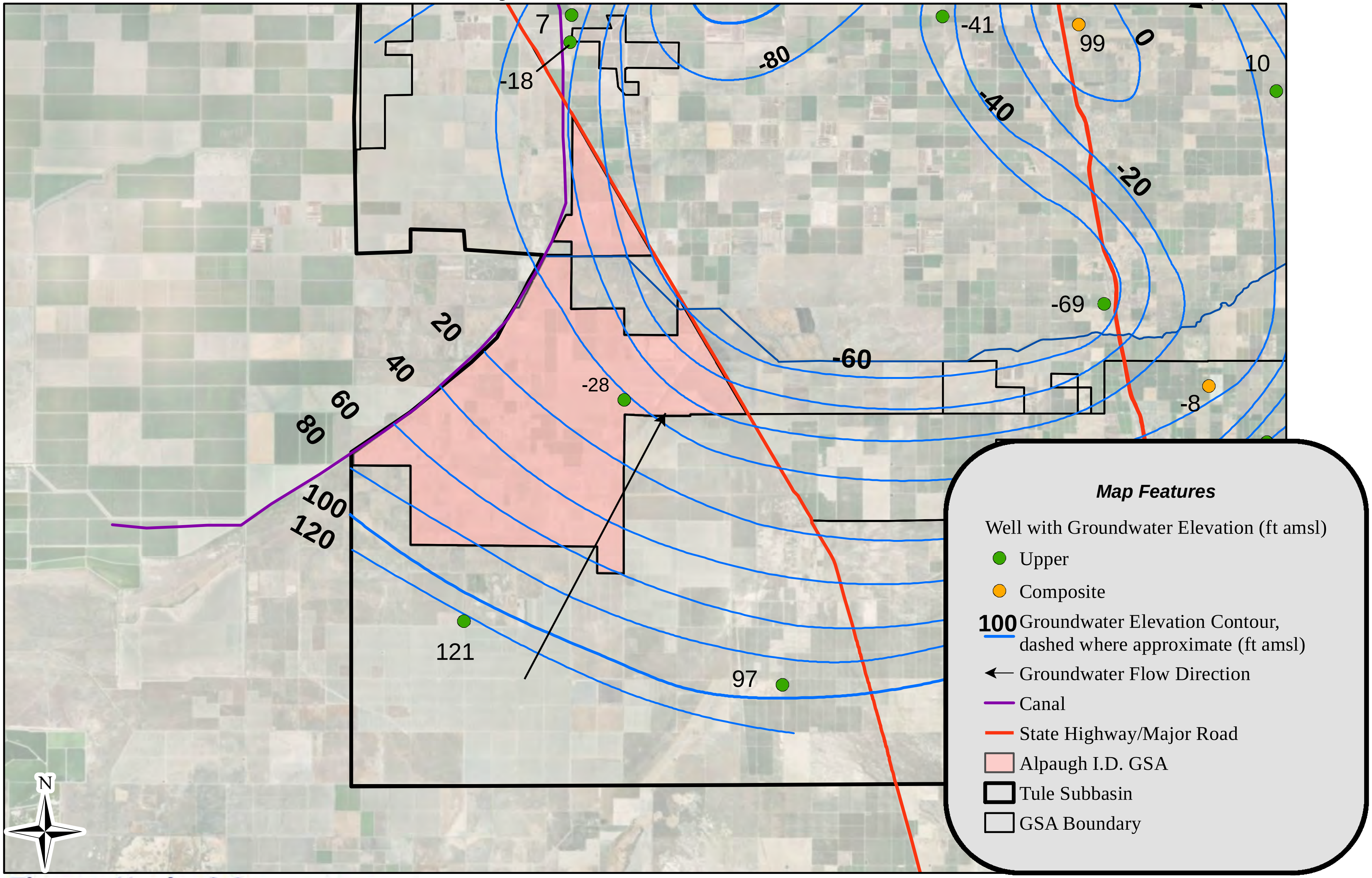
Note: All groundwater elevations are in feet above mean sea level.

**Spring 2020 Upper Aquifer**
**ALpaugh I.D. GSA**
**Appendix F**
**Figure 2**

Tule Subbasin Technical Advisory Committee

**2019/2020 Annual Report**

April 2021



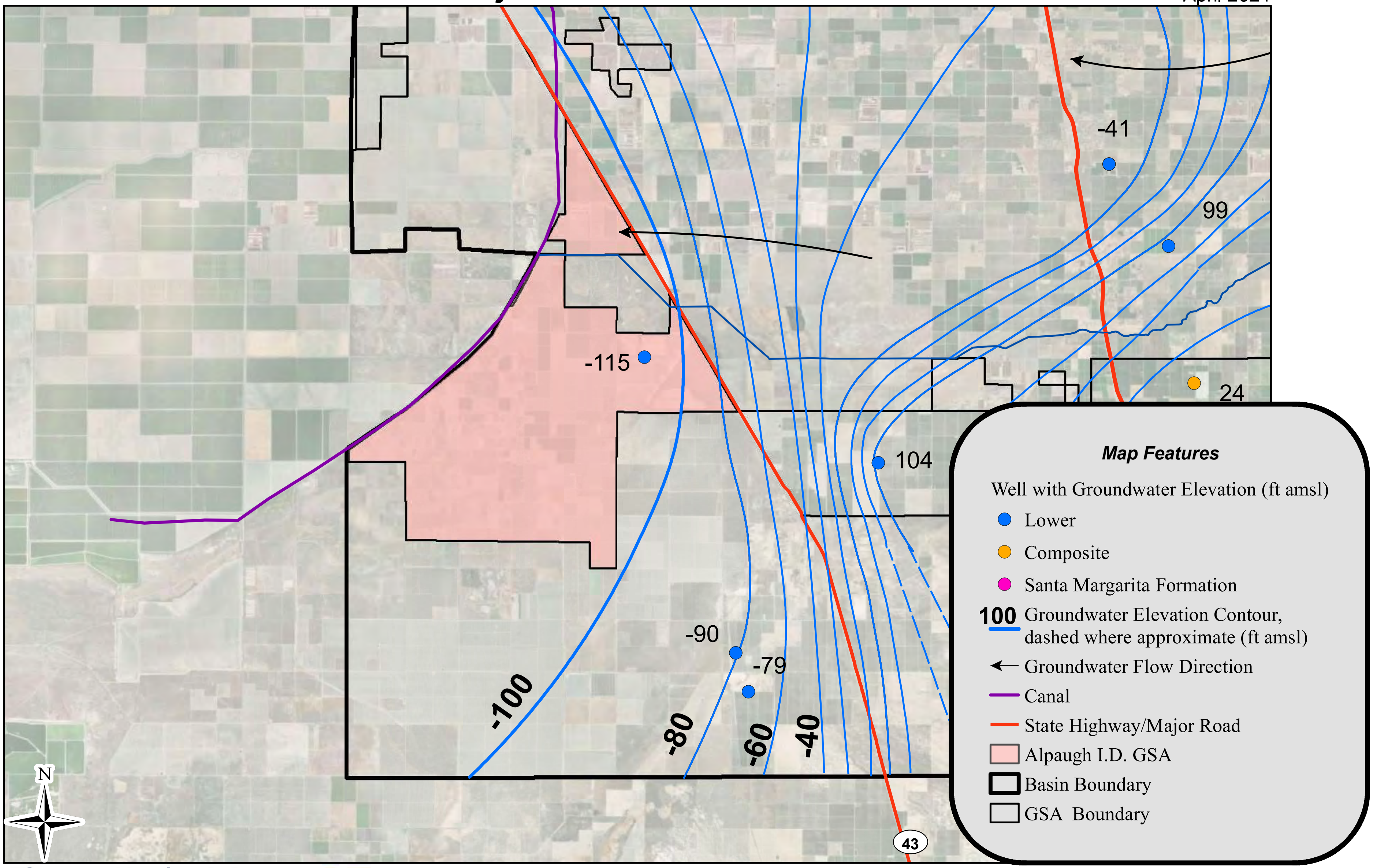

Thomas Harder & Co.
Groundwater Consulting

Note: All groundwater elevations are in feet above mean sea level.

**Fall 2020 Upper Aquifer**
**Alpaugh I.D. GSA**
**Appendix F**
**Figure 3**

## Tule Subbasin Technical Advisory Committee






Thomas Harder & Co.
Groundwater Consulting

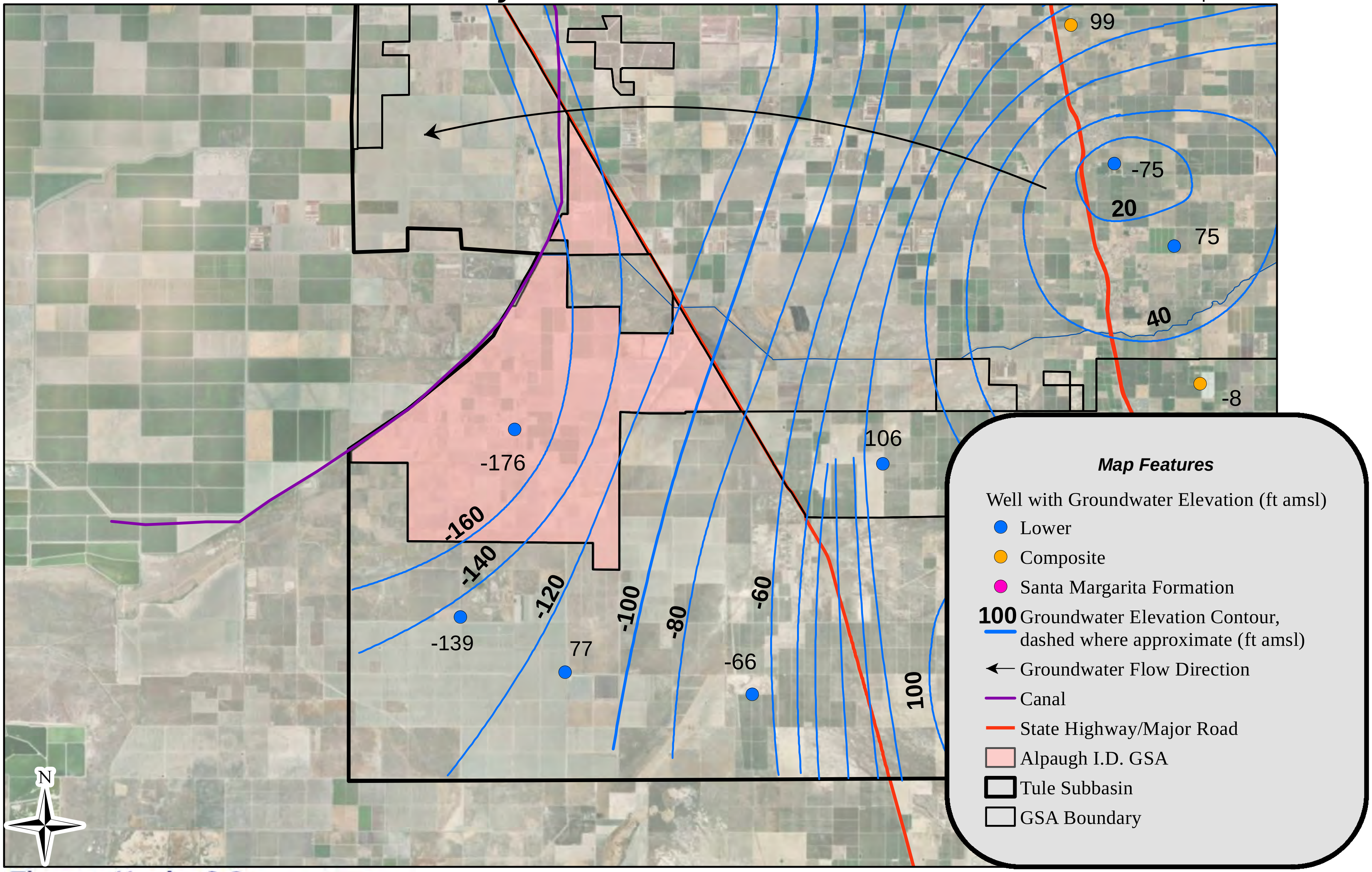
0 1 2 4 Miles

NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Spring 2020 Lower Aquifer**
**Alpaugh I.D. GSA**
**Appendix F**
**Figure 4**

## Tule Subbasin Technical Advisory Committee




Thomas Harder & Co.
Groundwater Consulting

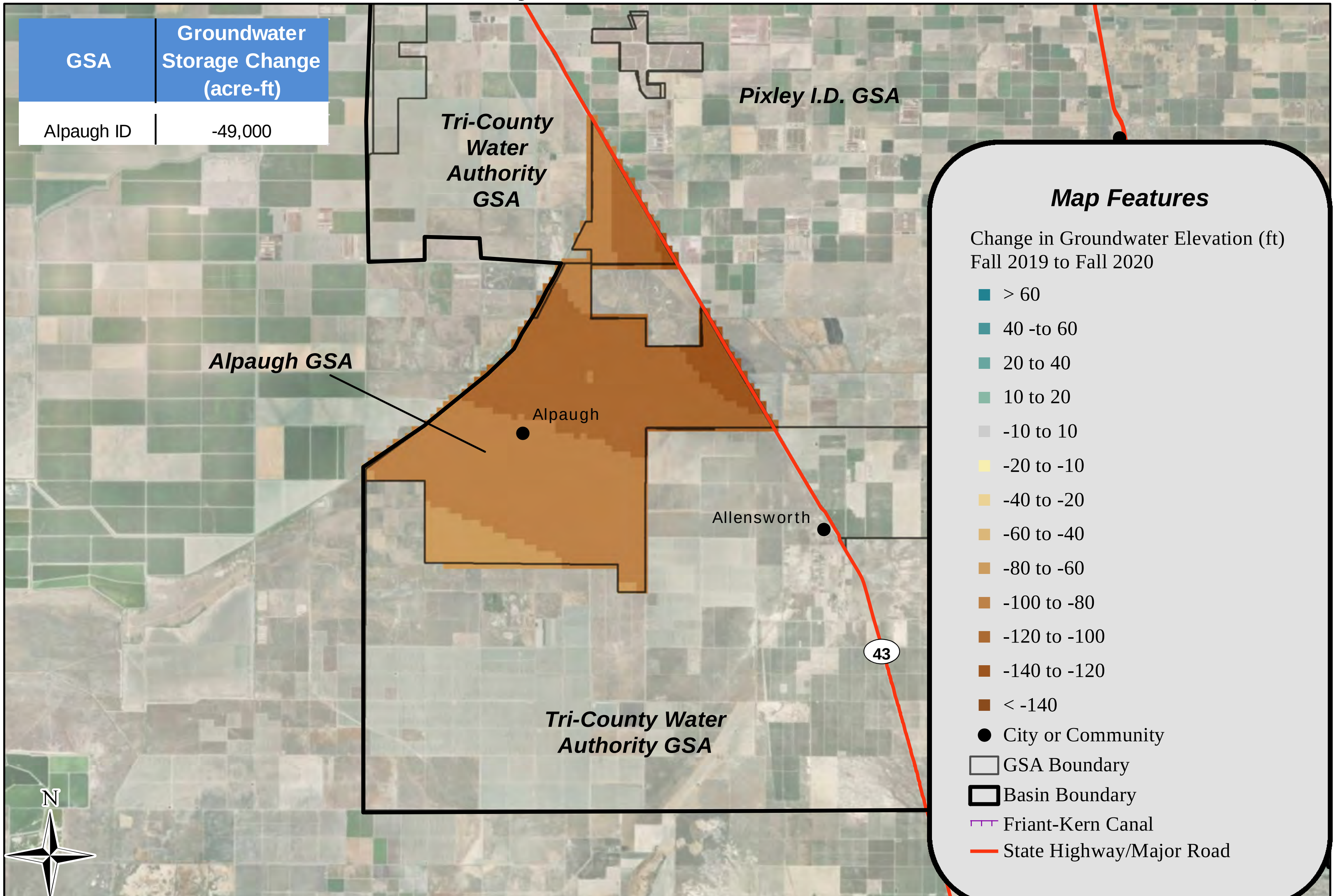
NAD 83 State Plane Zone 4

Note: All groundwater elevations are in feet above mean sea level.

**Fall 2020 Lower Aquifer**
**Alpaugh I.D. GSA**
**Appendix F**
**Figure 5**

## Tule Subbasin Technical Advisory Committee

**2019/2020 Annual Report**
April 2021




Thomas Harder & Co.
Groundwater Consulting

**Change in Groundwater Elevation Fall 2019 to Fall 2020**
**Alpaugh I.D. GSA**
**Appendix F**
**Figure 6**

# ATTACHMENT 2 - LTRID GSA RULES AND OPERATING POLICIES

**Lower Tule River Irrigation District**
**Groundwater Sustainability Agency**

**WATER MEASUREMENT & METERING**

The landowners within the GSA utilize both surface water and groundwater to meet the needs of the business operations and producing agricultural products. A key component to manage the sustainability of groundwater is to measure quantitatively the total amount of water used by each landowner within the GSA. This will allow the GSA to track groundwater water usage by landowner which can then be correlated to the amounts allowed to achieve sustainability.

The GSA will utilize satellite imagery to determine crop demands at the landowner level as described in more detail below:

**Calculate Groundwater Consumed using Evapotranspiration**

To calculate the amount of groundwater consumed by the crop, the following equation is applied:

1. Total Applied Surface Water is supplied and metered by the Irrigation District.

2. Total Crop Demand (Evapotranspiration or ET) is calculated by CalPoly – ITRC – METRICS Program.

    a. Consumption, based on the ET calculations will be tracked and will be available in the following sequencing:
        i. Precipitation Yield
        ii. Surface water applied
        iii. Sustainable Yield credits
        iv. District allocated groundwater credits
        v. Transitional groundwater credits**
        vi. Landowner developed groundwater credits**

        **The sequencing of the Transitional water credits and Landowner developed groundwater credits can be switched at the landowner's discretion.

    b. If surface water applied is more than ET, the landowner will receive a credit for over application of surface water according to the following schedule:

    Over Application of Surface Water for Irrigation Purposes

i. The credit calculated using this equation will be tracked and will increase the landowner groundwater account managed by the GSA. For every acre-foot of over applied surface water,

   90% credit goes to the landowner account, 10% to the GSA.

ii. For all groundwater credits issued to the landowners from over application of irrigation water, the credits will be available and carried over to subsequent years. The term of the credits will be perpetual. The groundwater credits can also be transferred, sold, or leased to other landowners based upon the GSA groundwater transfer policy.

The satellite imagery used to determine the ET values, will be audited by the GSA through spot checking land use for cropping patterns and compared to District metered data.

**Lower Tule River Irrigation District Groundwater Sustainability Agency**

## GROUNDWATER BANKING AT THE LANDOWNER LEVEL

### Irrigation District Recharge

The irrigation district oversees and manages the surface water for the district, separate and apart for the Groundwater Sustainability Agency. The irrigation district recognizes the surface water supplied is very important to achieve groundwater sustainability and needed for the landowners to continue operations of their farms and that landowners need to be able to balance all of these resources to achieve sustainability under SGMA.

When surface water beyond what is needed to meet irrigation demands is available, the irrigation district will maximize the use of these surface waters and divert these waters into the natural waterways, open channel canals, and district owned recharge basins. This will occur most often during above average water years when those waters cannot be stored and are released from local reservoirs. The surface water diverted and recharged into groundwater into district owned facilities is done to benefit all the landowners within the district without regard for specific credits under SGMA. Additionally, the irrigation districts will continue to optimize the distribution systems to maximize the recharge of surface water while supplying surface water to landowners as efficiently as possible.

### Landowner Groundwater Banking

During periods where surplus surface waters are available, landowners within the GSA can divert surface water into landowner owned designated recharge facilities for future groundwater credits. Surface water for banking can be:

1. Water the landowner purchases from the irrigation District through regular surface water purchase procedures.
2. Water rights water available to the landowner. E.g. Poplar Ditch share water
3. The District has established the following priority order of water service and related canal capacities:
    - Deliveries for irrigation demand
    - District recharge/banking for the benefit of all landowners
    - Landowner recharge/banking

When this occurs, the landowner can bank this surface water that is recharged to groundwater under the following conditions:

1. The surface water purchased must be applied directly to a specific groundwater recharge basin that meets the minimum GSA requirements for a groundwater

recharge basin. The location of the basin must be registered with the GSA to receive any credits.

- All surface water diverted to the landowner is required to be metered per GSA metering requirements.
- Surface water diverted will be credited to the landowner at 90% of the surface water diverted. The remaining 10% credit will remain with the GSA for the benefit of all the landowners.
- The groundwater credits issued to the landowners will be available and carried over to subsequent years. The term of the credits will be perpetual. The groundwater credits can also be transferred, sold, or leased to other landowners based upon the GSA groundwater transfer criteria.

2. Landowners can also use District owned recharge facilities to generate groundwater credits subject to the following criteria:
   - The landowner provides water from available allocation, purchase or water rights
   - Use of the District recharge facility is subject to available capacity as determined by the District
   - Groundwater credits will be credited to the landowner account at 75% of the surface water diverted. The remaining 25% credit will remain with the GSA for the benefit of all the landowners.

## Lower Tule River Irrigation District Groundwater Sustainability Agency

## WATER ACCOUNTING AND WATER TRANSFERS

To effectively achieve groundwater sustainability within the GSA and the Tule Subbasin, while maintaining the agriculture operations during the implementation of SGMA, each landowner within the GSA will be provided a baseline groundwater credit. These groundwater credits act as an individual water bank account for each landowner, allowing each landowner to decide how to feasibly and economically manage their farm operation within the rules established by the GSA and the Tule Subbasin.

**Water Accounting:**

To adequately track, monitor, and account for the water credits within the GSA, the following water budget will be established and monitored for each landowner[1] in the GSA:

| **Groundwater Credit Inputs:** | **Definition:** |
|---|---|
| Tule Subbasin Sustainable Yield | Common Groundwater available to all landowners within Tule Subbasin, defined under Subbasin Coordination Agreement |
| Precipitation Yield | Annual average precipitation in the GSA, calculated from 1991 going forward. |
| Districted Allocated Groundwater Credits | Allocated by the Board annually. Based on water diverted for recharge by the District, along with canal seepage losses in District canals. Allocated amounts will be credited to landowners proportionally based on assessed acres. |
| Landowner Developed Credits | • Surface Water diverted by the landowner into a specified recharge basin, credited per criteria set forth in Policy 2: Banking at Landowner Level<br>• Surface Water over-applied by landowner beyond crop demand, credited per criteria set forth in Policy 2.<br>• Groundwater credits obtained from other landowners. |

A credit or deficit for each landowner account will be accounted for on a monthly basis by the GSA.

**Water Transfers:**

Landowners may transfer groundwater water credits through either a direct sale or lease. The process for transferring groundwater credits is as follows:

- Groundwater credits will be tracked at a land-based level. Transfers of any credits accrued to the land requires the written approval of the landowner to transfer.
- Groundwater credits can only be transferred by a landowner that has a positive balance in their groundwater budget. Deficit groundwater credit transferring is not allowed.
- A groundwater credit transfer is a one to one transfer within the GSA. Transfers outside the GSA are subject to the Coordination with other Tule Subbasin GSAs.
- All groundwater credit transfers require formal notification (GSA approved transfer template) and approval of the GSA. The GSA will keep an account of all transfers within the GSA Water Accounting Program. The sale or lease terms of the groundwater credits is between landowners and not subject to disclosure.

## Lower Tule River Irrigation District Groundwater Sustainability Agency

## TRANSITIONAL GROUNDWATER CONSUMPTION

To assist landowners with the transition to implementation of the Sustainable Groundwater Management Act, groundwater use and extraction above basin wide sustainable yield will be phased based on periodic reviews of the GSP per the guidelines of SGMA.

The GSA will provide access to a water accounting program to track all water credits including District allocated groundwater credits, landowner developed groundwater credits, sustainable yield credits, precipitation yield credits, surface water allocations and transitional water consumption.

During the period of GSP implementation, transitional water credits (groundwater consumption above other available credits), may be consumed consistent with the following criteria:

1. Use will be consistent with the policies established for avoiding the undesirable effects under SGMA;
2. Transitional water will be available based on the following sequencing:
    i. Precipitation yield credits
    ii. Surface water allocation
    iii. Sustainable yield groundwater credits
    iv. District allocated groundwater credits
    v. Transitional water credits**
    vi. Landowner developed groundwater credits**
    **The sequencing of the Transitional water credits and Landowner developed groundwater credits can be switched at the landowner's discretion.
3. Transitional water credits will be available based on assessed acres and made available in 5-year blocks.
4. Transitional water credits stay with the landowner to be used on properties within the GSA and cannot be transferred to other landowners.
5. An upper limit for net groundwater use, including transitional water allocations, will be established. Exceeding this limit will result in fines and reduced allocations in the next year, per Policy #8 Implementation & Enforcement of Plan Actions.
6. There will be a phased approach to the availability of groundwater for transitional water. The GSP will provide for levels of groundwater consumption that will be higher during the initial phases and decreasing over time to reach sustainable consumption levels (as required by SGMA) by 2040. The amount of Transitional water available will be determined at the beginning of each phase.
    a. The first phase of transitional water will be from 2020 through the 2025 (2 AF/Acre/year)
    b. The second phase of transitional water will be from 2026 through 2030

(1.5 AF/Acre/year)

c. The third phase of transitional water will be 2031 through 2035 (1 AF/Acre/year)
d. The final phase of transitional water will be from 2031 through 2040 (0.5 AF/Acre/year)

7. There will be a fee schedule for transitional water consumption. The fee schedule will be implemented as described below in 2020.
    i. Tier 1 of transitional water consumption is 50% of the total transitional water allocated for the period and shall be assessed a fee of $90 per acre foot starting in 2021. The price will be adjusted annually by the Board based on a formula using the change in the Friant Class 1 water rate.
    ii. Tier 2 is transitional water consumption over Tier 1, up to the total transitional water allocation and shall be charged a fee of two times the rate of tier 1 transitional water consumption.
    iii. There will be no fee applied during 2020 for the first 2 acre-feet of Transitional water consumed. Consumption over 2 acre-feet during 2020 will follow the fee schedule above.

The above fee schedule is intended to serve as both a disincentive mechanism while also relating to the cost of mitigating the impacts of use of transitional pumping allocations. The above amounts, being based on the cost of Friant Class 1 water, were based in part on an analysis of replacement water costs, and in part on the costs of groundwater production as the basis for an effective economic disincentive. Further analysis and additional justifications for the level of the fee may be considered by the GSA between adoption of this policy and full implementation of the fee in 2021.

8. Revenues will be used to mitigate impacts and implement projects and programs including, but not limited to:
    - Friant Kern Canal capacity correction
    - Surface water development
    - Additional recharge basin construction
    - Monitoring impacts and effects of groundwater pumping.
    - Other projects that may be identified by the GSA. (examples could include water conservation grants to GSA members, land conservation and set-aside programs, or any other projects the GSA deems appropriate to help meet the sustainability goal).

A specific plan of mitigation will be developed prior to full implementation of the fee in 2021 and will be based on relative levels of impacts that can be shown to be associated with transitional pumping. Additional analysis, including technical analysis of projected impacts together with costs of effective and reasonable mitigation measures, will be completed as part of GSP implementation.

## Lower Tule River Irrigation District Groundwater Sustainability Agency

## LANDOWNER SURFACE WATER IMPORTED INTO THE GSA

District Landowners may participate in water exchanges or transfers outside of the GSA boundary that result in surface water being available for direct use by the landowner. Use of that water by the landowner within the GSA requires the use of Irrigation District infrastructure to divert this surface water to their land.

This surface water that is brought into the GSA by the landowner will be tracked and accounted by the GSA and applied to the landowner's water budget according to the following procedures:

1. Surface water brought into the GSA and credited to the landowner will be subject to a loss/reduction factor as determined by the Irrigation District Board of Directors.

2. Surface water brought into the GSA will be delivered to the landowner based upon canal capacity. No surface water delivery brought into the GSA will interrupt or interfere with scheduled allocations of the District surface water supplies.

3. Imported surface water may be used for groundwater recharge subject to the policies of the GSP.

## Lower Tule River Irrigation District Groundwater Sustainability Agency

## DISTRICT ALLOCATED GROUNDWATER CREDITS

The Irrigation District (District) owns and operates existing recharge basins. These basins, along with the open channel canal distribution systems, provide for both direct and indirect groundwater recharge. During times when surface water supplies beyond the irrigation needs of the landowners are available, the District uses the basins to divert the surface water for groundwater recharge. This happens most often in wetter years and comes in the form of Class Two under the Friant Contracts and flood releases from Lake Success. Recharge through channel loss in the distribution system occurs at all times when water is in the canals. These District owned facilities create additional opportunities for establishing groundwater credits beyond the Safe Yield of the Tule Subbasin.

**Any groundwater credits developed through recharge basins and through loss in the distribution system remains with the District and will not be allocated to the landowners until a determination is made by the GSA Board that minimum threshold amounts identified in the GSP have been met.**

District Owned Land Based Groundwater Recharge Credits:

The lands owned through fee title by the irrigation district are allocated a sub basin wide Sustainable Yield. The Sustainable Yield allocated to District owned lands by virtue of being in the Tule Subbasin, will be re-allocated back to the District Landowners proportionate to the landowner's assessed acreage in the GSA.

Surface Water Recharge Groundwater Credits:

The imported surface water that is diverted for recharge by the District into District owned facilities (both recharge basins and canals) will be tracked and accounted as a groundwater credits belonging to the District. The District will allocate these credits to lands within the GSA in the following manner:

- Up to 90% of the water diverted into the District groundwater recharge basins, and water accounted for as channel loss in the canals, will be available for allocation. The remaining 10% of the recharge water will not be allocated to landowners in the District as it is used to account for evaporation and other losses. Adjustments to the percent of recharge water allocated as groundwater credits may occur based on groundwater monitoring, avoiding undesirable results, and to help avoid minimum thresholds.
- The District will allocate the groundwater recharge credits proportionally to all landowners within the District by assessed acres. All District landowners pay an equal land based assessment and each landowner will be provided an equal groundwater credit based upon gross acreage owned within the District and irrespective of any

access to surface water that landowners may have through water rights, riparian water or any other surface water.

- The transfer or sale of the District groundwater recharge credits within the GSA will be permitted in accordance with Policy 3.

## Lower Tule River Irrigation District Groundwater Sustainability Agency

## CSD & PUD Water Use within the GSA

A community service district (CSD) is an entity formed by residents of an unincorporated area to provide a wide variety of services to its residences, particularly water and wastewater management, along with many others. A CSD may be formed and operated in accordance with the Community Services District Law (Government Code §61000-61850), which was created to provide an alternate method of providing services in unincorporated areas.

The Public Utility District Act authorizes the formation of public utility districts (PUD) and authorizes a district to acquire, construct, own, operate, and control works for supplying its inhabitants with water and other critical components for everyday life.

Within the LTRID GSA boundary are the following CSDs and PUDs ("Community):

- Tipton CSD
- Woodville PUD
- Poplar CSD

Each Community entered into an MOU with the LTRID GSA to cooperate on SGMA implementation. Consistent with Section 3 of the MOU, the Community will be considered within the boundaries of the LTRID GSA and included in the LTRID Groundwater Sustainability Plan.

Consistent with Section 6 of the MOU,_LTRID will identify the Community as a separate management area. As its own management area, LTRID will specifically address the minimum thresholds and measurable objectives for the Community to achieve sustainable management.

### Reporting of Community Water Use

Consistent with Section 7 of the MOU, the Community will provide LTRID the following information for determining the net groundwater usage of the Community:

On a quarterly basis:

- Each Community will submit the total of groundwater pumped from Community wells.
- Each Community will submit the total of water discharged to the wastewater treatment system that is treated and diverted to percolation/evaporation ponds

**Minimum Thresholds and Measurable Objectives**

The following will be considered the minimum thresholds and measurable objectives required by the Community to meet the sustainability for the implementation of the LTRID GSP for the period from January 2020 to January 2026:

- The net of water pumped minus water discharged will be considered total Community water use

- The total of all treated water discharged to percolation/evaporation ponds, less 10%, will be available to the LTRID GSA for calculation and use in total LTRID GSA water balance.

- If the Community is providing any treated discharge to adjacent lands, the Community shall provide a regular accounting to the LTRID GSA that includes total volume amount discharged and APN(s) receiving the discharge.

- The water use will be reviewed through periodic updates to the GSP and will be compared to the available sustainable yield for the community and pumping limits acceptable to the GSA, as allowed under the regulatory code of SGMA.

- Community wells will include all wells used by the Community that are connected to the Community water distribution system.

- The Community and the GSA Board of Directors agree to cooperate on conditions of approval for future growth to ensure they are consistent with GSA and Community policies including pursing grant funding opportunities, outreach and joint projects for developing additional water supply for the Community.

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## IMPLEMENTATION & ENFORCEMENT OF PLAN ACTIONS

This Groundwater Sustainability Plan (GSP) establishes the actions, which include the policies, projects, and implementation schedule, to achieve groundwater sustainability, in accordance with the Sustainable Groundwater Management Act (SGMA).

A major element of implantation is the establishment of the accounting system, the enforcement of regulatory fees related to that system of accounting, and identification of mitigation items to be funded through those fees. Regulatory fees, and the process for establishing them, are discussed in greater depth in Policy 4 related to Transitional Pumping policies. As noted in that policy, the level and justification for fees for transitional pumping are subject to continued analysis and decision making by the GSA governing body, and will be a major element of implementation of the GSP.

Regarding enforcement, for those landowners within the GSA who do not comply with the Actions of the GSP established to achieve sustainability, SGMA provides the GSA with the authority to enforce the approved actions. The Action of the GSP which are enforceable under the GSP include:

1. Failure to pay GSA assessments or groundwater consumption fees
2. Consumption of groundwater beyond the allowable limits set forth in the GSP
3. Failure to provide the GSA with required information

In the event of noncompliance by a landowner of the GSA, the following enforcement process will be implemented:

- At time a landowner is identified as not complying with the approved Actions of the GSP, a Notice of Non-Compliance (NONC) letter will be issued to the landowner. The NONC will identify the area(s) of non-compliance and request formal response from the landowner identifying plan to get back into compliance within 30 days.

- If the landowner does not respond to the NONC letter within 30 days, a Notice of Violation (NOV) will be issued to the landowner, stating that the landowner is now in violation of the GSP implementing SGMA. The NOV will request a meeting within 15 days to discuss a plan of action to meet compliance. At the time of issuing a NOV, an administrative fine of $5 per acre fee will be assessed to that parcel(s) in violation, to be paid within 15 days.

- If a landowner has been determined to have consumed groundwater beyond the allowable limits, the landowner will receive a penalty of $1,000 per acre-foot and a reduction of groundwater credits will be applied to the landowner account. The reduction shall be the overage of consumption plus an additional factor of 1.5 times.

- If a landowner does not correct a NOV, a lien against the property will be filed by the GSA and the GSA will pursue action according to Water Codes Sections 25500- 26677

- If a lien has been filed against the property for outstanding balances (amounts added to assessments) from the previous year, then the landowner will not be served any surface water pursuant to Irrigation District policy.

- All fees collected will be used to for GSP implementation activities, including but not limited to, GSA administration and GSP project funding and implementation.

As with regulatory fees, all enforcement actions are subject to further refinement and definition as technical data and monitoring results are collected through the various management actions identified in the GSP.