

# **Draft: Post Oak Savannah Guidance Document for Evaluating Compliance with Desired Future Conditions and Protective Drawdown Limits**

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## Acronyms and Abbreviations

DEM	Digital Elevation Model
DFC	Desired Future Condition
ft	foot/feet
GAM	Groundwater Availability model
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
IDW	inverse distance weighted
PDL	protective drawdown limit
POSGCD	Post Oak Savannah Groundwater Conservation District
TWDB	Texas Water Development Board

## 1.0 INTRODUCTION

The document describes Post Oak Savannah Groundwater Conservation District (POSGCD) field protocols for measuring water levels and POSGCD technical analyses for evaluating measured water levels from its groundwater monitoring network to determine compliance with Desired Future Conditions (DFCs) and Protective Drawdown Limits (PDLs). The protocols are provided to establish general rules for performing a task and are intentionally not comprehensive.

The document is an update to a previous guidance document (INTERA, 2018). The previous document presented protocols that were discussed, vetted, and approved through a series of presentations at POSGCD DFC committee and board meetings. The protocols presented herein will be continually updated in response to new information and changes in site conditions. Adjustments and modifications to the protocols for data and data analysis will be documented in updates of this document and in a POSGCD report such as Young and Kelley (2021) that evaluate compliance with PDLs and DFCs.

### 1.1 Desired Future Conditions

POSGCD's DFCs are listed in **Tables 1-1** through **1-4**. The DFCs in Tables 1-1 through 1-3 were obtained from POSGCD's Management Plan (POSGCD, 2017). The DFCs in Table 1-1 were adopted by Groundwater Management Area (GMA) 12. The DFCs in Table 1-4 were adopted by GMA 8.

Table 1-1 GMA 12 and POSGCD adopted DFCs based on the average drawdown that occurs between January 2000 and December 2069

Aquifer	Drawdown (ft)
Sparta	28
Queen City	30
Carrizo	67
Upper Wilcox (Calvert Bluff Fm)	149
Middle Wilcox (Simsboro Fm)	318
Lower Wilcox (Hooper Fm)	205

Table 1-2 GMA 12 and POSGCD adopted DFCs based on the average drawdown that occurs between January 2010 and December 2069

Aquifer	Drawdown (ft)
Yegua-Jackson	100

Table 1-3 GMA 12 and POSGCD adopted DFCs for Brazos River Alluvium Aquifer based on the average decrease in saturated thickness that occurs between January 2010 and December 2069

Aquifer	County	Average Decrease in Saturated Thickness (ft)
Brazos River Alluvium Aquifer	Milam in GMA 12	5
	Burleson in GMA 12	6

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Table 1-4 GMA 8 and POSGCD adopted DFCs based on average drawdown that occurs between January 2010 and December 2070

Aquifer	Drawdown (ft)
Paluxy	--
Glen Rose	212
Travis Peak	345
Hensell	229
Hosston	345

## 1.2 Protective Drawdown Limits

As described in Section 7 of its Management Plan, the POSGCD PDLs are listed in **Table 1-5**. Neither GMA 12 nor GMA 8 has established DFCs for the shallow or unconfined zones of the aquifers. The District developed the PDLs to protect the production capacity of existing wells in the shallow unconfined portions of the aquifer, where the water level above the well screen tends to be less than in the deep confined portions of the aquifer. The District created shallow management zones for each aquifer, except for the Brazos River Alluvium and Trinity aquifers. Each of the shallow management zones includes the portion of the aquifer that occurs at a depth of 400 feet or less, as measured from land surface.

Since January 2020, POSGCD has been evaluating whether or not enforcement of its PDLs would prevent the achievement of its DFCs. In 2021, an INTERA report (Young and Kelley, 2021) provided predictions of water level change from future pumping that indicated that the PDLs in Table 1-5 are incompatible with current DFCs. Because of concerns with potential incompatibility between PDLs and DFCs, the District is considering replacing their PDLs with an alternative such as DFCs for aquifer outcrops.

Table 1-5 Protective drawdown limits threshold values for average drawdown for the shallow management zones

Aquifer	Average Drawdown (ft) that Occurs between January 2000 and December 2069 in the Shallow Management Zone
Sparta	20
Queen City	20
Carrizo	20
Upper Wilcox (Calvert Bluff Fm)	20
Middle Wilcox (Simsboro Fm)	20
Lower Wilcox (Hooper Fm)	20
Yegua	20
Jackson	20

## **2.0 MONITORING PERFORMANCE STANDARDS DEFINED IN POSGCD MANAGEMENT PLAN**

The District will use measured water levels in its monitoring wells to determine its progress in conforming with its DFCs at least once every three years. This commitment is stated in Section 15.9 of POSGCD's Management Plan and is provided below:

*"At least once every three years, the general manager will report to the Board the measured water levels obtained from the monitoring wells within each Management Zone, the average measured drawdown for each Management Zone calculated from the measured water levels of the monitoring wells within the Management Zone, a comparison of the average measured drawdowns for each Management Zone with the DFCs for each Management Zone, and the District's progress in conforming with the DFCs. (from Section 15.9 from POSGCD Management Plan"*

While the District Management Plan does not specify a schedule for evaluating compliance with its PDLs, the current POSGCD policy is to evaluate PDL compliance on the same schedule as DFCs.

## 3.0 POSGCD GROUNDWATER MONITORING WELL NETWORK

This section describes the monitoring network of groundwater wells that the District uses to measure changes in water levels over time.

### 3.1 Locations

The POSGCD network of groundwater wells is continually updated, primarily due to the addition of wells. At the time this document was prepared, the POSGCD Monitoring Well network consisted of the 323 wells shown in **Figure 3-1**. **Appendix A** provides information for the 323 wells in Figure 3-1, including their location, well depth, screened interval, and aquifer assignment. In addition to the 323 wells monitored by POSGCD, the District also utilizes additional monitoring data shared by Lost Pines Groundwater Conservation District (GCD) (53 wells) and Brazos Valley GCD (163 wells) from their District monitoring networks. **Figure 3-2** shows the monitoring wells that are considered in the Total Management Zone (i.e., DFC) analyses, and **Figure 3-3** shows the monitoring wells that are considered in the Shallow Management Zone (i.e., PDL) analyses. The POSGCD Monitoring Well network currently has 56 wells equipped with transducers, many of which have collected continuous water level data since 2019. **Figure 3-4** shows the locations of POSGCD monitoring wells equipped with transducers. Methods to incorporate the transducer water level measurements into the DFC and PDL compliance calculations are proposed in this document.

### 3.2 Aquifer Assignments

POSGCD defines its aquifers based on the elevation surfaces for the model layers in the groundwater availability models unless there is reasonable cause to use another source of information. Using information from the groundwater availability models, POSGCD assigns a well to an aquifer (or formation) based on the methodology provided in Appendix A. Monitoring wells that are screened over more than one aquifer (or formation) are assigned a primary and secondary aquifers (or formations) based on the screen interval percentage that intersects each formation. While all wells with assigned aquifers are included in the POSGCD monitoring network (Figure 3-1), wells completed within a single aquifer (or formation) have been the wells primarily used in the compliance calculations. Monitoring wells screened through multiple aquifers (or formations) have not been included in the compliance calculations that were reported by INTERA in 2018, 2019, and 2020. In future analysis, wells screened through multiple aquifers will be considered for inclusion in the calculations if they are properly vetted. Any “multiple-aquifer” wells that is used in future compliance calculations will be identified as such in the documentation associated with the calculation. **Appendix B** identifies wells included in the POSGCD monitoring network, wells used in compliance calculations, and “multiple-aquifer” wells that may be implemented into compliance calculations in the future.

Table 3-1 provides a count of the wells were part of the monitoring well network. Figure 3-2 shows the locations of wells that are associated with a single aquifer and were used to evaluate DFC compliance in 2020 or 2021. Figure 3-3 shows the locations of wells that are associated with a single aquifer and were used to evaluate PDL compliance in 2020 or 2021. Figure 3-4 shows the location of wells equipped with transducers.

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Table 3-1 Wells with Measured Water Levels in 2020 or 2021 that are a Part of the Monitoring Well Network Used to Evaluate DFC and PDL Compliance

Monitored Aquifer	GCD	Number of Wells	
		Single Aquifer	Multiple Aquifer
Brazos River Alluvium	POSGCD	7	0
	BVGCD	22	0
	LPGCD	0	0
Yegua-Jackson	POSGCD	14	0
	BVGCD	9	0
	LPGCD	1	0
Sparta	POSGCD	20	0
	BVGCD	26	0
	LPGCD	9	0
Queen City	POSGCD	30	1
	BVGCD	4	0
	LPGCD	4	0
Carrizo	POSGCD	62	6
	BVGCD	7	0
	LPGCD	3	0
Calvert Bluff	POSGCD	58	4
	BVGCD	15	0
	LPGCD	3	0
Simsboro	POSGCD	40	8
	BVGCD	51	0
	LPGCD	9	0
Hooper	POSGCD	30	9
	BVGCD	15	0
	LPGCD	3	0
Total		441	28

Table 3-2 POSGCD Wells with Transducers

Monitored Aquifer	Number of Wells
Brazos River Alluvium	0
Yegua-Jackson	3
Sparta	5
Queen City	8
Carrizo	5
Calvert Bluff	13
Simsboro	13
Hooper	8
Total	55

If well screen information for a well is not available from the Texas Water Development Board (TWDB) groundwater database or cannot be identified from the well's driller log, then POSGCD will use available information to assign the well to an aquifer formation until POSGCD can use a downhole borehole video camera to determine the well screen interval. If there is not enough information to determine well screen placement in a well, the water level measurements from the well will not be used as part of the compliance evaluations. When aquifer (or formation) assignments for wells differ from the aquifer (or formation) assignments provided in the TWDB groundwater database, POSGCD will notify TWDB of the differences in the assignments and will coordinate with TWDB to try to agree on the appropriate assignment for the well. If POSGCD and TWDB cannot agree on well assignment, then POSGCD will document the discussion process and the reason for the different well assignments.

POSGCD will annually review and verify aquifer assignments according to the latest data available. As part of this annual review process, POSGCD will coordinate with neighboring GCDs to verify aquifer (or formation) assignments for wells. If POSGCD and the neighboring GCDs cannot agree on well assignments, then POSGCD will document the discussion process and the reason for the different well assignments.

### 3.3 Monitoring Frequency

POSGCD will attempt to measure the water level in each monitoring well at least once a year during a four-month period between January 1 and April 30. A manual measurement consists of either an e-line or steel tape reading at the well. A goal of the monitoring is to obtain a set of water level measurements for the entire monitoring network that are all taken within the same time window of two months or less.

The four-month period between January 1 and April 30 is when seasonal groundwater pumping has historically been low and the water level is highest. As a result, the water levels in some of the monitoring wells are recovering during the time period. To capture the seasonal fluctuations in the water levels, POSGCD will measure water levels more frequently than once a year in selected monitoring wells that are instrumented with transducers that measure water levels on a pre-determined and scheduled timing. Currently, POSGCD is using transducers to measure water levels hourly. As funding becomes available, POSGCD will continue to expand the seasonal and continual measurements of water levels at its monitoring wells.

### 3.4 Data Reporting

POSGCD will provide documentation to support aquifer assignments for every monitoring well. As part of its well database, POSGCD will create a diagram for each well that shows the Groundwater Availability Model (GAM) surfaces at the well location superimposed on the vertical location of the well screen.

**Appendix C** shows well diagrams for the current POSGCD monitoring network. **Figure 3-5** show two examples of these well diagrams. Where available, POSGCD will also provide additional aquifer assignment documentation, including well logs and downhole videos.

For every monitoring well, POSGCD will produce plots showing water levels through time. The visualization of water levels measurements is one of the avenues used to vet the measured water levels.

**Appendix D** provides hydrographs for POSGCD monitoring wells. **Figure 3-6** shows an example hydrograph. POSGCD will update these plots on an as needed basis and will generate yearly water level

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surfaces for the aquifer management zones. An example water level surface map is shown in **Figure 3-7**. Where appropriate several methods may be used to evaluate the sensitivity of a map of water level surfaced to the method used to interpolate the measured water levels. Currently, POSGCD is using three methods to interpolate measured water levels. These three methods are discussed in Section 5.



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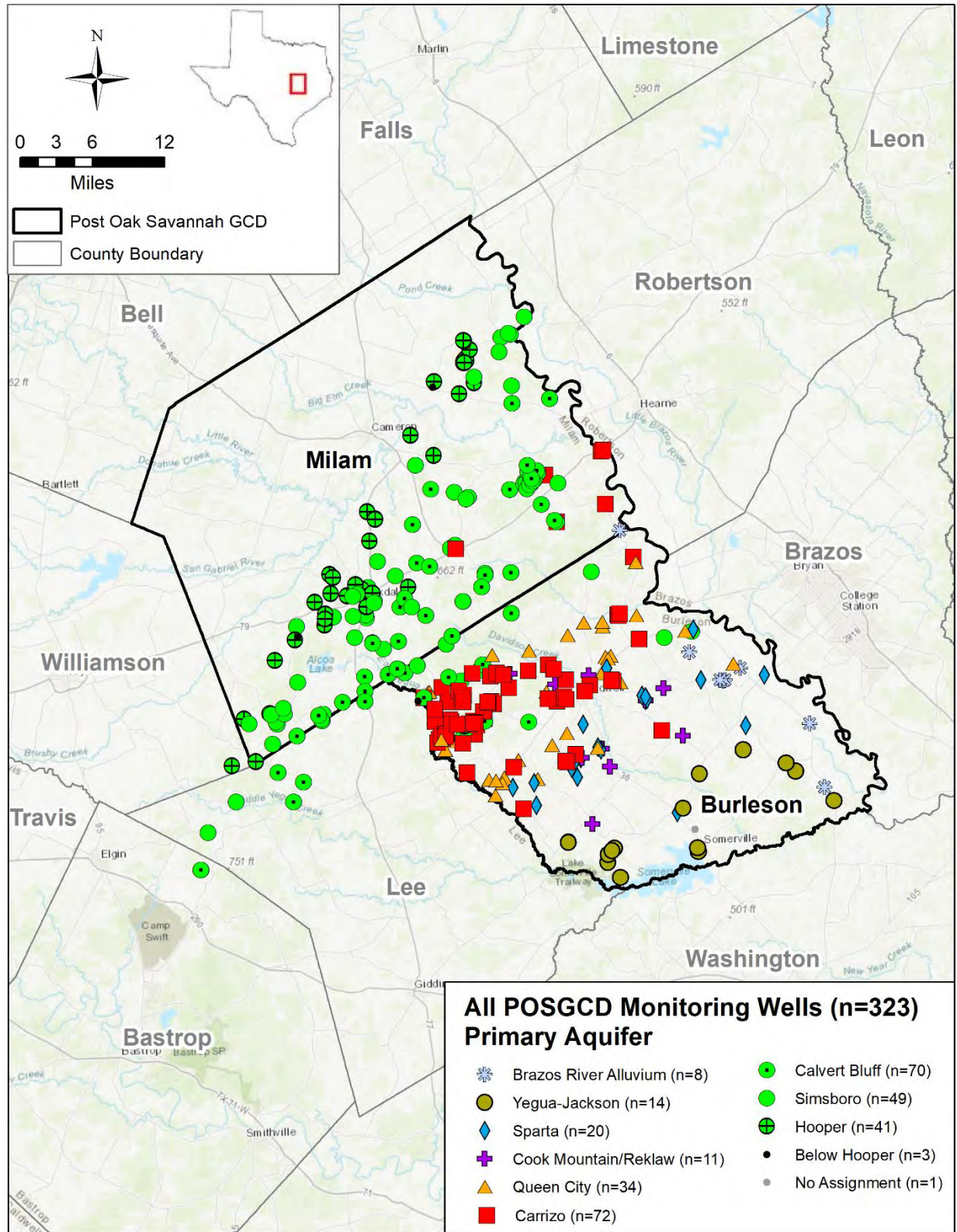


Figure 3-1 POSGCD Monitoring Well Locations.



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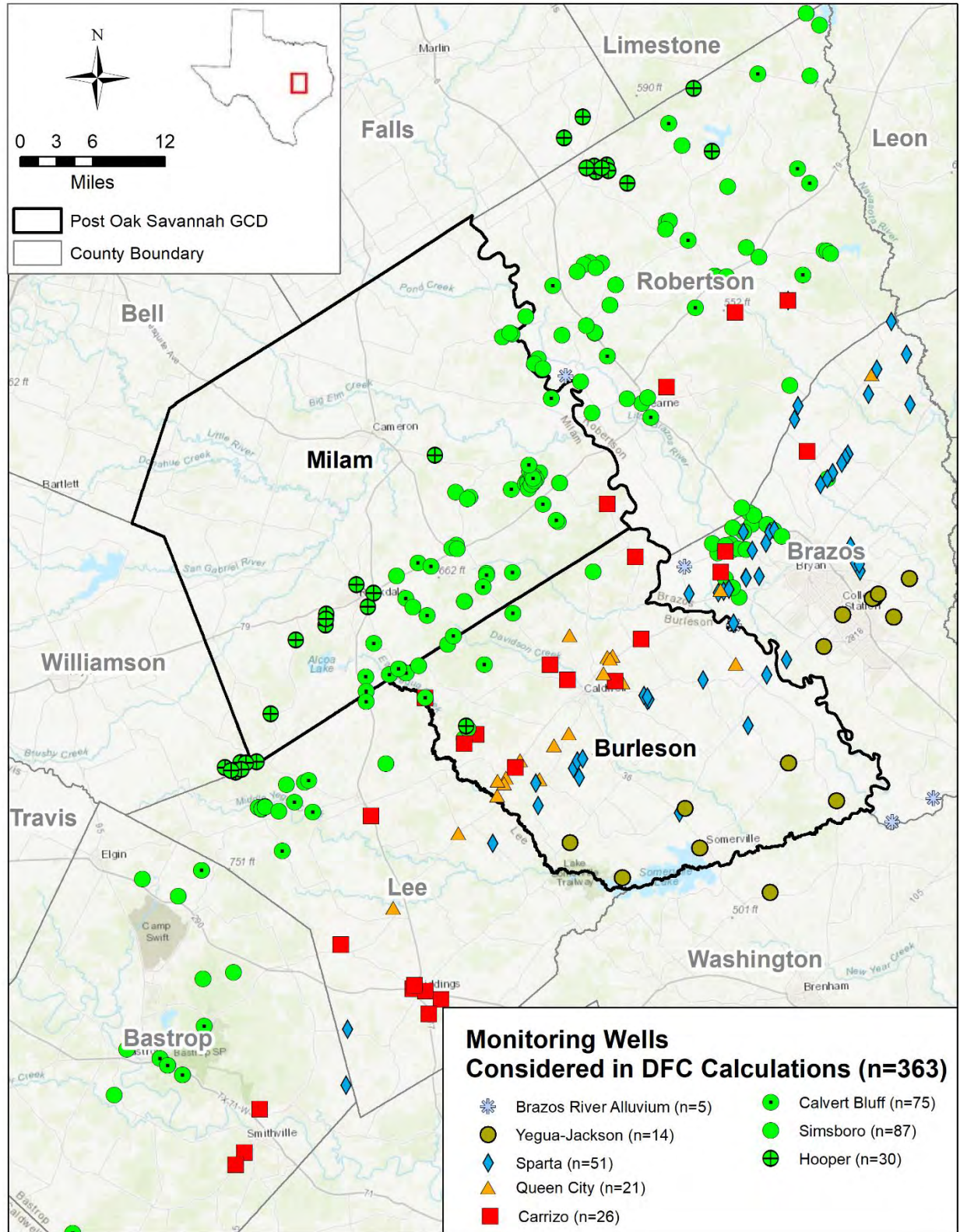


Figure 3-2 Location of monitoring of wells that are associated with a single aquifer and were used to evaluate DFC compliance in 2020 or 2021.



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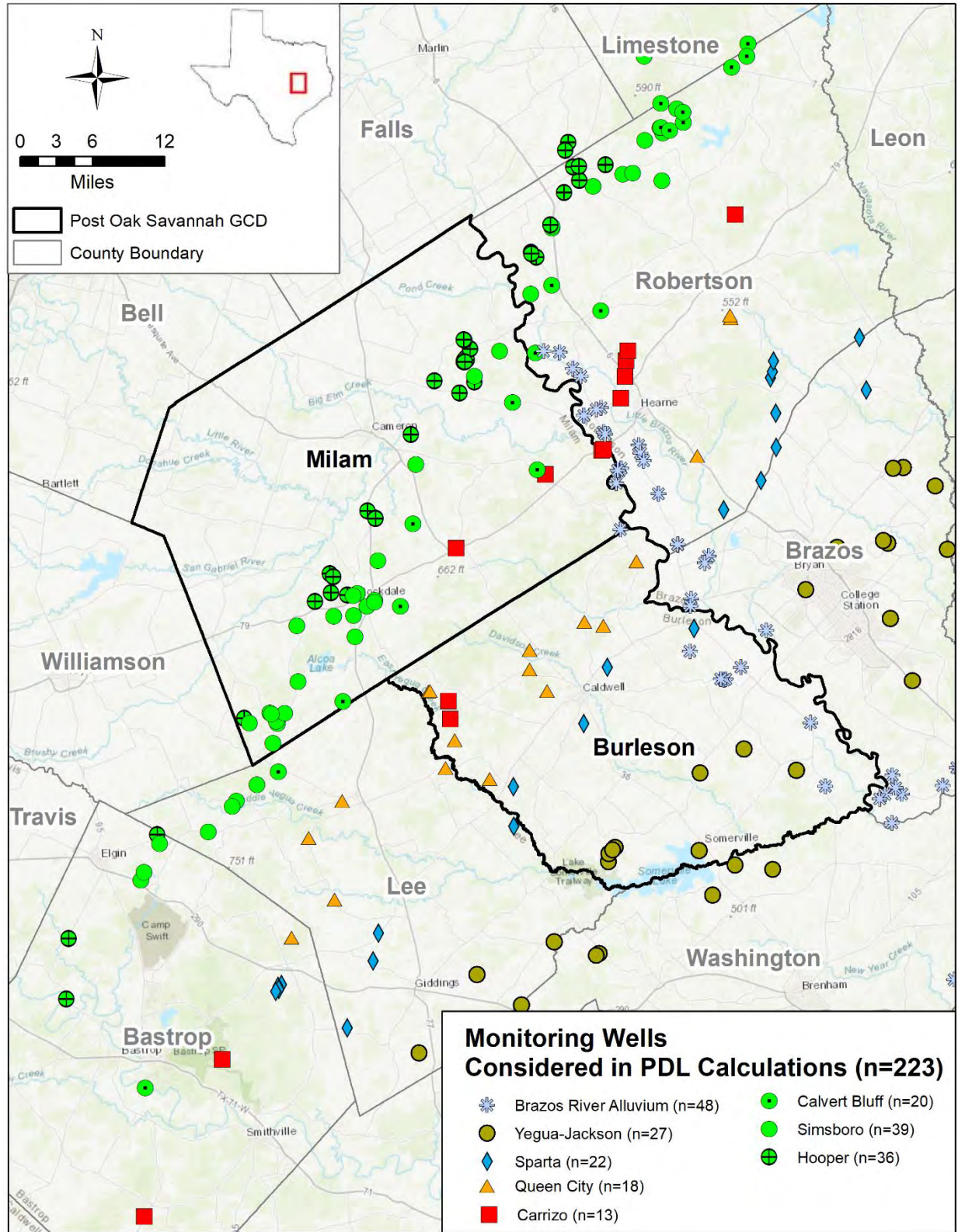


Figure 3-3 Location of monitoring wells that are associated with a single aquifer and were used to evaluate PDL compliance in 2020 or 2021.



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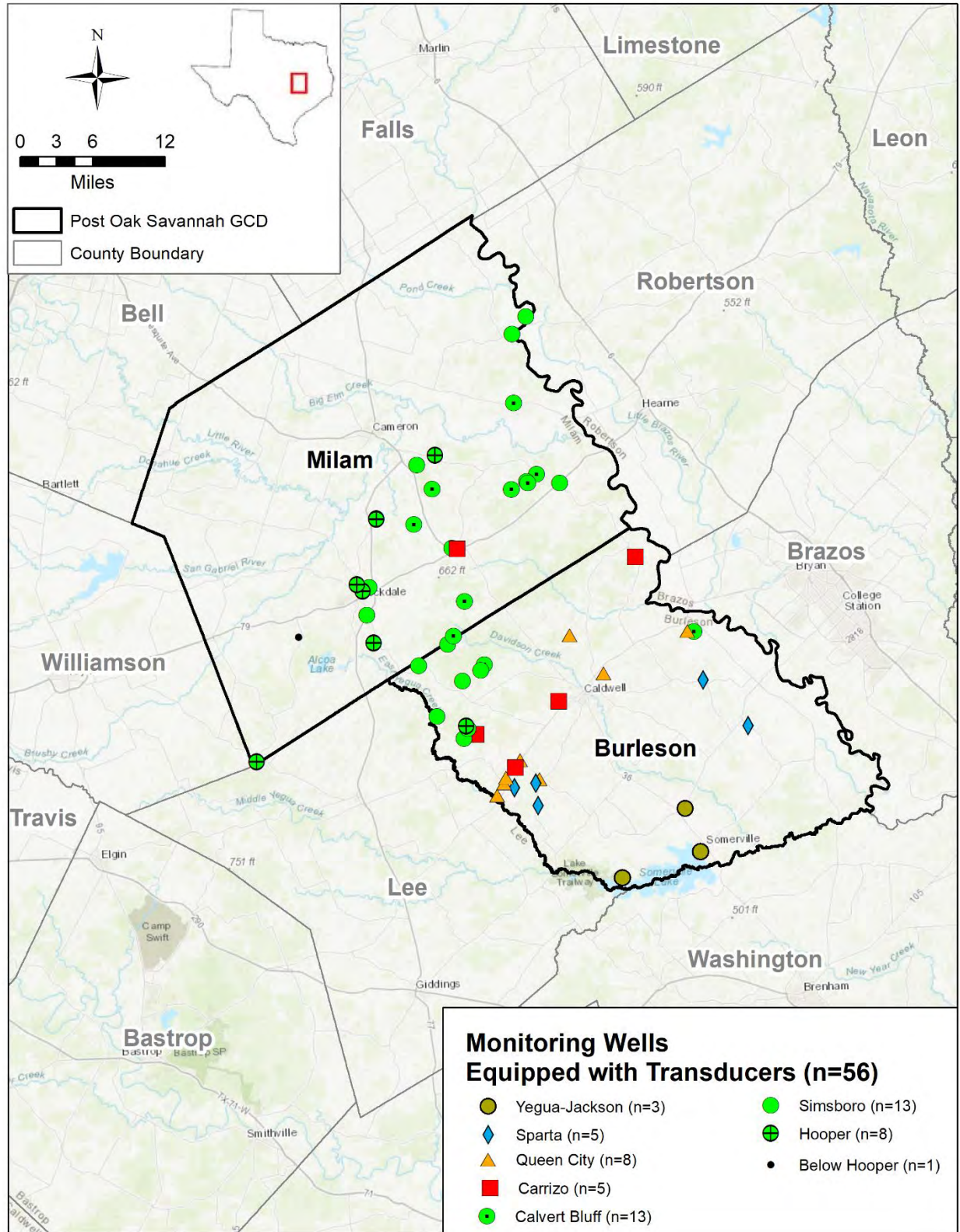


Figure 3-4 Monitoring well locations equipped with transducers in POSGCD

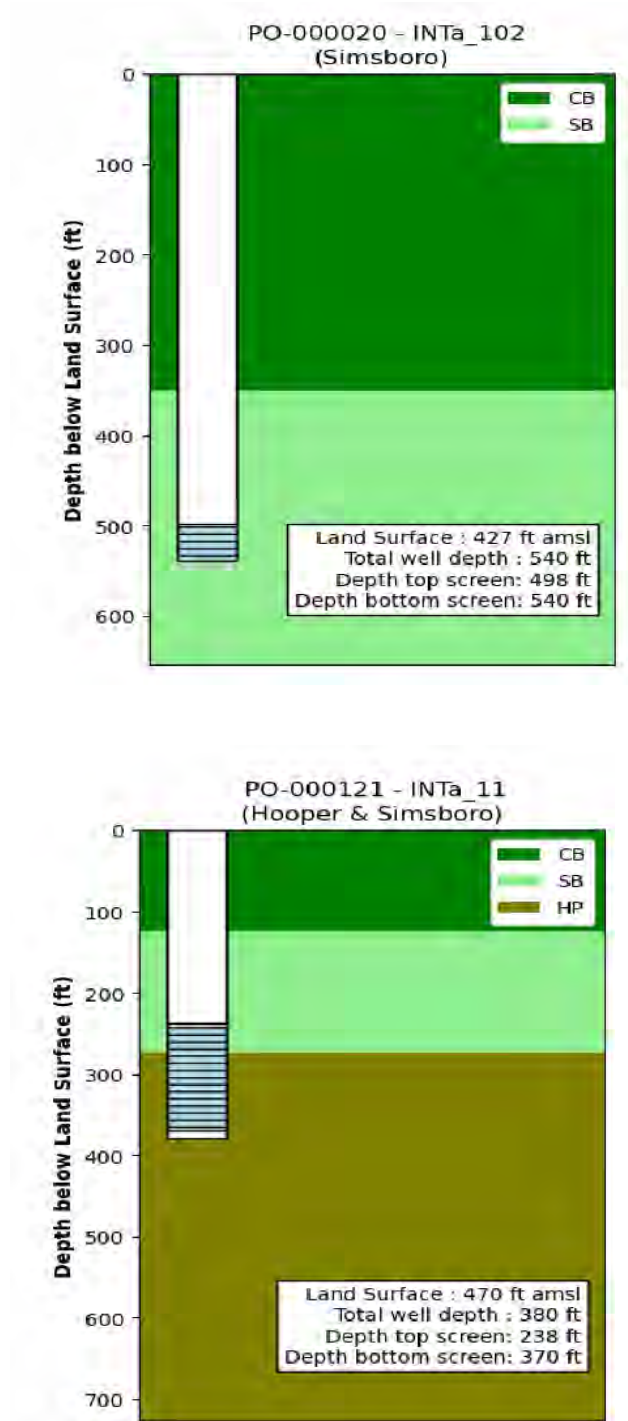


Figure 3-5 Example schematic of POSGCD monitoring wells showing the well screen relative to aquifers for a single-well aquifer (top) and a multiple-well aquifer (bottom)

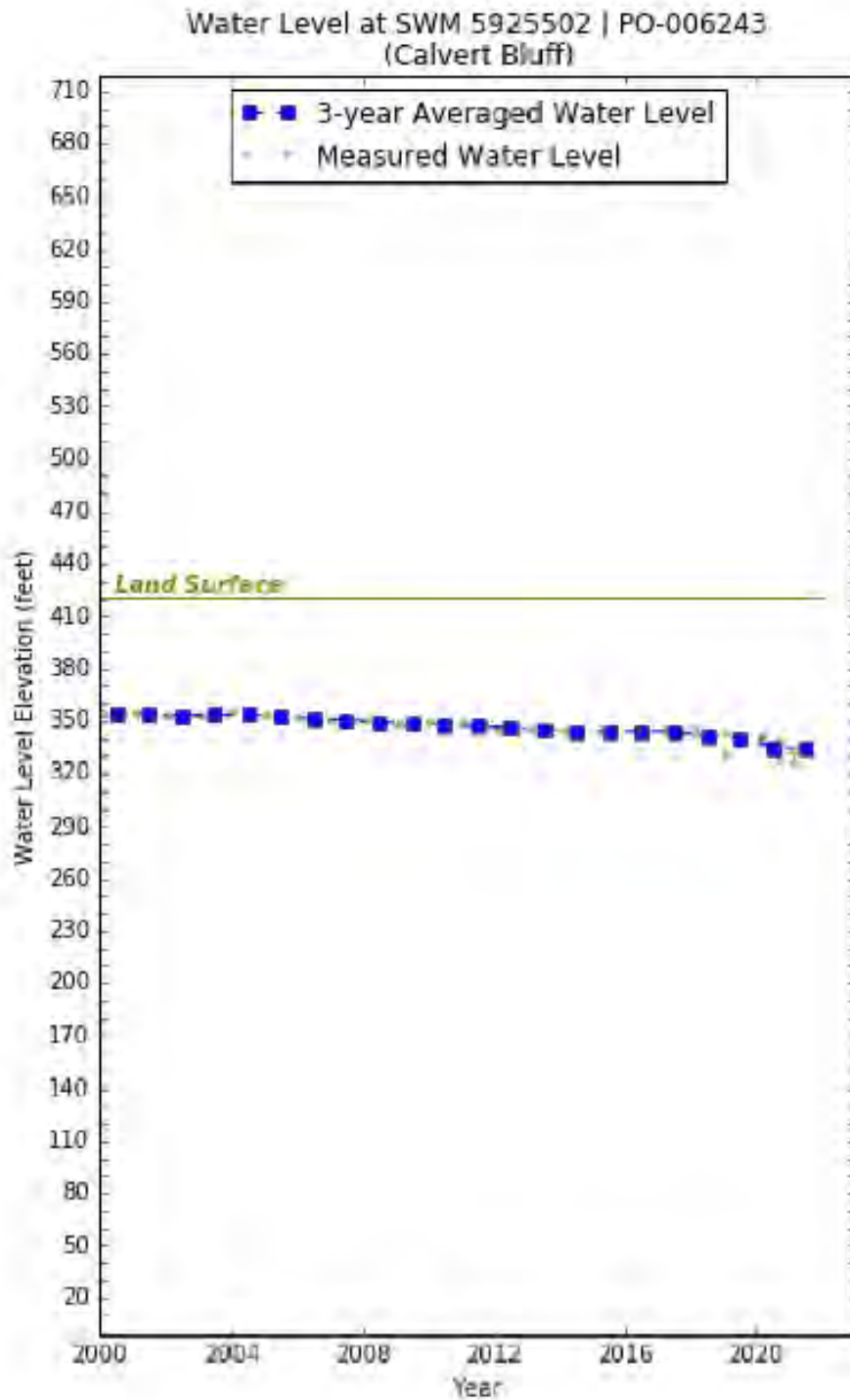


Figure 3-6 Example plot of water levels at a monitoring well



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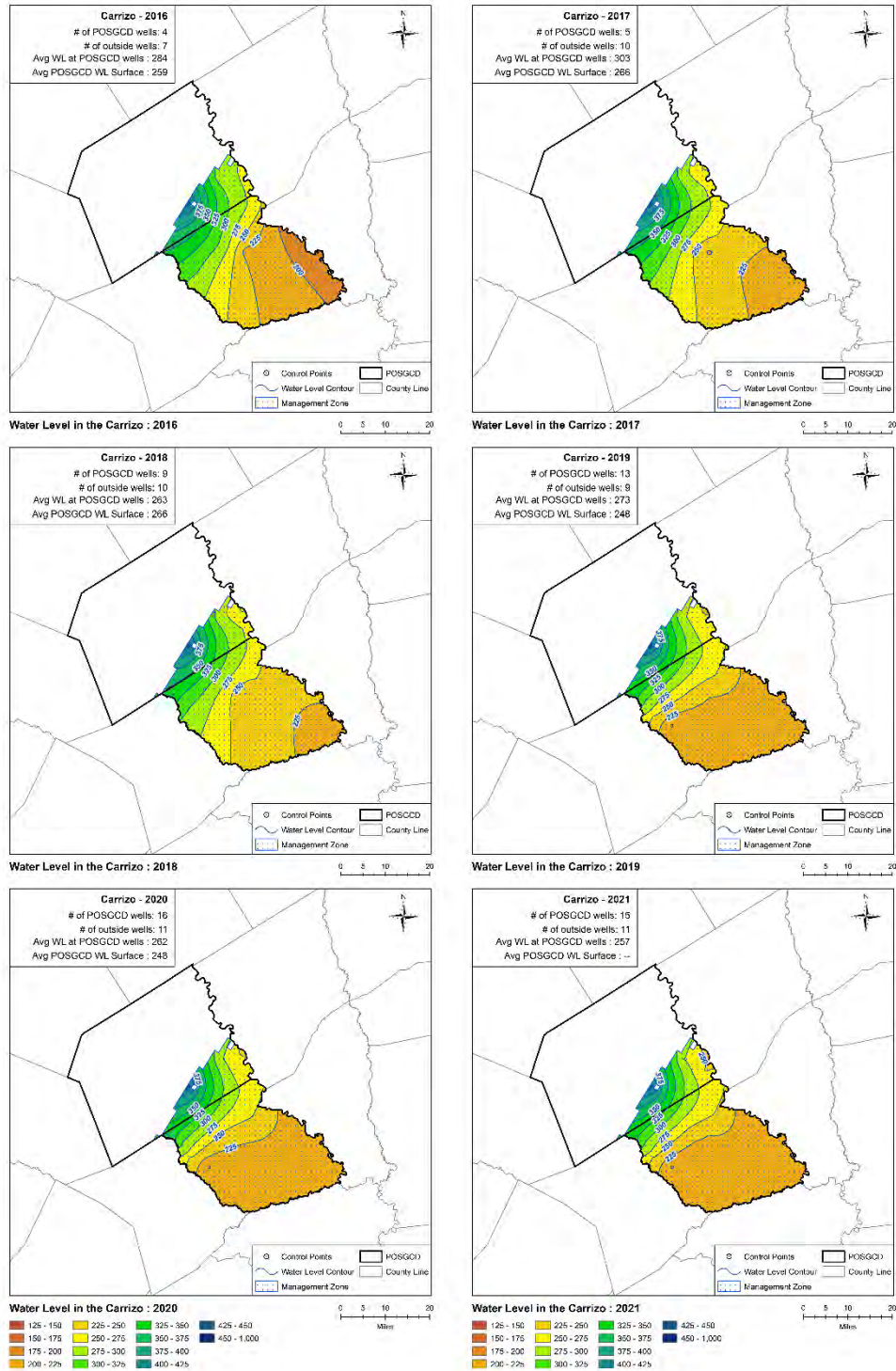


Figure 3-7 Example maps showing Carrizo water level surfaces through time

## 4.0 COLLECTING AND MANAGING MONITORING DATA

This section describes the collection and management of water level measurements.

### 4.1 Collection procedures

POSGCD staff is responsible for measuring water levels from monitoring wells in Milam and Burleson counties. POSGCD staff will be trained prior to collecting monitoring data. Training requirements will include reading the most current set of POSGCD field data collection protocols and participating in a measurement survey. **Appendix E** contains the protocols that have been adopted by POSGCD at the time this document was finalized.

### 4.2 Health and Safety Plan

POSGCD monitoring activities will be conducted in accordance with the POSGCD Health and Safety Plan (**Appendix F**). POSGCD staff will be required to review the Health and Safety Plan prior to monitoring events and to have access to the Health and Safety Plan during a monitoring event.

### 4.3 Water Level Records

POSGCD will use field notebooks to record field notes associated with each measurement event. During or immediately after a measurement event, the level measurements will be recorded on the POSGCD water level form for each individual well that is similar to the form provided in (**Appendix G**) The handwritten field water level measurements and notes will be scanned and entered into the POSGCD digital database within 2 weeks of recording.

### 4.4 Data Availability

POSGCD will post results from monitoring events on their web site in a timely fashion after the information has been properly reviewed and checked. Well location, well construction and water level hydrographs for the monitoring wells will be available on POSGCD's online mapping portal at [www.posgcd.halff.com](http://www.posgcd.halff.com).



## 5.0 METHODOLOGIES FOR ASSESSING AQUIFER DRAWDOWN FROM MEASURED GROUNDWATER LEVELS

This section defines the spatial extents in which DFCs and PDLs compliance calculations are considered. This section also summarizes the temporal and spatial interpolation methods used to assess drawdown with respect to DFCs and PDLs compliance for each aquifer management zone.

### 5.1 Total and Shallow Aquifer Management Zones

Total Aquifer Management Zones are defined by the aquifer areas within POSGCD. Three-year moving averages of measured water levels are determined to evaluate drawdown relative to each aquifer's DFC. **Figure 5-1** shows the total aquifer management zones over which average drawdowns are calculated.

Shallow Aquifer Management Zones are defined by the shallow aquifer (<400 feet deep) areas with POSGCD. Three-year moving averages of measured water levels are determined to evaluate drawdown relative to each aquifer PDL. **Figure 5-2** shows the shallow aquifer management zones over which average drawdown is calculated.

### 5.2 One- and Three-Year Water Level Averages

Average annual water level conditions are generated using three-year averages of measured water levels in the monitoring wells. The 3-year averages are determined using a three-step process:

Step 1: Calculate a single value for each month from January 1 to April 30 that has at least one measured water level

Step 2: Calculate the yearly averages from the monthly averages determined in Step 1

Step 3 Calculate the three-year averages from the yearly averages calculated in Step 2

In Step 1, the monthly values are calculated differently for wells with only manual measured water levels and for wells with transducer data. In most instances, wells with manual measurements will have only one well measurement over the four-month period whereas wells with transducer data could over 20,000 measurements. **Figure 5-3** depicts the process for determining the monthly averages for wells with the two set of measurements. For wells with only monthly data, the process is simply to average all water level measurements made in a month. For wells with transducer data, the monthly values are determined by the median of the transducer values. The median is used instead of the average to help prevent biasing the monthly value by the low water levels that occur during pumping.

**Figure 5-4** illustrates the process for determining yearly values in Step 2 and three-year values in Step 3. In Step 2, the yearly values are calculated by averaging the water level values for the months that have a monthly water level. If only one month out of the four months has a value, then the yearly average value is equal to the value assigned to one month. In Step 3, the three-year average is determined by averaging yearly values determined in Step 2 for the year of interest and for the year prior and for the year after the year of interest. For instance, if the year of interest is 2000, then the three-year value for the year 2000 would be based on the yearly averages for the years 1999, 2000, and 2001. In order for a yearly average to be determined, at least two of the three-consecutive years need to have yearly value.

### 5.3 Spatial Interpolation Methods

Spatial interpolation is required to estimate water levels, and thus drawdown, at unsampled locations that span Total and Shallow Aquifer Management Zones. Three interpolation methods are used to generate water level surfaces from measured water levels: topo to raster, kriged water levels, and kriged detrend water levels. The first method is deterministic and the latter two methods are geostatistical. Deterministic methods rely on using mathematical equations with fitting parameters to generate values at unsampled locations. Examples of deterministic methods are spline interpolation routines, which apply smoothing and inverse distance routines based on the extent of data set similarity. Geostatistical methods rely on using both statistical correlations and mathematical methods to generate values at unsampled locations.

**Figure 5-5** provides an example that compares the water level surface generated by the three spatial interpolation schemes for the Simsboro aquifer for drawdown that occurred from 2000 to 2019. Figure 5-5 compares water levels generated using the Topo to Raster (**Figure 5-5a**) and two different geostatistical methods (**Figures 5-5b and 5-5c**). Figure 5-5b shows results for kriging with detrending and Figure 5-5c shows results for kriging without detrending. The three interpolation methods are described in the subsections below. For these examples, the Topo to Raster surfaces and the Kriging surfaces were generated on a different numerical grid. The Topo to Raster used a numerical grid consisting of 500 ft by 500 ft grid cells whereas the Kriging surfaces consisted of 1,000 ft by 1,000 ft grid cells.

#### 5.3.1 Topo to Raster Method

The topo to raster method was implemented using the routines built into ArcMAP, which is ESRI's main tool for geospatial processing. The Topo to Raster is an interpolation method specifically designed for the creation of hydrologically correct topographic surfaces called digital elevation models (DEMs). The interpolation method uses an iterative finite difference interpolation technique. It is optimized to have the computational efficiency of local interpolation methods, such as inverse distance weighted (IDW) interpolation, without losing the surface continuity of global interpolation methods, such as Kriging. The method is essentially a specialized spline technique (Wahba, 1990) that has been modified to allow abrupt changes in the slope of the surface.

This approach is widely used because of the relatively simple set of equations needed to estimate values at unsampled locations. While Topo to Raster results in relatively smooth water level surfaces across each aquifer management zone, it interpolates using mathematical equations that do not consider spatial statistics (e.g., means, variances and correlations) and possible trends in the data. In addition, the Topo to Raster algorithms are designed to minimize the creation of sinks within an enclosed region. With regard to water level surfaces, sinks are associated with the location of wells that are pumping.

**Appendix H** provides additional description of the Topo to Raster method.

#### 5.3.2 Geostatistical Method

Statistics is the science of collecting, pooling, and making inferences from quantitative data. Geostatistics is the branch of science that focuses on geoscientific data. Geostatistical methods combine the use of statistical correlations and mathematical methods to generate values at unsampled locations. The most common geostatistical interpolation method is Kriging. Kriging algorithms are rooted in the

principles of spatial autocorrelation, which quantifies the correlation between variables relative to varying spatial extents (distance).

Kriging is a geostatistical interpolation technique that considers both the distance and the degree of variation between known data points when estimating values in unknown areas. Kriging accounts for the degree of variation, or spatial correlation, among the data points through a semivariogram model. The basic idea of Kriging is to predict the value of a function at a given point by computing a weighted average of the known values of the function in the neighborhood of the point. There are many forms of Kriging. The different forms of Kriging are detailed in Goovaerts (1997). The most commonly used forms of Kriging include: simple Kriging, ordinary Kriging, universal Kriging, cokriging, and Kriging with external drift. Ordinary Kriging is among the most commonly used types of Kriging and is the basis of geostatistics (Ryu and others, 2002). Ordinary Kriging gives the optimal prediction under the assumption of second-order stationary, a normal distribution for the modeled variable, and the absence of any trend in the data. By optimal prediction, what is meant is that Kriging provides the best linear unbiased prediction at unsampled locations and reproduces the measured values at all sampled locations exactly.

An important aspect of implementation of ordinary kriging is developing a semi-variogram to quantify the spatial continuity of the data. Introductions to semivariogram modeling and geostatistics are found in literature such as Isaaks and Srivastava (1989), American Society of Civil Engineers (1990), and Kitanidis (1997). The mathematical foundation and derivation of the semivariogram are beyond the scope of this report.

**Appendix I** describes the process for constructing the semivariogram and the steps for applying ordinary kriging to generate a water level surface. A potential concern with using Ordinary Kriging to interpolate water level data is that its application presumes that there are no spatial trends in the data. However, the POSGCD management zones all exhibit spatial trends in their water level surfaces. Because of the presence of spatial trend in the water level data, the results produced from Ordinary Kriging may be biased.

To account for any biases caused by a spatial trend in the application of Ordinary Kriging with the measured water levels, a method was developed to apply Ordinary Kriging to detrended measured water levels. **Appendix J** explains the steps associated with using Ordinary Kriging with detrended measured water levels to generate water level surfaces

## 5.4 Calculation of Average Drawdown

**Figure 5-6** is a schematic that illustrate the process used to calculate the average drawdown for a management zone. The process includes the following steps:

- Step 1. Develop the water level surfaces for the two years over which the average drawdown will be calculated. In Figure 5-6 the drawdown is for the period from 2000 to 2021 so water level surfaces are generated for the years 2000 and 2021.
- Step 2. Calculate the average water level elevations for the water level surfaces over which the average drawdown will be calculated. In Figure 5-6 an average water level elevation is calculated for the year 2000 and an average water level elevation is calculated for the year 2021.

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Step 3. Determine the average drawdown for the management zone by subtracting the average water value for the two years that are the bookend for the period of interest. For the case in **Figure 5-6**, the average drawdown from 2000 to 2021 is obtained by subtracting the average water level in 2021 from the average water level in 2000.



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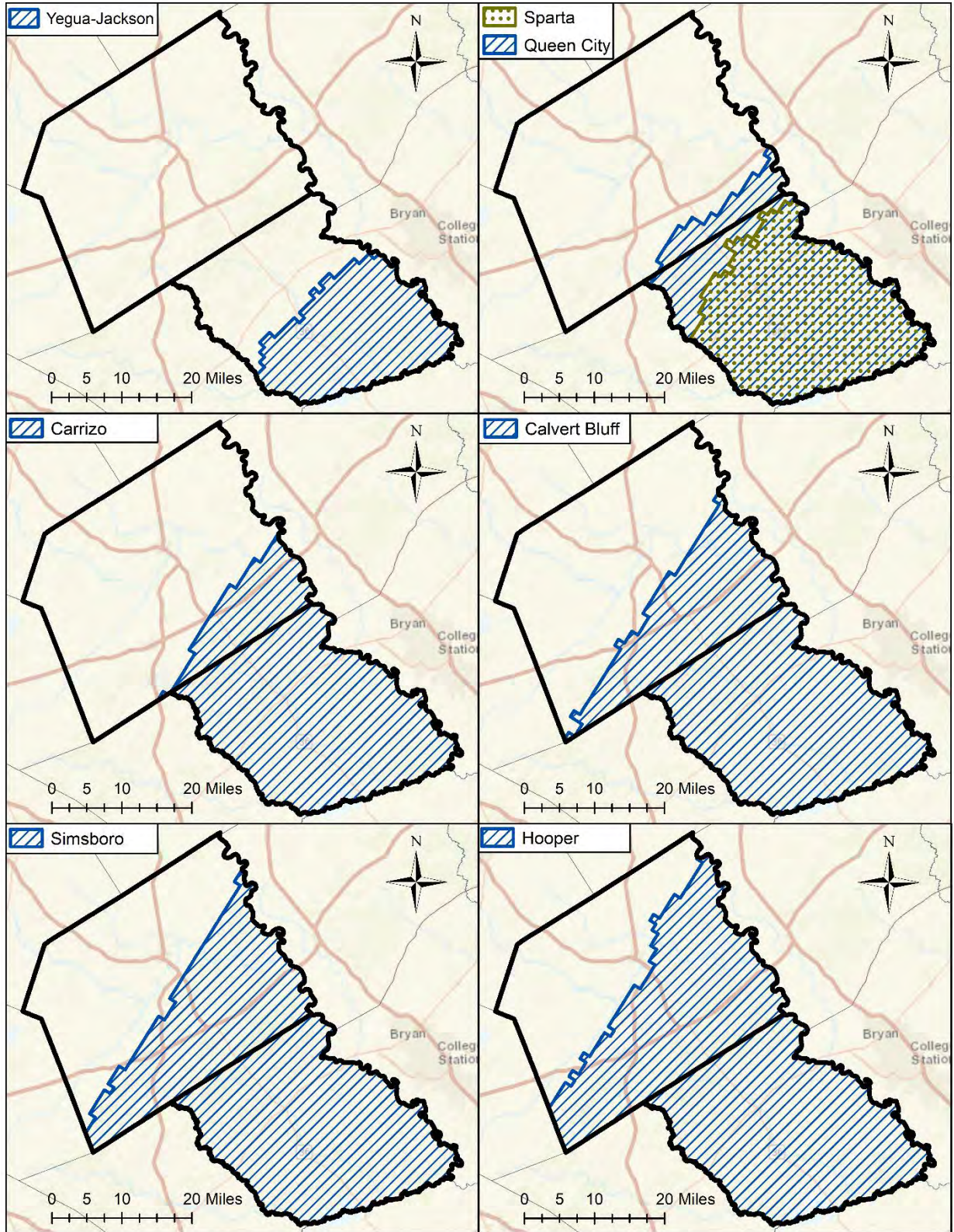


Figure 5-1 POSGCD total aquifer management zones for evaluating GMA 12 DFCs



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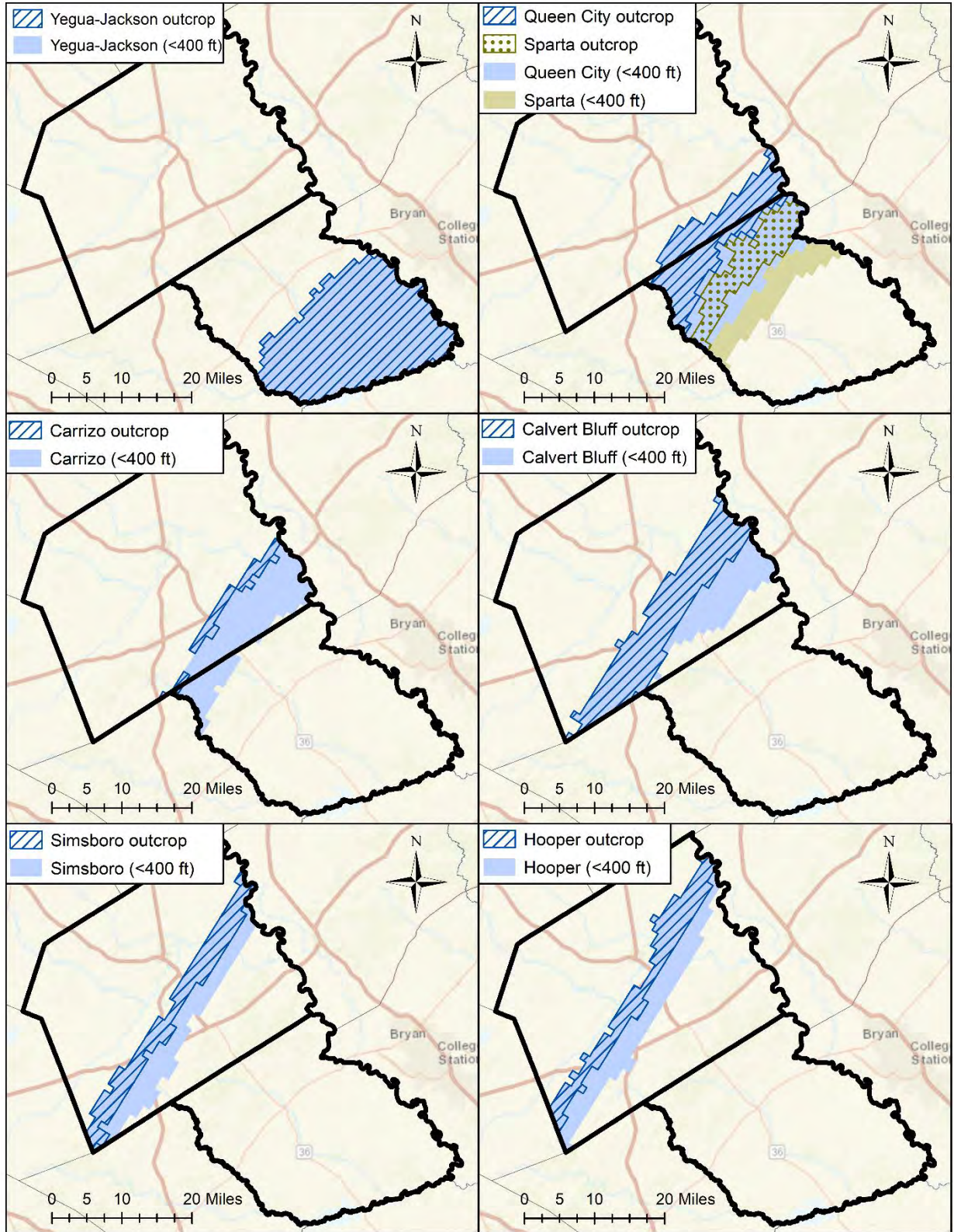


Figure 5-2 POSGCD shallow aquifer management zones for evaluating District PDLs

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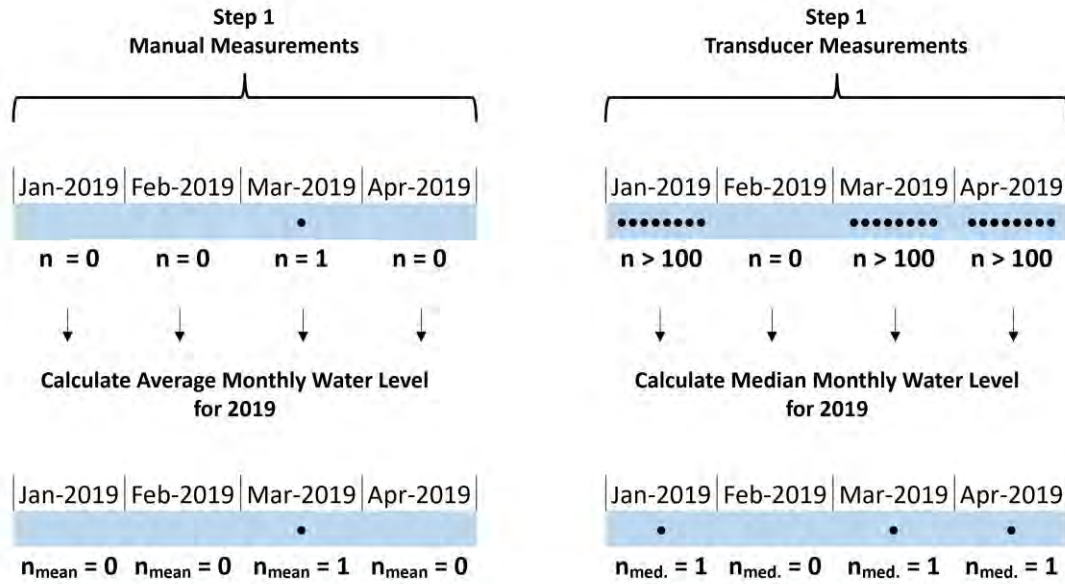


Figure 5-3 Schematic diagram showing the calculations used to determine monthly values for a well with only manual measurements (left) and for a well with transducer measurements (right)

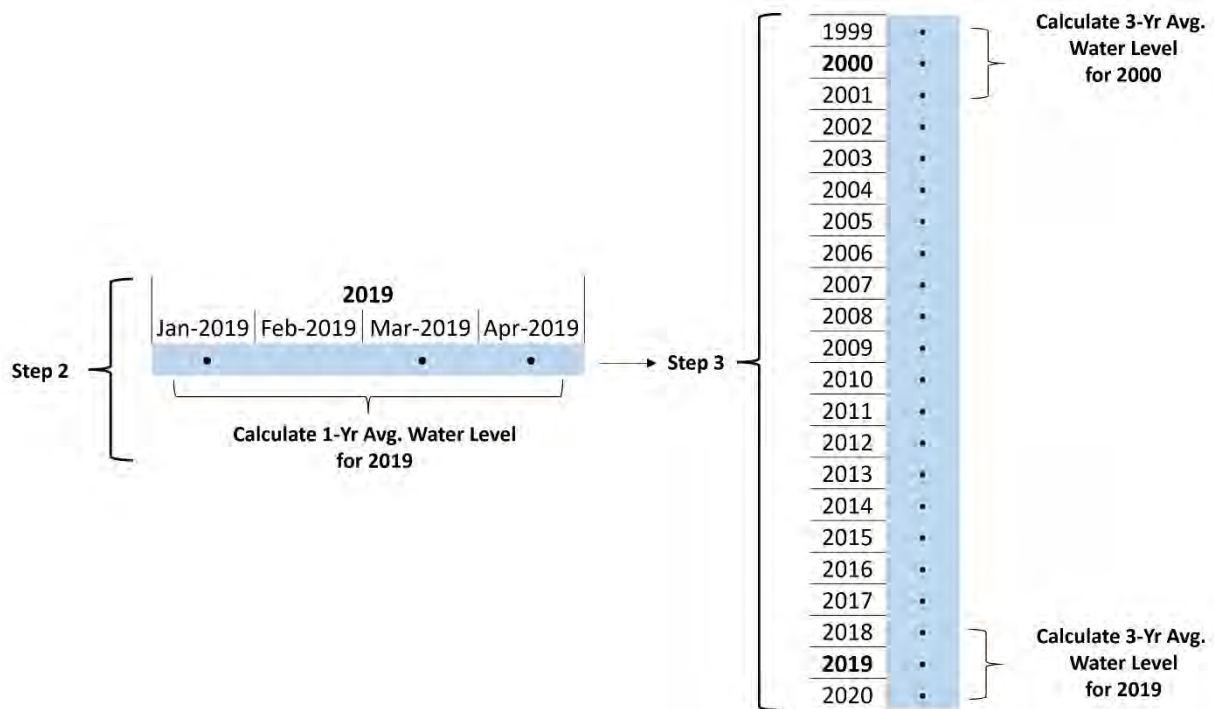


Figure 5-4 Schematic diagram showing the calculations used to determine the yearly value (left) and three-year value (right) for a well.



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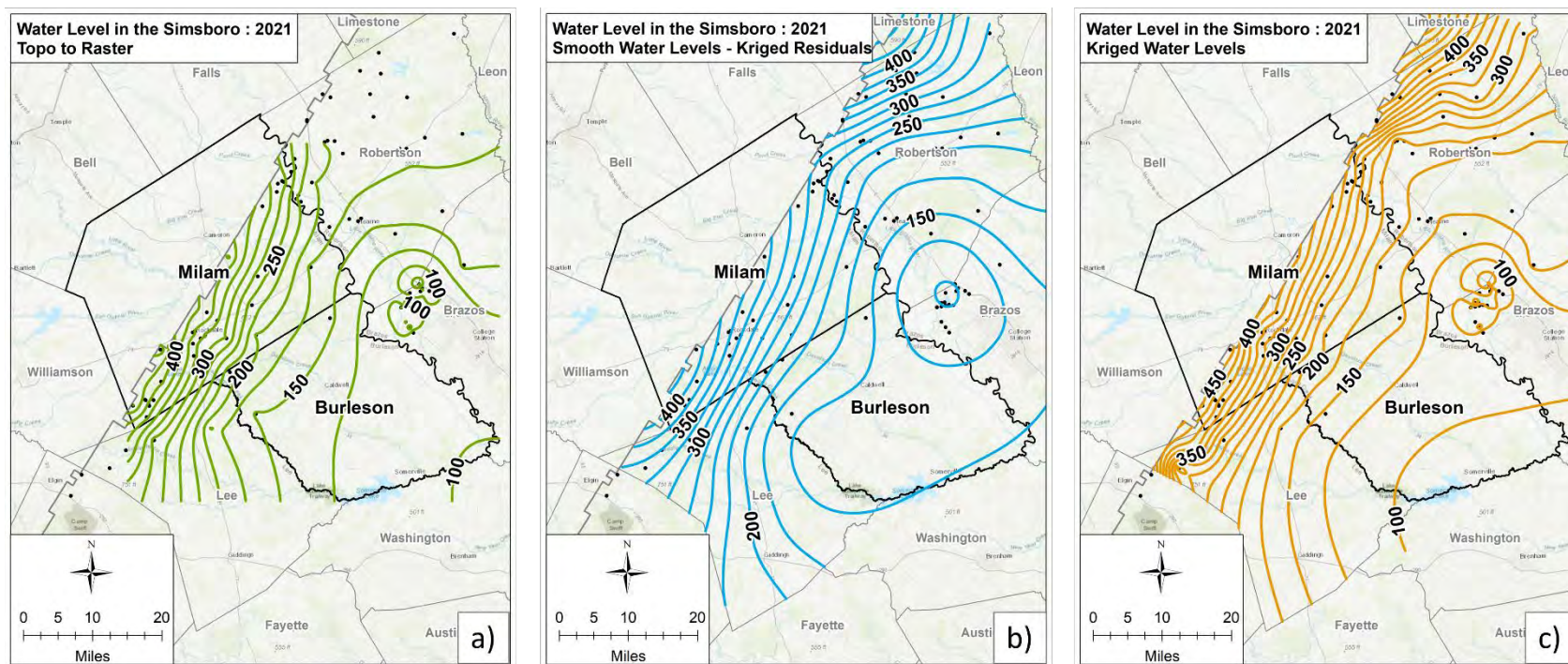


Figure 5-5 Diagrams comparing final interpolated water level surfaces results for the Total Simsboro Aquifer Management Zone using (a) topo to raster, (b) kriging with detrending, and (c) kriging without detrending



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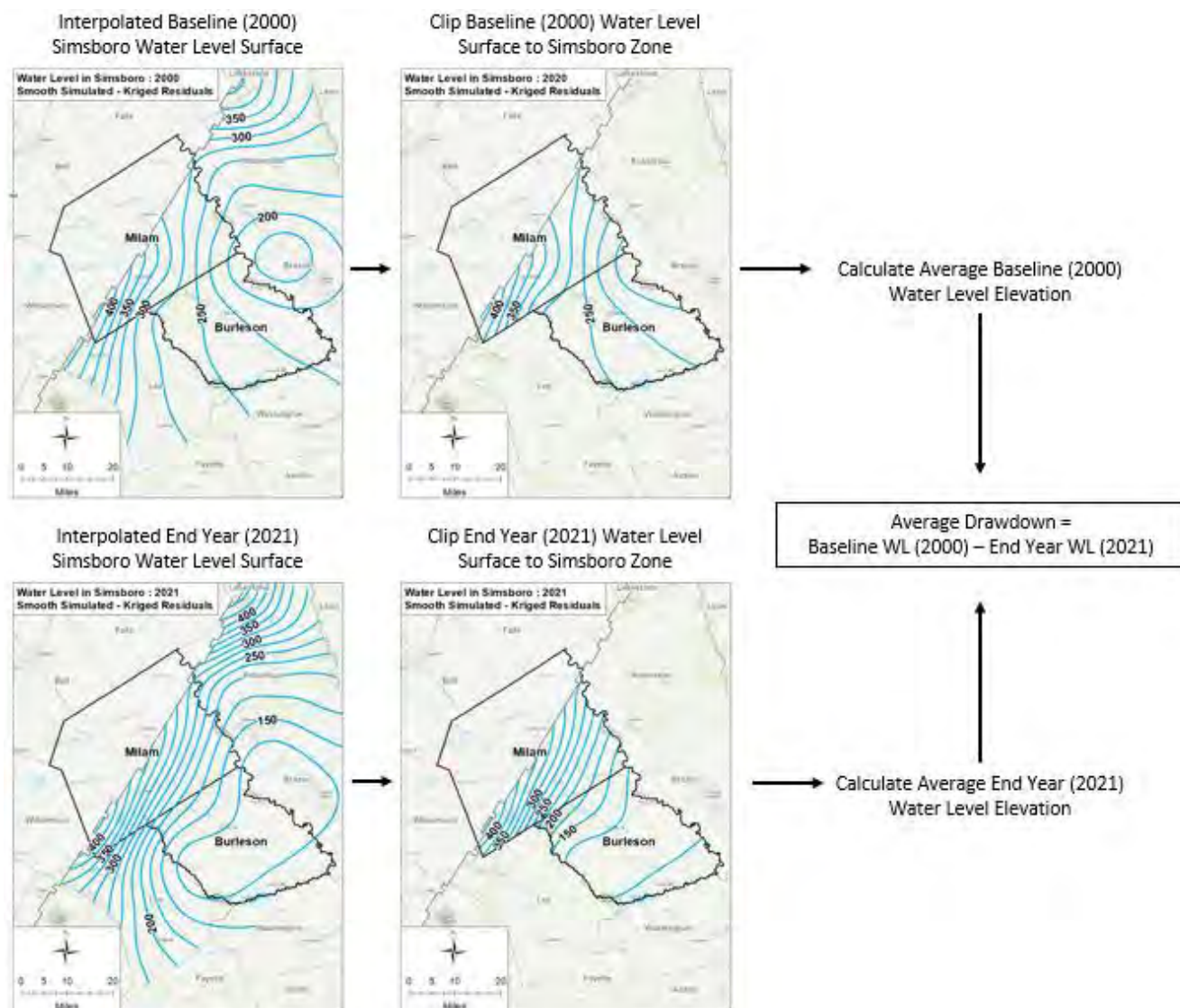


Figure 5-6 Diagram of drawdown calculation method for DFC compliance data from the Simsboro Aquifer. The interpolation method used to produce the drawdowns is Ordinary Kriging using detrended measured water levels.

## 6.0 EVALUATING COMPLIANCE WITH DFCS AND PDLs

This section describes the process used to evaluate compliance with DFCS and PDLs.

### 6.1 DFC Compliance - Total Aquifer Management Zones

POSGCD evaluates compliance with DFCS by comparing average drawdowns determined for an aquifer in Section 5 to DFCS. **Table 6-1** provides the results from five previous evaluations that include the time periods 2000 to 2015, 2000 to 2016, 2000 to 2017, 2000 to 2018, 2000 to 2019, 2000 to 2020, and 2000 to 2021. The drawdowns provided in Table 6-1 were generated by using the Topo to Raster method described in Section 5. **Figure 6-1** compares the results from these evaluations to action levels identified in POSGCD Groundwater Rule 16.4 “Actions Based on Monitoring Results.”

POSGCD does not currently evaluate compliance with the Brazos River Alluvium Aquifer DFC defined as change in saturated thickness. POSGCD also does not currently evaluate compliance with GMA 8 DFCS (Table 1-4) since there is not currently any permitted pumping from these aquifers. POSGCD will revisit GMA 8 DFCS if and when pumping is permitted in these aquifers in the future.

Table 6-1 Status of DFC compliance by total aquifer management zone (green text indicates compliance; orange text indicates at or above Threshold 1).

Management Zone	DFC	Drawdown from 2000 to 2015	Drawdown from 2000 to 2016	Drawdown from 2000 to 2017	Drawdown from 2000 to 2018	Drawdown from 2000 to 2019	Drawdown from 2000 to 2020	Drawdown from 2000 to 2021
		Calculated Drawdown	Calculated Drawdown	Calculated Drawdown	Calculated Drawdown	Calculated Drawdown	Calculated Drawdown	Calculated Drawdown
		(% of DFC)	(% of DFC)	(% of DFC)	(% of DFC)	(% of DFC)	(% of DFC)	(% of DFC)
Yegua Jackson	100	22.3	22.2	21.0	19.2	18.1	17.1	17.8
		22.3%	22.2%	21.0%	19.2%	18.1%	17.1%	17.8%
Sparta	28	6.9	8.6	12.3	14.5	15.0	13.8	14.3
		24.8%	30.6%	43.8%	51.8%	53.4%	49.3%	51.2%
Queen City	30	2.7	1.3	1.6	2.4	3.9	4.4	4.2
		8.9%	4.4%	5.5%	8.0%	13.0%	14.6%	14.1%
Carrizo	67	-	-	18.1	17.3	44.1	45.5	48.2
		-	-	27.0%	25.8%	65.9%	67.9%	71.9%
Calvert Bluff(Upper Wilcox)	149	-34.6	-19.0	-27.0	-28.3	-28.4	-57.8	-56.5
		-23.2%	-12.7%	-18.1%	-19.0%	-19.1%	-38.8%	-37.9%
Simsboro(Middle Wilcox)	318	14.9	19.0	24.7	22.4	28.3	30.3	32.0
		4.7%	6.0%	7.8%	7.0%	8.9%	9.5%	10.1%
Hooper(Lower Wilcox)	205	-1.3	2.2	3.6	-0.7	-0.5	3.0	10.7
		-0.6%	1.0%	1.8%	-0.3%	-0.2%	1.5%	5.2%

## 6.2 PDL Compliance - Shallow Aquifer Management Zones

POSGCD will track compliance with PDLs by comparing average drawdowns determined for a shallow management zone in Section 5 to PDLs. **Table 6-2** shows the results from five previous evaluations that include the time periods 2000 to 2015, 2000 to 2016, 2000 to 2017, 2000 to 2018, 2000 to 2019, 2000 to 2020, and 2000 to 2021. The drawdowns provided in Table 6-1 were generated by using the Topo to Raster method described in Section 5. **Figure 6-2** compares the results from these evaluations for the shallow aquifer to action levels identified in POSGCD Groundwater Rule 16.4 “Actions Based on Monitoring Results.”

Table 6-2 Status of PDL compliance by shallow aquifer management zone (green text indicates compliance).

Management Zone	PDL	Drawdown from 2000 to 2015	Drawdown from 2000 to 2016	Drawdown from 2000 to 2017	Drawdown from 2000 to 2018	Drawdown from 2000 to 2019	Drawdown from 2000 to 2020	Drawdown from 2000 to 2021
		Calculated Drawdown	Calculated Drawdown	Calculated Drawdown	Calculated Drawdown	Calculated Drawdown	Calculated Drawdown	Calculated Drawdown
		(% of DFC)	(% of DFC)	(% of DFC)	(% of DFC)	(% of DFC)	(% of DFC)	(% of DFC)
Yegua Jackson	20	4.40	0.93	1.46	1.60	3.63	4.07	1.2
		22%	5%	7%	8%	18%	20%	6%
Sparta	20	4.3	2.6	2.1	2.7	4.2	4.7	1.6
		21%	13%	11%	13%	21%	24%	8%
Queen City	20	4.4	2.6	1.6	1.2	1.9	2.2	0.03
		22%	13%	8%	6%	10%	11%	0%
Carrizo	20	6.1	4.3	1.9	1.0	1.1	1.1	0.66
		31%	21%	10%	5%	6%	6%	3%
Calvert Bluff (Upper Wilcox)	20	7.3	6.1	3.5	2.3	1.4	0.8	0.96
		37%	30%	18%	11%	7%	4%	5%
Simsboro (Middle Wilcox)	20	7.6	6.6	5.8	3.2	1.8	1.0	0.87
		38%	33%	29%	16%	9%	5%	4%
Hooper (Lower Wilcox)	20	8.1	7.3	6.7	3.3	2.6	2.3	2.2
		40%	37%	33%	17%	13%	12%	11%

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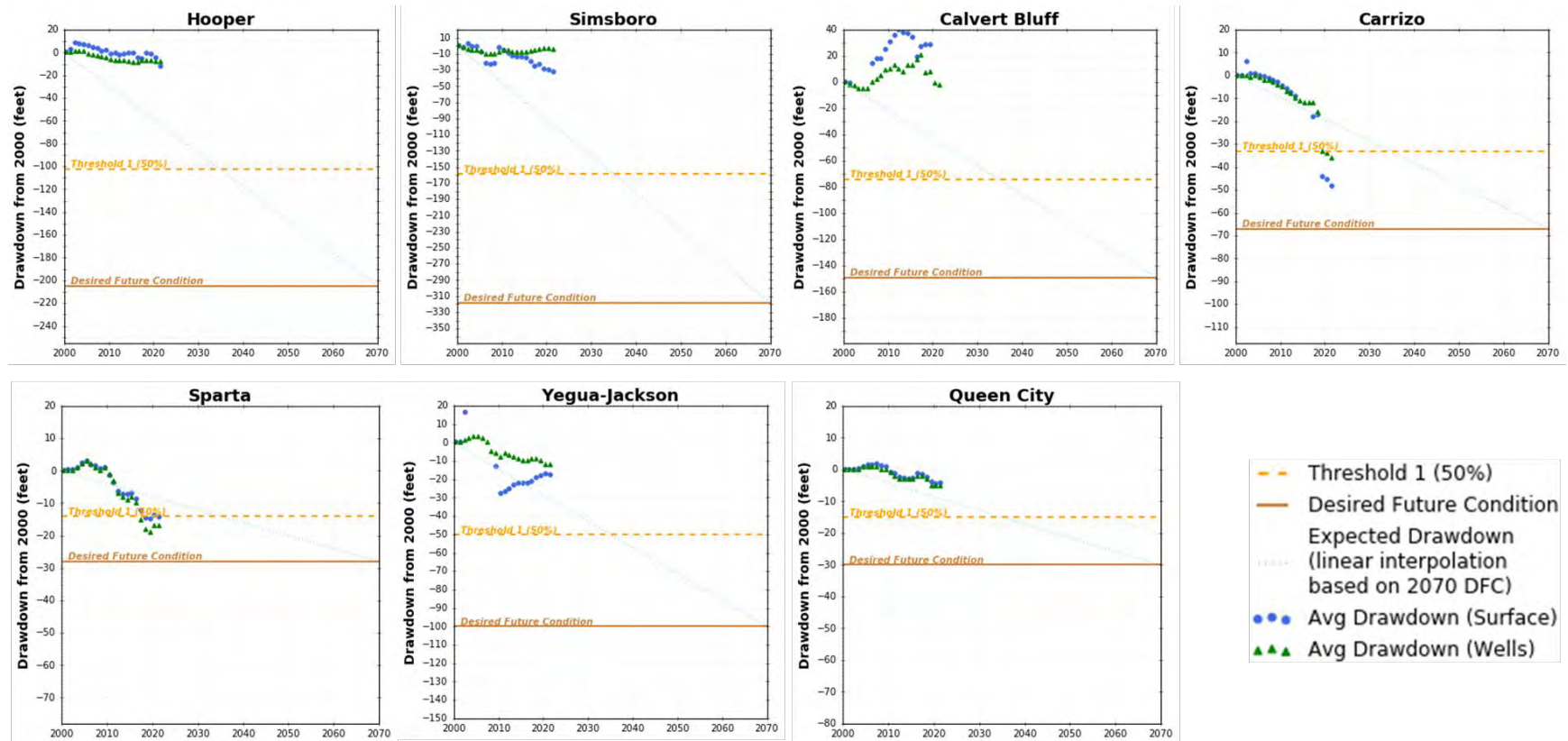


Figure 6-1 Status of DFC compliance by aquifer management zone



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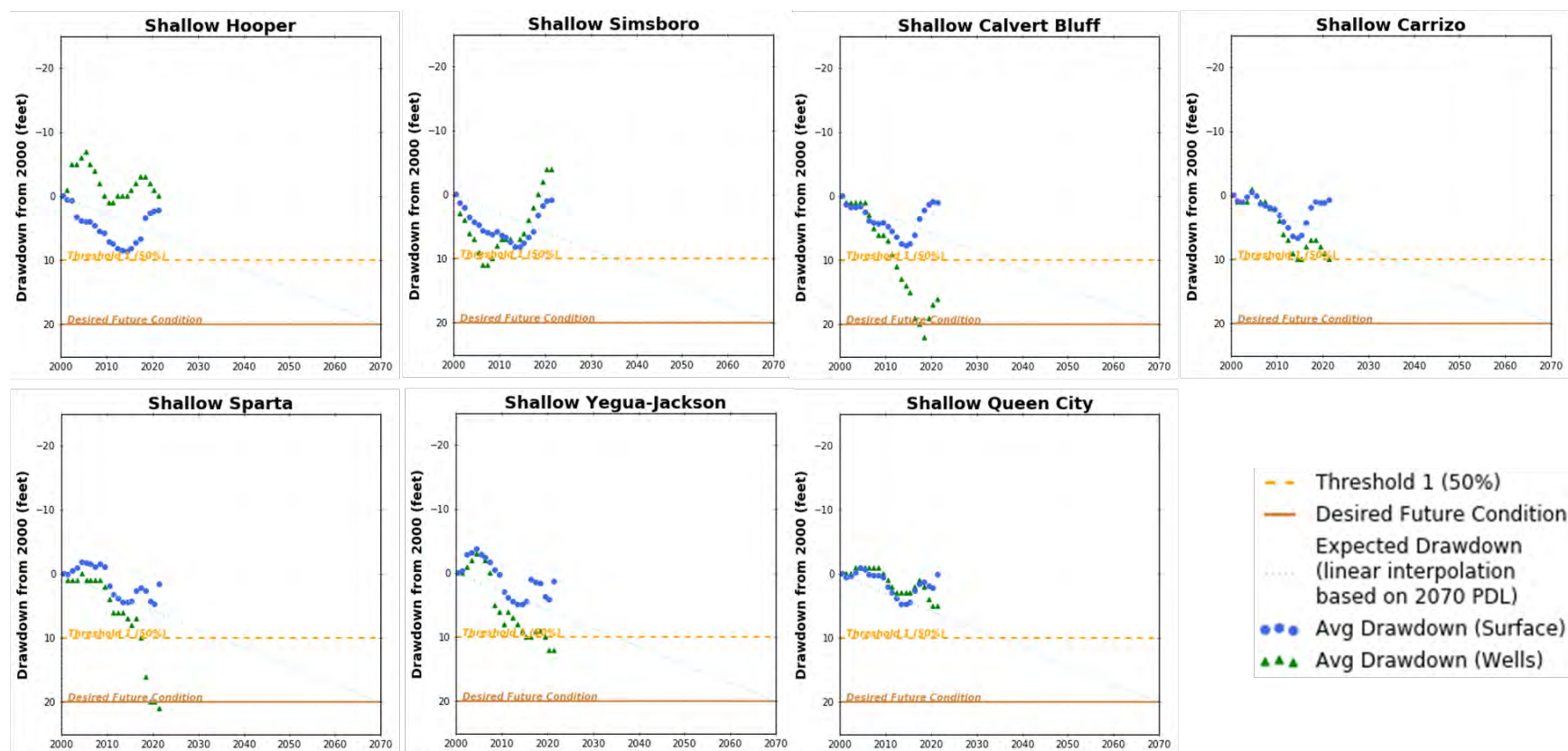


Figure 6-2 Status of PDL compliance by shallow aquifer management zone

## 7.0 REFERENCES

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**APPENDIX A**  
**POSGCD Aquifer Assignment Methodology**

The methodology used by POSGCD to assign monitoring wells to aquifers is based on comparing the aquifer tops and bottoms (based on groundwater availability model [GAM] surfaces) to screened intervals at a well location. The aquifer surfaces for the Queen City, Sparta, Carrizo, Calvert Bluff, Simsboro, and Hooper aquifers are taken from the GAM for the Queen City and Sparta Aquifers (Kelley and others, 2004). The aquifer surfaces for the Yegua-Jackson Aquifer are taken from the Yegua-Jackson Aquifer GAM (Deeds and others, 2010). Aquifer surfaces for the Brazos River Alluvium are from Ewing and Jigmond (2016). Recent investigations by INTERA has revealed that the GAM surfaces have not been equally vetted across the entire extent of each aquifer. The investigation has also shown that in some locations the GAM surfaces do not actually represent the tops and bottoms of an aquifer. Where there is sufficient evidence to indicate that the GAM surfaces may not accurately represent the aquifer surfaces, other information such as geophysical logs will be used to associate well screens with one or more aquifers.

The methodology is implemented using the following steps:

- Step 1:* Extract the top and bottom of aquifer surfaces from groundwater available models (GAMs) at the center of the GAM grid cells.
- Step 2:* Develop rasters for the tops and bottoms of aquifers of interest using the information from Step 1.
- Step 3:* At each well location (designated by a latitude and longitude), extract the elevation of the tops and bottom of aquifers of interest. Convert the aquifer elevations to depths below ground surface elevation.
- Step 4:* Using information from driller logs, the TWDB groundwater well database, field-measured values, or data tables in state reports, record the depth of the well and depth to each of the well's screened intervals into the POSGCD well database.
- Step 5:* Using information from Steps 1 through 4 in conjunction with aquifer surfaces determined from the analysis of geophysical logs, determine in which aquifer or formation the well terminates and in which aquifer or formation the screened intervals of a well are partitioned. Determine whether the well screen intervals reside in a single aquifer or multiple aquifers. If the well screens span multiple aquifers, then determine the portion of the well screens that intersect the different aquifers. A well screen is assigned to a single aquifer if 70% or more of the well screen is in a single aquifer. A secondary aquifer assignment is made if 30% or more of the well screen intersects a second aquifer.
- Step 6:* Construct figures that show the bottom of the well and the vertical location of the well screens relative to the tops and bottoms of the aquifers that exist at the well location.
- Step 7:* Construct a table that lists the aquifers that the well screens intersect and the thickness of each intersected aquifer.
- Step 8:* For wells with screens that intersect only one aquifer, assign the well to the aquifer intersected by the well screen. For wells with screens that intersect more than one aquifer, assign the well to all aquifers intersected with priority given to the aquifer that contains the largest screened interval.



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Kelley, V.A., Deeds, N.E., Fryar, D.G., Nicot, J-P., Jones, T.L., Dutton, A.R., Bruehl, G., Unger-Holtz, T., and Machin, J.L., 2004, Groundwater Availability Models for the Queen City and Sparta Aquifers; report prepared for the Texas Water Development Board, October, 2004, 867 p.

**APPENDIX B**

**POSGCD Groundwater Monitoring Well Network**

Table B-1. Post Oak Savannah GCD Monitoring Wells

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000020	5917505	30.6811	-96.9480	427	540	498-540	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	No	
PO-000025	5917409	30.6685	-96.9869	516	391	226-290, 320-390	124HOOP - Hooper Formation	Simsboro	Hooper	Milam	Yes	Yes
PO-000026	5917103	30.7238	-96.9830	457	410	115-410	124HOOP - Hooper Formation	Hooper	Simsboro	Milam	No	
PO-000053	5909901	30.7841	-96.8955	428	169	109-169	124SMBR - Simsboro Sand Member of Rockdale Formation	Calvert Bluff	Simsboro	Milam	Yes	Yes
PO-000059	5911402	30.7971	-96.7347	426	323	307-323	124CABF - Calvert Bluff Formation	Carrizo		Milam	Yes	
PO-000073	5910907	30.7809	-96.7850	378	440	410-430	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	Yes
PO-000077	5919103	30.7406	-96.7208	432	522	507-522	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	
PO-000084	5919302	30.7283	-96.6323	338	45	--	124QNCT - Queen City Sand of Claiborne Group	Brazos River Alluvium		Milam	Yes	
PO-000099	5925508	30.5692	-96.9477	408	520	480-520	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	
PO-000107	5925102	30.6009	-96.9825	419	860	767-782	124SMBR - Simsboro Sand Member of Rockdale Formation	Hooper	Simsboro	Milam	No	Yes
PO-000115	5917715	30.6448	-96.9898	465	152	--	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	Yes	
PO-000118	5917705	30.6515	-96.9781	491	326	286-326	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	Yes	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000121	5917714	30.6636	-96.9959	471	380	238-370	124SMBR - Simsboro Sand Member of Rockdale Formation	Hooper	Simsboro	Milam	Yes	Yes
PO-000138	5917713	30.6664	-96.9960	483	408	226-346, 356-408	124SMBR - Simsboro Sand Member of Rockdale Formation	Hooper	Simsboro	Milam	No	
PO-000170	5824914	30.6585	-97.0166	494	295	153-233	124SMBR - Simsboro Sand Member of Rockdale Formation	Hooper		Milam	Yes	
PO-000186	5909701	30.7588	-96.9853	421	218	182-207	124HOOP - Hooper Formation	Hooper		Milam	Yes	
PO-000221	5909605	30.8244	-96.8898	421	580	340-500	124HOOP - Hooper Formation	Hooper		Milam	No	Yes
PO-000223	5902706	30.8976	-96.8520	358	313	235-250, 256-298	124WLCX - Wilcox Group	Hooper		Milam	Yes	
PO-000234	5902309	30.9882	-96.7576	299	499	165-417	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	No	Yes
PO-000236	5902307	30.9642	-96.7907	416	450	410-450	124WLCX - Wilcox Group	Simsboro		Milam	No	
PO-000256	5902901	30.8849	-96.7783	368	318	284-308	124WLCX - Wilcox Group	Calvert Bluff		Milam	Yes	Yes
PO-000268	5832101	30.6234	-97.0880	477	60	40-60	124HOOP - Hooper Formation	Simsboro		Milam	Yes	
PO-000308	5927716	30.5372	-96.7417	451	400	--	124QNCT - Queen City Sand of Claiborne Group	Queen City		Burleson	Yes	
PO-000341	5927606	30.5782	-96.6506	394	820	558-820	124QNCT - Queen City Sand of Claiborne Group	Queen City		Burleson	No	



POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000433	5920410	30.6956	-96.6144	298	920	688-710, 794-815	124SMBR - Simsboro Sand Member of Rockdale Formation	Carrizo		Burleson	No	Yes
PO-000457	5919502	30.6793	-96.6738	463	2018	1831-1959	124CZSB - Carrizo Sand and Simsboro Sand Member of Rockdale Formation	Simsboro		Burleson	No	
PO-000475	5926803	30.5068	-96.8290	443	887	831-887	--	Carrizo		Burleson	No	
PO-000495	5926906	30.5011	-96.7679	424	1197	1097-1197	124CZWX - Carrizo Sand and Wilcox Group, Undifferentiated	Calvert Bluff	Carrizo	Burleson	No	
PO-000518	5927204	30.6190	-96.6865	307	205	163-205	124QNCT - Queen City Sand of Claiborne Group	Queen City		Burleson	Yes	
PO-000579	5937611	30.4321	-96.3978	234	240	177-240	124JCKSL - Lower Jackson Unit	Yegua-Jackson		Burleson	Yes	
PO-000596	5937329	30.4886	-96.3756	215	58	--	111ABZR - Alluvium, Brazos River	Brazos River Alluvium		Burleson	Yes	
PO-000618	5937109	30.4598	-96.4701	249	266	109-266	124YEGUU - Upper Yegua Unit	Yegua-Jackson		Burleson	Yes	
PO-000638	5937101	30.4889	-96.4655	236	1620	--	124QNCT - Queen City Sand of Claiborne Group	Sparta		Burleson	No	Yes
PO-000661	5936802	30.3868	-96.5646	348	1609	1513-1573	124SPRT - Sparta Sand	Sparta		Burleson	No	
PO-000691	5938709	30.3950	-96.3456	266	513	468-502	124YEGU - Yegua Formation	Yegua-Jackson		Burleson	No	
PO-000698	5943608	30.3106	-96.6464	277	533	494-533	124YEGUL - Lower Yegua Unit and Underlying Unit	Yegua-Jackson		Burleson	No	Yes

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000787	5938701	30.4117	-96.3579	205	56	--	111ABZR - Alluvium, Brazos River	Brazos River Alluvium		Burleson	Yes	
PO-000791	5935208	30.4964	-96.6920	374	364	322-364	124SPRT - Sparta Sand	Sparta		Burleson	Yes	
PO-000859	5929456	30.5437	-96.4938	229	60	--	111ABZR - Alluvium, Brazos River	Brazos River Alluvium		Burleson	Yes	
PO-000860	5929457	30.5445	-96.4920	230	60	--	111ABZR - Alluvium, Brazos River	Brazos River Alluvium		Burleson	Yes	
PO-000877	5928619	30.5453	-96.5255	265	780	685-700, 719-765	124SPRT - Sparta Sand	Sparta		Burleson	No	Yes
PO-000894	5928601	30.5792	-96.5404	241	58	--	111ABZR - Alluvium, Brazos River	Brazos River Alluvium		Burleson	Yes	
PO-000895	5928702	30.5291	-96.6086	343	498	456-498	124SPRT - Sparta Sand	Sparta		Burleson	No	
PO-000943	5934106	30.4885	-96.8437	443	840	800-840	124CRRZ - Carrizo Sand	Carrizo		Burleson	No	Yes
PO-001023	5929537	30.5491	-96.4369	223	1090	1048-1090	124SPRT - Sparta Sand	Sparta		Burleson	No	
PO-001061	5934608	30.4560	-96.7836	426	814	740-800	124QNCT - Queen City Sand of Claiborne Group	Queen City		Burleson	No	Yes
PO-001062	5918101	30.7161	-96.8633	566	790	689-770	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	
PO-001063	5918104	30.7128	-96.8700	557	800	650-780	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	Yes

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-001064	5918908	30.6323	-96.7877	511	1687	1490-1534, 1564-1620	124CZSB - Carrizo Sand and Simsboro Sand Member of Rockdale Formation	Calvert Bluff		Burleson	No	
PO-001066	5918705	30.6481	-96.8546	575	813	540-645	124SMBR - Simsboro Sand Member of Rockdale Formation	Calvert Bluff		Milam	No	Yes
PO-001074	5927506	30.5431	-96.6811	352	1252	1035-1190, 1220-1240	--	Carrizo		Burleson	No	
PO-001075	5927717	30.5299	-96.7172	432	1303	1060-1080, 1110-1130, 1210-1290	--	Carrizo		Burleson	No	
PO-001076	5927714	30.5272	-96.7143	429	1314	1238-1304, 1238-1304, 1238-1304	--	Carrizo		Burleson	No	
PO-001077	5927803	30.5360	-96.6882	325	1210	1048-1206	--	Carrizo		Burleson	No	
PO-001082	5911703	30.7872	-96.7169	361	992	889-980	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	No	Yes
PO-001109	--	30.5938	-96.9673	456	1030	812-1012	--	Simsboro	Hooper	Milam	No	
PO-001110	5824611	30.6713	-97.0040	495	485	190-283, 343-383, 403-423, 463-483	124HOOP - Hooper Formation	Hooper		Milam	No	
PO-001111	5917803	30.6432	-96.9265	487	1000	760-797, 800-837, 839-876, 879-916, 918-955, 957-994	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	No	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-001112	5917606	30.6913	-96.8999	507	598	551-596	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	
PO-001117	5917712	30.6312	-96.9901	460	475	270-450, 460-475	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	Hooper	Milam	No	
PO-001118	5917711	30.6349	-96.9910	467	463	250-300, 345-443, 453-463	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	Hooper	Milam	No	
PO-001120	5928105	30.5969	-96.6098	350	1252	1104-1236	124CRRZ - Carrizo Sand	Carrizo		Burleson	No	
PO-001166	5929410	30.5580	-96.4700	226	71	--	111ABZR - Alluvium, Brazos River	Brazos River Alluvium		Burleson	Yes	
PO-001197	5934107	30.4811	-96.8721	444	370	150-170, 240-260, 340-360	124QNCT - Queen City Sand of Claiborne Group	Queen City		Burleson	Yes	
PO-001327	--	30.4846	-96.8878	384	500	460-500	--	Carrizo		Burleson	No	
PO-001343	--	30.8017	-96.7586	432	455	430-450	--	Calvert Bluff		Milam	No	
PO-001390	--	30.5716	-96.8293	515	1120	980-1110	--	Calvert Bluff		Burleson	No	Yes
PO-001450	5832304	30.6085	-97.0074	434	271	250-270	-	Simsboro		Milam	Yes	
PO-001486	--	30.6607	-97.0026	458	182	162-182	--	Simsboro		Milam	Yes	
PO-001505	5831905	30.5080	-97.1580	553	120	110-120	-	Simsboro		Milam	Yes	
PO-001573	5934601	30.4327	-96.7571	381	784	734-774	124QNCT - Queen City Sand of Claiborne Group	Queen City		Burleson	No	Yes
PO-001575	5927718	30.5254	-96.7270	451	1300	1252-1277	124CZCB - Carrizo Sand and Calvert Bluff Formation	Carrizo	Calvert Bluff	Burleson	No	Yes



POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-001628	--	30.7905	-96.7528	455	446	427-442	--	Calvert Bluff		Milam	No	
PO-001786	--	30.7987	-96.7464	419	436	406-426	--	Calvert Bluff		Milam	No	
PO-001789	5911403	30.7985	-96.7489	452	515	487-507	-	Calvert Bluff		Milam	No	Yes
PO-001883	5832704	30.5065	-97.1186	480	180	160-180	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	Yes	
PO-001947	--	30.6620	-97.0391	492	360	340-360	--	Hooper		Milam	Yes	
PO-001983	--	30.6108	-97.0867	536	490	450-470	--	Below Hooper		Milam	No	Yes
PO-001990	--	30.4921	-97.0914	484	288	248-288	--	Calvert Bluff		Milam	Yes	
PO-002014	5839303	30.4829	-97.1259	480	182	162-182	-	Simsboro		Milam	Yes	
PO-002061	--	30.9105	-96.8305	354	360	330-350	--	Hooper		Milam	Yes	
PO-002152	5925409	30.5609	-96.9952	465	480	450-470	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	
PO-002153	5925410	30.5436	-96.9951	447	690	670-690	-	Calvert Bluff		Milam	No	
PO-002173	5925103	30.6009	-96.9826	419	420	400-420	124WLCX - Wilcox Group	Calvert Bluff		Milam	No	
PO-002191	5917716	30.6448	-96.9895	464	520	470-490	124HOOP - Hooper Formation	Hooper		Milam	No	
PO-002204	5917717	30.6610	-96.9806	487	750	720-750	-	Hooper		Milam	No	
PO-002205	--	30.6577	-97.0083	455	130	110-130	--	Simsboro		Milam	Yes	
PO-002217	--	30.6672	-96.9308	473	938	918-938	--	Hooper	Simsboro	Milam	No	
PO-002355	--	30.7425	-96.7234	384	514	--	--	Calvert Bluff		Milam	No	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-002423	5902904	30.9060	-96.7781	406	240	180-220	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	Calvert Bluff	Milam	Yes	
PO-002537	--	30.6372	-97.0474	527	510	460-500	--	Hooper		Milam	No	
PO-002538	5824915	30.6341	-97.0084	456	188	163-183	-	Simsboro		Milam	Yes	
PO-002556	--	30.6314	-97.0481	527	431	400-420	--	Hooper		Milam	No	
PO-002659	--	30.7935	-96.7539	484	470	430-450	--	Calvert Bluff		Milam	No	
PO-003129	--	30.5268	-96.6039	380	650	610-650	--	Sparta		Burleson	No	
PO-003430	--	30.5281	-96.8796	358	360	320-360	--	Carrizo		Burleson	Yes	
PO-003440	5925901	30.5046	-96.8981	338	312	272-312	--	Carrizo		Burleson	Yes	
PO-003444	--	30.4835	-96.8930	350	492	411-463	--	Carrizo		Burleson	No	
PO-004459	--	30.5066	-96.8771	408	400	360-400	--	Carrizo		Burleson	Yes	
PO-004968	--	30.5639	-96.7649	455	160	130-150	--	Queen City		Burleson	Yes	
PO-005109	--	30.5474	-96.6479	417	1235	1151-1235	--	Carrizo		Burleson	No	
PO-005113	--	30.5490	-96.6503	384	1235	1135-1235	--	Carrizo		Burleson	No	
PO-005228	--	30.5500	-96.8809	426	295	275-295	--	Reklaw		Burleson	Yes	
PO-005231	--	30.5428	-96.7937	479	915	873-894	--	Carrizo		Burleson	No	
PO-005486	--	30.5871	-96.7643	421	199	179-199	--	Queen City		Burleson	Yes	
PO-005767	--	30.5011	-96.8716	414	500	380-480	--	Carrizo	Reklaw	Burleson	No	
PO-005816	--	30.5457	-96.8872	433	338	304-336	--	Carrizo	Reklaw	Burleson	Yes	
PO-005817	--	30.5042	-96.8757	451	486	416-476	--	Carrizo	Reklaw	Burleson	No	
PO-005899	--	30.4231	-96.7928	365	300	260-300	--	Sparta		Burleson	Yes	Yes
PO-006090	--	30.5573	-96.6638	383	620	580-620	--	Queen City		Burleson	No	Yes
PO-006145	5927611	30.5457	-96.6380	397	770	650-750	Queen City	Queen City		Burleson	No	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-006153	--	30.5477	-96.6504	418	620	580-620	--	Queen City		Burleson	No	
PO-006243	5925502	30.5644	-96.9386	421	614	593-614	124CZCB - Carrizo Sand and Calvert Bluff Formation	Calvert Bluff		Burleson	No	
PO-006305	5832908	30.5313	-97.0268	434	344	324-344	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	Yes	
PO-006330	--	30.7986	-96.7546	447	410	384-404	--	Calvert Bluff		Milam	No	
PO-006405	--	30.5044	-96.8446	457	780	690-770	--	Carrizo		Burleson	No	
PO-006483	--	30.4442	-96.7095	335	484	424-464	--	Sparta		Burleson	No	
PO-006551	--	30.5636	-96.7306	372	1057	890-950	--	Carrizo		Burleson	No	
PO-006560	--	30.4707	-96.8849	405	210	189-210	--	Queen City		Burleson	Yes	
PO-006586	5927309	30.6134	-96.6602	380	260	240-260	Queen City	Queen City		Burleson	Yes	
PO-006621	5926402	30.5526	-96.8606	490	2020	1580-1780	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	Calvert Bluff	Burleson	No	Yes
PO-006796	--	30.5256	-97.1099	502	212	192-212	--	Simsboro		Milam	Yes	
PO-006806	--	30.6256	-96.6127	284	360	300-340	--	Queen City		Burleson	Yes	
PO-006815	5926703	30.5356	-96.8572	442	563	542-563	--	Carrizo		Burleson	No	
PO-006816	5926702	30.5411	-96.8639	463	583	--	--	Carrizo		Burleson	No	
PO-006910	5926403	30.5648	-96.8347	496	2200	1750-1950, 2060-2090	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	Calvert Bluff	Burleson	No	Yes
PO-007085	--	30.7922	-96.7498	460	520	490-510	--	Calvert Bluff		Milam	No	
PO-007117	--	30.6074	-97.0905	557	412	372-392	--	Hooper		Milam	No	
PO-007183	--	30.4865	-96.7146	336	570	480-560	--	Queen City		Burleson	No	
PO-007197	--	30.4730	-96.7359	369	780	--	--	Queen City		Burleson	No	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-007242	--	30.6537	-96.9365	511	562	542-562	--	Calvert Bluff		Milam	No	
PO-007283	--	30.9610	-96.8426	409	235	196-235	--	Hooper		Milam	Yes	
PO-007285	--	30.5338	-96.9131	370	460	400-440	--	Carrizo		Burleson	No	
PO-007363	5832404	30.5566	-97.0885	494	174	154-174	-	Simsboro		Milam	Yes	
PO-007364	5824612	30.6846	-97.0401	433	180	160-180	124HOOP - Hooper Formation	Hooper		Milam	Yes	
PO-007390	--	30.4682	-96.6723	354	420	400-420	--	Sparta		Burleson	No	
PO-007506	5824610	30.6716	-97.0040	493	392	165-193, 196-259, 339-390	124HOOP - Hooper Formation	Hooper	Simsboro	Milam	Yes	Yes
PO-007579	--	30.5833	-96.8161	470	260	240-260	--	Queen City		Burleson	Yes	
PO-007585	--	30.4553	-96.6967	394	533	433-533	--	Sparta		Burleson	No	
PO-007586	--	30.4561	-96.6949	375	415	373-415	--	Cook Mountain		Burleson	No	
PO-007587	--	30.4332	-96.7023	333	550	450-530	--	Sparta		Burleson	No	
PO-007601	--	30.5241	-96.6019	368	895	855-895	--	Sparta		Burleson	No	
PO-007603	5928701	30.5229	-96.6033	359	553	328-553	124SPRT - Sparta Sand	Cook Mountain		Burleson	No	
PO-007614	--	30.7994	-96.7519	432	460	435-455	--	Calvert Bluff		Milam	No	
PO-007773	5910910	30.7875	-96.7650	436	430	405-424	--	Calvert Bluff		Milam	No	
PO-007774	5910705	30.7799	-96.8624	438	560	493-535	124CABF - Calvert Bluff Formation	Simsboro		Milam	No	
PO-007838	--	30.5831	-97.1197	551	194	144-184	--	Hooper	Simsboro	Milam	Yes	
PO-007965	5929408	30.5638	-96.4796	228	1200	--	-	Queen City		Burleson	No	



POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-007998	5910908	30.7899	-96.7631	502	460	435-455	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	Yes
PO-008037	--	30.8000	-96.7450	405	430	405-425	--	Calvert Bluff		Milam	No	
PO-008038	--	30.4447	-96.6559	290	145	124-145	--	Cook Mountain	Yegua-Jackson	Burleson	Yes	
PO-008053	--	30.4900	-96.8844	374	460	420-460	--	Carrizo		Burleson	No	
PO-008054	--	30.4892	-96.8834	355	520	480-520	--	Carrizo		Burleson	No	
PO-008073	--	30.5454	-96.7290	392	1001	796-976	--	Reklaw		Burleson	No	
PO-008095	--	30.6328	-96.9070	499	433	408-428	--	Calvert Bluff		Milam	No	
PO-008096	5831906	30.5193	-97.1285	544	547	522-542	-	Hooper		Milam	No	
PO-008147	--	30.4794	-96.8954	342	460	435-455	--	Carrizo		Burleson	No	
PO-008149	--	30.6649	-96.8282	498	770	739-759	--	Calvert Bluff		Milam	No	
PO-008151	5917804	30.6434	-96.9429	475	385	--	-	Calvert Bluff		Milam	Yes	
PO-008153	--	30.7881	-96.7619	498	454	429-449	--	Calvert Bluff		Milam	No	Yes
PO-008172	5831904	30.5138	-97.1645	578	370	330-370	-	Hooper		Milam	Yes	
PO-008213	--	30.3547	-96.7174	322	440	180-200, 340-360, 420-440	--	Yegua-Jackson		Burleson	No	
PO-008219	--	30.5579	-96.8191	491	960	860-950	--	Carrizo		Burleson	No	
PO-008239	5928804	30.5367	-96.5783	300	460	418-460	124SPRT - Sparta Sand	Cook Mountain		Burleson	No	
PO-008245	--	30.8027	-96.7463	418	397	370-390	--	Calvert Bluff		Milam	Yes	

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PO-008255	--	30.5175	-97.0544	457	490	410-490	--	Calvert Bluff		Milam	No	
PO-008261	--	30.5552	-96.6818	402	1090	960-1070	--	Reklaw	Carrizo	Burleson	No	
PO-008271	--	30.5328	-96.8601	462	535	425-525	--	Carrizo		Burleson	No	
PO-008274	5902311	30.9675	-96.7772	369	445	424-444	-	Simsboro		Milam	No	Yes
PO-008276	--	30.8099	-96.7593	384	450	426-446	--	Calvert Bluff		Milam	No	
PO-008281	--	30.7864	-96.7571	471	420	395-415	--	Calvert Bluff		Milam	No	
PO-008322	--	30.4992	-96.8400	437	640	600-640	--	Carrizo		Burleson	No	
PO-008326	--	30.5628	-96.7659	462	980	850-970	--	Carrizo		Burleson	No	
PO-008388	5943104	30.3552	-96.7173	323	3988	3600-3800	124SMBR - Simsboro Sand Member of Rockdale Formation	Hooper	Simsboro	Burleson	No	
PO-008415	5929433	30.5447	-96.4987	231	59	--	111ABZR - Alluvium, Brazos River	Brazos River Alluvium		Burleson	Yes	
PO-008420	--	30.3394	-96.5368	250	197	157-197	--	Yegua-Jackson		Burleson	Yes	Yes
PO-008449	5943312	30.3390	-96.6623	325	362	269-340	124YEGU - Yegua Formation	Yegua-Jackson		Burleson	Yes	
PO-008451	5925408	30.5631	-96.9622	381	690	300-380, 620-680	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	
PO-008456	5936210	30.4789	-96.5531	362	1070	896-955, 983-1017	124SPRT - Sparta Sand	Cook Mountain		Burleson	No	
PO-008658	5910706	30.7732	-96.8429	450	528	508-528	124SMBR - Simsboro Sand Member of Rockdale Formation	Calvert Bluff		Milam	No	
PO-008668	--	30.5598	-96.7922	488	722	680-722	--	Reklaw		Burleson	No	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-008678	5943305	30.3464	-96.6539	284	367	258-367	124YEGU - Yegua Formation	Yegua-Jackson		Burleson	Yes	
PO-008680	5943304	30.3437	-96.6570	306	370	280-370	124YEGU - Yegua Formation	Yegua-Jackson		Burleson	Yes	
PO-008767	5934108	30.4836	-96.8605	411	2230	1800-2100	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Burleson	No	Yes
PO-008772	--	30.9369	-96.8405	364	120	60-120	--	Hooper		Milam	Yes	
PO-008794	--	30.5272	-96.8188	471	760	735-755	--	Carrizo		Burleson	No	
PO-008795	--	30.9349	-96.8428	376	279	256-279	--	Hooper		Milam	Yes	
PO-008802	--	30.5746	-96.6542	413	700	600-700	--	Queen City		Burleson	No	
PO-008805	--	30.5599	-96.8091	493	863	843-863	--	Carrizo		Burleson	No	
PO-008823	--	30.7621	-96.7412	392	570	485-505	--	Calvert Bluff		Milam	No	
PO-008826	--	30.5610	-96.8108	499	860	840-860	--	Carrizo		Burleson	No	
PO-008840	--	30.7812	-96.7608	485	420	400-420	--	Calvert Bluff		Milam	No	
PO-008845	--	30.5768	-96.6577	427	700	660-700	--	Queen City		Burleson	No	
PO-008865	--	30.6519	-97.0617	412	160	120-140	--	Hooper		Milam	Yes	
PO-008907	--	30.4680	-96.6724	356	900	879-900	--	Queen City		Burleson	No	
PO-008913	--	30.4425	-96.8556	351	709	689-709	--	Carrizo		Burleson	No	
PO-008923	--	30.5243	-96.8160	488	780	754-774	--	Carrizo		Burleson	No	
PO-008935	5901904	30.9131	-96.8862	389	80	64-74	124HOOP - Hooper Formation	Hooper		Milam	Yes	
PO-008945	--	30.7876	-96.7547	461	465	440-460	--	Calvert Bluff		Milam	No	
PO-008959	5918602	30.6815	-96.7868	438	810	790-810	-	Calvert Bluff		Milam	No	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-008964	--	30.5007	-96.8739	394	500	390-490	--	Carrizo		Burleson	No	
PO-008965	--	30.5274	-96.8582	480	600	500-590	--	Carrizo		Burleson	No	
PO-008971	--	30.5339	-96.9133	362	840	820-840	--	Calvert Bluff		Burleson	No	
PO-009004	--	30.5092	-97.0561	495	280	230-270	--	Calvert Bluff		Milam	Yes	
PO-009064	5928343	30.6038	-96.5363	242	3255	2400-2410, 2750-2760	-	Calvert Bluff	Simsboro	Burleson	No	Yes
PO-009067	--	30.5587	-96.8015	471	970	840-960	--	Carrizo		Burleson	No	
PO-009094	--	30.9393	-96.8413	378	315	200-300	--	Hooper		Milam	Yes	
PO-009095	5910707	30.7713	-96.8465	423	580	550-570	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	No	
PO-009101	--	30.4530	-96.7039	361	440	420-440	--	Sparta		Burleson	No	
PO-009104	5928342	30.6067	-96.5342	244	380	340-380	124SPRT - Sparta Sand	Sparta		Burleson	Yes	
PO-009125	--	30.5035	-96.8290	410	920	880-900	--	Calvert Bluff		Burleson	No	
PO-009135	--	30.4864	-96.8900	361	480	430-450	--	Carrizo		Burleson	No	
PO-009157	5936809	30.3919	-96.5563	299	740	520-580	124JKYG - Jackson Group and Yegua Formation	Yegua-Jackson		Burleson	No	Yes
PO-009162	--	30.9349	-96.8448	401	303	245-265	--	Hooper		Milam	Yes	
PO-009166	5918108	30.7115	-96.8625	506	1240	1178-1220	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	No	Yes
PO-009167	5918109	30.7115	-96.8625	505	140	90-130	124CRRZ - Carrizo Sand	Carrizo		Milam	Yes	Yes

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-009189	--	30.4956	-96.8548	462	1078	1008-1029, 1033-1054, 1057-1078	--	Calvert Bluff		Burleson	No	Yes
PO-009210	--	30.6190	-96.6608	321	512	477-492	--	Queen City		Burleson	No	
PO-009215	5925904	30.5111	-96.8972	390	2724	1560-1570, 2100-2110, 2130-2140	-	Simsboro	Hooper	Burleson	No	Yes
PO-009230	5925302	30.5971	-96.8796	526	2491	1590-1600, 1710-1720	-	Simsboro		Burleson	No	Yes
PO-009327	5901905	30.9066	-96.8888	365	140	120-140	-	Below Hooper		Milam	Yes	
PO-009332	--	30.5155	-96.8303	496	850	810-840	--	Carrizo		Burleson	No	
PO-009346	5925905	30.5405	-96.9071	393	80	50-70	-	Queen City		Burleson	Yes	
PO-009369	--	30.7406	-96.7203	429	320	260-320	--	Carrizo	Reklaw	Milam	Yes	
PO-009372	5925906	30.5411	-96.9048	418	120	80-100	-	Queen City		Burleson	Yes	
PO-009387	--	30.6044	-96.7098	364	580	490-570	--	Queen City		Burleson	No	Yes
PO-009404	--	30.4651	-96.6680	313	520	480-520	--	Sparta		Burleson	No	
PO-009431	--	30.5695	-96.7376	384	820	790-810	--	Carrizo		Burleson	No	
PO-009434	--	30.5026	-96.8420	460	635	615-635	--	Carrizo		Burleson	No	
PO-009445	5934609	30.4278	-96.7628	362	500	280-320, 365-395	-	Sparta		Burleson	No	Yes
PO-009446	5925511	30.5724	-96.9207	417	2350	1620-1630, 1706-1716, 1870-1880	-	Simsboro		Burleson	No	Yes
PO-009453	--	30.6241	-97.0487	502	440	415-435	--	Hooper		Milam	No	
PO-009467	--	30.8017	-96.7548	441	290	180-260	--	Carrizo	Calvert Bluff	Milam	Yes	
PO-009468	--	30.7602	-96.6515	328	470	360-440	--	Carrizo		Milam	No	



POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-009475	--	30.6069	-96.8713	504	685	550-560, 600-610	--	Calvert Bluff		Milam	No	Yes
PO-009477	--	30.4008	-96.7605	355	520	424-520	--	Sparta		Burleson	No	Yes
PO-009480	5831907	30.5197	-97.1288	545	235	205-235	-	Simsboro		Milam	Yes	
PO-009486	--	30.5230	-96.6043	363	630	610-630	--	Sparta		Burleson	No	
PO-009487	--	30.6811	-97.0354	474	151	135-151	--	Hooper		Milam	Yes	
PO-009493	--	30.8254	-96.6521	289	270	180-260	--	Carrizo		Milam	Yes	
PO-009495	--	30.6494	-96.9790	478	320	280-320	--	Simsboro		Milam	Yes	
PO-009497	--	30.9174	-96.8304	379	142	115-135	--	Simsboro		Milam	Yes	
PO-009498	--	30.6022	-96.9464	467	383	361-381	--	Calvert Bluff		Milam	Yes	
PO-009540	--	30.7959	-96.7555	482	440	415-435	--	Calvert Bluff		Milam	No	
PO-009545	--	30.8137	-96.9157	442	180	140-160	--	Simsboro		Milam	Yes	Yes
PO-009551	--	30.7422	-96.9221	411	220	160-180	--	Calvert Bluff		Milam	Yes	Yes
PO-009552	--	30.7904	-96.7547	456	460	435-455	--	Calvert Bluff		Milam	No	
PO-009553	--	30.7497	-96.9740	437	230	198-218	--	Hooper		Milam	Yes	Yes
PO-009555	--	30.7497	-96.9740	437	118	90-110	--	Hooper		Milam	Yes	Yes
PO-009556	--	30.9615	-96.8438	407	128	81-120	--	Hooper		Milam	Yes	
PO-009559	--	30.6792	-96.8228	464	700	670-690	--	Calvert Bluff		Milam	No	
PO-009570	--	30.5014	-96.8502	443	620	575-615	--	Carrizo		Burleson	No	
PO-009572	--	30.5258	-96.8231	464	780	757-777	--	Carrizo		Burleson	No	
PO-009588	--	30.3337	-97.2305	555	500	459-479	--	Calvert Bluff		Bastrop	No	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-009597	--	30.4149	-97.1786	443	136	104-134	--	Simsboro		Lee	Yes	
PO-009601	--	30.4362	-97.0841	463	544	474-534	--	Calvert Bluff		Lee	No	
PO-009604	--	30.6811	-96.8228	451	680	657-677	--	Calvert Bluff		Milam	No	
PO-009606	--	30.4485	-97.1197	447	255	235-255	--	Calvert Bluff		Lee	Yes	
PO-009609	--	30.5197	-96.8981	392	420	360-380	--	Carrizo		Burleson	No	
PO-009651	--	30.3435	-96.5380	249	850	380-420, 500-540, 580-620, 720-760	--	Yegua-Jackson		Burleson	No	
PO-009706	--	30.6349	-96.9909	471	419	265-305, 365-420	--	Simsboro	Hooper	Milam	No	Yes
PO-009707	--	30.6051	-96.5455	471	870	438-522, 549-590, 632-800, 813-855	--	Queen City	Sparta	Burleson	No	Yes
PO-009708	--	30.4289	-96.8069	358	504	482-502	--	Queen City		Burleson	No	Yes
PO-009709	--	30.4358	-96.8041	363	455	433-453	--	Queen City		Burleson	No	Yes
PO-009710	--	30.4147	-96.8169	313	499	477-497	--	Queen City		Burleson	No	Yes
PO-009716	5917510	30.6961	-96.9180	450	500	378-418	-	Calvert Bluff		Milam	No	
PO-009745	5824916	30.6340	-97.0361	496	157	127-157	-	Simsboro		Milam	Yes	
PO-009747	--	30.3337	-97.2305	555	500	459-479	--	Calvert Bluff		Bastrop	No	
PO-009748	--	30.3783	-97.2189	439	300	280-300	--	Simsboro		Lee	Yes	
PO-009749	5840704	30.4127	-97.0986	402	454	433-454	124CABF - Calvert Bluff Formation	Calvert Bluff		Lee	No	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-009751	--	30.5312	-96.9952	422	620	--	--	Calvert Bluff		Lee	No	
PO-009752	--	30.7961	-96.7531	452	435	405-425	--	Calvert Bluff		Milam	No	
PO-009753	5832705	30.5096	-97.1201	493	185	175-185	-	Simsboro		Milam	Yes	
PO-009754	5832706	30.5186	-97.1082	476	123	103-123	-	Simsboro		Milam	Yes	
PO-009755	5917411	30.6990	-96.9728	431	113	93-113	-	Simsboro		Milam	Yes	
PO-009765	--	30.5616	-96.8445	510	604	564-604	--	Carrizo		Burleson	No	
PO-009767	--	30.8889	-96.7250	357	685	--	--	Calvert Bluff		Milam	No	
PO-009768	--	30.9470	-96.7942	374	314	284-294	--	Simsboro		Milam	Yes	
PO-009769	5925512	30.5693	-96.9491	396	734	694-734	-	Calvert Bluff		Milam	No	
PO-009770	5839510	30.4579	-97.1831	532	138	118-138	-	Hooper	Simsboro	Williamson	Yes	
PO-009774	--	30.4336	-96.8250	378	347	274-314	--	Queen City		Burleson	Yes	
PO-009781	--	30.9504	-96.8351	445	148	120-140	--	Hooper		Milam	Yes	
PO-009787	--	30.5015	-96.8448	438	675	655-675	--	Carrizo		Burleson	No	
PO-009806	--	30.9367	-96.8438	372	115	48-108	--	Hooper		Milam	Yes	
PO-009807	--	30.4780	-96.8602	413	890	660-740, 760-800, 830-870	--	Carrizo		Burleson	No	
PO-009808	--	30.8493	-96.9217	367	152	131-151	--	Hooper		Milam	Yes	
PO-009812	--	30.4326	-96.5319	294	260	200-240	--	Yegua-Jackson		Burleson	Yes	
PO-009824	--	30.9691	-96.7806	378	460	430-450	--	Simsboro		Milam	No	
PO-010881	--	30.4665	-96.6667	292	228	196-228	--	Cook Mountain		Burleson	Yes	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-010899	5920409	30.6898	-96.6114	297	230	188-230	124QNCT - Queen City Sand of Claiborne Group	Queen City		Burleson	Yes	
PO-010921	--	30.3763	-96.6827	335	410	340-400	--	Cook Mountain		Burleson	No	
PO-010924	--	30.3298	-96.6634	302	350	--	--	Yegua-Jackson		Burleson	Yes	
PO-010937	5911607	30.8238	-96.6550	304	276	--	111ABZR - Alluvium, Brazos River	Carrizo		Milam	Yes	
PO-010952	--	30.5010	-96.8754	390	500	420-490	--	Carrizo		Burleson	No	
PO-010967	--	30.4868	-96.8844	382	560	440-560	--	Carrizo		Burleson	No	
PO-010970	--	30.5503	-96.7138	382	990	--	--	Carrizo		Burleson	No	
PO-010971	--	30.4322	-96.8159	342	461	437-457	--	Queen City		Burleson	No	
PO-011022	--	30.4420	-96.4105	240	570	550-570	--	Yegua-Jackson		Burleson	No	
PO-011032	--	30.6482	-96.8547	575	1744	1462-1546, 1588-1715	--	Simsboro		Milam	No	
PO-011118	--	30.4985	-96.8568	476	2742	2600-2660	--	Hooper		Burleson	No	Yes
PO-011143	--	30.5185	-97.1270	527	165	125-165	--	Simsboro		Milam	Yes	
PO-011234	--	30.5632	-96.6567	399	300	210-290	--	Sparta		Burleson	Yes	
PO-011279	--	30.4471	-96.7900	418	1244	944-1244	--	Carrizo		Burleson	No	Yes
PO-011283	--	30.4621	-97.1499	441	440	409-430	--	Hooper		Milam	No	Yes
PO-011306	--	30.3662	-96.5402	289	--	--	--	No Assignment		Burleson	Yes	
PO-011376	--	30.4831	-96.8905	382	253	233-253	--	Queen City		Burleson	Yes	
PO-011380	--	30.5007	-96.8675	452	520	480-520	--	Carrizo		Burleson	No	
PO-011383	--	30.5269	-96.8239	473	740	705-735	--	Carrizo		Burleson	No	

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-011387	--	30.4606	-96.7033	323	1500	1267-1500	--	Carrizo		Burleson	No	
PO-011388	--	30.4518	-96.7155	366	1505	1320-1500	--	Carrizo		Burleson	No	
PO-011389	--	30.4527	-96.7176	364	1500	1319-1500	--	Carrizo		Burleson	No	
PO-011401	--	30.5287	-96.7397	413	580	480-580	--	Queen City		Burleson	No	
PO-011402	--	30.5284	-96.7398	412	1000	897-1000	--	Carrizo		Burleson	No	
PO-011409	--	30.5300	-96.9211	348	1966	1540-1561, 1620-1641, 1865-1886	--	Below Hooper		Lee	No	
PO-011423	--	30.5579	-96.8778	391	1200	1200-1300	--	Calvert Bluff	Simsboro	Burleson	No	
PO-011519	--	30.4861	-96.5820	332	1962	1659-1680, 1767-1788, 1820-1830	--	Carrizo		Burleson	No	
PO-011520	--	30.3969	-96.7783	314	1520	1316-1520	--	Carrizo		Burleson	No	
PO-011521	--	30.6271	-96.6384	283	1024	824-1024	--	Carrizo		Burleson	No	
PO-011522	--	30.6259	-96.6376	302	1004	804-1004	--	Carrizo		Burleson	No	
PO-011523	--	30.6281	-96.6360	302	1004	805-1004	--	Carrizo		Burleson	No	
PO-011524	--	30.5977	-96.5749	314	2665	2440-2640	--	Simsboro		Burleson	No	
PO-011551	--	30.5114	-97.0571	493	300	260-300	--	Calvert Bluff		Milam	Yes	
PO-011553	--	30.5161	-97.0608	485	270	230-260	--	Calvert Bluff		Milam	Yes	



Table B-2. Monitoring Wells Considered for DFC Calculations

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000020	5917505	30.68111	-96.948012	427.31	540	498-540	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	--	Milam	No	
PO-000073	5910907	30.780887	-96.784999	378.05	440	410-430	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Milam	No	Yes
PO-000077	5919103	30.740555	-96.720832	431.51	522	507-522	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Milam	No	
PO-000099	5925508	30.569169	-96.947723	407.55	520	480-520	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Milam	No	
PO-000221	5909605	30.824408	-96.88976	421.25	580	340-500	124HOOP - Hooper Formation	Hooper	--	Milam	No	Yes
PO-000234	5902309	30.988152	-96.757564	298.86	499	165-417	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	--	Milam	No	Yes
PO-000236	5902307	30.964169	-96.790695	415.89	450	410-450	124WLCX - Wilcox Group	Simsboro	--	Milam	No	
PO-000341	5927606	30.57822262	-96.65056693	393.771	820	558-820	124QNCT - Queen City Sand of Claiborne Group	Queen City	--	Burleson	No	
PO-000433	5920410	30.69556	-96.614391	298.2	920	688-710, 794-815	124SMBR - Simsboro Sand Member of Rockdale Formation	Carrizo	--	Burleson	No	Yes
PO-000457	5919502	30.679286	-96.673801	462.64	2018	1831-1959	124CZSB - Carrizo Sand and Simsboro Sand Member of Rockdale Formation	Simsboro	--	Burleson	No	
PO-000638	5937101	30.48886448	-96.46550691	235.872	1620		124QNCT - Queen City Sand of Claiborne Group	Sparta	--	Burleson	No	Yes

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000661	5936802	30.38675	-96.564559	347.73	1609	1513-1573	124SPRT - Sparta Sand	Sparta	--	Burleson	No	
PO-000691	5938709	30.395025	-96.345573	266.28	513	468-502	124YEGU - Yegua Formation	Yegua-Jackson	--	Burleson	No	
PO-000698	5943608	30.310623	-96.646383	277.14	533	494-533	124YEGUL - Lower Yegua Unit and Underlying Unit	Yegua-Jackson	--	Burleson	No	Yes
PO-000877	5928619	30.545329	-96.525524	264.76	780	685-700, 719-765	124SPRT - Sparta Sand	Sparta	--	Burleson	No	Yes
PO-000895	5928702	30.529052	-96.60857	343.09	498	456-498	124SPRT - Sparta Sand	Sparta	--	Burleson	No	
PO-000943	5934106	30.488497	-96.843686	442.85	840	800-840	124CRRZ - Carrizo Sand	Carrizo	--	Burleson	No	Yes
PO-001023	5929537	30.549091	-96.436877	222.98	1090	1048-1090	124SPRT - Sparta Sand	Sparta	--	Burleson	No	
PO-001061	5934608	30.456017	-96.783585	425.98	814	740-800	124QNCT - Queen City Sand of Claiborne Group	Queen City	--	Burleson	No	Yes
PO-001062	5918101	30.716077	-96.863345	565.67	790	689-770	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Milam	No	
PO-001063	5918104	30.712769	-96.869969	556.68	800	650-780	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Milam	No	Yes
PO-001064	5918908	30.632259	-96.78774	511.28	1687	1490-1534, 1564-1620	124CZSB - Carrizo Sand and Simsboro Sand Member of Rockdale Formation	Calvert Bluff	--	Burleson	No	
PO-001066	5918705	30.648057	-96.854621	574.7	813	540-645	124SMBR - Simsboro Sand Member of Rockdale Formation	Calvert Bluff	--	Milam	No	Yes

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-001082	5911703	30.787152	-96.716872	361.02	992	889-980	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	--	Milam	No	Yes
PO-001110	5824611	30.671293	-97.004037	494.62	485	190-283, 343-383, 403-423, 463-483	124HOOP - Hooper Formation	Hooper	--	Milam	No	
PO-001111	5917803	30.643179	-96.926545	486.95	1000	760-797, 800-837, 839-876, 879-916, 918-955, 957-994	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	--	Milam	No	
PO-001112	5917606	30.691311	-96.899934	507.33	598	551-596	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Milam	No	
PO-001120	5928105	30.596919	-96.609785	350.21	1252	1104-1236	124CRRZ - Carrizo Sand	Carrizo	--	Burleson	No	
PO-001343	0	30.801748	-96.75859	431.87	455	430-450	--	Calvert Bluff	--	Milam	No	
PO-001390	0	30.571577	-96.829333	515.04	1120	980-1110	--	Calvert Bluff	--	Burleson	No	Yes
PO-001573	5934601	30.432723	-96.757079	380.73	784	734-774	124QNCT - Queen City Sand of Claiborne Group	Queen City	--	Burleson	No	Yes
PO-001628	0	30.790479	-96.752813	454.64	446	427-442	--	Calvert Bluff	--	Milam	No	
PO-001786	0	30.798707	-96.746351	418.73	436	406-426	--	Calvert Bluff	--	Milam	No	
PO-001789	5911403	30.798458	-96.748911	451.93	515	487-507	-	Calvert Bluff	--	Milam	No	Yes
PO-002152	5925409	30.560937	-96.995195	465.16	480	450-470	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Milam	No	
PO-002153	5925410	30.543611	-96.995077	447.36	690	670-690	-	Calvert Bluff	--	Milam	No	
PO-002173	5925103	30.600894	-96.982554	418.57	420	400-420	124WLCX - Wilcox Group	Calvert Bluff	--	Milam	No	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-002191	5917716	30.64475	-96.989459	463.65	520	470-490	124HOOP - Hooper Formation	Hooper	--	Milam	No	
PO-002204	5917717	30.66098	-96.980581	487.32	750	720-750	-	Hooper	--	Milam	No	
PO-002355	0	30.742536	-96.723449	384.03	514		--	Calvert Bluff	--	Milam	No	
PO-002537	0	30.637155	-97.047405	526.68	510	460-500	--	Hooper	--	Milam	No	
PO-002556	0	30.631444	-97.048054	526.68	431	400-420	--	Hooper	--	Milam	No	
PO-002659	0	30.793544	-96.753895	483.92	470	430-450	--	Calvert Bluff	--	Milam	No	
PO-003129	0	30.526832	-96.60392	380.38	650	610-650	--	Sparta	--	Burleson	No	
PO-005109	0	30.547438	-96.647943	416.59	1235	1151-1235	--	Carrizo	--	Burleson	No	
PO-006090	0	30.55726	-96.663845	383.15	620	580-620	--	Queen City	--	Burleson	No	Yes
PO-006145	5927611	30.545711	-96.637995	397.32	770	650-750	Queen City	Queen City	--	Burleson	No	
PO-006153	0	30.547688	-96.650416	418.02	620	580-620	--	Queen City	--	Burleson	No	
PO-006243	5925502	30.564449	-96.93863	420.88	614	593-614	124CZCB - Carrizo Sand and Calvert Bluff Formation	Calvert Bluff	--	Burleson	No	
PO-006330	0	30.798573	-96.754642	446.69	410	384-404	--	Calvert Bluff	--	Milam	No	
PO-006483	0	30.444177	-96.709519	335.27	484	424-464	--	Sparta	--	Burleson	No	
PO-007085	0	30.79218	-96.749811	460.01	520	490-510	--	Calvert Bluff	--	Milam	No	
PO-007117	0	30.607372	-97.090487	556.5	412	372-392	--	Hooper	--	Milam	No	
PO-007183	0	30.486545	-96.714566	336.21	570	480-560	--	Queen City	--	Burleson	No	
PO-007197	0	30.473	-96.7359	369.453	780		--	Queen City	--	Burleson	No	
PO-007242	0	30.65372	-96.936482	510.72	562	542-562	--	Calvert Bluff	--	Milam	No	
PO-007285	0	30.533847	-96.913127	369.73	460	400-440	--	Carrizo	--	Burleson	No	
PO-007390	0	30.468221	-96.67232	354.48	420	400-420	--	Sparta	--	Burleson	No	
PO-007585	0	30.455325	-96.696669	393.67	533	433-533	--	Sparta	--	Burleson	No	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-007587	0	30.433183	-96.702289	332.55	550	450-530	--	Sparta	--	Burleson	No	
PO-007601	0	30.524118	-96.601927	368.23	895	855-895	--	Sparta	--	Burleson	No	
PO-007614	0	30.799439	-96.751916	432.44	460	435-455	--	Calvert Bluff	--	Milam	No	
PO-007773	5910910	30.787523	-96.76501	436.37	430	405-424	--	Calvert Bluff	--	Milam	No	
PO-007774	5910705	30.779877	-96.862409	437.87	560	493-535	124CABF - Calvert Bluff Formation	Simsboro	--	Milam	No	
PO-007965	5929408	30.56376009	-96.47961101	227.533	1200		-	Queen City	--	Burleson	No	
PO-007998	5910908	30.789919	-96.763075	502.4	460	435-455	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Milam	No	Yes
PO-008037	0	30.800021	-96.745012	405.21	430	405-425	--	Calvert Bluff	--	Milam	No	
PO-008073	0	30.545419	-96.729014	391.56	1001	796-976	--	Reklaw	--	Burleson	No	
PO-008095	0	30.632753	-96.907044	498.55	433	408-428	--	Calvert Bluff	--	Milam	No	
PO-008096	5831906	30.519275	-97.128543	544.1	547	522-542	-	Hooper	--	Milam	No	
PO-008149	0	30.664946	-96.828151	498.43	770	739-759	--	Calvert Bluff	--	Milam	No	
PO-008153	0	30.788113	-96.761897	497.62	454	429-449	--	Calvert Bluff	--	Milam	No	Yes
PO-008213	0	30.354736	-96.717394	322.33	440	180-200, 340-360, 420-440	--	Yegua-Jackson	--	Burleson	No	
PO-008274	5902311	30.96749	-96.777223	369.18	445	424-444	-	Simsboro	--	Milam	No	Yes
PO-008276	0	30.8099	-96.759338	383.96	450	426-446	--	Calvert Bluff	--	Milam	No	
PO-008281	0	30.786376	-96.757111	470.77	420	395-415	--	Calvert Bluff	--	Milam	No	
PO-008451	5925408	30.56314	-96.962249	380.98	690	300-380, 620-680	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Milam	No	
PO-008658	5910706	30.773217	-96.842923	449.8	528	508-528	124SMBR - Simsboro Sand Member of Rockdale Formation	Calvert Bluff	--	Milam	No	



GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-008767	5934108	30.483562	-96.86045	410.72	2230	1800-2100	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	--	Burleson	No	Yes
PO-008802	0	30.574557	-96.654183	413.03	700	600-700	--	Queen City	--	Burleson	No	
PO-008823	0	30.762068	-96.741154	391.73	570	485-505	--	Calvert Bluff	--	Milam	No	
PO-008840	0	30.78124	-96.760787	485.18	420	400-420	--	Calvert Bluff	--	Milam	No	
PO-008845	0	30.576779	-96.657712	427.32	700	660-700	--	Queen City	--	Burleson	No	
PO-008907	0	30.468045	-96.672368	355.63	900	879-900	--	Queen City	--	Burleson	No	
PO-008945	0	30.787566	-96.754675	460.9	465	440-460	--	Calvert Bluff	--	Milam	No	
PO-008959	5918602	30.68149	-96.786819	437.94	810	790-810	-	Calvert Bluff	--	Milam	No	
PO-008971	0	30.53394	-96.913311	362.04	840	820-840	--	Calvert Bluff	--	Burleson	No	
PO-009095	5910707	30.771335	-96.846475	422.59	580	550-570	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	--	Milam	No	
PO-009101	0	30.452998	-96.703926	360.57	440	420-440	--	Sparta	--	Burleson	No	
PO-009157	5936809	30.39192	-96.556262	299.43	740	520-580	124JKYG - Jackson Group and Yegua Formation	Yegua-Jackson	--	Burleson	No	Yes
PO-009166	5918108	30.711453	-96.862516	505.76	1240	1178-1220	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	--	Milam	No	Yes
PO-009189	0	30.49561	-96.854834	461.68	1078	1008-1029, 1033-1054, 1057-1078	--	Calvert Bluff	--	Burleson	No	Yes
PO-009230	5925302	30.597068	-96.879605	525.71	2491	1590-1600,	-	Simsboro	--	Burleson	No	Yes

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
						1710-1720						
PO-009387	0	30.604445	-96.70975	364.19	580	490-570	--	Queen City	--	Burleson	No	Yes
PO-009404	0	30.465084	-96.667991	313.12	520	480-520	--	Sparta	--	Burleson	No	
PO-009431	0	30.569484	-96.737646	384.48	820	790-810	--	Carrizo	--	Burleson	No	
PO-009445	5934609	30.42776	-96.762799	361.58	500	280-320, 365-395	-	Sparta	--	Burleson	No	Yes
PO-009446	5925511	30.572377	-96.920672	417.45	2350	1620-1630, 1706-1716, 1870-1880	-	Simsboro	--	Burleson	No	Yes
PO-009453	0	30.624066	-97.048654	502.08	440	415-435	--	Hooper	--	Milam	No	
PO-009468	0	30.760171	-96.651465	327.95	470	360-440	--	Carrizo	--	Milam	No	
PO-009475	0	30.606932	-96.871251	504.03	685	550-560, 600-610	--	Calvert Bluff	--	Milam	No	Yes
PO-009477	0	30.400752	-96.760522	354.88	520	424-520	--	Sparta	--	Burleson	No	Yes
PO-009486	0	30.523034	-96.604322	363.24	630	610-630	--	Sparta	--	Burleson	No	
PO-009540	0	30.795901	-96.7555	482.22	440	415-435	--	Calvert Bluff	--	Milam	No	
PO-009552	0	30.790381	-96.754689	456.04	460	435-455	--	Calvert Bluff	--	Milam	No	
PO-009559	0	30.679167	-96.822778	464.15	700	670-690	--	Calvert Bluff	--	Milam	No	
PO-009588	0	30.333743	-97.230485	555.05	500	459-479	--	Calvert Bluff	--	Bastrop	No	
PO-009601	0	30.436225	-97.084104	463.27	544	474-534	--	Calvert Bluff	--	Lee	No	
PO-009604	0	30.681111	-96.822778	450.85	680	657-677	--	Calvert Bluff	--	Milam	No	
PO-009651	0	30.343491	-96.537967	249.43	850	380-420, 500-540,	--	Yegua-Jackson	--	Burleson	No	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
						580-620, 720-760						
PO-009708	0	30.428949	-96.806908	358.15	504	482-502	--	Queen City	--	Burleson	No	Yes
PO-009709	0	30.435756	-96.804091	362.53	455	433-453	--	Queen City	--	Burleson	No	Yes
PO-009710	0	30.414663	-96.81687	312.56	499	477-497	--	Queen City	--	Burleson	No	Yes
PO-009716	5917510	30.69608317	-96.91801394	450.205	500	378-418	-	Calvert Bluff	--	Milam	No	
PO-009747	0	30.333743	-97.230485	555.05	500	459-479	--	Calvert Bluff	--	Bastrop	No	
PO-009749	5840704	30.412727	-97.098625	401.92	454	433-454	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Lee	No	
PO-009751	0	30.53119917	-96.99522244	422.079	620		--	Calvert Bluff	--	Lee	No	
PO-009752	0	30.79608	-96.753138	451.85	435	405-425	--	Calvert Bluff	--	Milam	No	
PO-009767	0	30.888939	-96.724989	356.51	685		--	Calvert Bluff	--	Milam	No	
PO-009769	5925512	30.569346	-96.949119	395.99	734	694-734	-	Calvert Bluff	--	Milam	No	
PO-009807	0	30.477976	-96.860164	412.91	890	660-740, 760-800, 830-870	--	Carrizo	--	Burleson	No	
PO-009824	0	30.96914	-96.780574	377.77	460	430-450	--	Simsboro	--	Milam	No	
PO-010970	0	30.550286	-96.71384	382.074	990		--	Carrizo	--	Burleson	No	
PO-010971	0	30.432226	-96.815857	342.24	461	437-457	--	Queen City	--	Burleson	No	
PO-011022	0	30.44197	-96.410513	239.52	570	550-570	--	Yegua-Jackson	--	Burleson	No	
PO-011032	0	30.648152	-96.85468	575.42	1744	1462-1546, 1588-1715	--	Simsboro	--	Milam	No	
PO-011118	0	30.498455	-96.856797	475.91	2742	2600-2660	--	Hooper	--	Burleson	No	Yes
PO-011279	0	30.447111	-96.789976	418.47	1244	944-1244	--	Carrizo	--	Burleson	No	Yes

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-011283	0	30.462071	-97.149871	441.29	440	409-430	--	Hooper	--	Milam	No	Yes
5862302	5862302	30.100833	-97.284167	522.145	515	--	--	Calvert Bluff	--	Bastrop	No	
5862305	5862305	30.088879	-97.264104	513.636	1020	--	--	Calvert Bluff	--	Bastrop	No	
--	5903818	30.915556	-96.704167	285.01	0	--	--	Brazos River Alluvium	--	Robertson	No	
--	5922510	30.678611	-96.303056	310.025	0	--	--	Sparta	--	Brazos	No	
--	5930309	30.613297	-96.257656	250.37	0	--	--	Yegua-Jackson	--	Brazos	No	
--	5921512	30.667633	-96.443294	295.781	0	--	--	Sparta	--	Brazos	No	
--	5840713	30.402223	-97.120833	453.895	0	--	--	Simsboro	--	Lee	No	
--	5904803	30.89861	-96.563611	427.233	410	--	--	Carrizo	--	Robertson	No	
--	5856901	30.138888	-97.03361	463.699	410	--	--	Sparta	--	Lee	No	
--	3959713	31.024166	-96.71861	295.573	420	--	--	Calvert Bluff	--	Robertson	No	
--	5921112	30.721389	-96.462778	362.618	439	--	--	Sparta	--	Brazos	No	
--	3960601	31.073332	-96.527499	443.559	442	--	--	Calvert Bluff	--	Robertson	No	
--	3952701	31.143888	-96.609444	402.243	448	--	--	Hooper	--	Robertson	No	
--	5920932	30.649166	-96.541666	244.589	470	--	--	Sparta	--	Brazos	No	
--	5912106	30.8625	-96.587221	279.959	482	--	--	Calvert Bluff	--	Robertson	No	
--	3951902	31.163611	-96.665833	437.873	495	--	--	Hooper	--	Robertson	No	
--	5907101	30.968054	-96.246944	259.537	500	--	--	Sparta	--	Brazos	No	
--	5921417	30.667092	-96.461597	283.207	510	--	--	Sparta	--	Brazos	No	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
--	5903305	30.998888	-96.639166	360.096	528	--	--	Simsboro	--	Robertson	No	
--	3960204	31.0875	-96.558056	420.21	540	--	--	Simsboro	--	Robertson	No	
--	3954701	31.137499	-96.354444	380.6	545	--	--	Calvert Bluff	--	Robertson	No	
--	5923703	30.658888	-96.234166	235.987	550	--	--	Yegua-Jackson	--	Brazos	No	
--	5921736	30.666236	-96.461386	280.929	550	--	--	Sparta	--	Brazos	No	
--	3944904	31.255	-96.5125	475.311	560	--	--	Hooper	--	Robertson	No	
--	5839508	30.456112	-97.193889	520.448	560	--	--	Hooper	--	Williams on	No	
--	3951913	31.163333	-96.644444	472.591	572	--	--	Hooper	--	Robertson	No	
--	3959602	31.044166	-96.6575	310.347	600	--	--	Simsboro	--	Robertson	No	
--	5839509	30.452501	-97.185834	507.724	605	--	--	Hooper	--	Williams on	No	
--	5904307	30.992221	-96.520277	434.511	620	--	--	Calvert Bluff	--	Robertson	No	
--	5839923	30.407777	-97.149166	403.449	620	--	--	Simsboro	--	Lee	No	
--	5839506	30.450278	-97.179444	486.164	630	--	--	Hooper	--	Williams on	No	
--	5921734	30.653055	-96.497499	254.164	640	--	--	Queen City	--	Brazos	No	
--	5839201	30.461667	-97.172222	480.903	640	--	--	Hooper	--	Williams on	No	
--	5839927	30.408055	-97.139721	417.635	657	--	--	Simsboro	--	Lee	No	
--	5922912	30.641388	-96.277777	301.63	660	--	--	Yegua-Jackson	--	Brazos	No	



GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
--	5839925	30.405555	-97.144721	413.739	660	--	--	Simsboro	--	Lee	No	
--	5903203	30.974999	-96.673332	326.714	661	--	--	Simsboro	--	Robertson	No	
--	5839302	30.461112	-97.164723	482.367	675	--	--	Hooper	--	Williamson	No	
--	5839507	30.453611	-97.171389	467.165	675	--	--	Hooper	--	Williamson	No	
--	5914707	30.781943	-96.34361	337.409	760	--	--	Sparta	--	Brazos	No	
--	5914708	30.789167	-96.336111	345.122	780	--	--	Sparta	--	Brazos	No	
--	5839922	30.407777	-97.149444	404.654	820	--	--	Simsboro	--	Lee	No	
--	5933704	30.394166	-96.992777	439.133	832	--	--	Carrizo	--	Lee	No	
--	3962703	31.027499	-96.36861	473.527	860	--	--	Calvert Bluff	--	Robertson	No	
--	5839924	30.405277	-97.144444	419.758	860	--	--	Hooper	--	Lee	No	
--	5941707	30.283054	-96.965833	415.032	880	--	--	Queen City	--	Lee	No	
--	5856301	30.240277	-97.039444	535.048	897	--	--	Carrizo	--	Lee	No	
--	5839926	30.407777	-97.139999	416.741	900	--	--	Hooper	--	Lee	No	
--	5903815	30.908055	-96.683333	284.156	978	--	--	Simsboro	--	Robertson	No	
--	5945806	30.288056	-96.441945	452.51	981	--	--	Yegua-Jackson	--	Washington	No	
--	5911703	30.78710363	-96.71687678	368.112	992	--	--	Simsboro	--	Milam	No	
--	3959806	31.04	-96.683611	333.119	999	--	--	Simsboro	--	Robertson	No	
--	5922508	30.679999	-96.308333	334.913	1080	--	--	Sparta	--	Brazos	No	
--	3961503	31.0625	-96.44611	401.502	1100	--	--	Simsboro	--	Robertson	No	
--	5929603	30.566666	-96.408888	292.362	1100	--	--	Sparta	--	Brazos	No	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
--	0	30.815683	-96.369917	358.981	1355	--	--	Carrizo	--	Brazos	No	
--	5848115	30.354722	-97.117499	482.4	1620	--	--	Calvert Bluff	--	Lee	No	
--	3962501	31.055277	-96.333054	338.778	1730	--	--	Simsboro	--	Robertson	No	
--	3962502	31.051944	-96.32861	323.957	1740	--	--	Simsboro	--	Robertson	No	
--	5949805	30.154166	-96.919999	490.691	2218	--	--	Carrizo	--	Lee	No	
--	5913707	30.750833	-96.464166	347.249	2740	--	--	Simsboro	--	Robertson	No	
--	5921208	30.74093036	-96.447179	336.969	2834	--	--	Simsboro	--	Brazos	No	
--	5921303	30.715001	-96.409445	340.283	2950	--	--	Simsboro	--	Brazos	No	
58-39-941	0	30.405683	-97.14461	414.959	660	--	--	Simsboro	--	Lee	No	
58-40-414	0	30.434269	-97.109415	441.986	985	--	--	Simsboro	--	Lee	No	
58-40-509	5840509	30.438333	-97.078332	517.992	680	--	--	Calvert Bluff	--	Lee	No	
58-40-808	5840808	30.400556	-97.073889	394.974	578	--	--	Calvert Bluff	--	Lee	No	
58-46-5-0016	5846516	30.325334	-97.312697	521.747	598	--	--	Simsboro	--	Bastrop	No	
58-46-6-0011	5846611	30.303609	-97.263494	507.027	461	--	--	Simsboro	--	Bastrop	No	
58-55-219	0	30.210257	-97.189686	517.892	517	--	--	Simsboro	--	Bastrop	No	
58-55-407	0	30.203371	-97.23182	644.39	1381	--	--	Simsboro	--	Bastrop	No	
58-55-707	5855707	30.146667	-97.232222	458.203	769	--	--	Calvert Bluff	--	Bastrop	No	
58-62-138	0	30.121171	-97.340146	349.641	540	--	--	Simsboro	--	Bastrop	No	
58-62-208	5862208	30.1094444	-97.2947222	521.456	636	--	--	Calvert Bluff	--	Bastrop	No	
58-62-304	5862304	30.100841	-97.284174	522.348	735	--	--	Calvert Bluff	--	Bastrop	No	
58-62-307	5862307	30.088908	-97.264138	513.636	450	--	--	Calvert Bluff	--	Bastrop	No	
58-62-416	0	30.066917	-97.359209	417.099	602	--	--	Simsboro	--	Bastrop	No	
58-63-606	5863606	30.045662	-97.157899	385.083	868	--	--	Carrizo	--	Bastrop	No	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
58-64-603	5864603	30.071388	-97.038055	371.641	454	--	--	Sparta	--	Bastrop	No	
59-33-408	0	30.456134	-96.970428	360.852	0	--	--	Simsboro	--	Lee	No	
59-42-106	5942106	30.370554	-96.872499	394.127	482	--	--	Queen City	--	Lee	No	
59-42-203	5942203	30.357223	-96.825	367.081	465	--	--	Sparta	--	Lee	No	
59-49-509	5949509	30.184999	-96.941388	501.942	2018	--	--	Carrizo	--	Lee	No	
59-49-512	5949512	30.181943	-96.924166	497.186	2020	--	--	Carrizo	--	Lee	No	
59-49-513	5949513	30.189166	-96.938888	499.216	1996	--	--	Carrizo	--	Lee	No	
59-49-604	5949604	30.171388	-96.902777	482.711	2160	--	--	Carrizo	--	Lee	No	
67-05-803	6705803	29.901667	-97.420833	668.085	830	--	--	Calvert Bluff	--	Bastrop	No	
67-07-204	6707204	29.979397	-97.193077	423.618	765	--	--	Carrizo	--	Bastrop	No	
67-07-206	6707206	29.99361	-97.180554	391.108	750	--	--	Carrizo	--	Bastrop	No	
BVDO-0001	5921416	30.69849617	-96.48863395	308.882	1360	--	--	Carrizo	--	Brazos	No	
BVDO-0002	5921510	30.6988719	-96.45150891	320.36	540	--	--	Sparta	--	Brazos	No	
BVDO-0003	5921108	30.72682015	-96.47762263	365.022	2770	--	--	Simsboro	--	Brazos	No	
BVDO-0013	5921415	30.7058442	-96.48853	337.114	2965	--	--	Simsboro	--	Brazos	No	
BVDO-0042	5914504	30.800277	-96.322499	355.36	800	--	--	Sparta	--	Brazos	No	
BVDO-0053	5920317	30.70898841	-96.50678221	242.502	2749	--	--	Simsboro	--	Brazos	No	
BVDO-0054	3961707	31.02889632	-96.47485974	459.738	1440	--	--	Simsboro	--	Robertson	No	
BVDO-0092	5903440	30.92483729	-96.735858	289.236	530	--	--	Simsboro	--	Robertson	No	
BVDO-0117	5929116	30.61237	-96.4809	241.18	720	--	--	Sparta	--	Brazos	No	
BVDO-0118	3960205	31.09764247	-96.55244183	459.903	681	--	--	Simsboro	--	Robertson	No	
BVDO-0188	3951915	31.15964901	-96.63584852	447.7	580	--	--	Hooper	--	Robertson	No	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
BVDO-0219	5922512	30.70045502	-96.31441336	353.559	1027	--	--	Sparta	--	Brazos	No	
BVDO-0223	5914709	30.77546003	-96.35343278	320.914	1005	--	--	Sparta	--	Brazos	No	
BVGO-0010	3952604	31.18747911	-96.5317096	471.602	500	--	--	Simsboro	--	Robertson	No	
BVGO-0474	5906903	30.91194602	-96.26960209	341.237	520	--	--	Sparta	--	Brazos	No	
BVGO-0545	5913308	30.87087307	-96.3815162	367.413	620	--	--	Sparta	--	Brazos	No	
BVGO-0614	5921511	30.70723202	-96.432182	306.62	543	--	--	Sparta	--	Brazos	No	
BVGO-0836	5905105	30.98537903	-96.46427	444.047	420	--	--	Carrizo	--	Robertson	No	
BVGO-1222	5907402	30.92836199	-96.227116	270.979	480	--	--	Sparta	--	Brazos	No	
BVHU-0001	5921201	30.7229823	-96.42011116	309.211	499	--	--	Sparta	--	Brazos	No	
BVHU-0002	5921203	30.72048713	-96.42625	335.756	554	--	--	Sparta	--	Brazos	No	
BVHU-0004	5921202	30.72263536	-96.42042586	311.634	2950	--	--	Simsboro	--	Brazos	No	
BVHU-0005	5921205	30.72953136	-96.42977686	320.511	2880	--	--	Simsboro	--	Brazos	No	
BVHU-0007	5921207	30.74430106	-96.453876	297.843	2730	--	--	Simsboro	--	Brazos	No	
BVHU-0008	5921107	30.72160746	-96.46249913	359.71	2881	--	--	Simsboro	--	Brazos	No	
BVHU-0009	5921209	30.73012636	-96.45119972	369.581	2867	--	--	Simsboro	--	Brazos	No	
BVHU-0010	5921210	30.73560436	-96.44675159	345.109	2865	--	--	Simsboro	--	Brazos	No	
BVHU-0012	5904707	30.8862634	-96.59045274	374.487	1430	--	--	Simsboro	--	Robertson	No	
BVHU-0013	5904701	30.88570654	-96.61942006	296.398	1441	--	--	Simsboro	--	Robertson	No	
BVHU-0014	5904702	30.87955434	-96.59869165	294.644	1275	--	--	Simsboro	--	Robertson	No	
BVHU-0019	3962401	31.05602062	-96.3371146	352.824	1730	--	--	Simsboro	--	Robertson	No	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
BVHU-0022	3961501	31.05093224	-96.42856714	426.559	1436	--	--	Simsboro	--	Robertson	No	
BVHU-0023	3951912	31.16672087	-96.6375	483.674	551	--	--	Hooper	--	Robertson	No	
BVHU-0027	5914706	30.7819444	-96.3433333	337.345	3061	--	--	Simsboro	--	Brazos	No	
BVHU-0031	5905901	30.89558274	-96.39170564	427.471	2200	--	--	Simsboro	--	Robertson	No	
BVHU-0038	5921410	30.70027075	-96.46004114	349.269	2973	--	--	Simsboro	--	Brazos	No	
BVHU-0039	5921409	30.70163537	-96.47024114	340.469	2975	--	--	Simsboro	--	Brazos	No	
BVHU-0040	5921411	30.70033537	-96.47895886	329.55	2940	--	--	Simsboro	--	Brazos	No	
BVHU-0041	5921412	30.70734607	-96.48089548	348.891	2938	--	--	Simsboro	--	Brazos	No	
BVHU-0042	5921413	30.69864009	-96.48866077	308.882	2884	--	--	Simsboro	--	Brazos	No	
BVHU-0043	5921414	30.6973	-96.4993	276.544	2910	--	--	Simsboro	--	Brazos	No	
BVHU-0046	3959504	31.04818524	-96.673783	361.083	1077	--	--	Simsboro	--	Robertson	No	
BVHU-0047	3959604	31.05076616	-96.66650609	318.736	1076	--	--	Simsboro	--	Robertson	No	
BVHU-0055	5922910	30.636083	-96.286556	280.615	562	--	--	Yegua-Jackson	--	Brazos	No	
BVHU-0056	5922911	30.63674947	-96.28280653	280.676	652	--	--	Yegua-Jackson	--	Brazos	No	
BVHU-0144	3954703	31.1554333	-96.3710333	420.818	625	--	--	Calvert Bluff	--	Robertson	No	
BVHU-0246	3946405	31.32651214	-96.333439	382.937	705	--	--	Simsboro	--	Robertson	No	
BVHU-0404	5920574	30.68199081	-96.54646186	247.849	0	--	--	Brazos River Alluvium	--	Brazos	No	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
BVHU-0415	3951911	31.16551283	-96.65523449	417.323	550	--	--	Hooper	--	Robertson	No	
BVHU-0416	3951910	31.15882876	-96.6529025	438.288	527	--	--	Hooper	--	Robertson	No	
BVHU-0450	5921705	30.65331948	-96.48549941	259.148	487	--	--	Sparta	--	Brazos	No	
BVHU-0451	5921704	30.65116808	-96.49301852	255.963	482	--	--	Sparta	--	Brazos	No	
BVHU-0452	5920920	30.64952787	-96.50053034	244.598	424	--	--	Sparta	--	Brazos	No	
BVHU-0453	5921402	30.67416538	-96.49617	261.76	1345	--	--	Carrizo	--	Brazos	No	
BVHU-0454	5921723	30.6550808	-96.4801685	266.025	2979	--	--	Simsboro	--	Brazos	No	
BVHU-0455	5921732	30.666388	-96.489999	265.27	3018	--	--	Simsboro	--	Brazos	No	
BVHU-0456	5921714	30.64342617	-96.47189	264.838	3060	--	--	Simsboro	--	Brazos	No	
BVHU-1025	5903441	30.93109479	-96.74705534	289.376	580	--	--	Simsboro	--	Robertson	No	
BVOP-0003	5930207	30.6182601	-96.32857033	310.181	721	--	--	Yegua-Jackson	--	Brazos	No	
BVOP-0005	5930410	30.5807781	-96.35641048	288.665	680	--	--	Yegua-Jackson	--	Brazos	No	
BVOP-0018	3959601	31.049444	-96.649166	320.042	600	--	--	Simsboro	--	Robertson	No	
BVOP-0020	3953403	31.17919239	-96.489684	430.095	750	--	--	Hooper	--	Robertson	No	
BVOP-0025	5922509	30.67035904	-96.30227548	289.941	1096	--	--	Sparta	--	Brazos	No	
BVOP-0027	3961703	31.02818634	-96.48761608	472.051	1217	--	--	Simsboro	--	Robertson	No	
BVOP-0028	3961705	31.02677878	-96.49235042	446.098	1215	--	--	Simsboro	--	Robertson	No	
BVOP-0029	3961706	31.02993463	-96.49130473	448.795	1234	--	--	Simsboro	--	Robertson	No	



GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
BVOP-0043	5946310	30.36780002	-96.269151	195.807	0	--	--	Brazos River Alluvium	--	Brazos	No	
BVOP-0048	5914503	30.80634198	-96.317611	355.721	780	--	--	Sparta	--	Brazos	No	
BVOP-0051	5903211	30.96449911	-96.70747507	311.292	440	--	--	Simsboro	--	Robertson	No	
BVOP-0126	5939714	30.39444145	-96.2103728	195.273	0	--	--	Brazos River Alluvium	--	Brazos	No	
BVOP-0158	5929117	30.61024	-96.48	240.263	0	--	--	Brazos River Alluvium	--	Brazos	No	
BVOP-0182	5915102	30.86767305	-96.22482492	341.272	540	--	--	Sparta	--	Brazos	No	
BVOP-0269	5906904	30.90602099	-96.27669698	355.117	780	--	--	Queen City	--	Brazos	No	
BVR-0166	5906901	30.88172532	-96.28223541	350.738	703	--	--	Sparta	--	Brazos	No	
BVR-0644	3959905	31.02264318	-96.63052745	392.983	480	--	--	Simsboro	--	Robertson	No	
BVR-0774	5914505	30.81093533	-96.314	365.922	645	--	--	Sparta	--	Brazos	No	
BVR-1282	3953703	31.136388	-96.469166	413.55	450	--	--	Simsboro	--	Robertson	No	
BVR-1283	5903437	30.93692557	-96.74163122	293.104	460	--	--	Simsboro	--	Robertson	No	
BVR-1284	3946702	31.26621619	-96.34915827	400.921	660	--	--	Simsboro	--	Robertson	No	
BVR-1286	3952202	31.21444503	-96.54938486	470.293	0	--	--	Calvert Bluff	--	Robertson	No	
BVR-1295	3951201	31.2252819	-96.66935757	460.581	0	--	--	Hooper	--	Falls	No	
BVR-1296	3951504	31.20061228	-96.69611634	442.416	0	--	--	Hooper	--	Falls	No	
BVR-1300	5913302	30.854444	-96.386666	363.016	458	--	--	Sparta	--	Brazos	No	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
BVR-1313	5903606	30.93777099	-96.644952	317.929	440	--	--	Calvert Bluff	--	Robertson	No	
BVR-1396	5903304	30.9662659	-96.66196746	359.983	660	--	--	Simsboro	--	Robertson	No	
BVR-1405	5905301	30.99742853	-96.39052061	470.906	750	--	--	Carrizo	--	Robertson	No	
BVR-1408	5905303	30.99766555	-96.39045248	469.862	0	--	--	Sparta	--	Robertson	No	
BVR-1440	3960206	31.09618356	-96.5569701	443.61	0	--	--	Calvert Bluff	--	Robertson	No	
BVR-1450	5903307	30.96558259	-96.66163555	360.813	0	--	--	Calvert Bluff	--	Robertson	No	
BVR-1506	5911204	30.87001867	-96.66903285	275.138	1250	--	--	Simsboro	--	Robertson	No	
BVR-1584	3946109	31.34152551	-96.35147008	376.545	580	--	--	Simsboro	--	Limestone	No	

Table B-3. Monitoring Wells Considered for PDL Calculations

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000059	5911402	30.797116	-96.734743	425.96	323	307-323	124CABF - Calvert Bluff Formation	Carrizo	--	Milam	Yes	
PO-000084	5919302	30.728258	-96.632283	338.48	45		124QNCT - Queen City Sand of Claiborne Group	Brazos River Alluvium	--	Milam	Yes	
PO-000115	5917715	30.644786	-96.98975	464.91	152		124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	--	Milam	Yes	
PO-000118	5917705	30.651521	-96.978108	490.52	326	286-326	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	--	Milam	Yes	
PO-000170	5824914	30.658537	-97.016606	493.85	295	153-233	124SMBR - Simsboro Sand Member of Rockdale Formation	Hooper	--	Milam	Yes	
PO-000186	5909701	30.758804	-96.985292	421.25	218	182-207	124HOOP - Hooper Formation	Hooper	--	Milam	Yes	
PO-000223	5902706	30.897589	-96.851978	358.44	313	235-250, 256-298	124WLCX - Wilcox Group	Hooper	--	Milam	Yes	
PO-000256	5902901	30.884889	-96.778263	368.46	318	284-308	124WLCX - Wilcox Group	Calvert Bluff	--	Milam	Yes	Yes
PO-000268	5832101	30.623416	-97.087963	476.91	60	40-60	124HOOP - Hooper Formation	Simsboro	--	Milam	Yes	
PO-000308	5927716	30.537221	-96.741666	451.132	400		124QNCT - Queen City Sand of Claiborne Group	Queen City	--	Burleson	Yes	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000518	5927204	30.619047	-96.686457	306.812	205	163-205	124QNCT - Queen City Sand of Claiborne Group	Queen City	--	Burleson	Yes	
PO-000579	5937611	30.432127	-96.397781	234.144	240	177-240	124JCKSL - Lower Jackson Unit	Yegua-Jackson	--	Burleson	Yes	
PO-000596	5937329	30.48861	-96.375554	214.695	58		111ABZR - Alluvium, Brazos River	Brazos River Alluvium	--	Burleson	Yes	
PO-000618	5937109	30.459824	-96.470121	249.1	266	109-266	124YEGUU - Upper Yegua Unit	Yegua-Jackson	--	Burleson	Yes	
PO-000787	5938701	30.411689	-96.357915	204.723	56		111ABZR - Alluvium, Brazos River	Brazos River Alluvium	--	Burleson	Yes	
PO-000791	5935208	30.496356	-96.691955	374.01	364	322-364	124SPRT - Sparta Sand	Sparta	--	Burleson	Yes	
PO-000859	5929456	30.543654	-96.493777	229.218	60		111ABZR - Alluvium, Brazos River	Brazos River Alluvium	--	Burleson	Yes	
PO-000860	5929457	30.544539	-96.492047	229.531	60		111ABZR - Alluvium, Brazos River	Brazos River Alluvium	--	Burleson	Yes	
PO-000894	5928601	30.579192	-96.540368	241.137	58		111ABZR - Alluvium, Brazos River	Brazos River Alluvium	--	Burleson	Yes	
PO-001166	5929410	30.558021	-96.469975	225.512	71		111ABZR - Alluvium, Brazos River	Brazos River Alluvium	--	Burleson	Yes	
PO-001197	5934107	30.481138	-96.872117	443.6	370	150-170, 240-260, 340-360	124QNCT - Queen City Sand of Claiborne Group	Queen City	--	Burleson	Yes	
PO-001450	5832304	30.608458	-97.007393	433.64	271	250-270	-	Simsboro	--	Milam	Yes	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-001486	0	30.660719	-97.00257	458.01	182	162-182	--	Simsboro	--	Milam	Yes	
PO-001505	5831905	30.507954	-97.15798	552.87	120	110-120	-	Simsboro	--	Milam	Yes	
PO-001883	5832704	30.506526	-97.118557	479.79	180	160-180	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	--	Milam	Yes	
PO-001947	0	30.662023	-97.039118	492.4	360	340-360	--	Hooper	--	Milam	Yes	
PO-002014	5839303	30.482942	-97.125936	480.31	182	162-182	-	Simsboro	--	Milam	Yes	
PO-002061	0	30.910475	-96.83047	354.25	360	330-350	--	Hooper	--	Milam	Yes	
PO-002205	0	30.657701	-97.008279	455.38	130	110-130	--	Simsboro	--	Milam	Yes	
PO-002538	5824915	30.634102	-97.008392	456.39	188	163-183	-	Simsboro	--	Milam	Yes	
PO-003430	0	30.528079	-96.879562	357.72	360	320-360	--	Carrizo	--	Burleson	Yes	
PO-004459	0	30.506583	-96.877112	407.935	400	360-400	--	Carrizo	--	Burleson	Yes	
PO-004968	0	30.563852	-96.764876	454.542	160	130-150	--	Queen City	--	Burleson	Yes	
PO-005486	0	30.587096	-96.764341	421.1	199	179-199	--	Queen City	--	Burleson	Yes	
PO-005899	0	30.423109	-96.792805	364.99	300	260-300	--	Sparta	--	Burleson	Yes	Yes
PO-006305	5832908	30.531266	-97.026756	434.243	344	324-344	124CABF - Calvert Bluff Formation	Calvert Bluff	--	Milam	Yes	
PO-006586	5927309	30.613416	-96.660202	379.83	260	240-260	Queen City	Queen City	--	Burleson	Yes	
PO-007283	0	30.96101	-96.842631	408.98	235	196-235	--	Hooper	--	Milam	Yes	
PO-007363	5832404	30.556554	-97.088493	493.539	174	154-174	-	Simsboro	--	Milam	Yes	
PO-007364	5824612	30.684556	-97.040078	433.13	180	160-180	124HOOP - Hooper Formation	Hooper	--	Milam	Yes	
PO-008151	5917804	30.643448	-96.942944	475.097	385		-	Calvert Bluff	--	Milam	Yes	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-008172	5831904	30.51383	-97.164512	577.71	370	330-370	-	Hooper	--	Milam	Yes	
PO-008245	0	30.802738	-96.746268	417.59	397	370-390	--	Calvert Bluff	--	Milam	Yes	
PO-008415	5929433	30.544655	-96.498726	231.407	59		111ABZR - Alluvium, Brazos River	Brazos River Alluvium	--	Burleson	Yes	
PO-008420	0	30.339441	-96.536761	249.87	197	157-197	--	Yegua-Jackson	--	Burleson	Yes	Yes
PO-008449	5943312	30.339005	-96.662334	324.8	362	269-340	124YEGU - Yegua Formation	Yegua-Jackson	--	Burleson	Yes	
PO-008678	5943305	30.34644	-96.653937	284.48	367	258-367	124YEGU - Yegua Formation	Yegua-Jackson	--	Burleson	Yes	
PO-008680	5943304	30.343735	-96.656985	306.04	370	280-370	124YEGU - Yegua Formation	Yegua-Jackson	--	Burleson	Yes	
PO-008772	0	30.936896	-96.840521	364.37	120	60-120	--	Hooper	--	Milam	Yes	
PO-008795	0	30.934859	-96.842781	376.06	279	256-279	--	Hooper	--	Milam	Yes	
PO-008865	0	30.651916	-97.061748	412.35	160	120-140	--	Hooper	--	Milam	Yes	
PO-008935	5901904	30.91313	-96.886244	388.83	80	64-74	124HOOP - Hooper Formation	Hooper	--	Milam	Yes	
PO-009094	0	30.939341	-96.841313	377.81	315	200-300	--	Hooper	--	Milam	Yes	
PO-009104	5928342	30.606732	-96.534182	243.7	380	340-380	124SPRT - Sparta Sand	Sparta	--	Burleson	Yes	
PO-009162	0	30.934887	-96.844776	401.23	303	245-265	--	Hooper	--	Milam	Yes	
PO-009167	5918109	30.71147	-96.86247	505.28	140	90-130	124CRRZ - Carrizo Sand	Carrizo	--	Milam	Yes	Yes
PO-009346	5925905	30.540548	-96.907128	392.88	80	50-70	-	Queen City	--	Burleson	Yes	
PO-009372	5925906	30.54111	-96.904828	418.3	120	80-100	-	Queen City	--	Burleson	Yes	



GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-009480	5831907	30.51974	-97.128765	545.178	235	205-235	-	Simsboro	--	Milam	Yes	
PO-009487	0	30.681115	-97.035385	473.56	151	135-151	--	Hooper	--	Milam	Yes	
PO-009493	0	30.825372	-96.652117	288.85	270	180-260	--	Carrizo	--	Milam	Yes	
PO-009495	0	30.649373	-96.979027	477.74	320	280-320	--	Simsboro	--	Milam	Yes	
PO-009497	0	30.917406	-96.830408	379.24	142	115-135	--	Simsboro	--	Milam	Yes	
PO-009545	0	30.813705	-96.915701	441.74	180	140-160	--	Simsboro	--	Milam	Yes	Yes
PO-009551	0	30.742183	-96.922138	411.15	220	160-180	--	Calvert Bluff	--	Milam	Yes	Yes
PO-009553	0	30.749728	-96.974034	436.6	230	198-218	--	Hooper	--	Milam	Yes	Yes
PO-009555	0	30.7497	-96.974028	436.67	118	90-110	--	Hooper	--	Milam	Yes	Yes
PO-009556	0	30.961546	-96.843779	407.22	128	81-120	--	Hooper	--	Milam	Yes	
PO-009597	0	30.414877	-97.1786	443.04	136	104-134	--	Simsboro	--	Lee	Yes	
PO-009606	0	30.448499	-97.119669	446.75	255	235-255	--	Calvert Bluff	--	Lee	Yes	
PO-009745	5824916	30.634	-97.036108	495.75	157	127-157	-	Simsboro	--	Milam	Yes	
PO-009748	0	30.378317	-97.21891	438.51	300	280-300	--	Simsboro	--	Lee	Yes	
PO-009753	5832705	30.509568	-97.120109	493.3	185	175-185	-	Simsboro	--	Milam	Yes	
PO-009754	5832706	30.518632	-97.108223	476.04	123	103-123	-	Simsboro	--	Milam	Yes	
PO-009755	5917411	30.698968	-96.972777	430.77	113	93-113	-	Simsboro	--	Milam	Yes	
PO-009768	0	30.946955	-96.7942	374.35	314	284-294	--	Simsboro	--	Milam	Yes	
PO-009774	0	30.433609	-96.824999	377.93	347	274-314	--	Queen City	--	Burleson	Yes	
PO-009781	0	30.950404	-96.835052	445.44	148	120-140	--	Hooper	--	Milam	Yes	
PO-009806	0	30.936655	-96.843817	372.22	115	48-108	--	Hooper	--	Milam	Yes	
PO-009808	0	30.849332	-96.92166	367.13	151.6	131-151	--	Hooper	--	Milam	Yes	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
PO-009812	0	30.43258	-96.531884	293.97	260	200-240	--	Yegua-Jackson	--	Burleson	Yes	
PO-010899	5920409	30.689832	-96.611437	297.25	230	188-230	124QNCT - Queen City Sand of Claiborne Group	Queen City	--	Burleson	Yes	
PO-010924	0	30.329788	-96.663389	302.09	350		--	Yegua-Jackson	--	Burleson	Yes	
PO-010937	5911607	30.823778	-96.654983	304.332	276		111ABZR - Alluvium, Brazos River	Carrizo	--	Milam	Yes	
PO-011143	0	30.518502	-97.126979	526.74	165	125-165	--	Simsboro	--	Milam	Yes	
PO-011234	0	30.563152	-96.656749	398.96	300	210-290	--	Sparta	--	Burleson	Yes	
5950401	5950401	30.198611	-96.851112	410.225	300	--	--	Yegua-Jackson	--	Lee	Yes	
5951102	5951102	30.235278	-96.7425	298.249	335	--	--	Yegua-Jackson	--	Lee	Yes	
5957201	5957201	30.106112	-96.934445	385.947	194	--	--	Yegua-Jackson	--	Lee	Yes	
--	5955306	30.225	-96.151945	184.1	20	--	--	Brazos River Alluvium	--	Washington	Yes	
--	5904405	30.942778	-96.614167	404.163	35	--	--	Carrizo	--	Robertson	Yes	
--	5911608	30.801944	-96.62861	265.132	50	--	--	Brazos River Alluvium	--	Robertson	Yes	
--	5939904	30.415555	-96.133333	185.475	52	--	--	Brazos River Alluvium	--	Brazos	Yes	
--	5905601	30.924721	-96.411388	397.405	54	--	--	Sparta	--	Robertson	Yes	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
--	5939918	30.408334	-96.152778	190.793	58	--	--	Brazos River Alluvium	--	Brazos	Yes	
--	5938918	30.394721	-96.282499	199.962	59	--	--	Brazos River Alluvium	--	Brazos	Yes	
--	5912454	30.81	-96.597221	262.307	61	--	--	Brazos River Alluvium	--	Robertson	Yes	
--	5911623	30.799445	-96.633334	267.304	61	--	--	Brazos River Alluvium	--	Robertson	Yes	
--	5911605	30.798333	-96.632221	267.073	62	--	--	Brazos River Alluvium	--	Robertson	Yes	
--	5939503	30.428888	-96.17361	190.062	62	--	--	Brazos River Alluvium	--	Brazos	Yes	
--	5903519	30.923332	-96.692221	281.894	63	--	--	Brazos River Alluvium	--	Robertson	Yes	
--	5911202	30.866666	-96.67861	274.896	68	--	--	Brazos River Alluvium	--	Robertson	Yes	
--	5938901	30.399722	-96.275278	200.138	70	--	--	Brazos River Alluvium	--	Brazos	Yes	
--	5939907	30.385277	-96.161944	188.659	70	--	--	Brazos River Alluvium	--	Brazos	Yes	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
--	5911301	30.873332	-96.660833	275.12	72	--	--	Brazos River Alluvium	--	Robertson	Yes	
--	5955501	30.174444	-96.187778	163.676	100	--	--	Brazos River Alluvium	--	Washington	Yes	
--	3952702	31.155972	-96.599917	390.734	105	--	--	Simsboro	--	Robertson	Yes	
--	5945404	30.320556	-96.4875	252.874	175	--	--	Yegua-Jackson	--	Washington	Yes	
--	5904404	30.93111	-96.617221	388.264	200	--	--	Carrizo	--	Robertson	Yes	
--	5945504	30.313611	-96.435	329.714	227	--	--	Yegua-Jackson	--	Washington	Yes	
--	3929801	31.53444	-96.419998	460.686	240	--	--	Hooper	--	Limestone	Yes	
--	5947301	30.3375	-96.160278	186.496	245	--	--	Brazos River Alluvium	--	Washington	Yes	
--	5915801	30.768054	-96.190833	219.617	250	--	--	Yegua-Jackson	--	Brazos	Yes	
--	5839607	30.433888	-97.149721	452.596	250	--	--	Simsboro	--	Lee	Yes	
--	5921104	30.748333	-96.487777	310.949	260	--	--	Sparta	--	Robertson	Yes	
--	5922609	30.704722	-96.265555	283.538	267	--	--	Yegua-Jackson	--	Brazos	Yes	
--	5906902	30.886388	-96.282777	343.156	300	--	--	Sparta	--	Brazos	Yes	
--	5915404	30.791944	-96.234444	333.242	304	--	--	Yegua-Jackson	--	Brazos	Yes	
--	5951204	30.219167	-96.680556	329.112	304	--	--	Yegua-Jackson	--	Washington	Yes	
--	5915706	30.79111	-96.24861	310.726	307	--	--	Yegua-Jackson	--	Brazos	Yes	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
--	3959403	31.062223	-96.745278	326.991	320	--	--	Hooper	--	Robertson	Yes	
--	3945803	31.279128	-96.456401	450.275	340	--	--	Calvert Bluff	--	Robertson	Yes	
--	5923502	30.691666	-96.177221	252.682	350	--	--	Yegua-Jackson	--	Brazos	Yes	
--	5951205	30.216944	-96.684167	340.407	353	--	--	Yegua-Jackson	--	Washington	Yes	
--	3951907	31.166721	-96.6375	441.356	355	--	--	Hooper	--	Robertson	Yes	
--	5839806	30.408611	-97.184999	433.909	355	--	--	Simsboro	--	Lee	Yes	
--	5944907	30.285556	-96.52	291.796	360	--	--	Yegua-Jackson	--	Washington	Yes	
--	5950909	30.160278	-96.790278	432.729	375	--	--	Yegua-Jackson	--	Washington	Yes	
--	5949101	30.218332	-96.994721	424.383	377	--	--	Sparta	--	Lee	Yes	
--	5903306	30.991944	-96.650555	352.951	380	--	--	Calvert Bluff	--	Robertson	Yes	
58-38-906	5838906	30.376389	-97.290278	583.949	319	--	--	Hooper	--	Bastrop	Yes	
58-40-913	5840913	30.411666	-97.031388	462.196	220	--	--	Queen City	--	Lee	Yes	
58-45-802	5845802	30.254167	-97.416944	481.356	56	--	--	Hooper	--	Bastrop	Yes	
58-46-301	5846301	30.365853	-97.287257	557.73	63	--	--	Simsboro	--	Bastrop	Yes	
58-46-5-0001	5846510	30.332166	-97.309637	459.726	120	--	--	Simsboro	--	Bastrop	Yes	
58-46-503	5846503	30.32257	-97.314366	540.091	51	--	--	Simsboro	--	Bastrop	Yes	
58-48-201	5848201	30.36861	-97.079721	451.062	252	--	--	Queen City	--	Lee	Yes	
58-48-509	5848509	30.29361	-97.045833	454.112	324	--	--	Queen City	--	Lee	Yes	
58-53-504	5853504	30.181667	-97.421944	417.821	104	--	--	Hooper	--	Bastrop	Yes	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
58-55-6-0029	0	30.190743	-97.127646	519.547	270	--	--	Sparta	--	Bastrop	Yes	
58-55-6-0030	0	30.186888	-97.126862	508.268	370	--	--	Sparta	--	Bastrop	Yes	
58-55-6-0031	0	30.187691	-97.126967	509.746	250	--	--	Sparta	--	Bastrop	Yes	
58-55-6-0032	0	30.184939	-97.131094	499.317	230	--	--	Sparta	--	Bastrop	Yes	
58-56-104	5856104	30.249445	-97.106667	552.743	300	--	--	Queen City	--	Bastrop	Yes	
58-56-4-0011	0	30.192959	-97.123054	525.397	260	--	--	Sparta	--	Bastrop	Yes	
58-56-906	5856906	30.138611	-97.033055	463.879	380	--	--	Sparta	--	Lee	Yes	
58-62-506	5862506	30.0725	-97.315556	351.819	290	--	--	Calvert Bluff	--	Bastrop	Yes	
58-63-103	5863103	30.104723	-97.207223	385.939	120	--	--	Carrizo	--	Bastrop	Yes	
59-33-608	5933608	30.448056	-96.886111	383.297	274	--	--	Queen City	--	Lee	Yes	
59-34-801	5934801	30.375555	-96.793611	318.863	307	--	--	Sparta	--	Lee	Yes	
59-41-704	5941704	30.251388	-96.986388	398.543	154	--	--	Sparta	--	Lee	Yes	
67-06-501	6706501	29.918054	-97.32111	480.356	160	--	--	Carrizo	--	Bastrop	Yes	
BVDO-0028	5921911	30.648832	-96.376587	349.105	284	--	--	Yegua-Jackson	--	Brazos	Yes	
BVDO-0081	5922511	30.698471	-96.331103	319.904	230	--	--	Yegua-Jackson	--	Brazos	Yes	
BVDO-0100	5913307	30.86222	-96.410278	410.317	310	--	--	Sparta	--	Robertson	Yes	
BVDO-0127	5939809	30.407926	-96.194001	193.798	62	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVDO-0133	5946312	30.365246	-96.267078	195.17	72	--	--	Brazos River Alluvium	--	Brazos	Yes	



GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
BVGO-0083	3945804	31.270417	-96.422286	376.126	400	--	--	Calvert Bluff	--	Robertson	Yes	
BVGO-0180	5904708	30.911566	-96.619272	326.403	200	--	--	Carrizo	--	Robertson	Yes	
BVGO-0397	3952304	31.227276	-96.526929	470.174	200	--	--	Calvert Bluff	--	Robertson	Yes	
BVGO-0406	3952303	31.231732	-96.535127	458.482	200	--	--	Simsboro	--	Robertson	Yes	
BVGO-0447	5913606	30.820971	-96.411365	383.272	260	--	--	Sparta	--	Brazos	Yes	
BVGO-0662	3945503	31.292029	-96.434762	435.715	340	--	--	Calvert Bluff	--	Robertson	Yes	
BVGO-0791	5905905	30.912199	-96.413107	402.709	260	--	--	Sparta	--	Robertson	Yes	
BVGO-0992	3952302	31.214725	-96.526717	432.284	200	--	--	Calvert Bluff	--	Robertson	Yes	
BVGO-1218	5906606	30.949787	-96.289554	362.566	365	--	--	Sparta	--	Robertson	Yes	
BVGO-1234	3945502	31.307223	-96.432707	374.2	235	--	--	Calvert Bluff	--	Limestone	Yes	
BVHU-0054	5930308	30.610936	-96.259925	230.192	240	--	--	Yegua-Jackson	--	Brazos	Yes	
BVHU-0067	5912807	30.769767	-96.577502	261.501	74	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVHU-0186	5911309	30.843485	-96.649617	271.581	58	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVHU-0276	5920540	30.708055	-96.552777	248.405	57	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVHU-0296	5911308	30.845833	-96.651666	270.44	65	--	--	Brazos River Alluvium	--	Robertson	Yes	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
BVHU-0359	5903402	30.945385	-96.732313	290.287	63	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVHU-0394	5920933	30.63375	-96.538162	250.512	66	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVHU-0400	5920647	30.684958	-96.515849	240.436	59	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVHU-0412	3951801	31.165676	-96.675143	460.682	258	--	--	Hooper	--	Robertson	Yes	
BVHU-0413	3951802	31.16514	-96.682926	455.638	243	--	--	Hooper	--	Robertson	Yes	
BVHU-0457	5929211	30.601597	-96.433158	251.276	72	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVHU-0987	5920907	30.642191	-96.536537	241.87	61	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVHU-1018	5903801	30.913888	-96.681388	280.203	65	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVHU-1041	5912420	30.819228	-96.600835	260.139	56	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVHU-1057	5903908	30.875277	-96.654444	275.053	67	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVHU-1063	5903439	30.943395	-96.71025	284.743	62	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVHU-1070	3959712	31.01445	-96.74797	300.191	236	--	--	Simsboro	--	Robertson	Yes	

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BVHU-1116	5938608	30.422454	-96.264267	204.162	65	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVOP-0022	5911905	30.784259	-96.636193	262.325	60	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVOP-0037	5938903	30.407337	-96.259882	201.861	73	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVOP-0055	5938904	30.399721	-96.251666	201.11	66	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVOP-0110	5939501	30.427011	-96.168978	183.994	70	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVOP-0160	5912604	30.813938	-96.521975	340.73	340	--	--	Queen City	--	Robertson	Yes	
BVOP-0286	3952803	31.145795	-96.559228	421.13	360	--	--	Simsboro	--	Robertson	Yes	
BVR-0038	3959405	31.057804	-96.738389	360.931	260	--	--	Hooper	--	Robertson	Yes	
BVR-0510	5903935	30.885836	-96.62604	296.108	180	--	--	Carrizo	--	Robertson	Yes	
BVR-0675	5905904	30.9047	-96.416048	411.622	233	--	--	Sparta	--	Robertson	Yes	
BVR-0771	3959404	31.064351	-96.746114	349.445	178	--	--	Hooper	--	Robertson	Yes	
BVR-0866	5931703	30.534899	-96.232057	271.093	220	--	--	Yegua-Jackson	--	Brazos	Yes	
BVR-0920	3952703	31.155194	-96.614157	420.59	80	--	--	Simsboro	--	Robertson	Yes	
BVR-0975	3959104	31.096522	-96.717687	418.69	320	--	--	Hooper	--	Robertson	Yes	
BVR-0977	3959105	31.095158	-96.715382	399.514	40	--	--	Simsboro	--	Robertson	Yes	
BVR-0990	5913803	30.781998	-96.433864	343.69	320	--	--	Sparta	--	Robertson	Yes	
BVR-1045	3951807	31.134688	-96.697159	427.731	255	--	--	Hooper	--	Robertson	Yes	

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BVR-1197	3961201	31.102377	-96.458	507.729	70	--	--	Carrizo	--	Robertson	Yes	
BVR-1252	3951805	31.148668	-96.675144	450.496	260	--	--	Hooper	--	Robertson	Yes	
BVR-1257	3952504	31.194999	-96.581666	451.772	100	--	--	Simsboro	--	Robertson	Yes	
BVR-1271	3951503	31.185578	-96.693585	440.866	206	--	--	Hooper	--	Falls	Yes	
BVR-1285	3952506	31.205784	-96.546216	500.718	115	--	--	Calvert Bluff	--	Robertson	Yes	
BVR-1287	3952203	31.209622	-96.558816	457.711	52	--	--	Calvert Bluff	--	Robertson	Yes	
BVR-1288	3952204	31.209578	-96.559523	454.288	185	--	--	Calvert Bluff	--	Robertson	Yes	
BVR-1289	3952505	31.202871	-96.556077	443.619	40	--	--	Calvert Bluff	--	Robertson	Yes	
BVR-1290	3952205	31.238696	-96.557427	509.224	84	--	--	Calvert Bluff	--	Robertson	Yes	
BVR-1291	3951914	31.141524	-96.656253	404.768	24	--	--	Simsboro	--	Robertson	Yes	
BVR-1297	3951501	31.194999	-96.689166	460.676	272	--	--	Hooper	--	Falls	Yes	
BVR-1309	5905104	30.981922	-96.469685	477.686	120	--	--	Queen City	--	Robertson	Yes	
BVR-1310	5905101	30.978023	-96.468883	465.215	27	--	--	Queen City	--	Robertson	Yes	
BVR-1345	5903438	30.943138	-96.744387	295.141	181	--	--	Calvert Bluff	--	Robertson	Yes	
BVR-1412	3959714	31.024173	-96.718677	294.857	133	--	--	Calvert Bluff	--	Robertson	Yes	
BVR-1489	5922601	30.701237	-96.259504	300.388	300	--	--	Yegua-Jackson	--	Brazos	Yes	
BVR-1502	3951806	31.14867	-96.675176	447.228	32	--	--	Simsboro	--	Robertson	Yes	

GCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	Primary Aquifer (First Unit)	Secondary Aquifer (Second Unit)	County	Shallow?	Transducer
BVR-1504	5912471	30.829126	-96.603204	263.477	64	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVR-1505	5920573	30.707649	-96.55262	248.294	52	--	--	Brazos River Alluvium	--	Robertson	Yes	
BVR-1507	5939905	30.414751	-96.133585	185.076	62	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVR-1509	5920603	30.693051	-96.510385	240.657	60	--	--	Brazos River Alluvium	--	Brazos	Yes	
BVR-1593	3944505	31.295863	-96.579056	551.338	70	--	--	Simsboro	--	Limestone	Yes	
BVR-1634	3959106	31.092661	-96.71538	390.683	29	--	--	Simsboro	--	Robertson	Yes	

Table B-4. Monitoring Wells Equipped with Transducers

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000025	5917409	30.668465	-96.986881	515.5	391	226-290, 320-390	124HOOP - Hooper Formation	Simsboro	Hooper	Milam	Yes	Yes
PO-000053	5909901	30.784118	-96.895502	428.03	169	109-169	124SMBR - Simsboro Sand Member of Rockdale Formation	Calvert Bluff	Simsboro	Milam	Yes	Yes
PO-000073	5910907	30.780887	-96.784999	378.05	440	410-430	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	Yes
PO-000107	5925102	30.600928	-96.982453	418.69	860	767-782	124SMBR - Simsboro Sand Member of Rockdale Formation	Hooper	Simsboro	Milam	No	Yes
PO-000121	5917714	30.663612	-96.995863	470.62	380	238-370	124SMBR - Simsboro Sand Member of Rockdale Formation	Hooper	Simsboro	Milam	Yes	Yes
PO-000221	5909605	30.824408	-96.88976	421.25	580	340-500	124HOOP - Hooper Formation	Hooper		Milam	No	Yes
PO-000234	5902309	30.988152	-96.757564	298.86	499	165-417	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	No	Yes
PO-000256	5902901	30.884889	-96.778263	368.46	318	284-308	124WLCX - Wilcox Group	Calvert Bluff		Milam	Yes	Yes
PO-000433	5920410	30.69556	-96.614391	298.2	920	688-710, 794-815	124SMBR - Simsboro Sand Member of Rockdale Formation	Carrizo		Burleson	No	Yes
PO-000638	5937101	30.48886448	-96.46550691	235.872	1620	--	124QNCT - Queen City Sand of Claiborne Group	Sparta		Burleson	No	Yes
PO-000698	5943608	30.310623	-96.646383	277.14	533	494-533	124YEGUL - Lower Yegua Unit and Underlying Unit	Yegua-Jackson		Burleson	No	Yes
PO-000877	5928619	30.545329	-96.525524	264.76	780	685-700, 719-765	124SPRT - Sparta Sand	Sparta		Burleson	No	Yes



POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000943	5934106	30.488497	-96.843686	442.85	840	800-840	124CRRZ - Carrizo Sand	Carrizo		Burleson	No	Yes
PO-001061	5934608	30.456017	-96.783585	425.98	814	740-800	124QNCT - Queen City Sand of Claiborne Group	Queen City		Burleson	No	Yes
PO-001063	5918104	30.712769	-96.869969	556.68	800	650-780	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	Yes
PO-001066	5918705	30.648057	-96.854621	574.7	813	540-645	124SMBR - Simsboro Sand Member of Rockdale Formation	Calvert Bluff		Milam	No	Yes
PO-001082	5911703	30.787152	-96.716872	361.02	992	889-980	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	No	Yes
PO-001390	--	30.571577	-96.829333	515.04	1120	980-1110	--	Calvert Bluff		Burleson	No	Yes
PO-001573	5934601	30.432723	-96.757079	380.73	784	734-774	124QNCT - Queen City Sand of Claiborne Group	Queen City		Burleson	No	Yes
PO-001575	5927718	30.525363	-96.727044	450.56	1300	1252-1277	124CZCB - Carrizo Sand and Calvert Bluff Formation	Carrizo	Calvert Bluff	Burleson	No	Yes
PO-001789	5911403	30.798458	-96.748911	451.93	515	487-507	-	Calvert Bluff		Milam	No	Yes
PO-001983	--	30.610758	-97.0867	535.54	490	450-470	--	Below Hooper		Milam	No	Yes
PO-005899	--	30.423109	-96.792805	364.99	300	260-300	--	Sparta		Burleson	Yes	Yes
PO-006090	--	30.55726	-96.663845	383.15	620	580-620	--	Queen City		Burleson	No	Yes
PO-006621	5926402	30.552628	-96.860572	490.37	2020	1580-1780	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	Calvert Bluff	Burleson	No	Yes
PO-006910	5926403	30.564832	-96.834747	496.08	2200	1750-1950, 2060-2090	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro	Calvert Bluff	Burleson	No	Yes

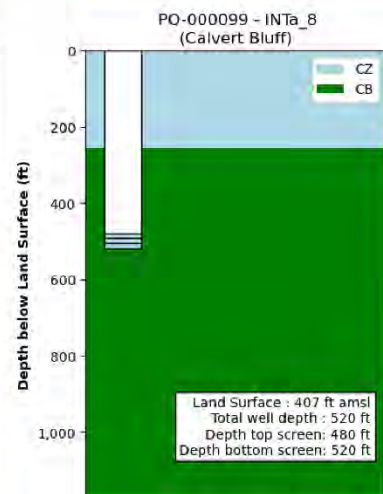
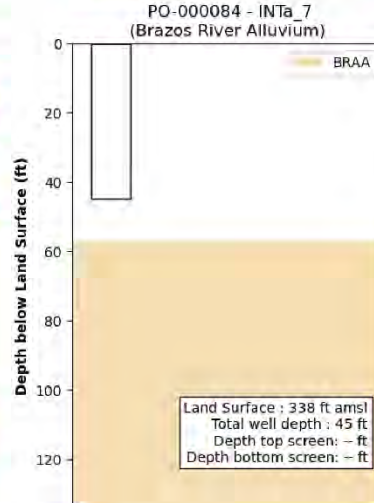
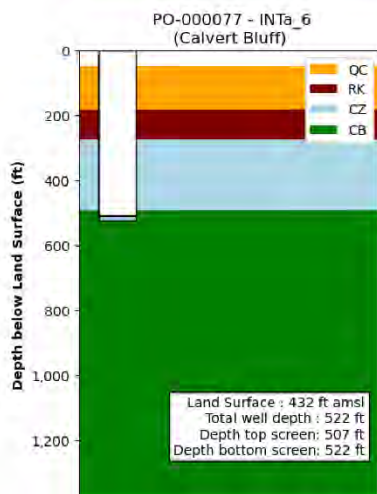
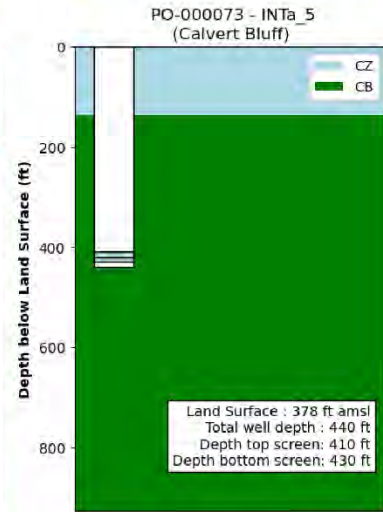
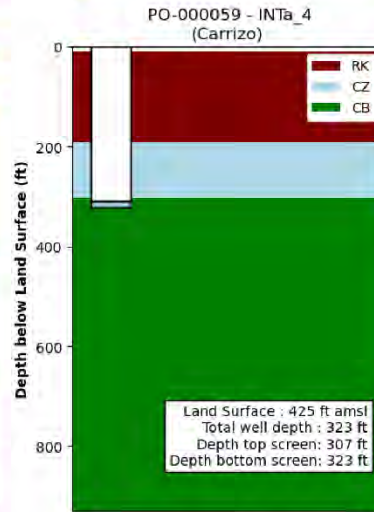
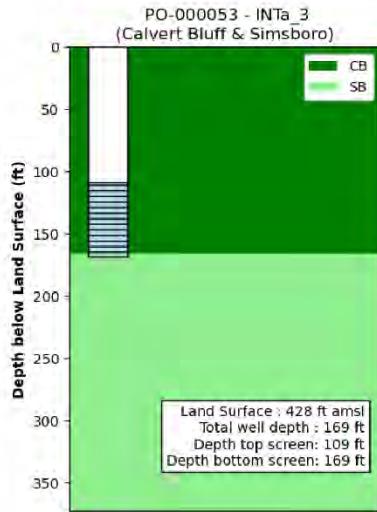
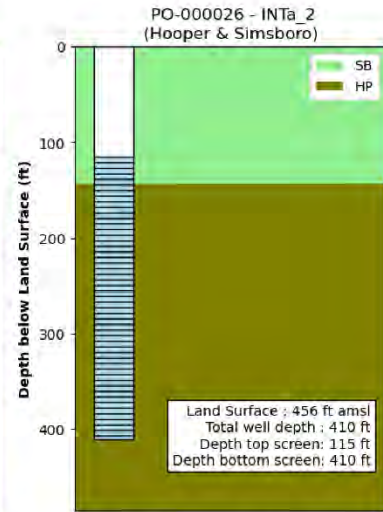
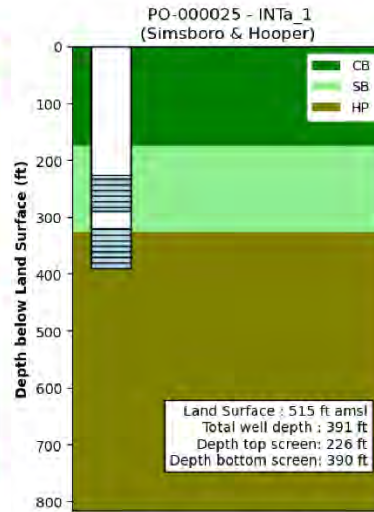
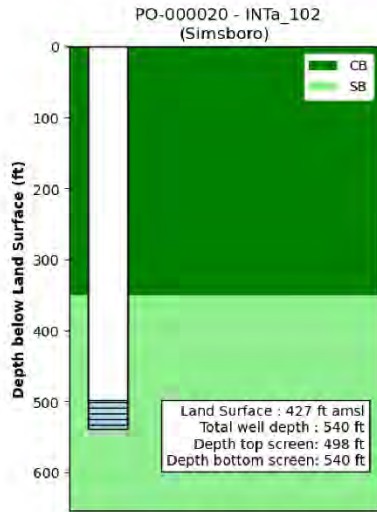
POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-007506	5824610	30.671559	-97.003968	493.35	392	165-193, 196-259, 339-390	124HOOP - Hooper Formation	Hooper	Simsboro	Milam	Yes	Yes
PO-007998	5910908	30.789919	-96.763075	502.4	460	435-455	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	Yes
PO-008153	--	30.788113	-96.761897	497.62	454	429-449	--	Calvert Bluff		Milam	No	Yes
PO-008274	5902311	30.96749	-96.777223	369.18	445	424-444	-	Simsboro		Milam	No	Yes
PO-008420	--	30.339441	-96.536761	249.87	197	157-197	--	Yegua-Jackson		Burleson	Yes	Yes
PO-008767	5934108	30.483562	-96.86045	410.72	2230	1800-2100	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Burleson	No	Yes
PO-009064	5928343	30.603813	-96.536293	241.71	3255	2400-2410, 2750-2760	-	Calvert Bluff	Simsboro	Burleson	No	Yes
PO-009157	5936809	30.39192	-96.556262	299.43	740	520-580	124JKYG - Jackson Group and Yegua Formation	Yegua-Jackson		Burleson	No	Yes
PO-009166	5918108	30.711453	-96.862516	505.76	1240	1178-1220	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	No	Yes
PO-009167	5918109	30.71147	-96.86247	505.28	140	90-130	124CRRZ - Carrizo Sand	Carrizo		Milam	Yes	Yes
PO-009189	--	30.49561	-96.854834	461.68	1078	1008-1029, 1033-1054, 1057-1078	--	Calvert Bluff		Burleson	No	Yes
PO-009215	5925904	30.511144	-96.897175	389.81	2724	1560-1570, 2100-	-	Simsboro	Hooper	Burleson	No	Yes

POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
						2110, 2130-2140						
PO-009230	5925302	30.597068	-96.879605	525.71	2491	1590-1600, 1710-1720	-	Simsboro		Burleson	No	Yes
PO-009387	--	30.604445	-96.70975	364.19	580	490-570	--	Queen City		Burleson	No	Yes
PO-009445	5934609	30.42776	-96.762799	361.58	500	280-320, 365-395	-	Sparta		Burleson	No	Yes
PO-009446	5925511	30.572377	-96.920672	417.45	2350	1620-1630, 1706-1716, 1870-1880	-	Simsboro		Burleson	No	Yes
PO-009475	--	30.606932	-96.871251	504.03	685	550-560, 600-610	--	Calvert Bluff		Milam	No	Yes
PO-009477	--	30.400752	-96.760522	354.88	520	424-520	--	Sparta		Burleson	No	Yes
PO-009545	--	30.813705	-96.915701	441.74	180	140-160	--	Simsboro		Milam	Yes	Yes
PO-009551	--	30.742183	-96.922138	411.15	220	160-180	--	Calvert Bluff		Milam	Yes	Yes
PO-009553	--	30.749728	-96.974034	436.6	230	198-218	--	Hooper		Milam	Yes	Yes
PO-009555	--	30.7497	-96.974028	436.67	118	90-110	--	Hooper		Milam	Yes	Yes
PO-009706	--	30.63488	-96.990939	470.82	419	265-305, 365-420	--	Simsboro	Hooper	Milam	No	Yes
PO-009707	--	30.605093	-96.545499	470.82	870	438-522, 549-590, 632-800, 813-855	--	Queen City	Sparta	Burleson	No	Yes
PO-009708	--	30.428949	-96.806908	358.15	504	482-502	--	Queen City		Burleson	No	Yes

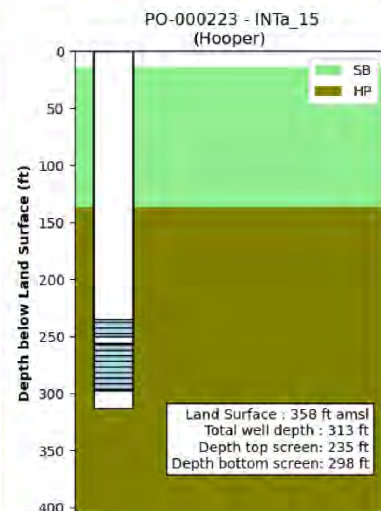
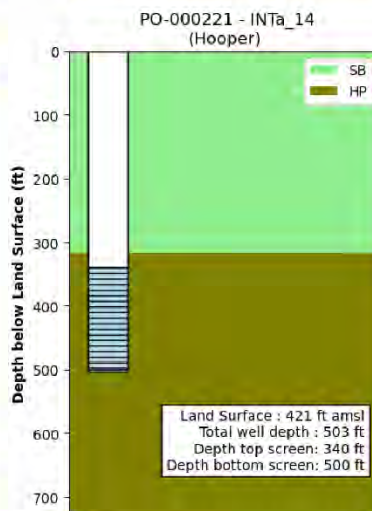
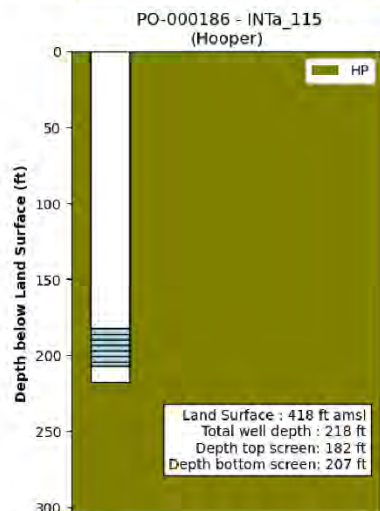
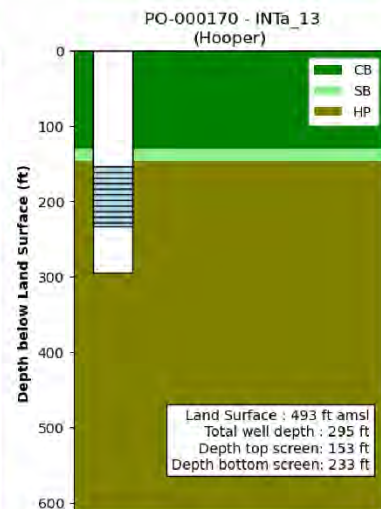
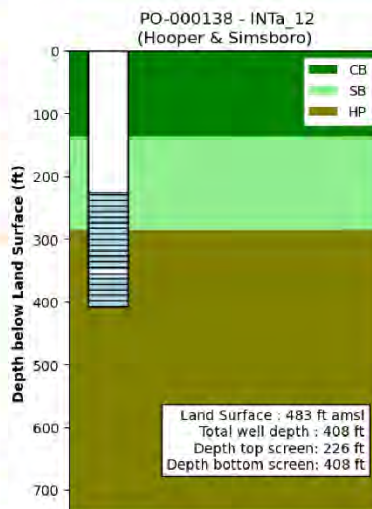
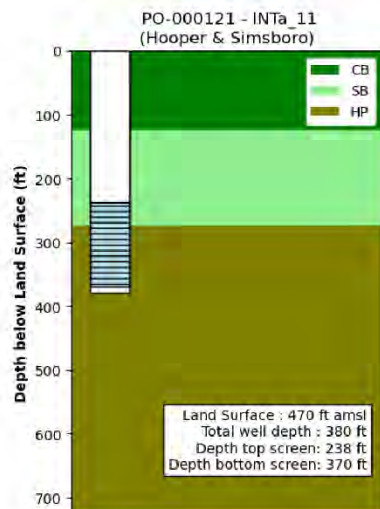
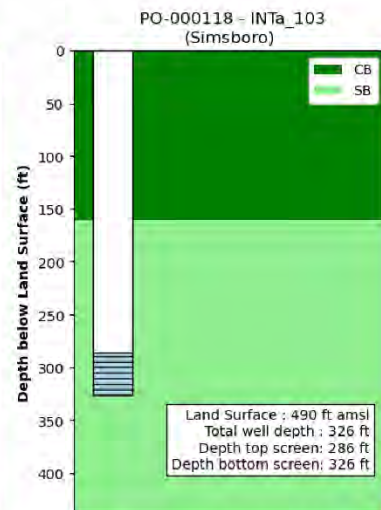
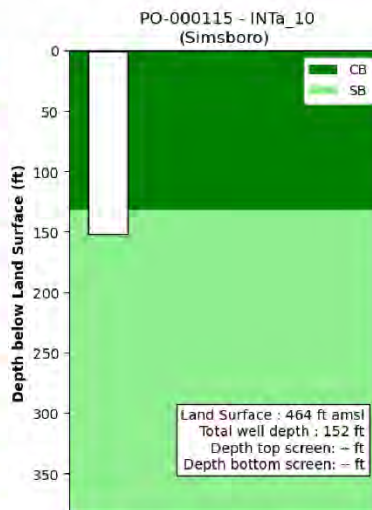
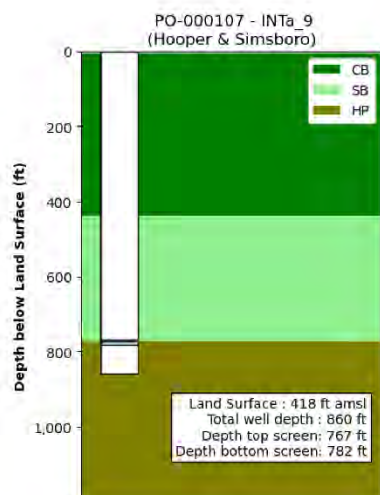
POSGCD Well Number	State Well Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Surface Elevation (ft amsl)	Depth (ft)	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-009709	--	30.435756	-96.804091	362.53	455	433-453	--	Queen City		Burleson	No	Yes
PO-009710	--	30.414663	-96.81687	312.56	499	477-497	--	Queen City		Burleson	No	Yes
PO-011118	--	30.498455	-96.856797	475.91	2742	2600-2660	--	Hooper		Burleson	No	Yes
PO-011279	--	30.447111	-96.789976	418.47	1244	944-1244	--	Carrizo		Burleson	No	Yes
PO-011283	--	30.462071	-97.149871	441.29	440	409-430	--	Hooper		Milam	No	Yes

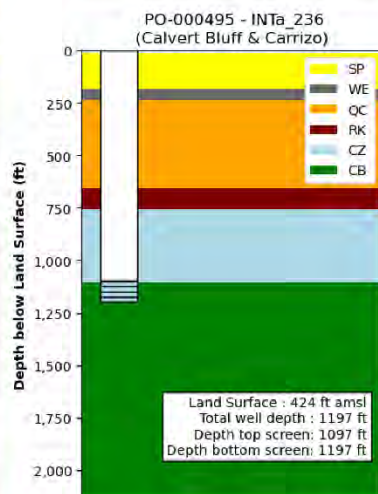
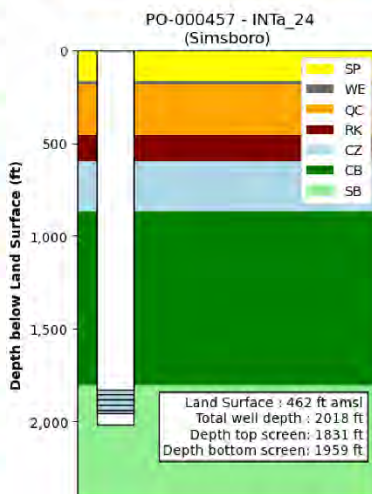
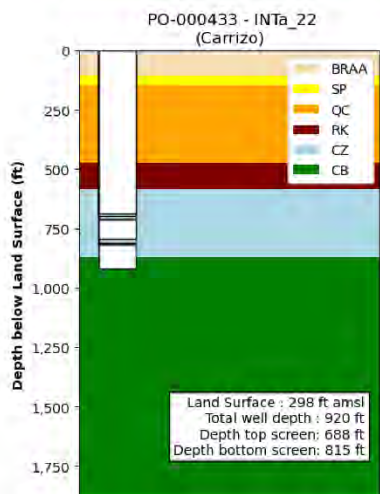
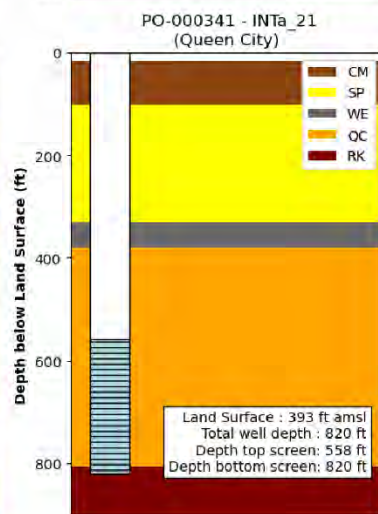
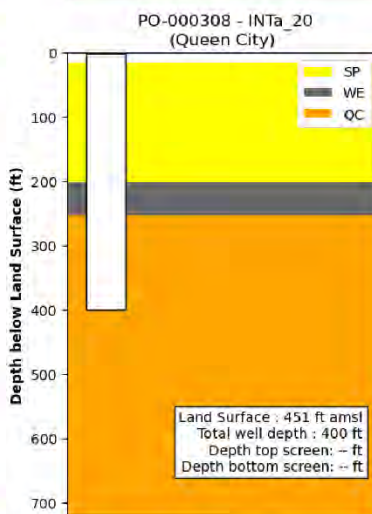
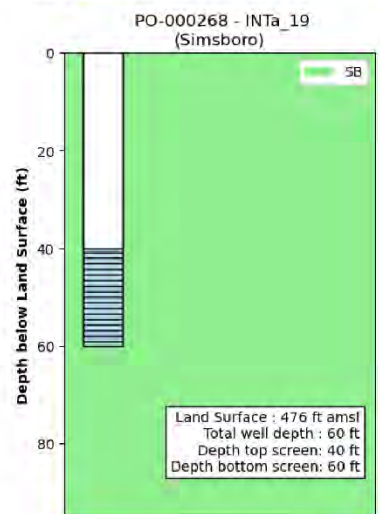
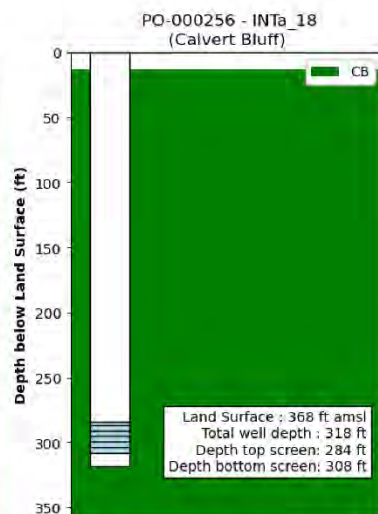
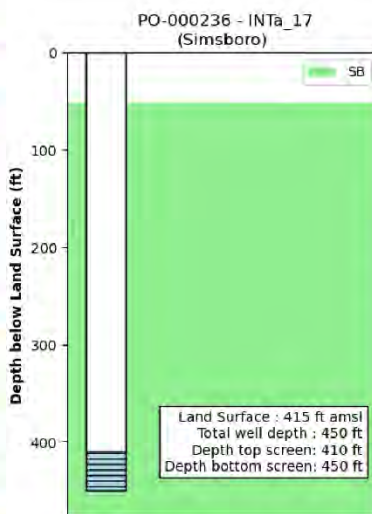
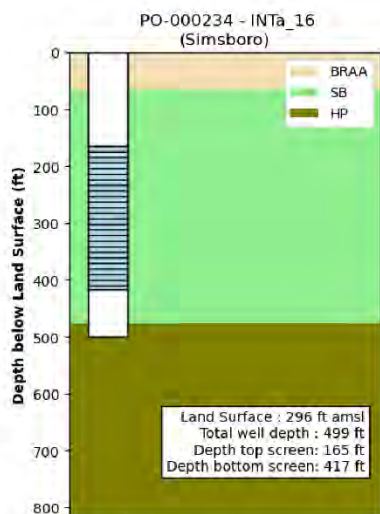
## **APPENDIX C**

### **Schematic Well Diagrams for POSGCD Monitoring Wells**

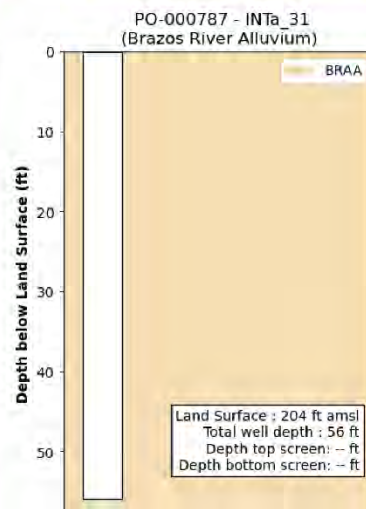
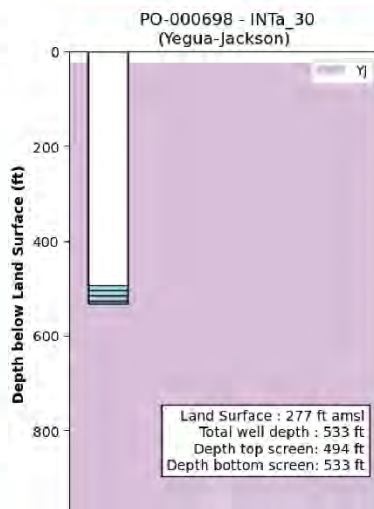
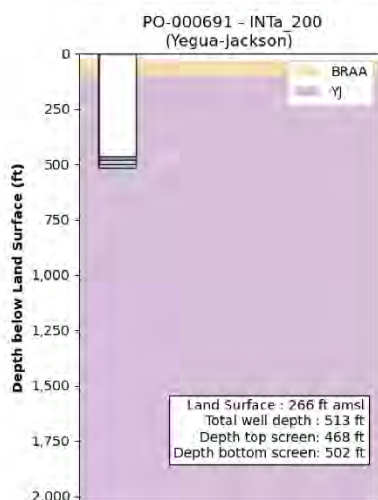
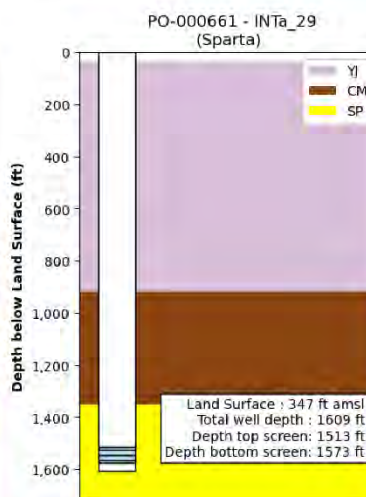
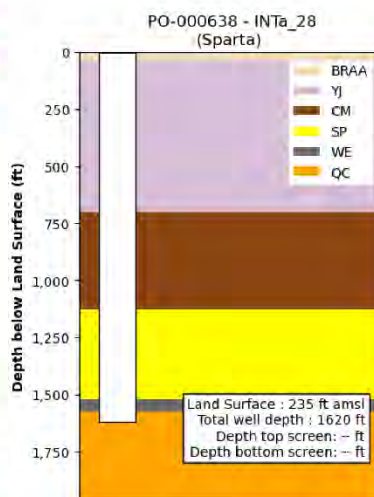
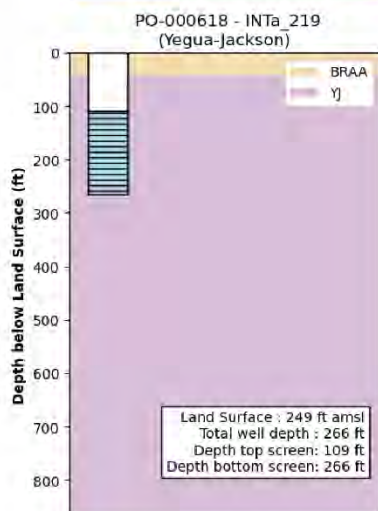
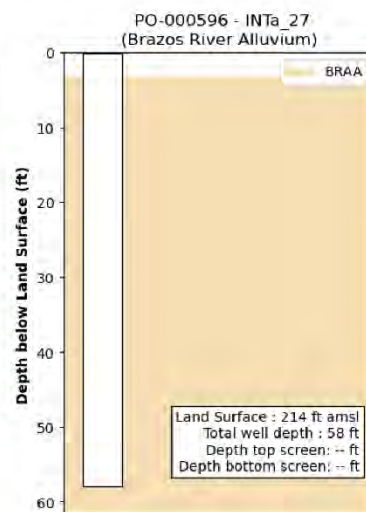
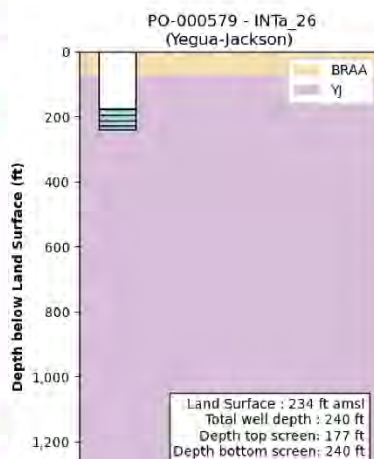
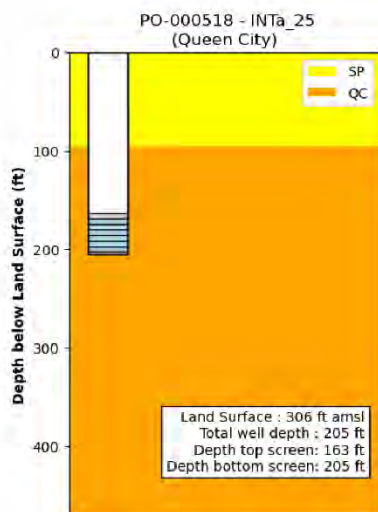


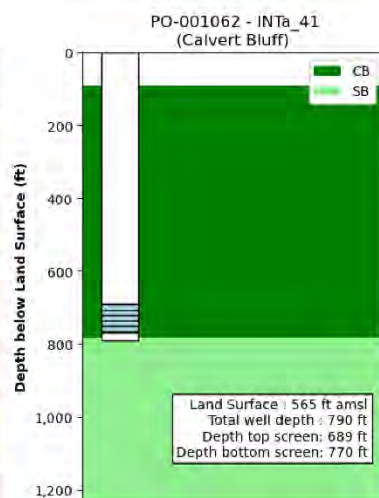
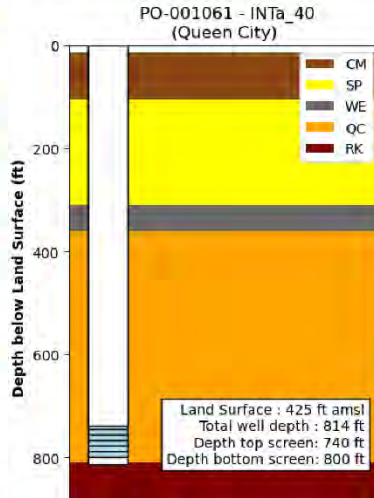
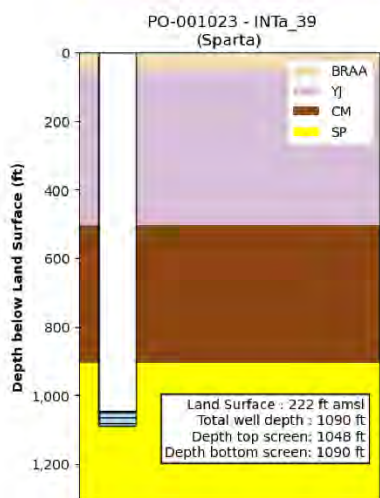
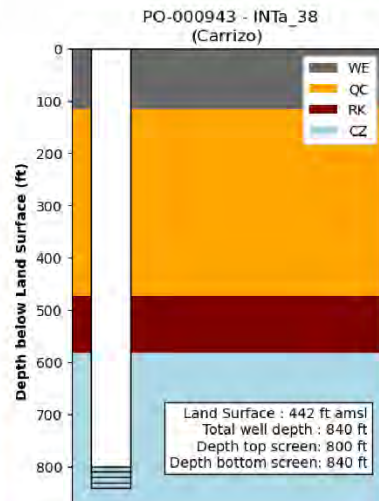
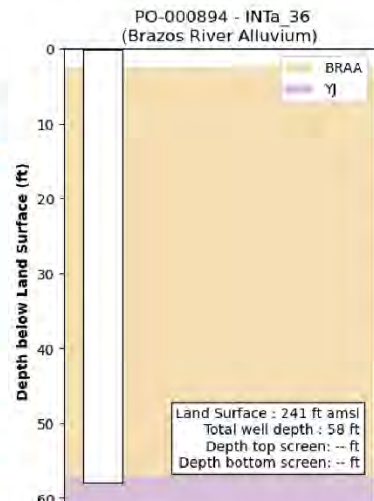
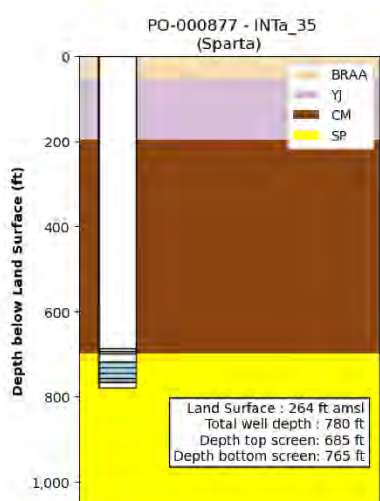
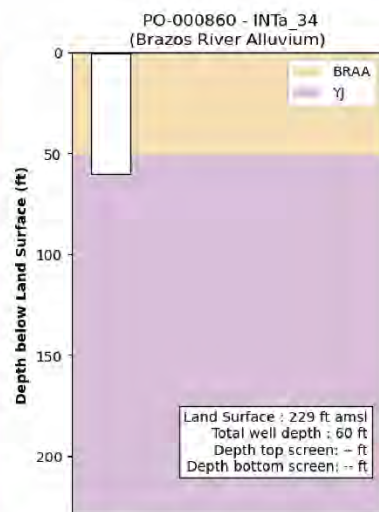
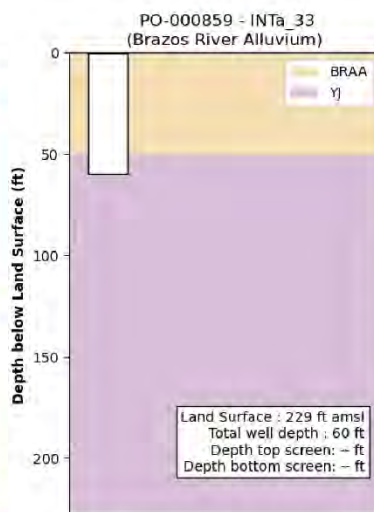
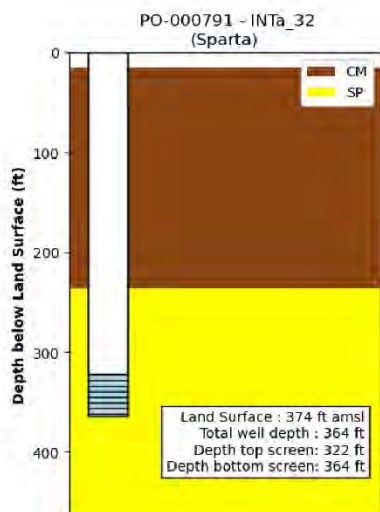




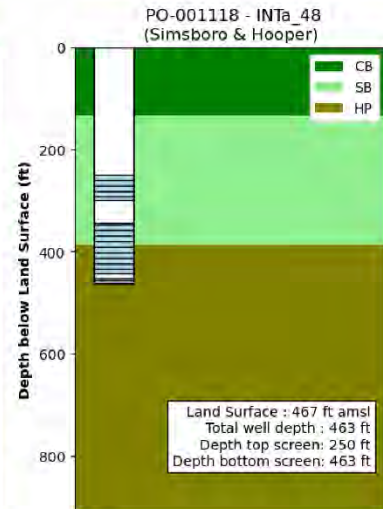
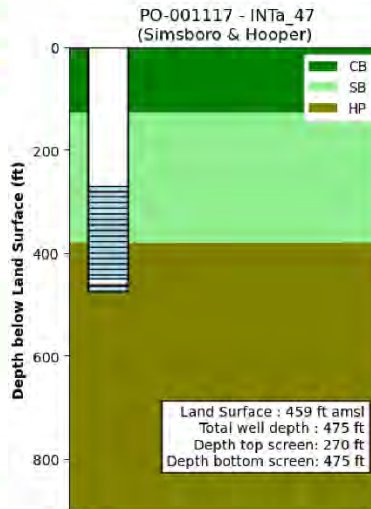
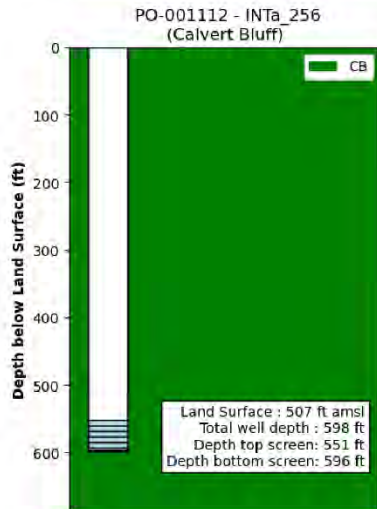
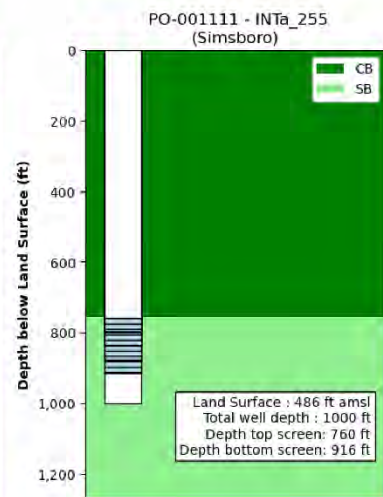
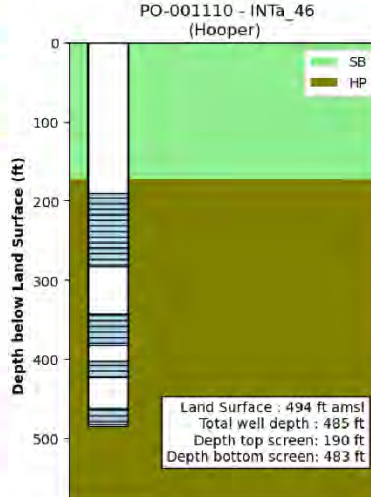
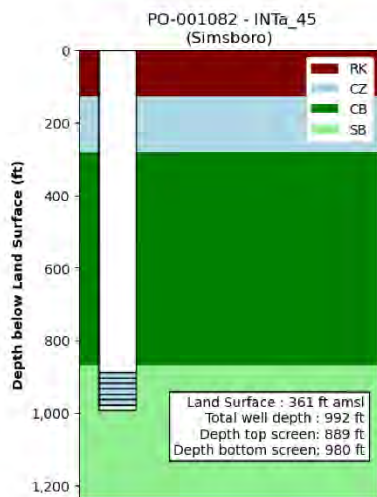
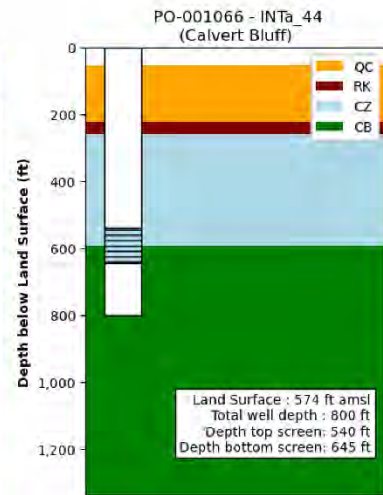
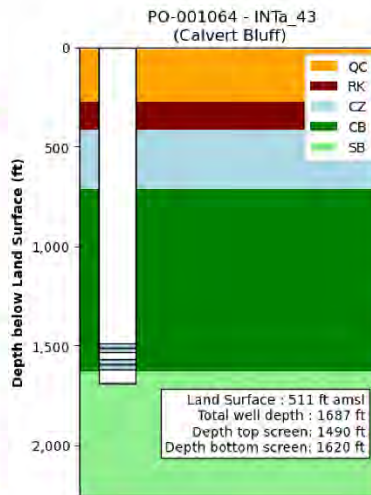
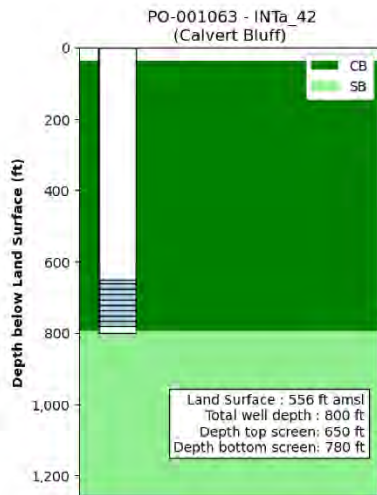


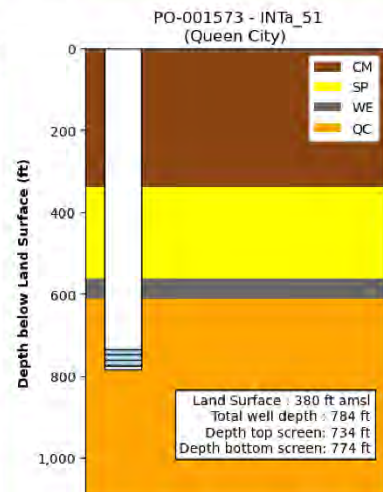
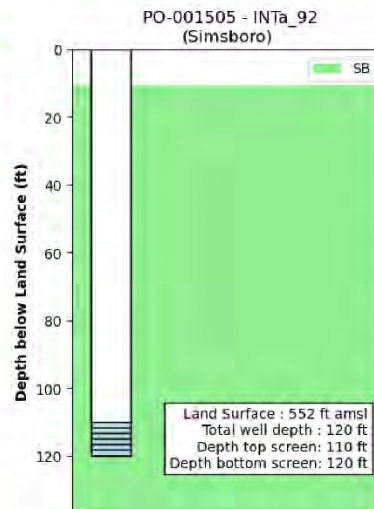
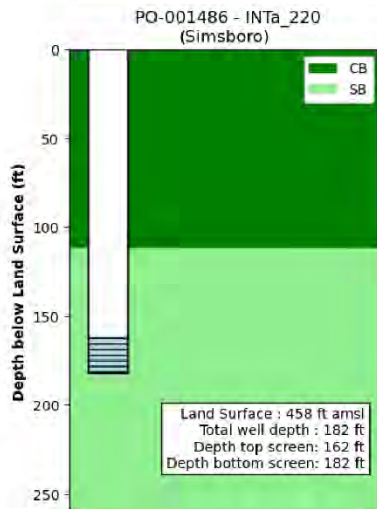
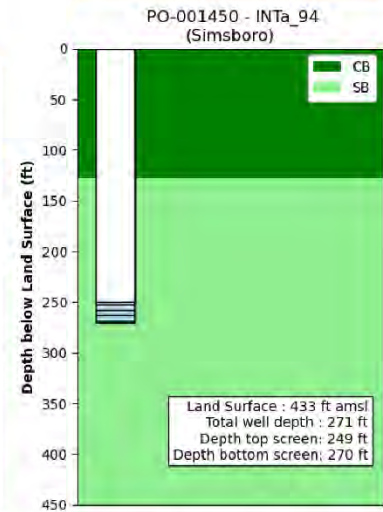
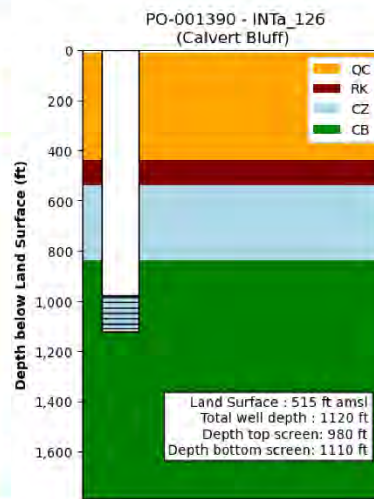
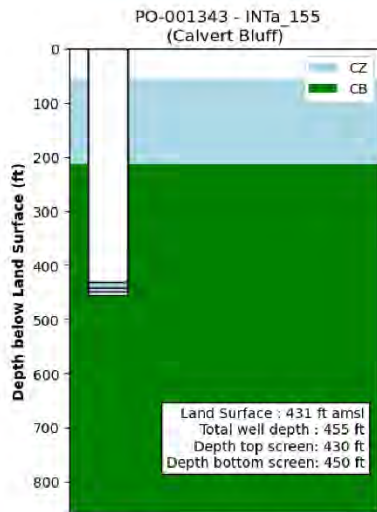
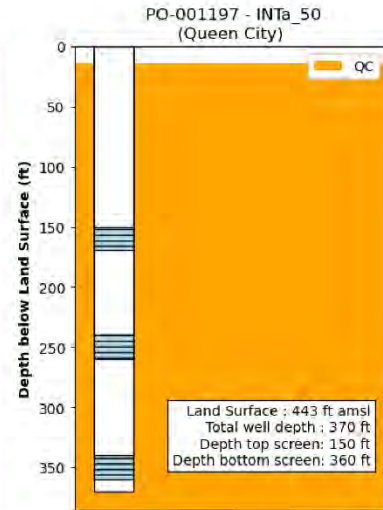
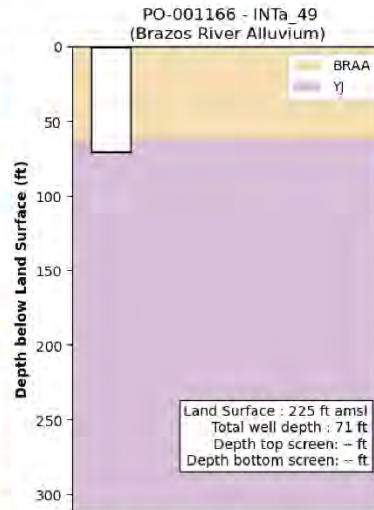
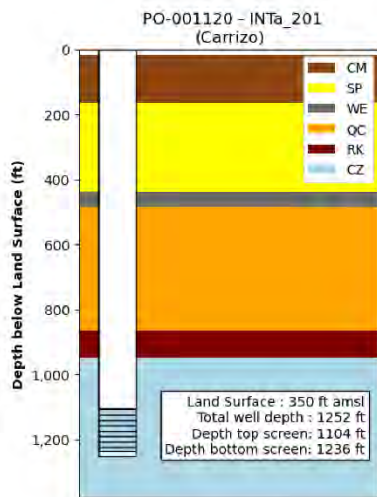




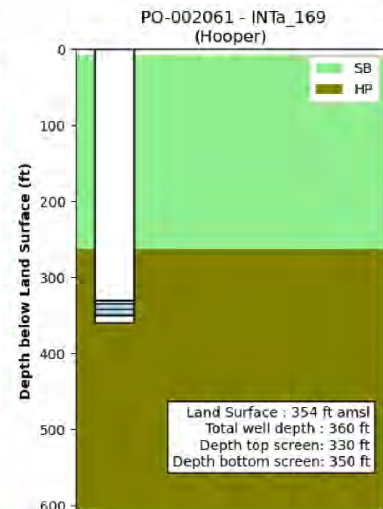
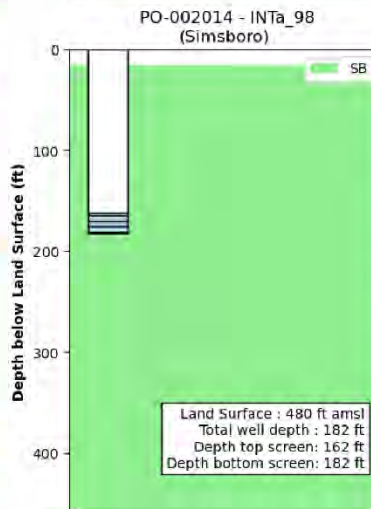
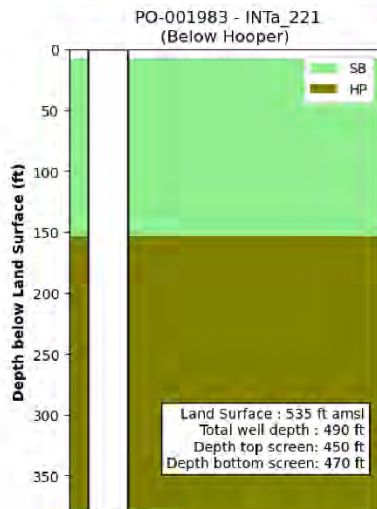
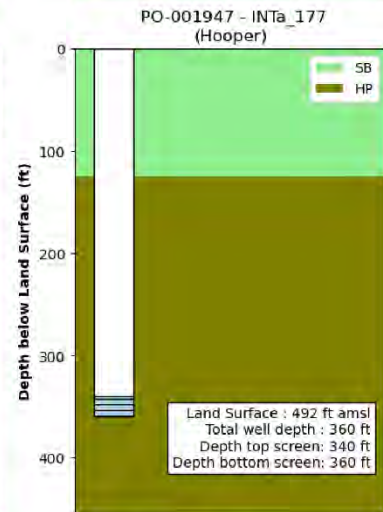
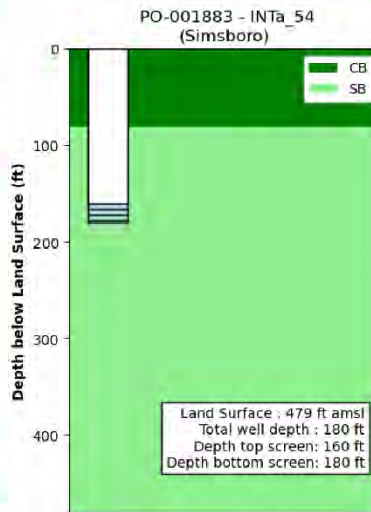
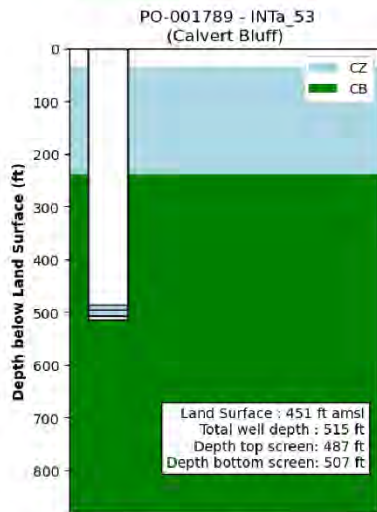
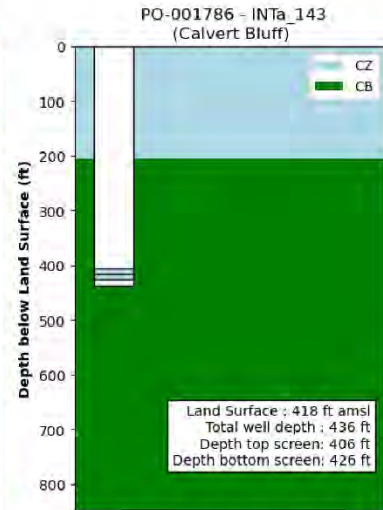
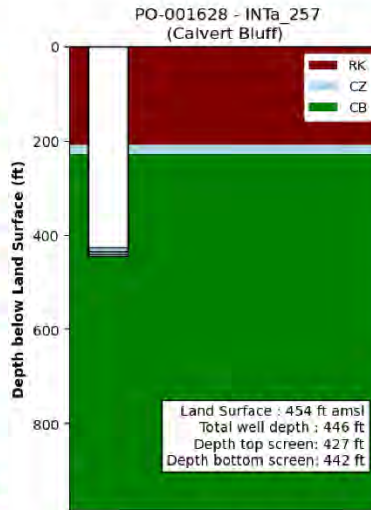
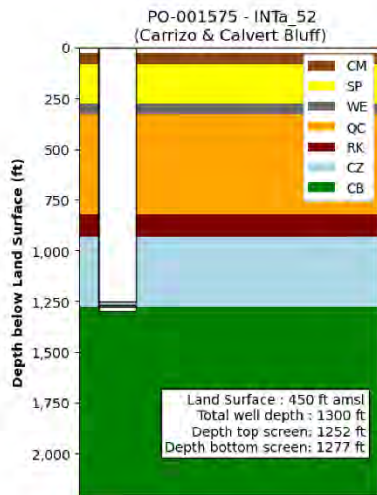


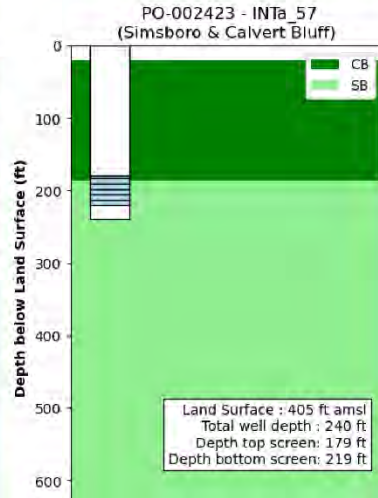
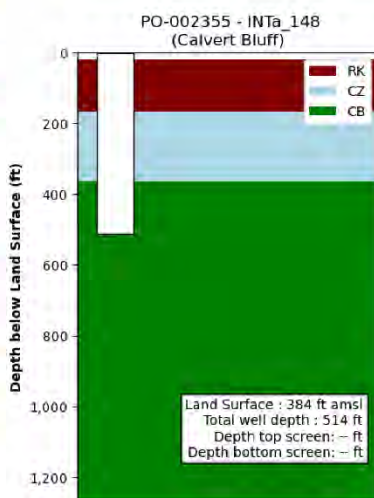
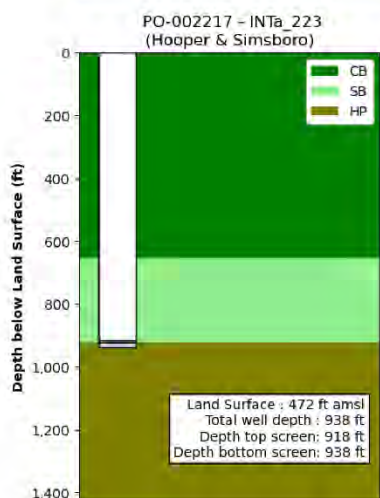
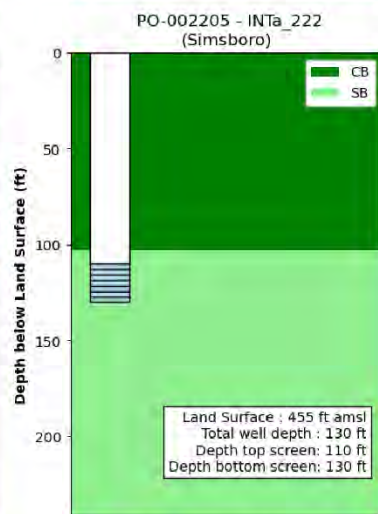
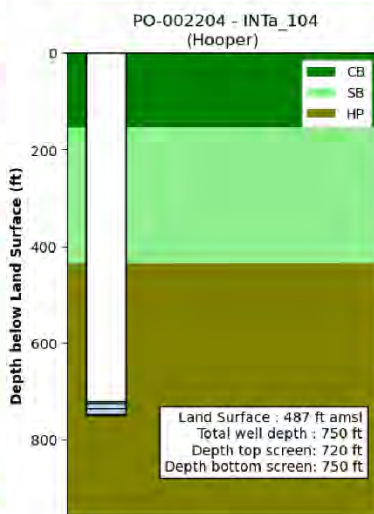
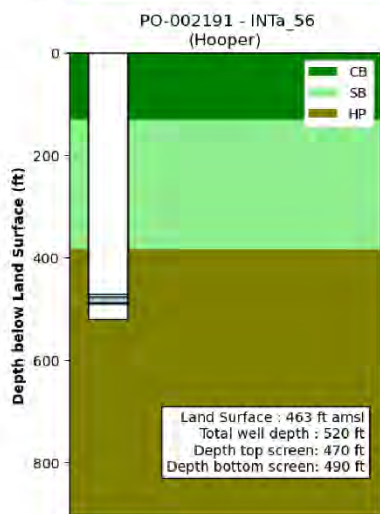
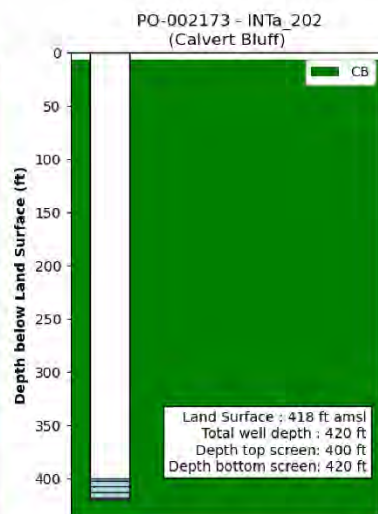
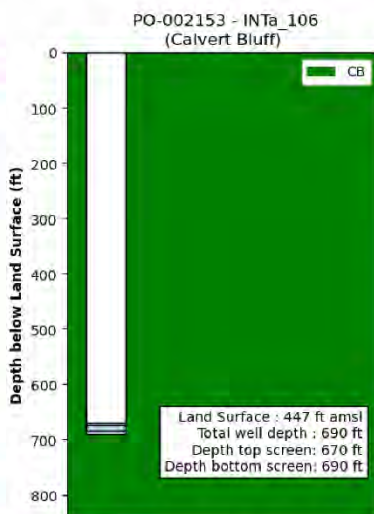
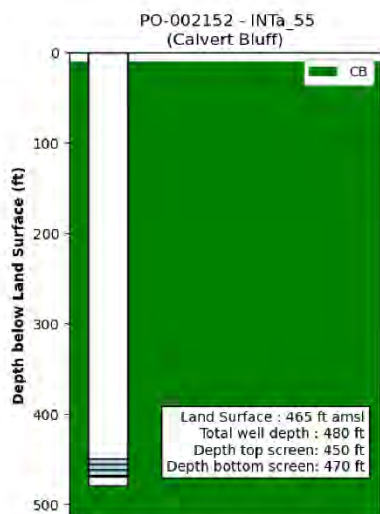




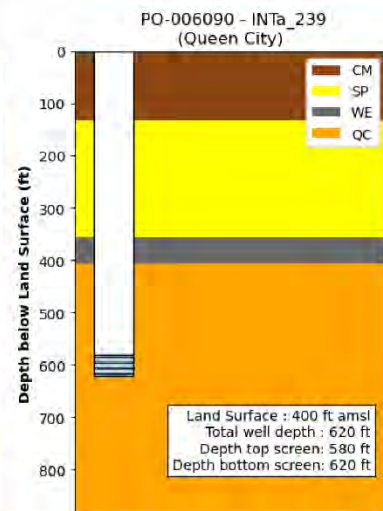
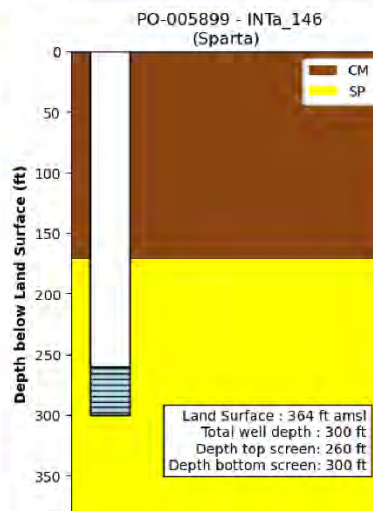
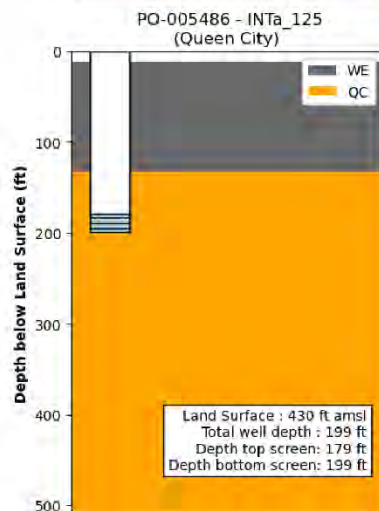
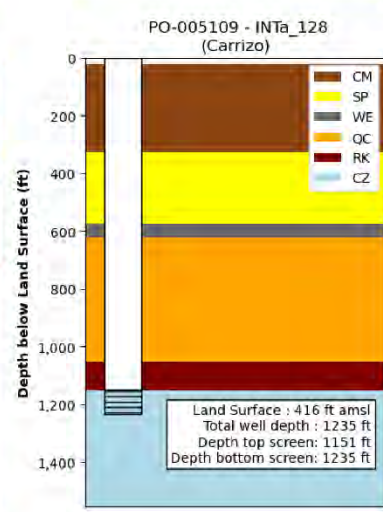
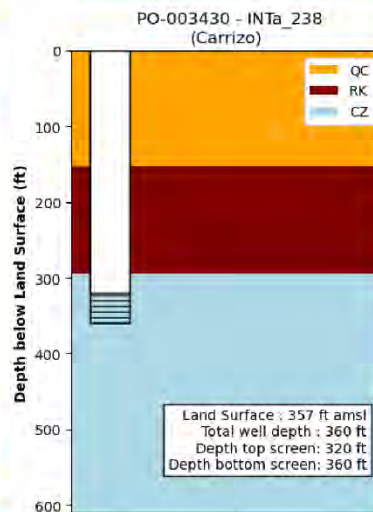
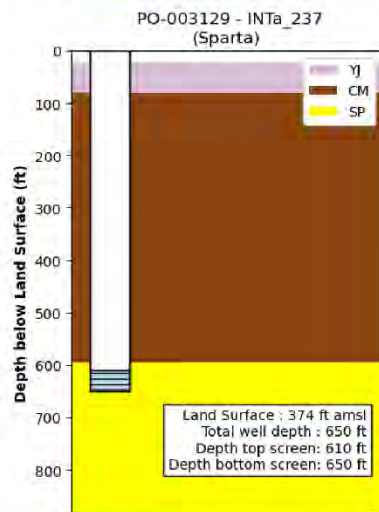
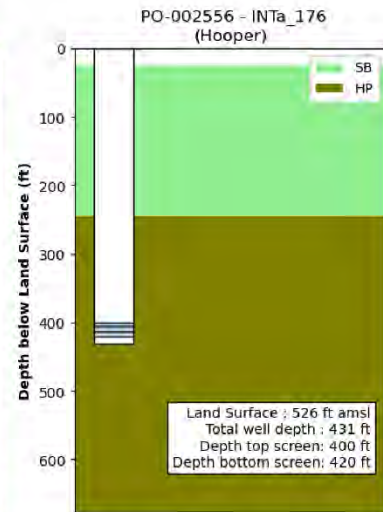
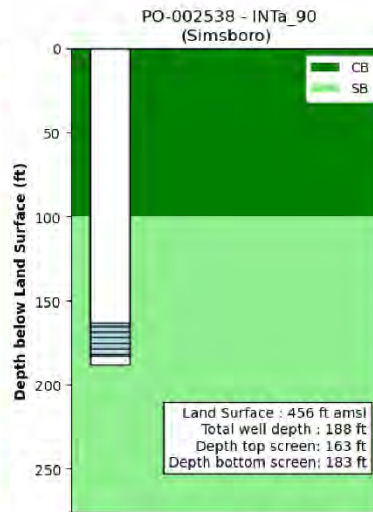
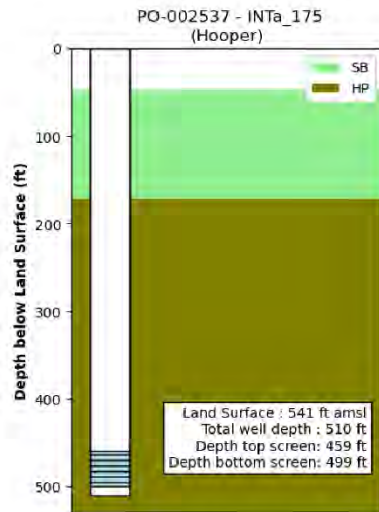


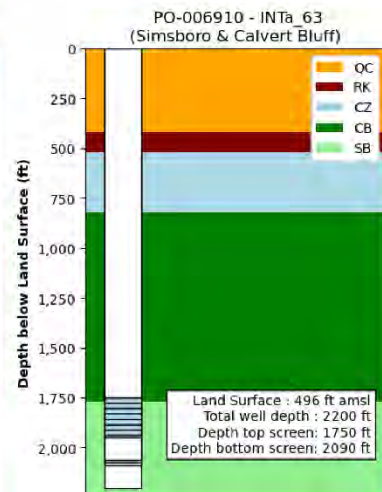
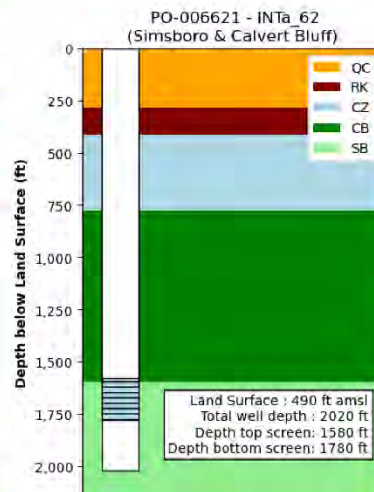
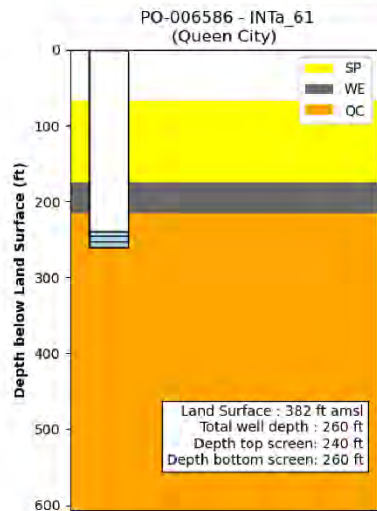
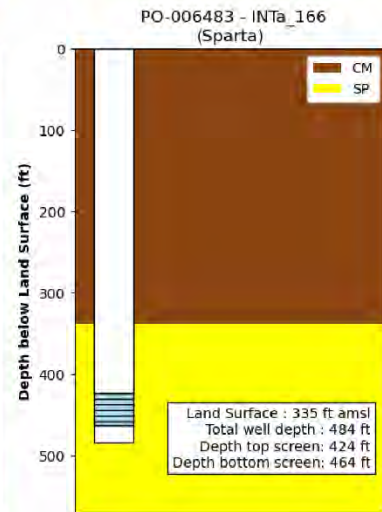
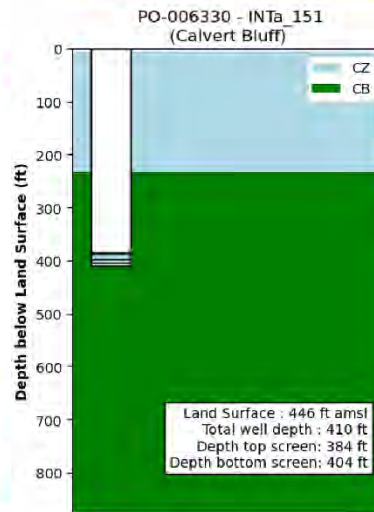
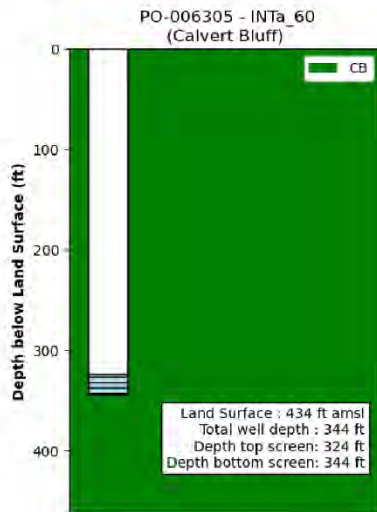
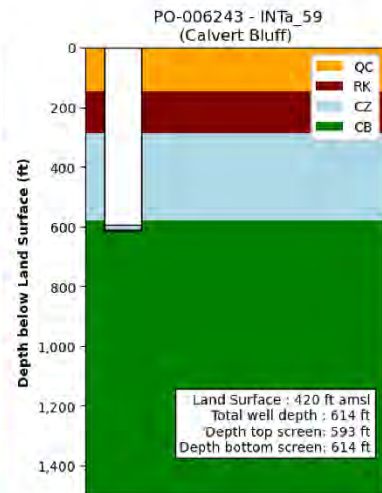
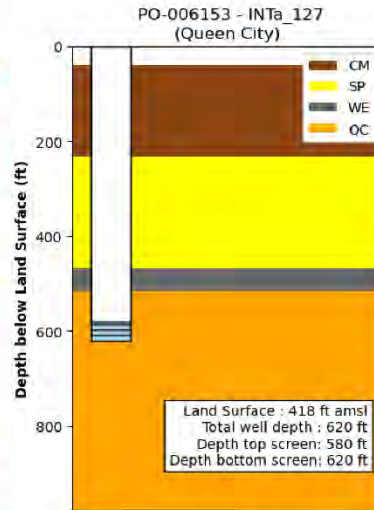
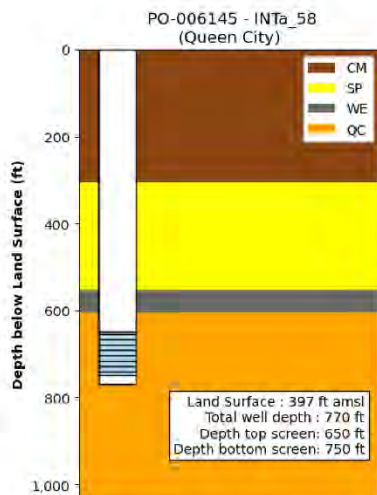




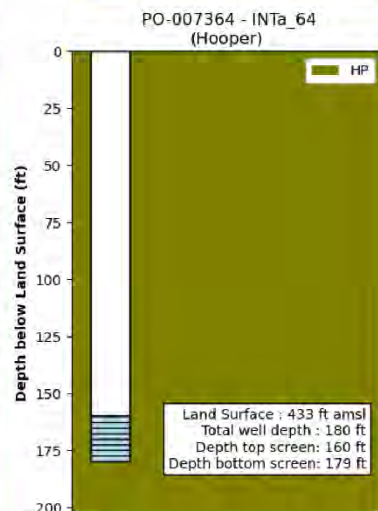
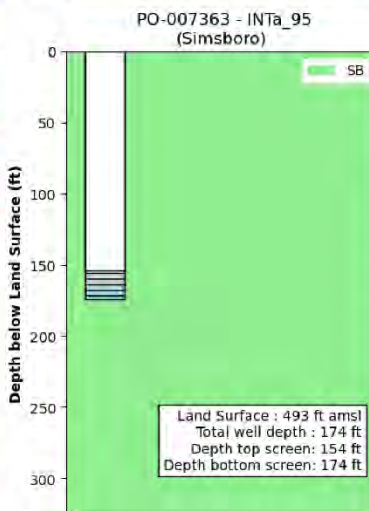
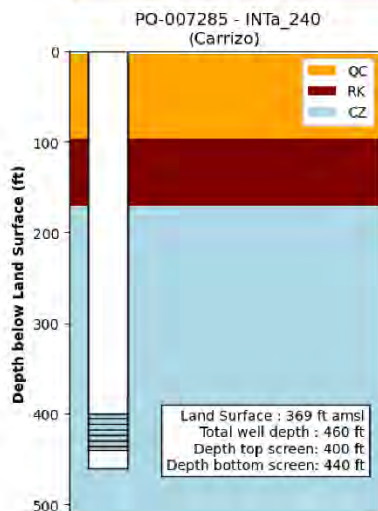
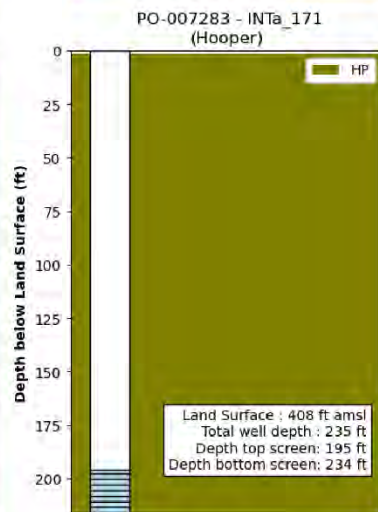
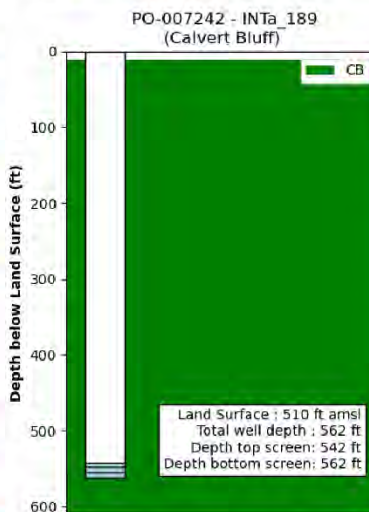
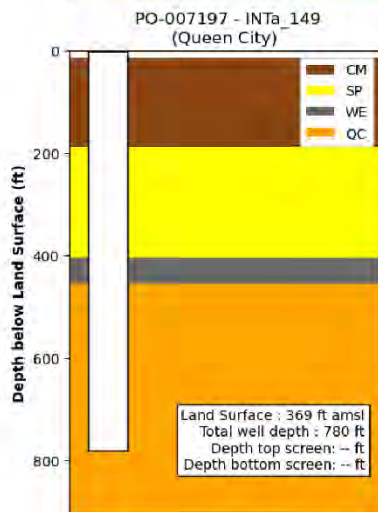
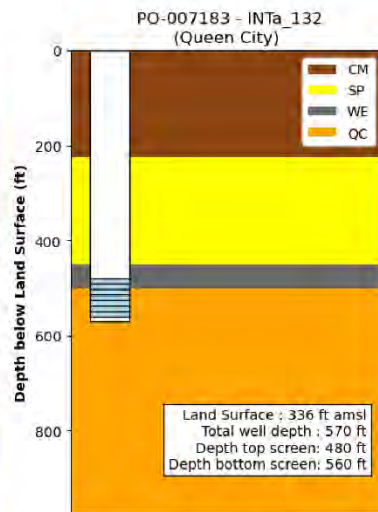
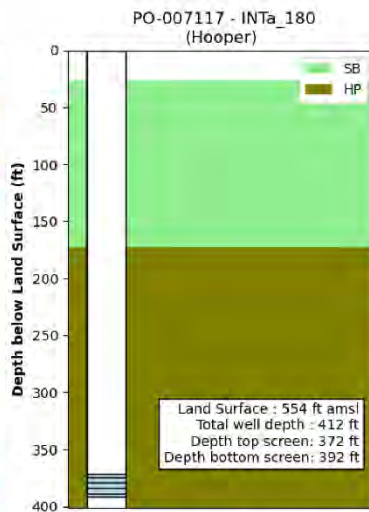
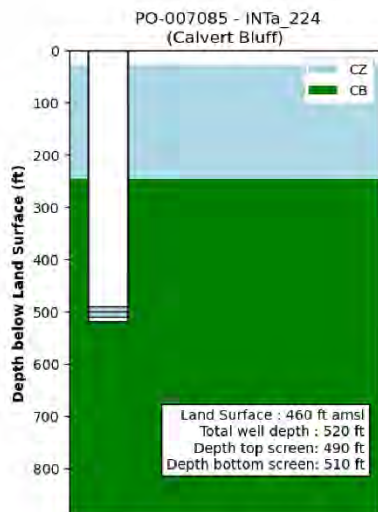


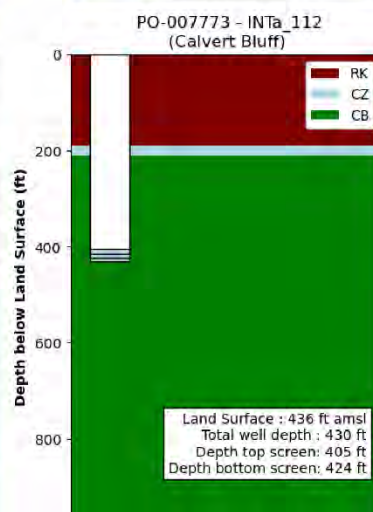
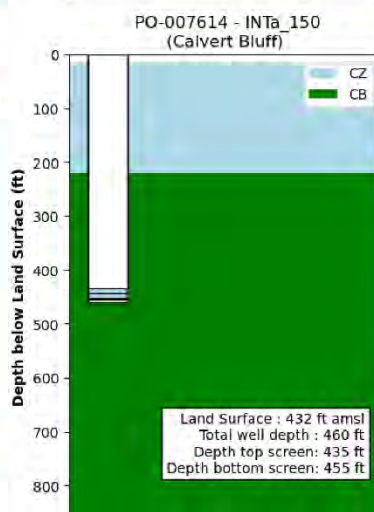
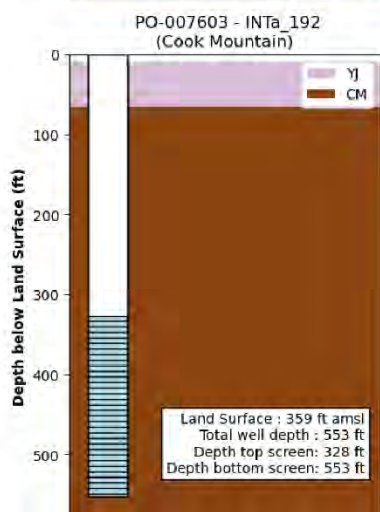
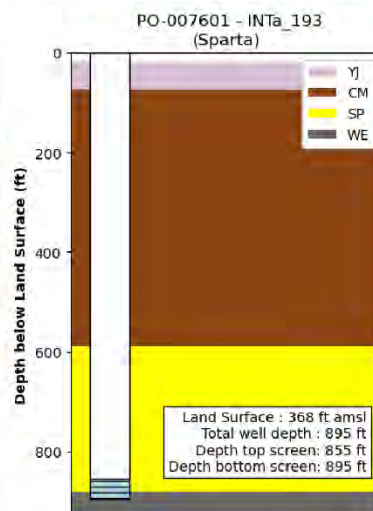
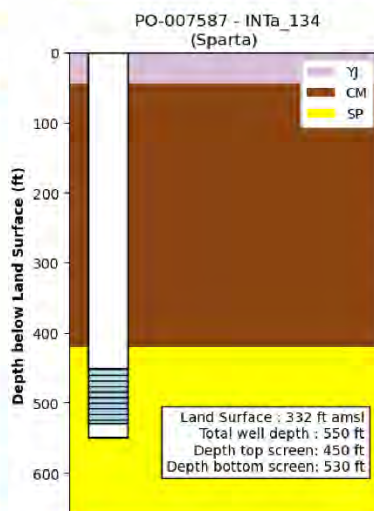
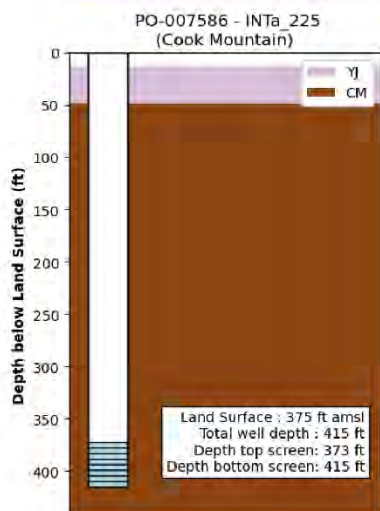
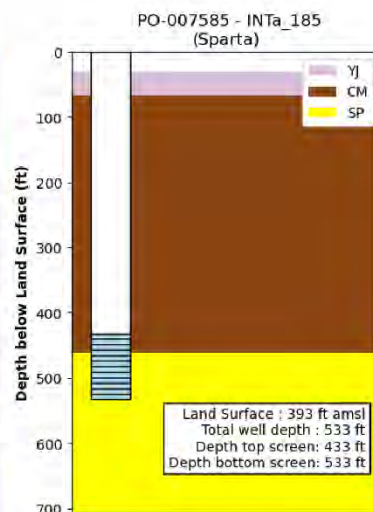
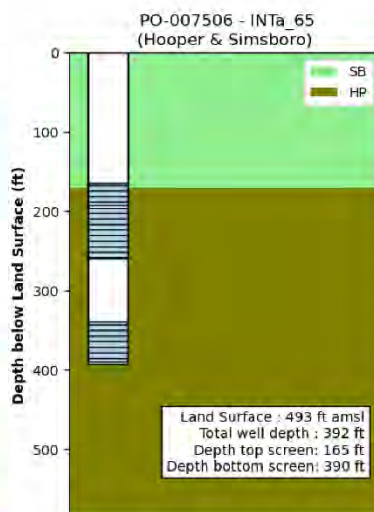
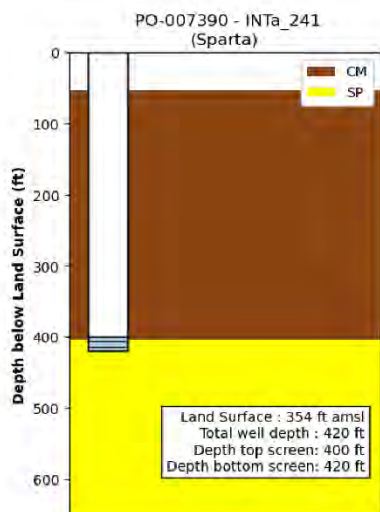




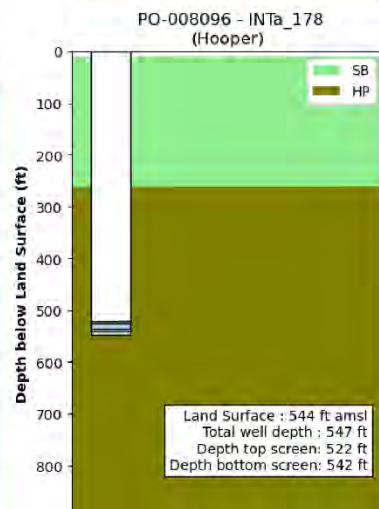
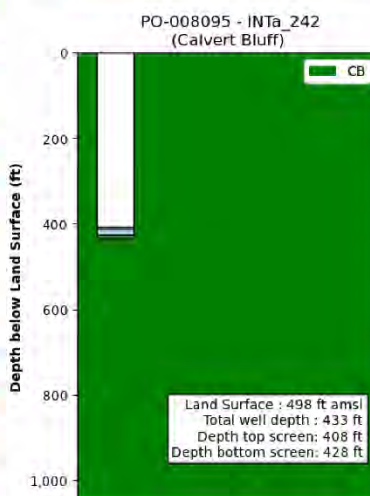
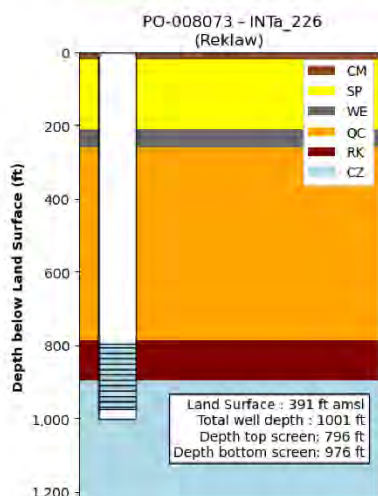
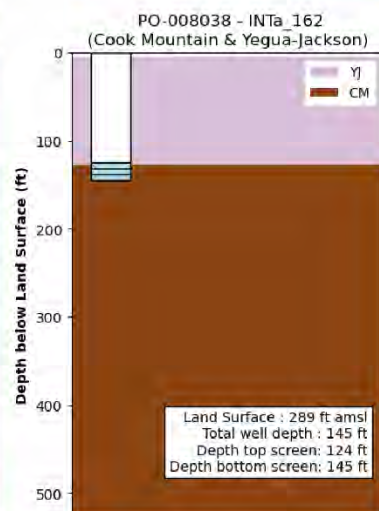
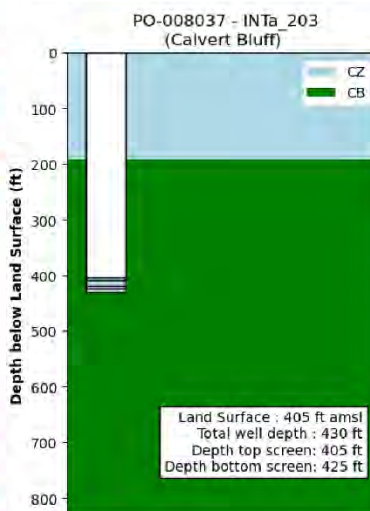
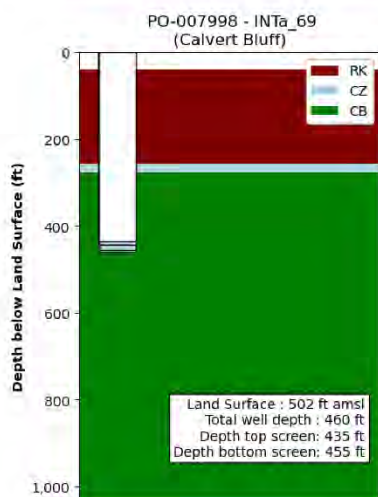
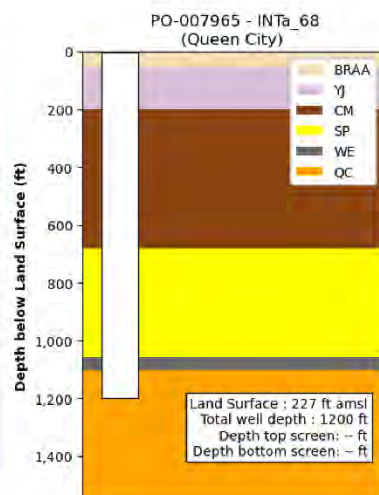
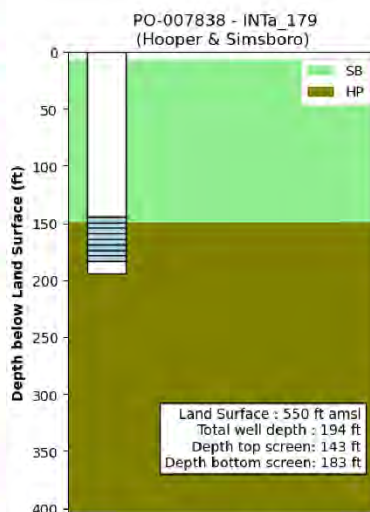
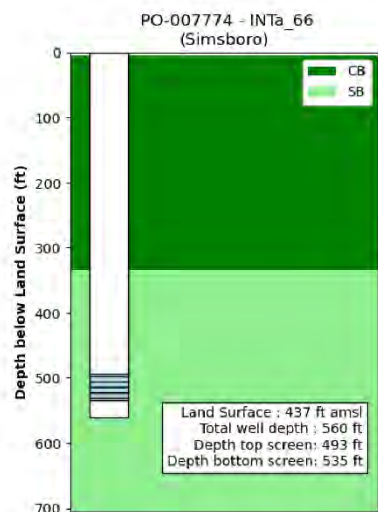




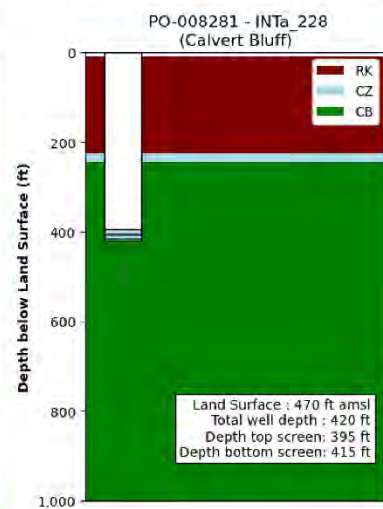
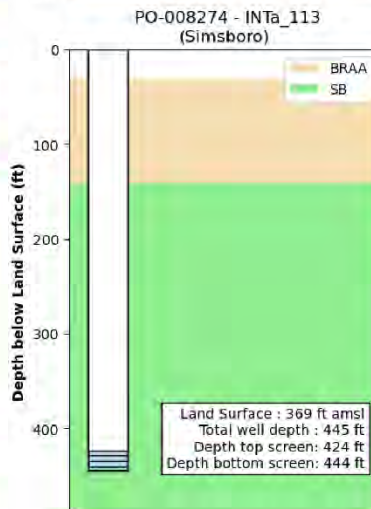
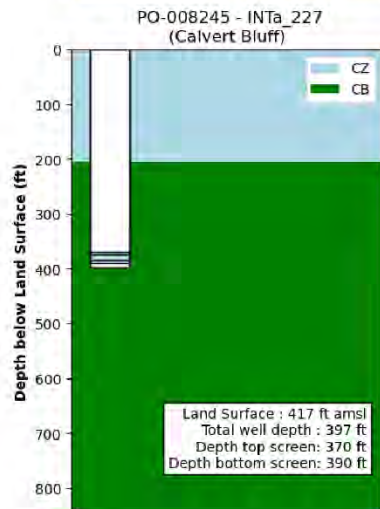
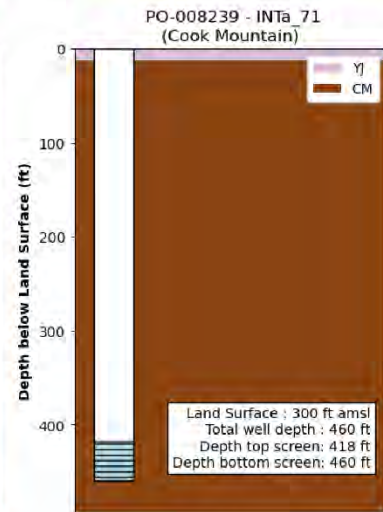
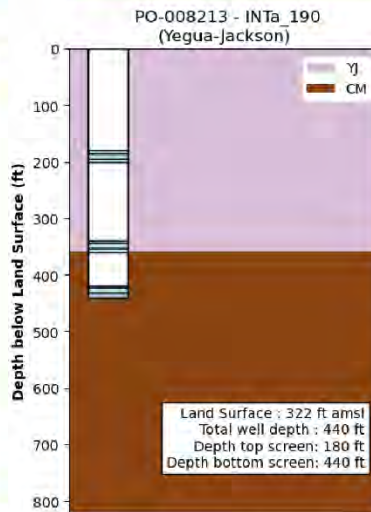
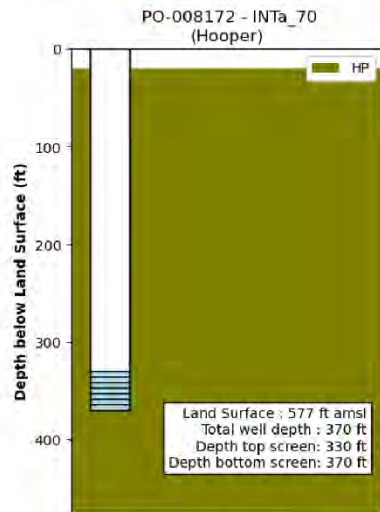
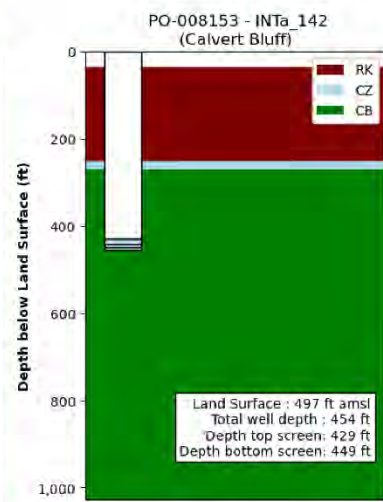
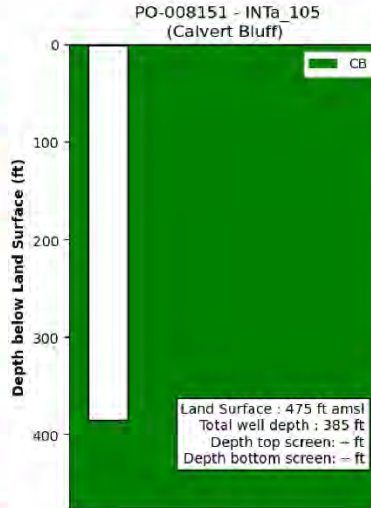
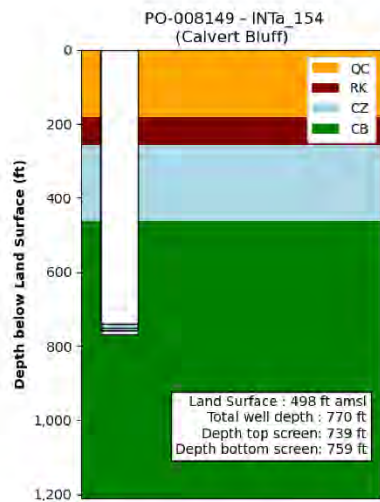


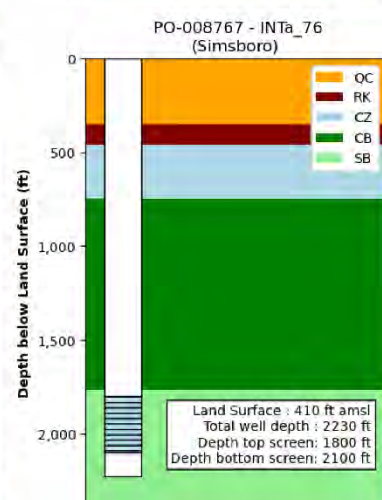
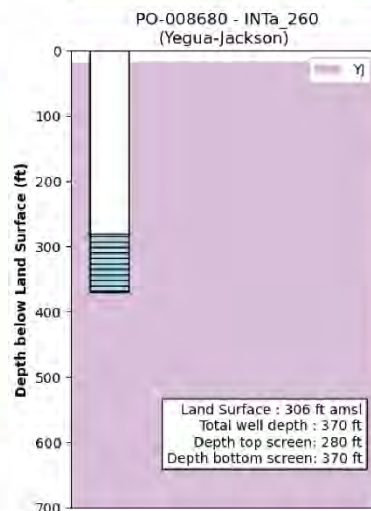
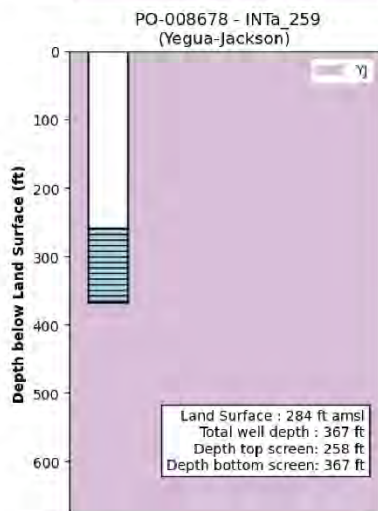
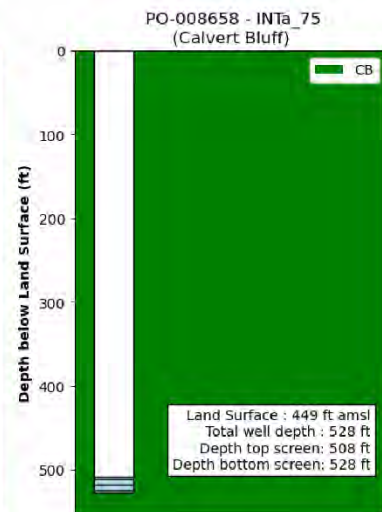
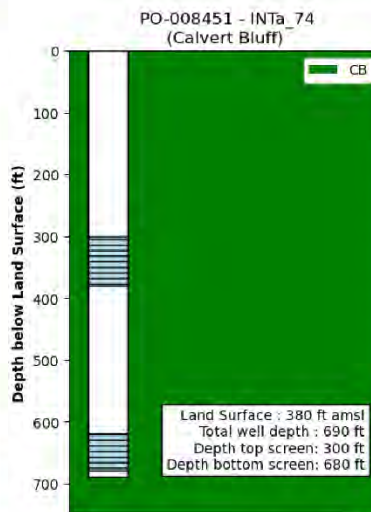
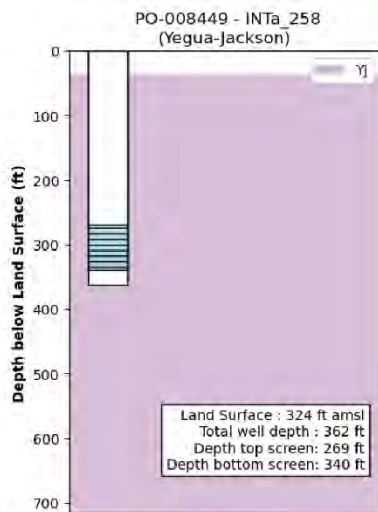
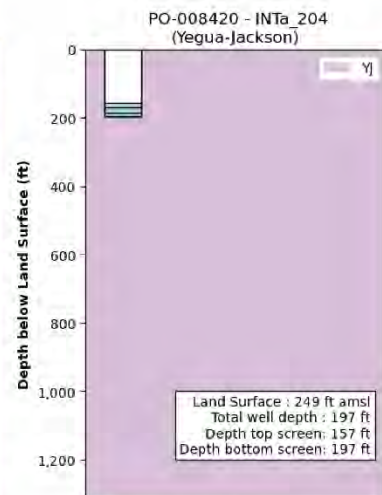
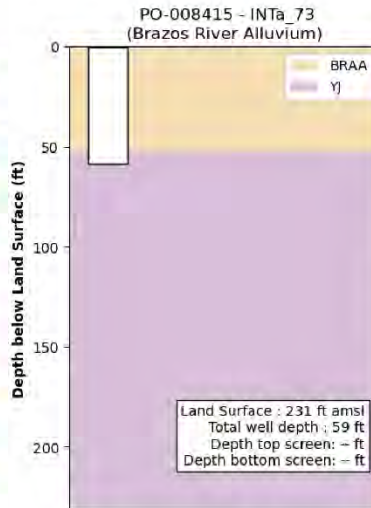
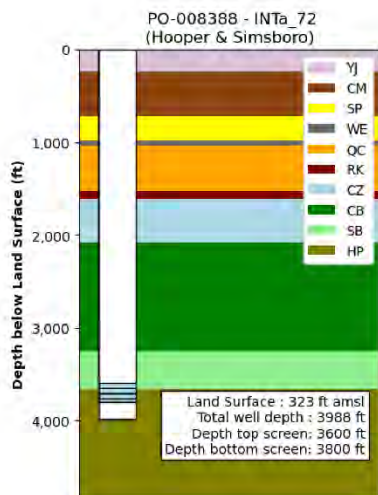




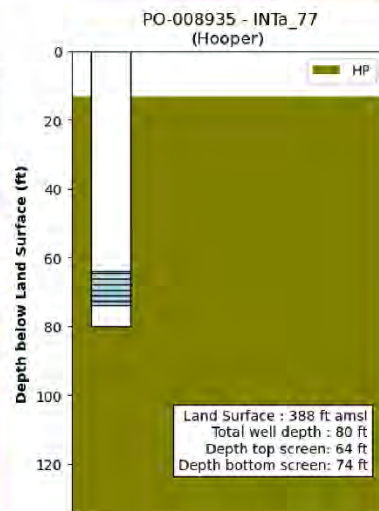
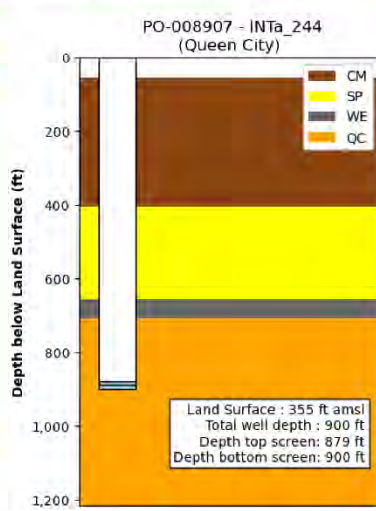
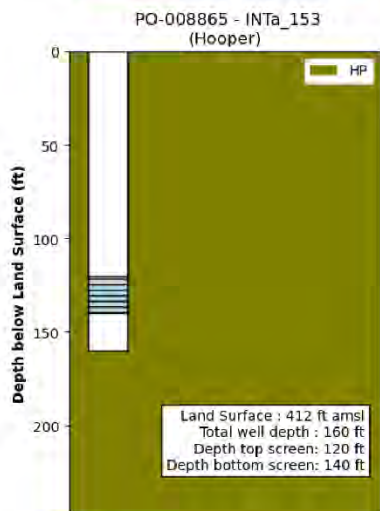
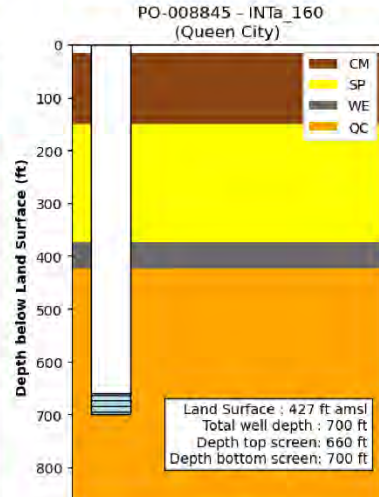
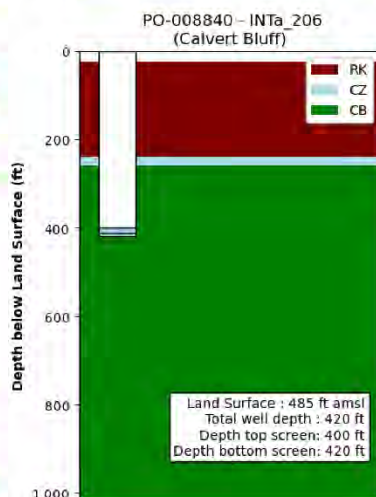
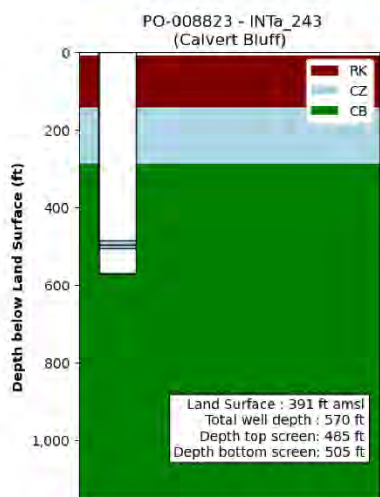
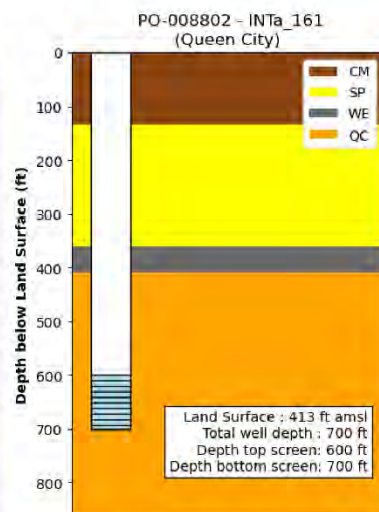
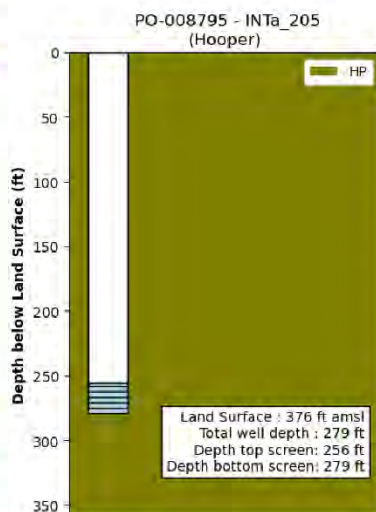
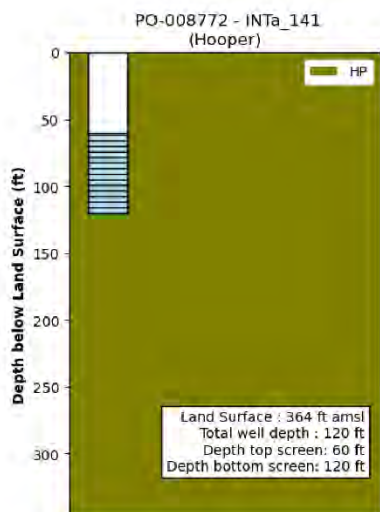


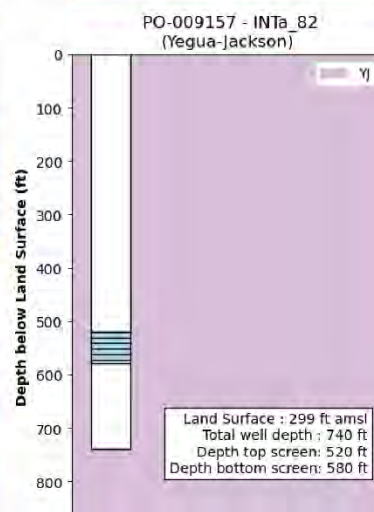
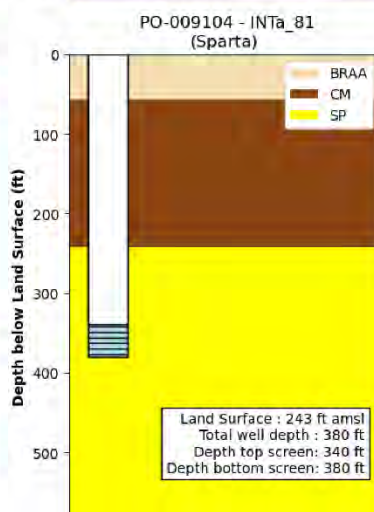
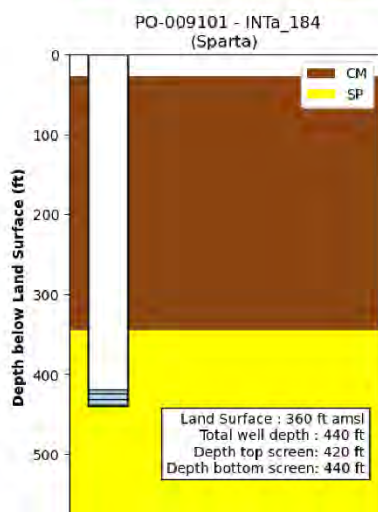
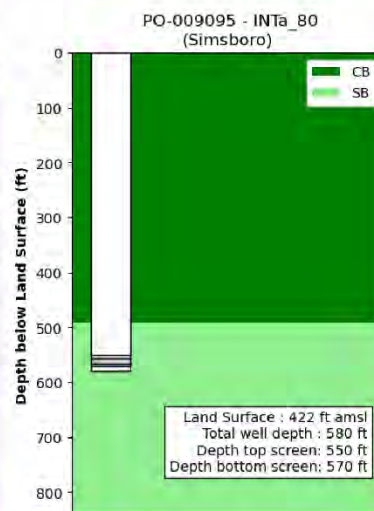
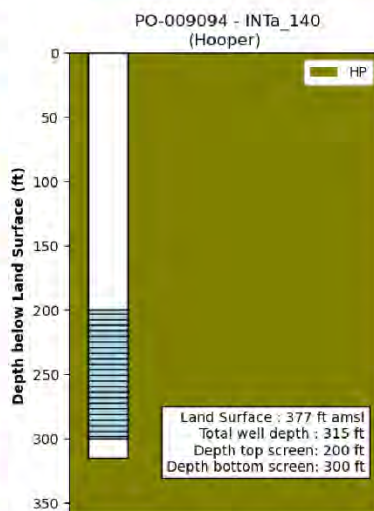
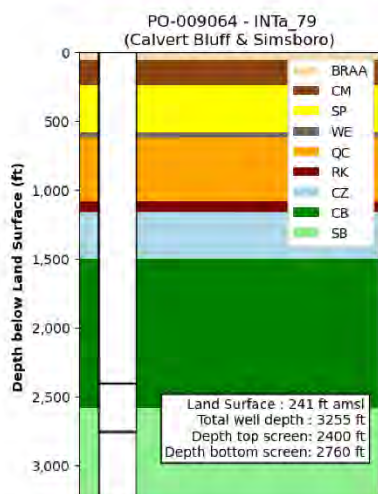
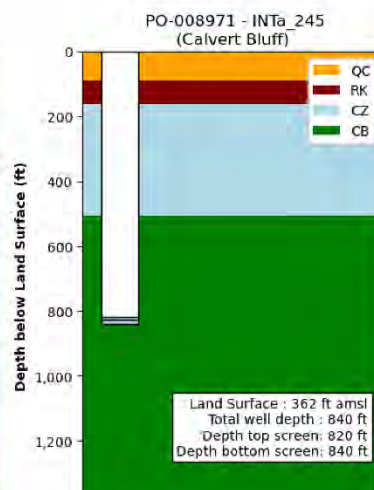
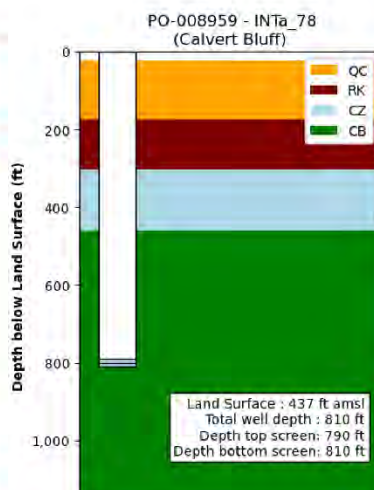
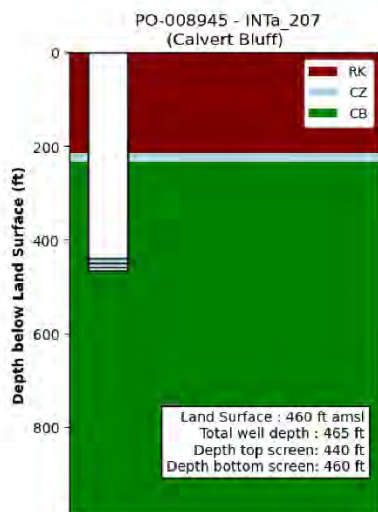




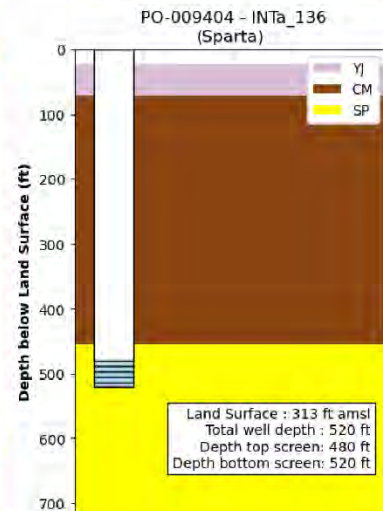
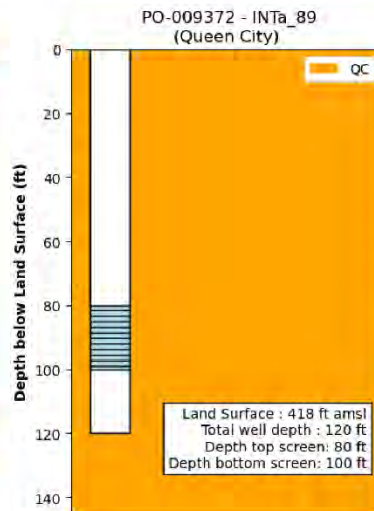
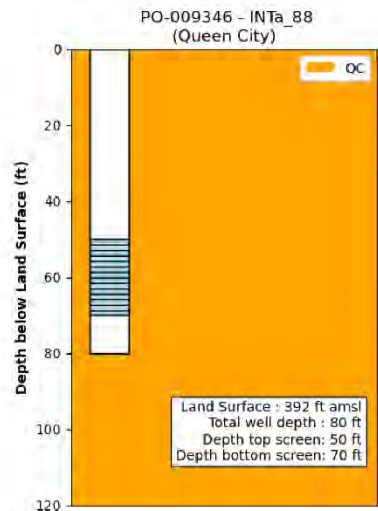
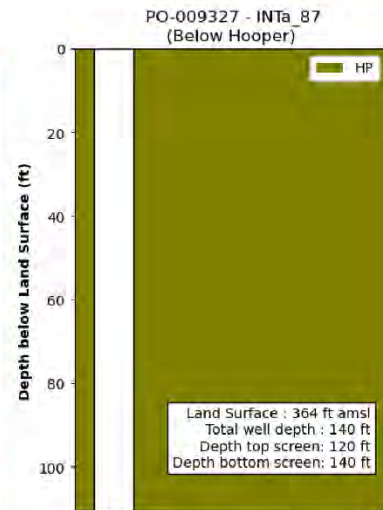
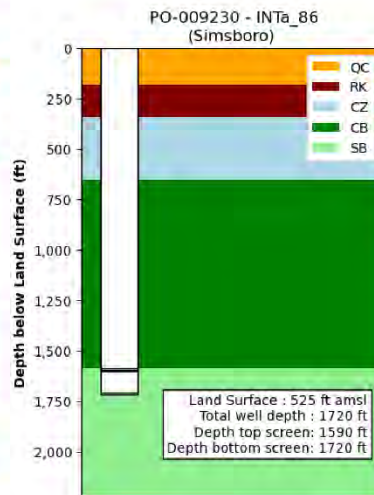
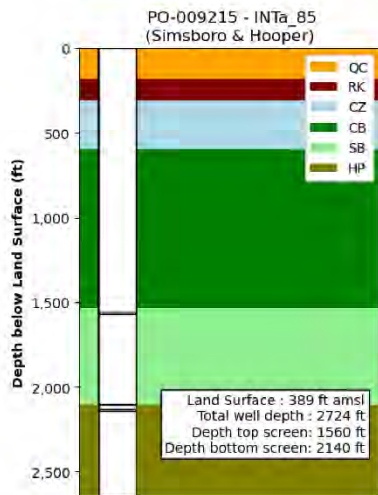
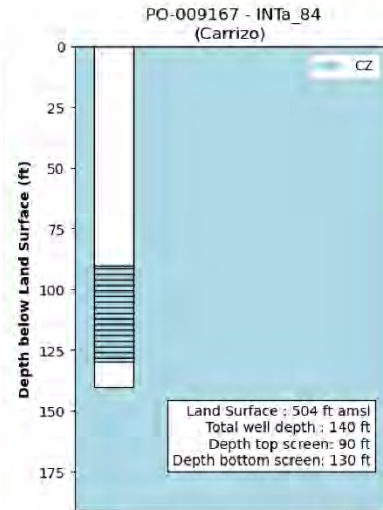
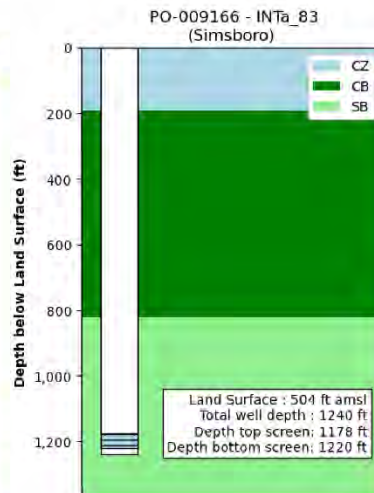
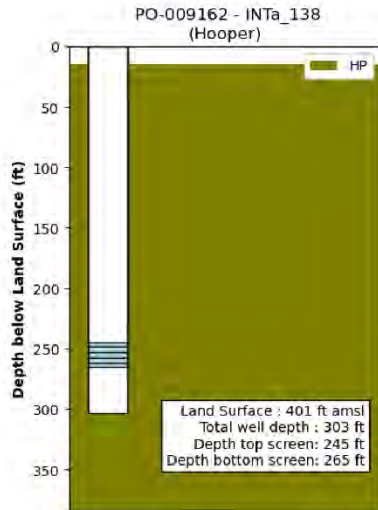


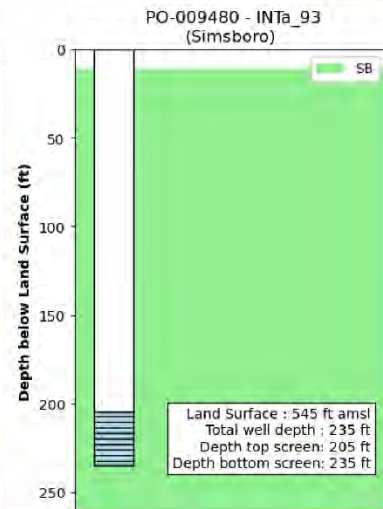
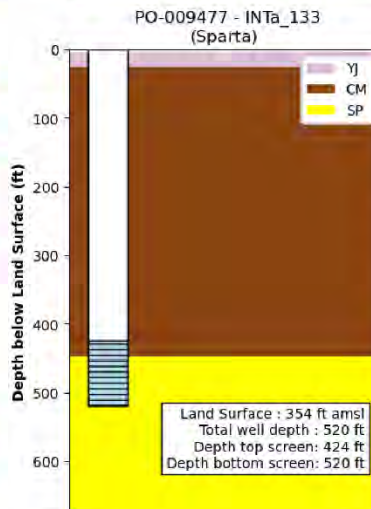
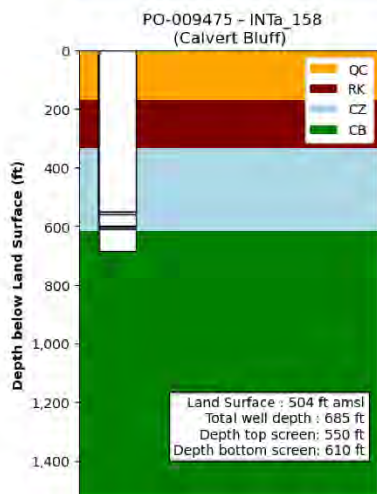
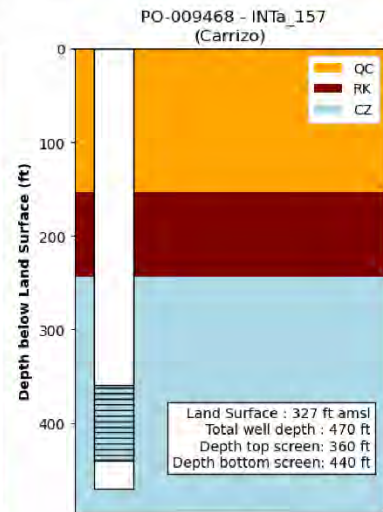
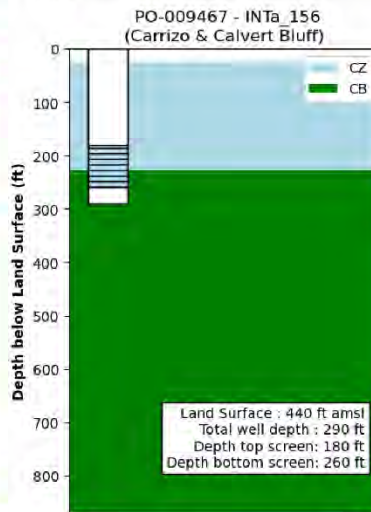
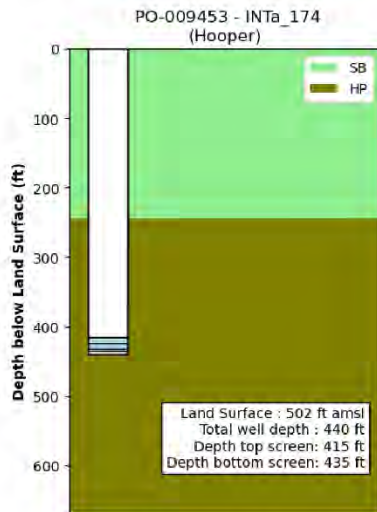
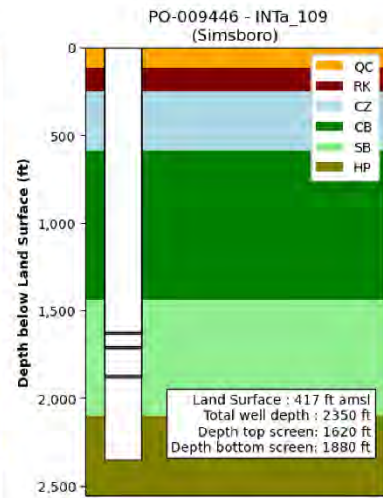
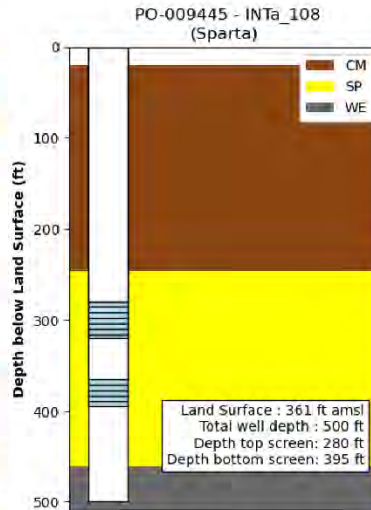
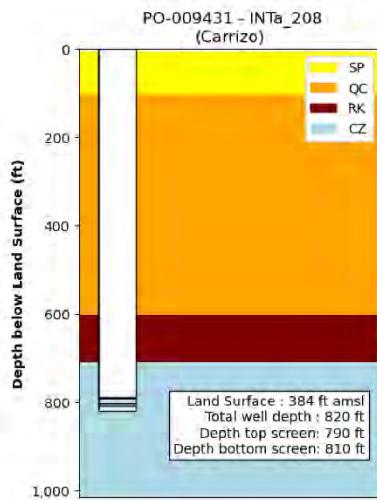




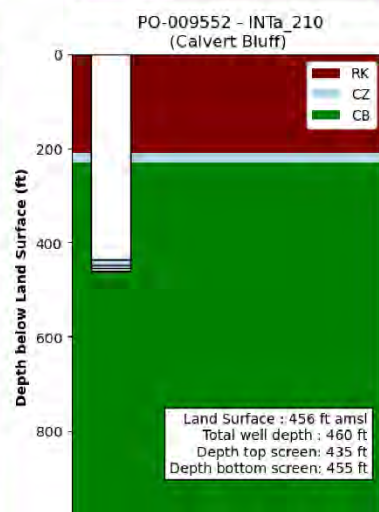
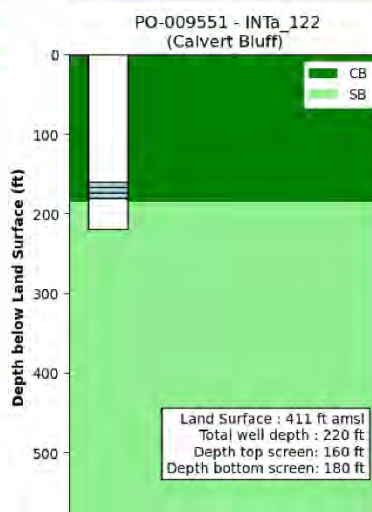
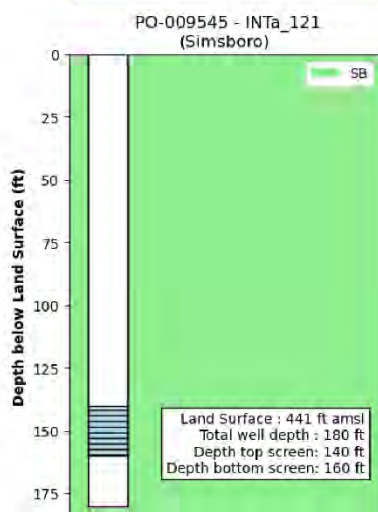
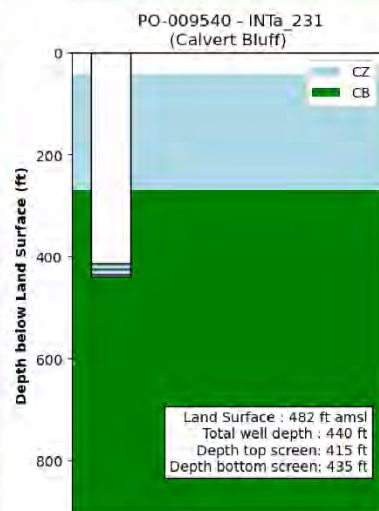
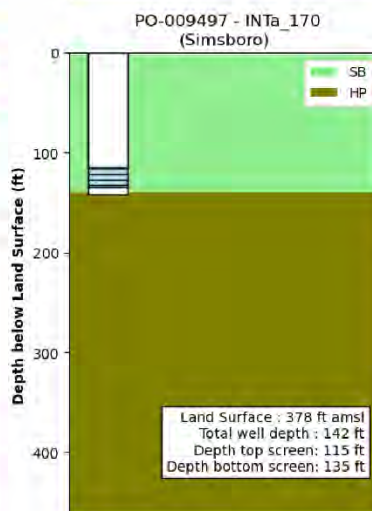
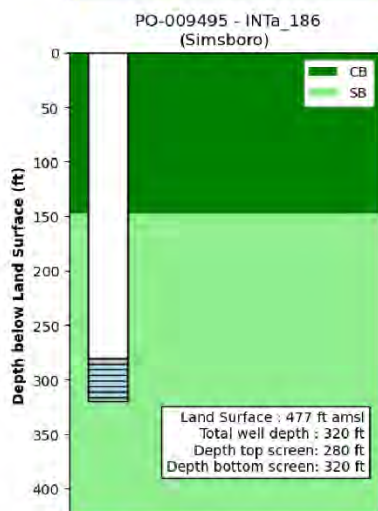
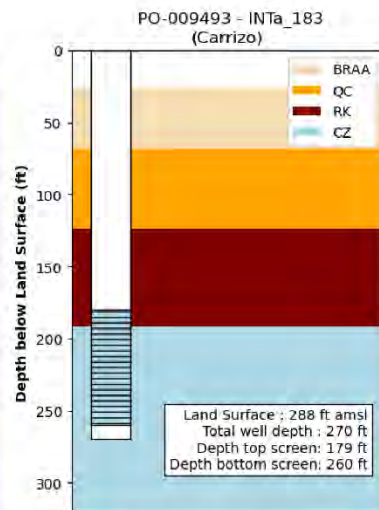
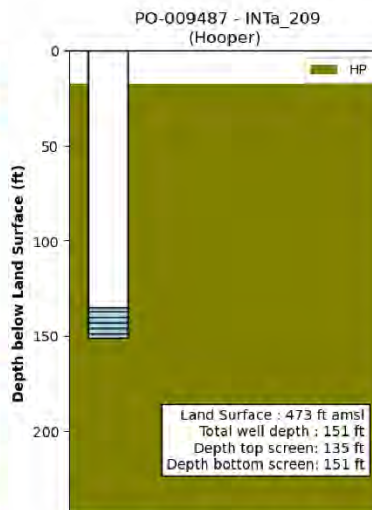
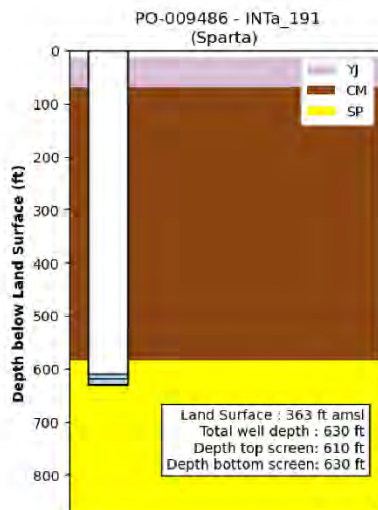




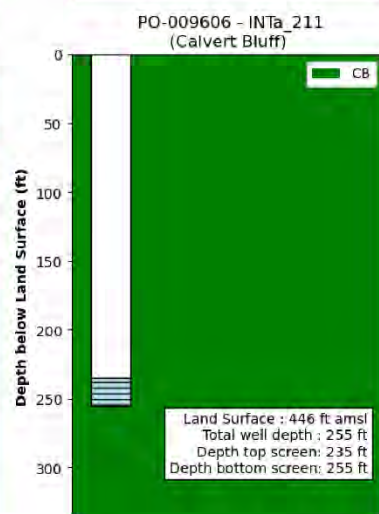
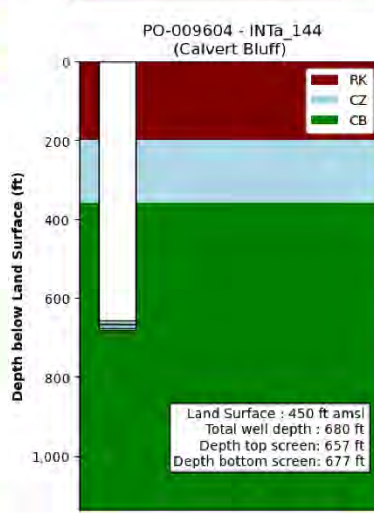
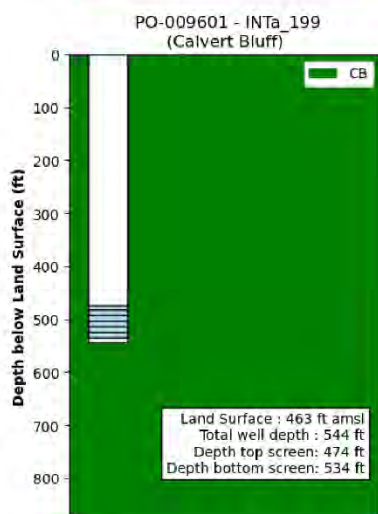
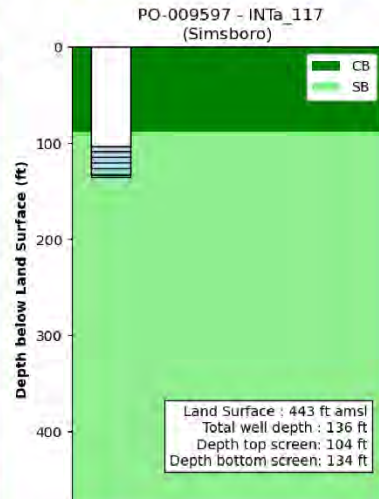
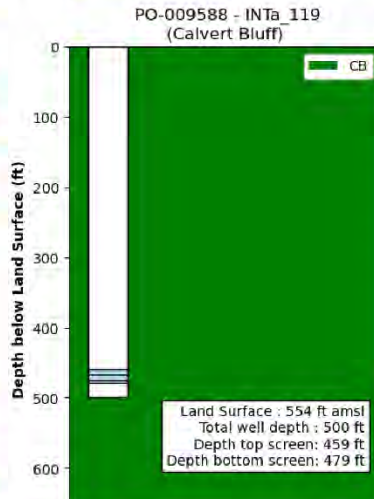
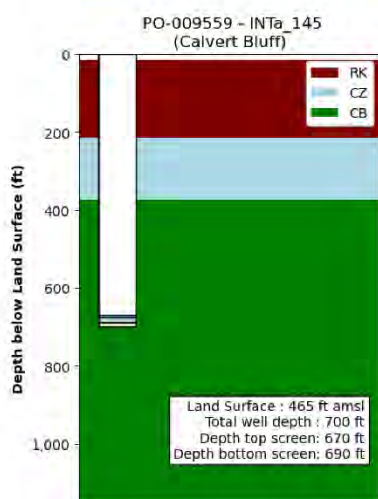
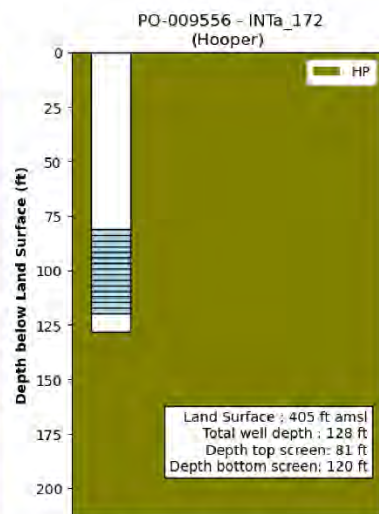
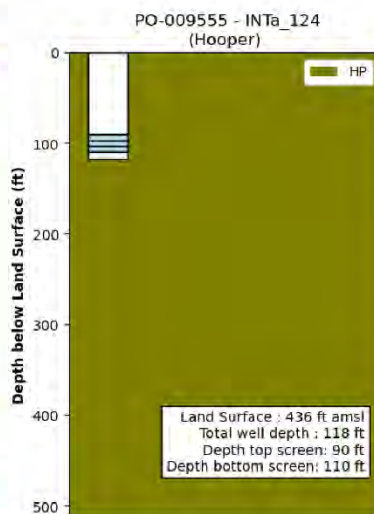
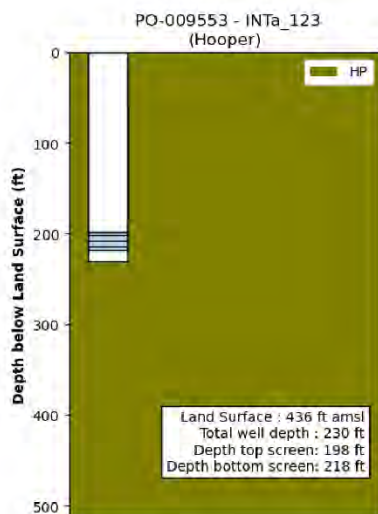


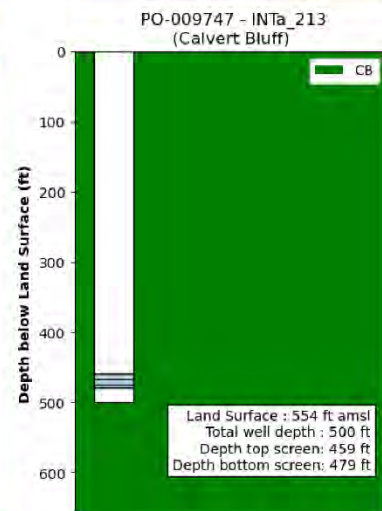
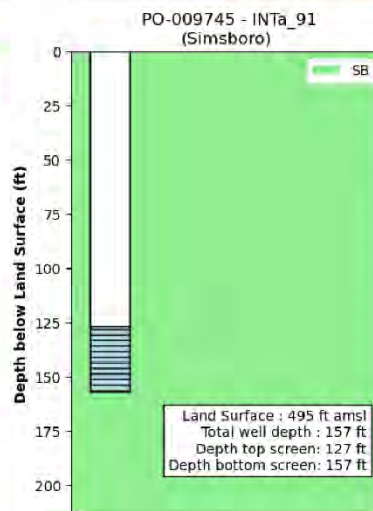
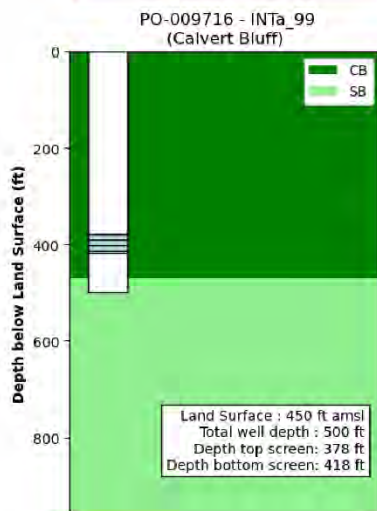
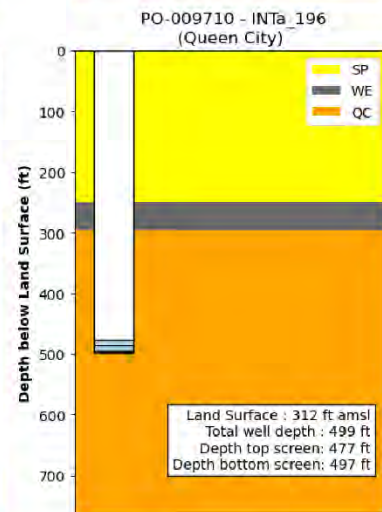
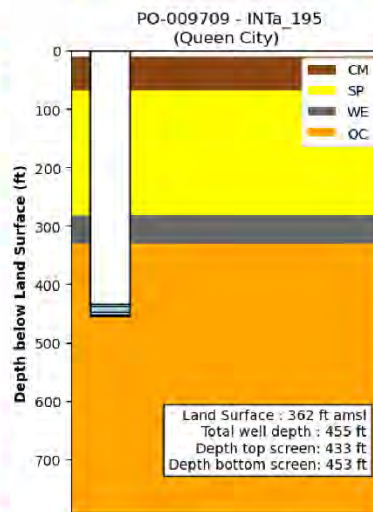
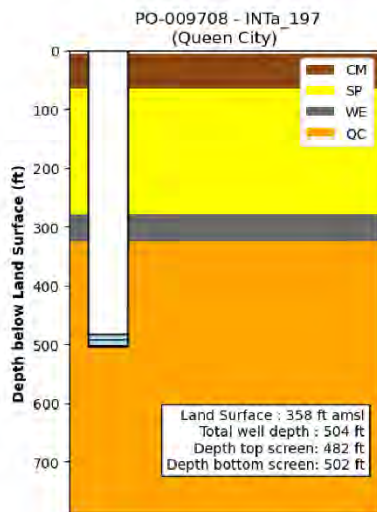
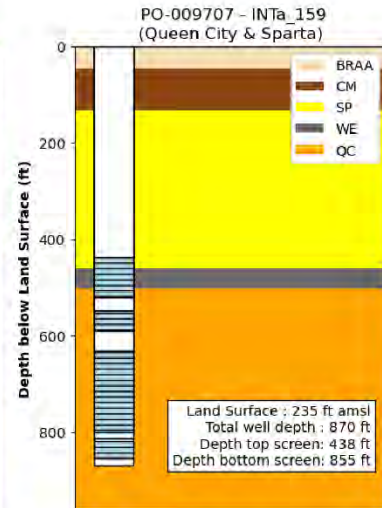
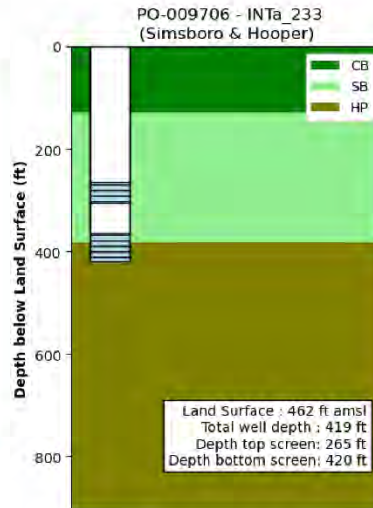
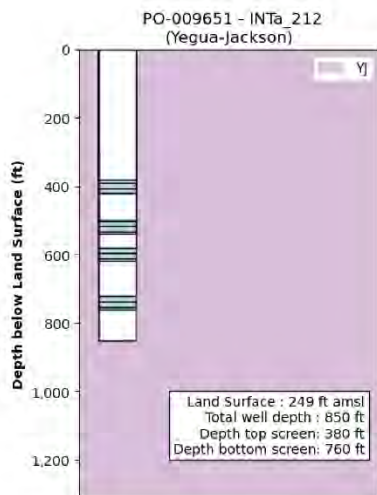


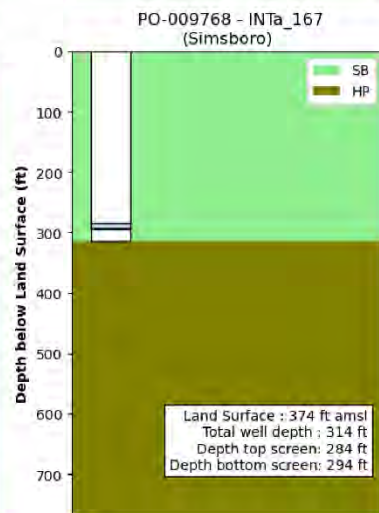
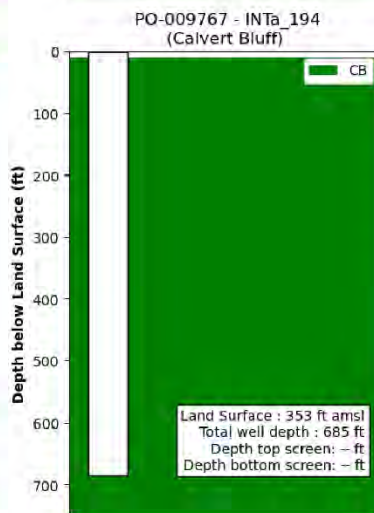
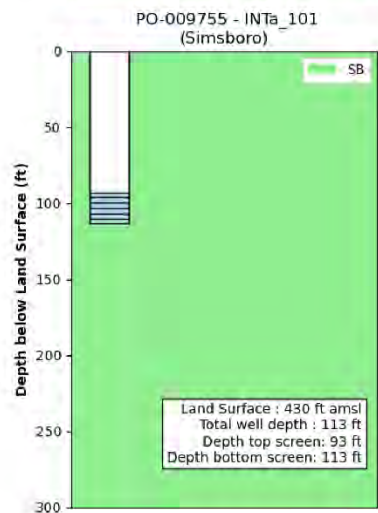
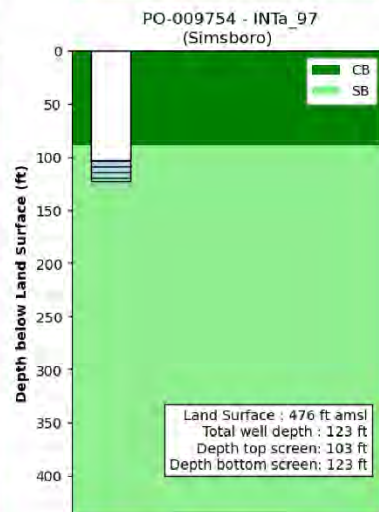
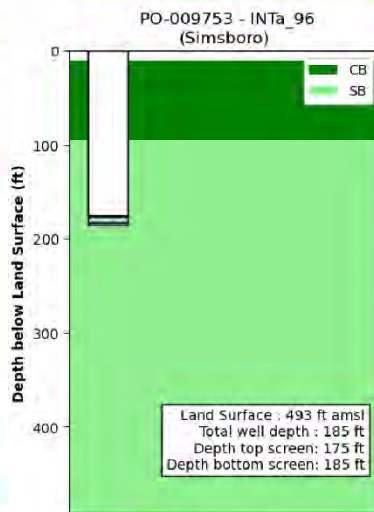
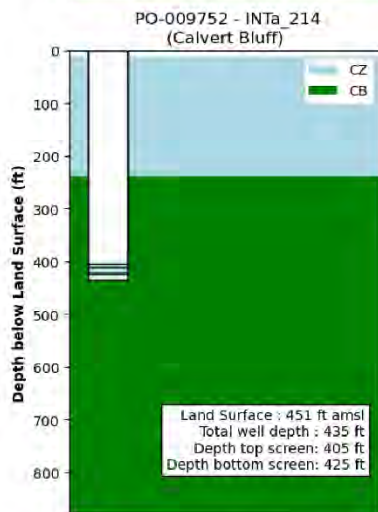
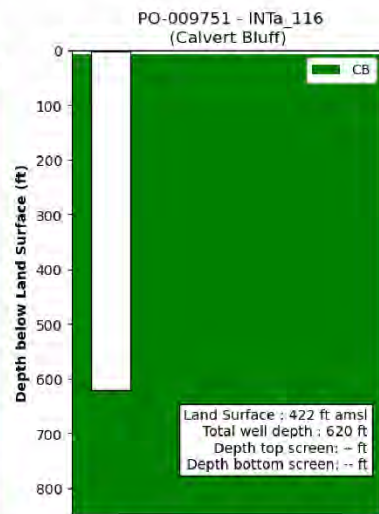
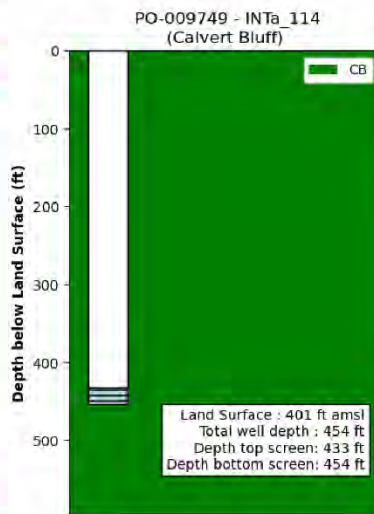
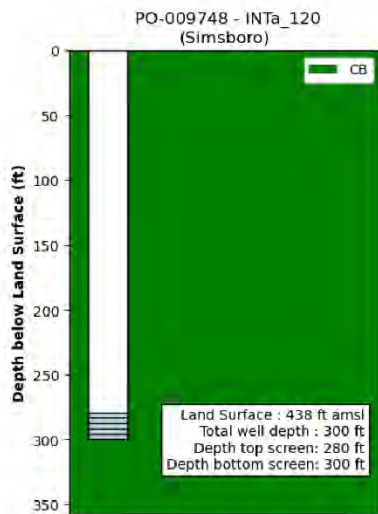




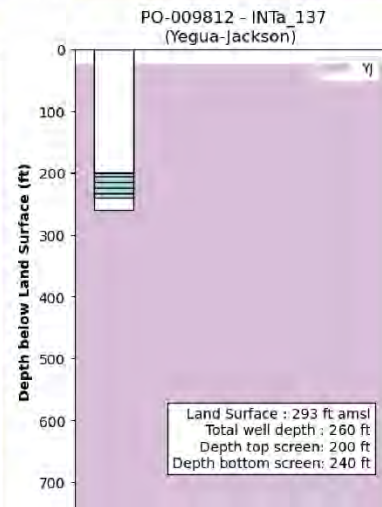
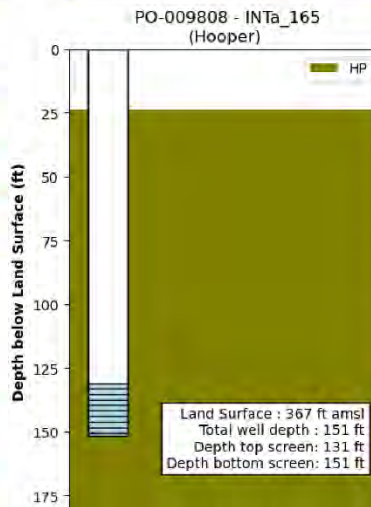
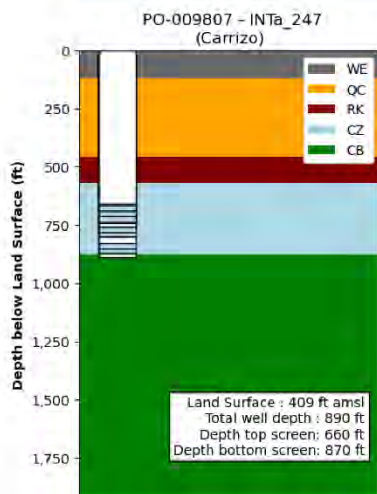
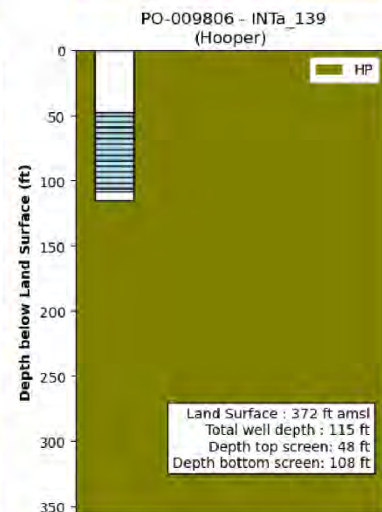
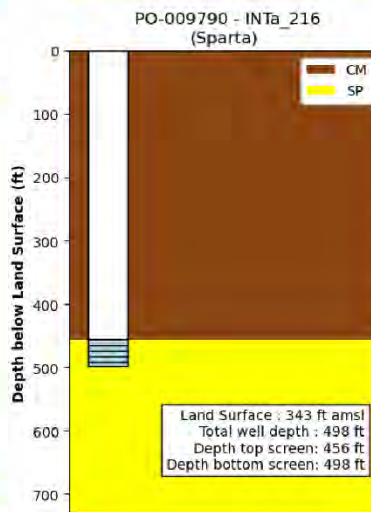
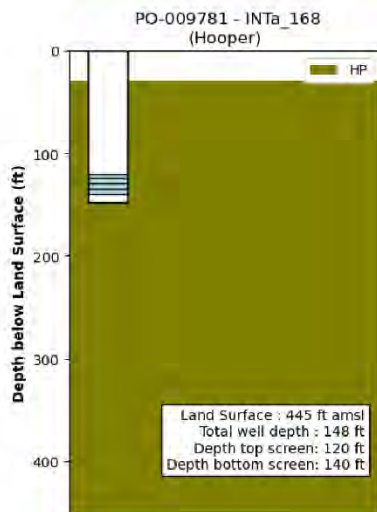
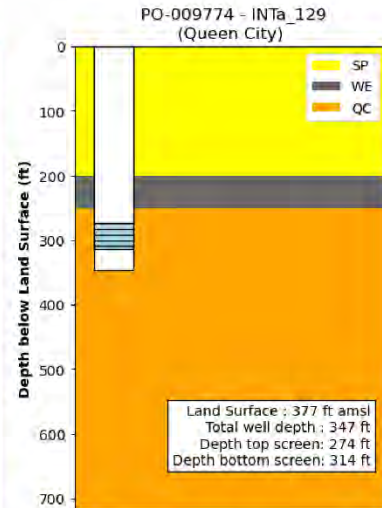
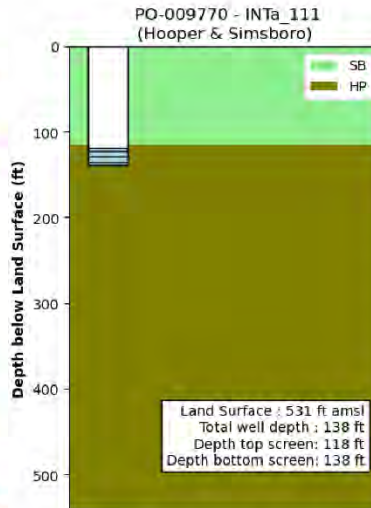
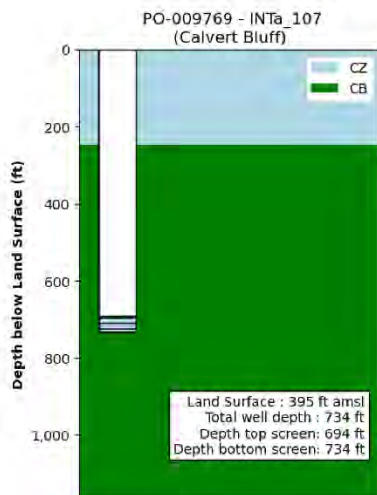


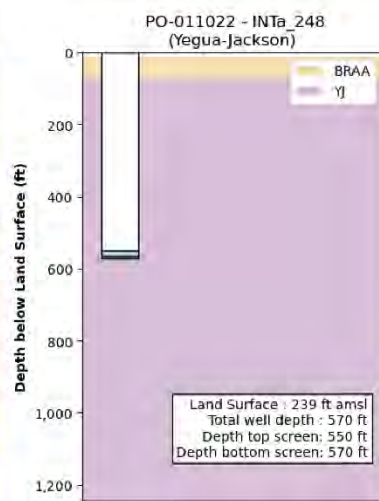
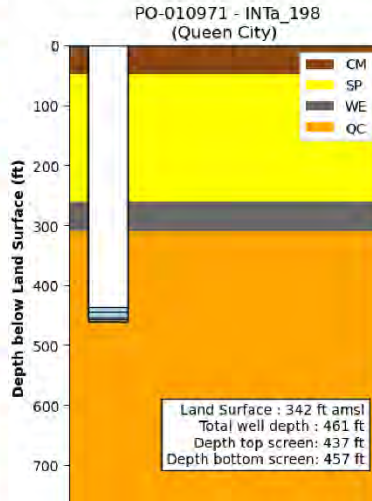
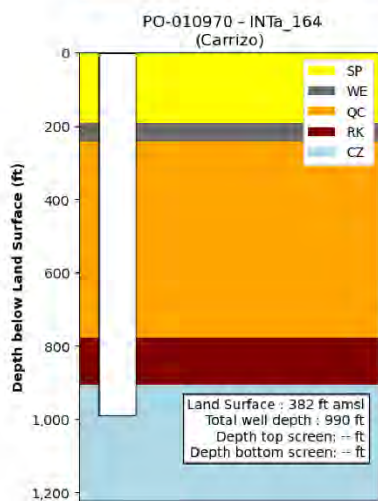
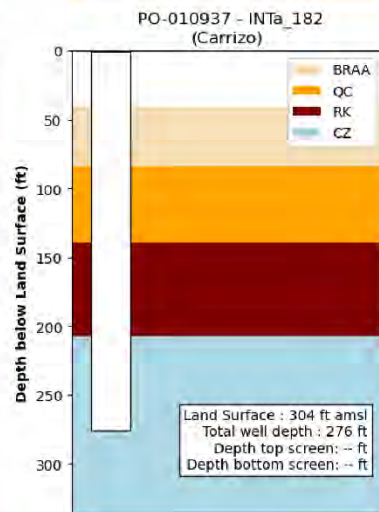
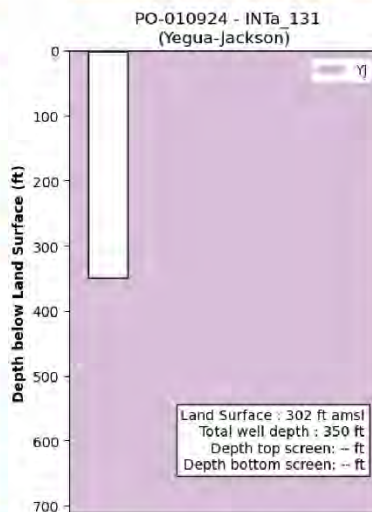
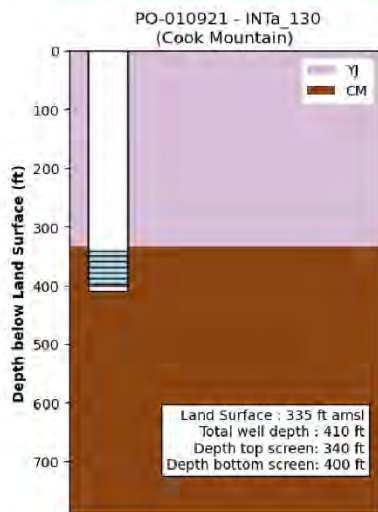
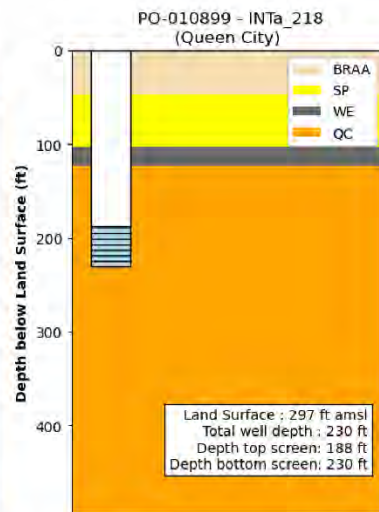
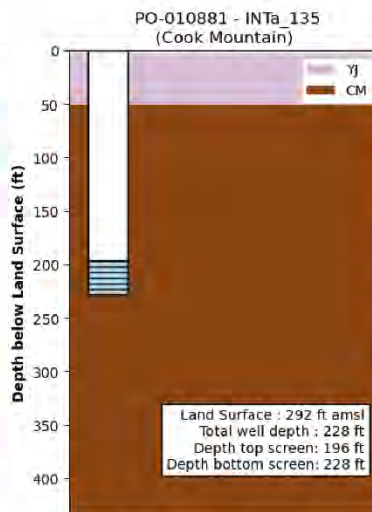
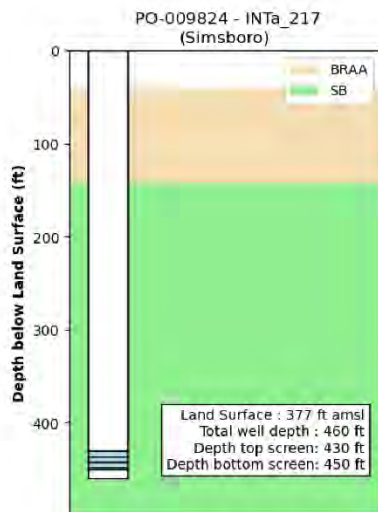






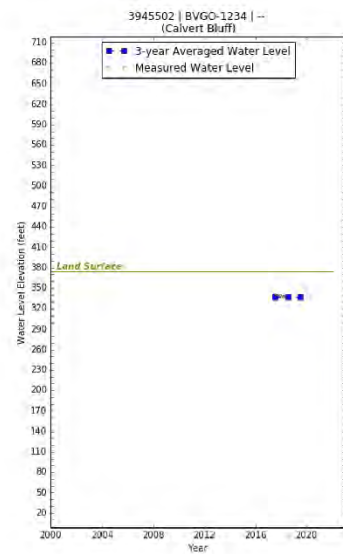
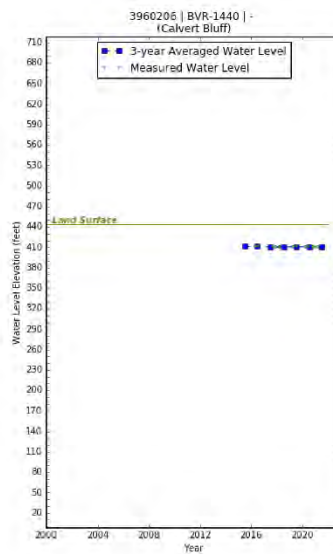
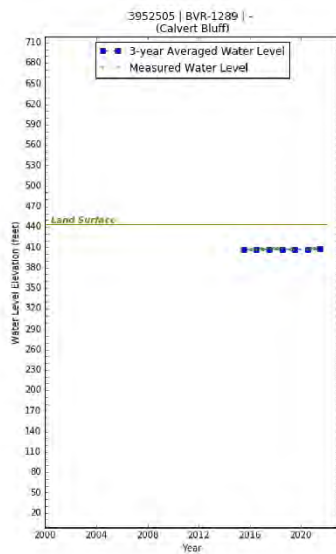
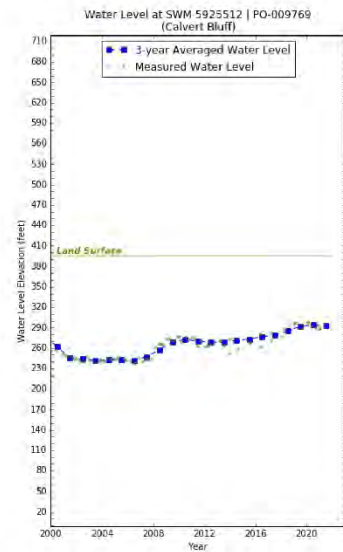
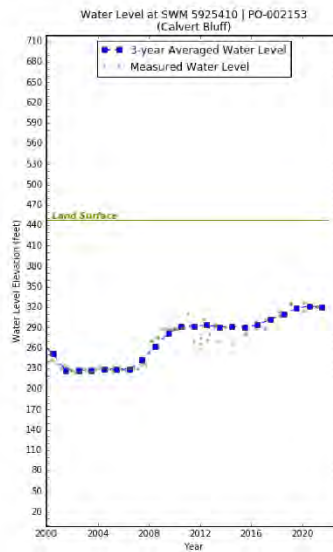
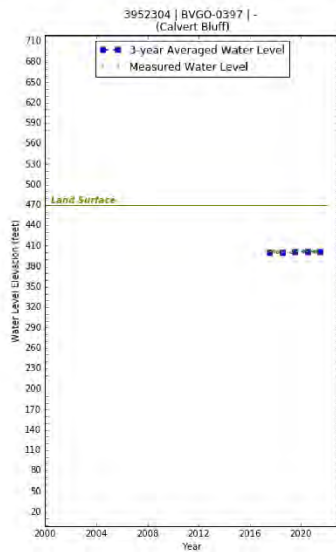
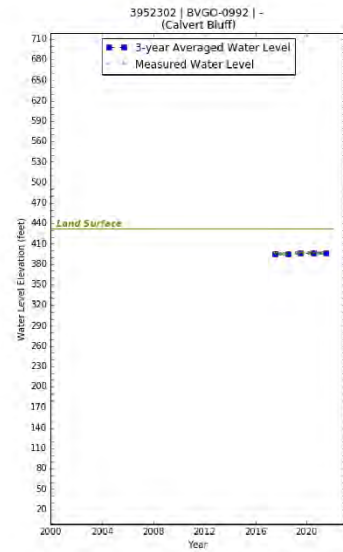
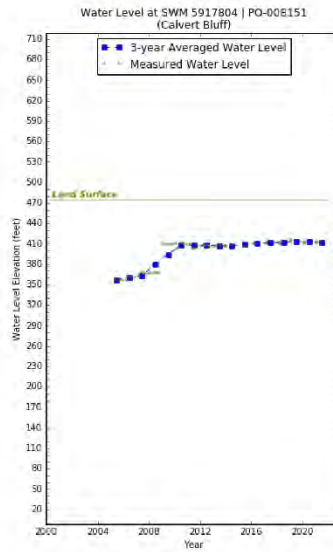
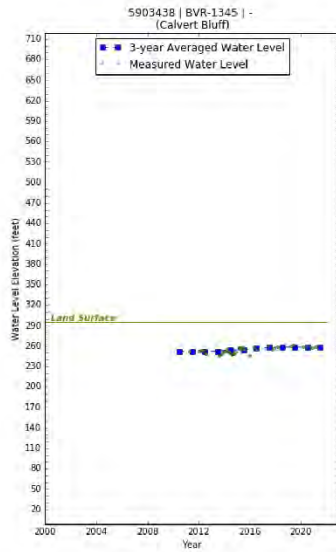




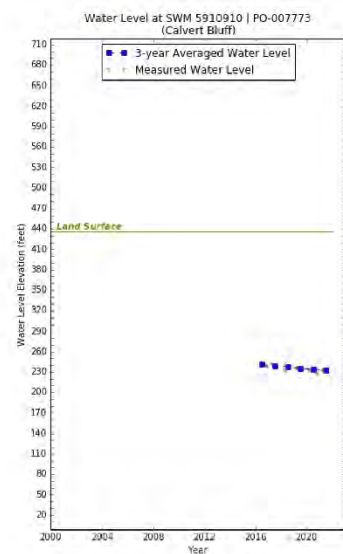
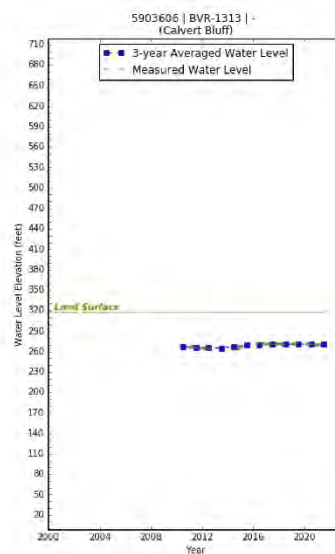
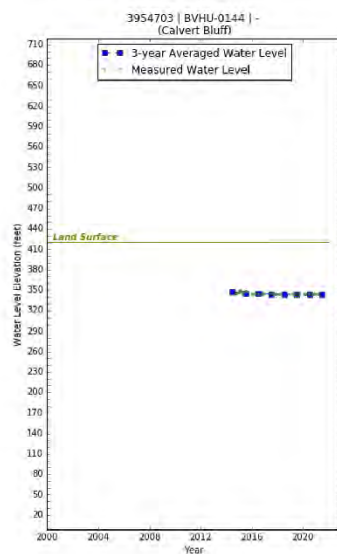
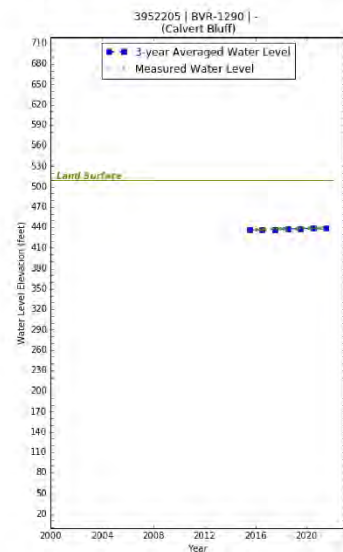
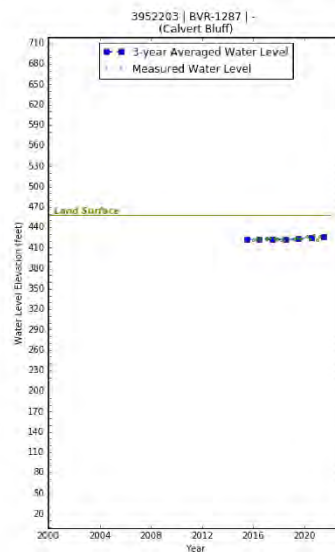
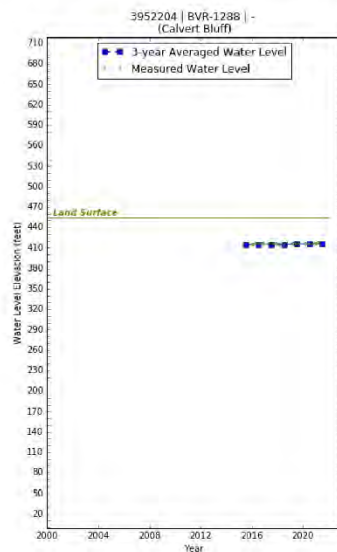
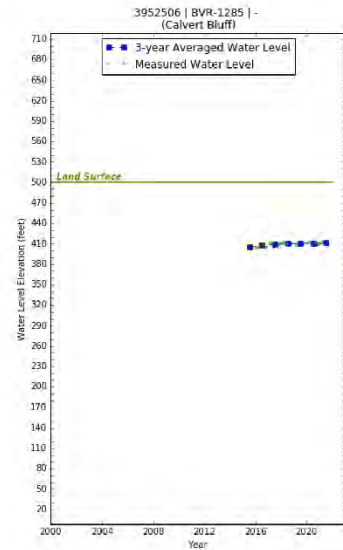
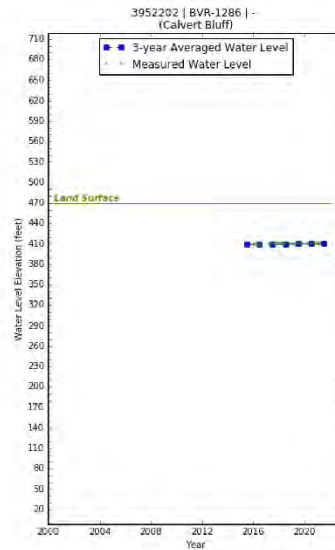
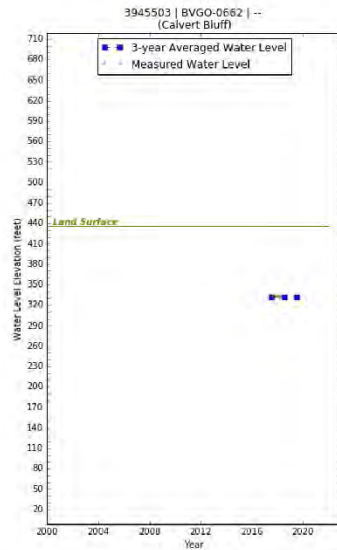


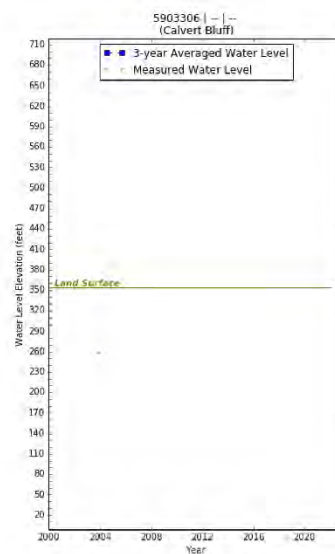
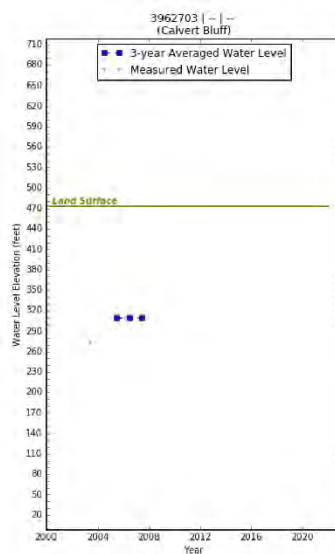
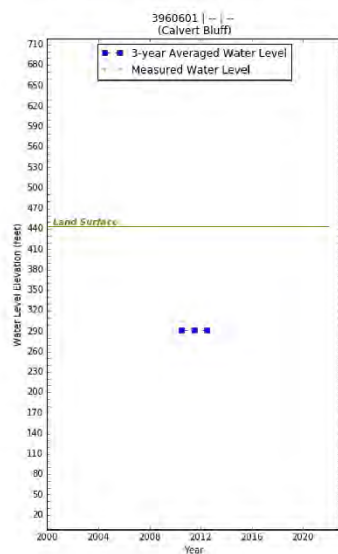
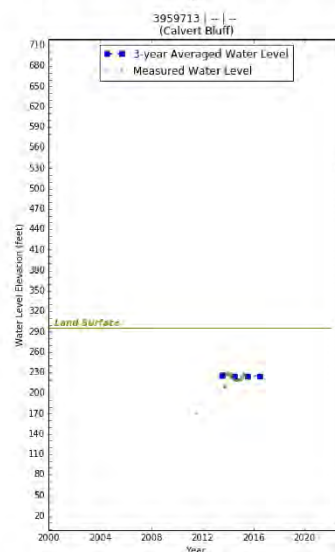
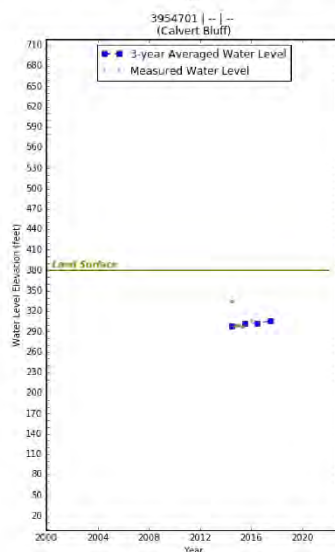
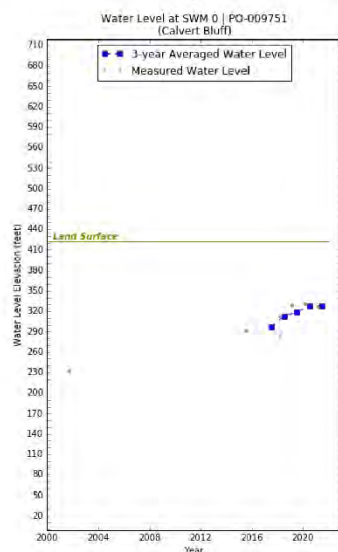
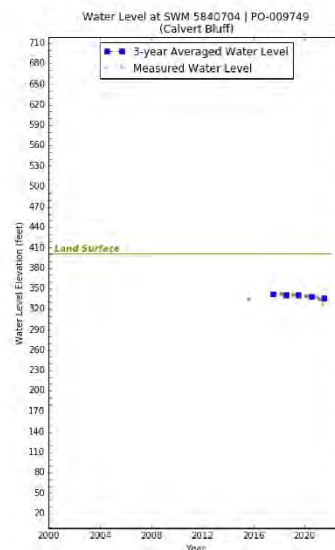
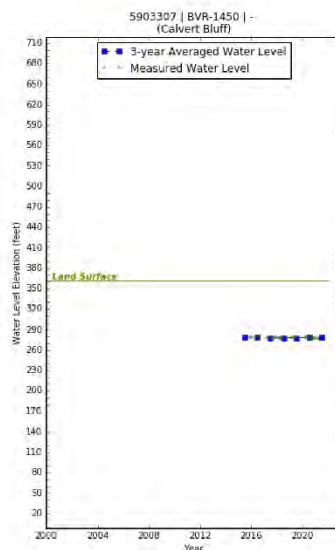
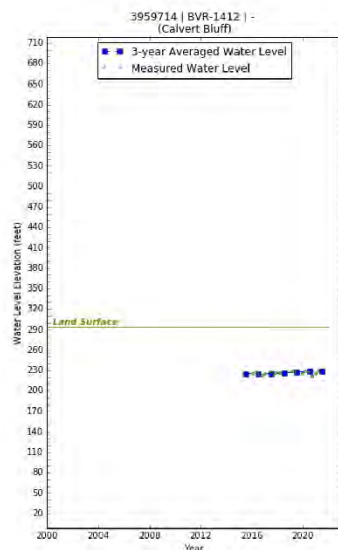
**APPENDIX D**

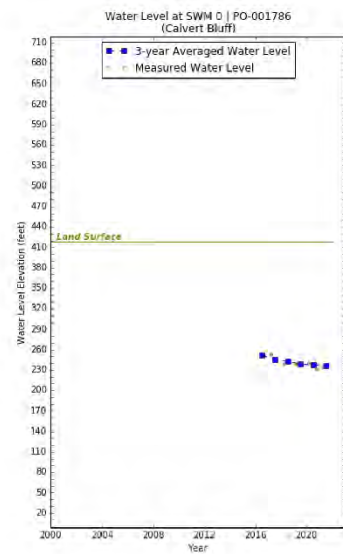
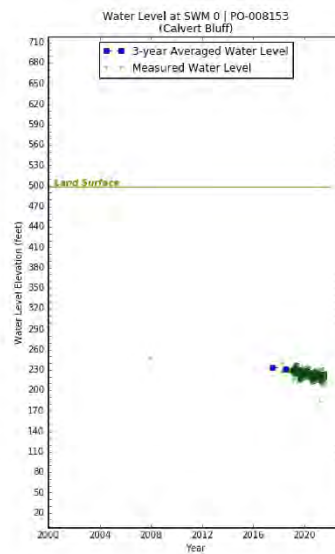
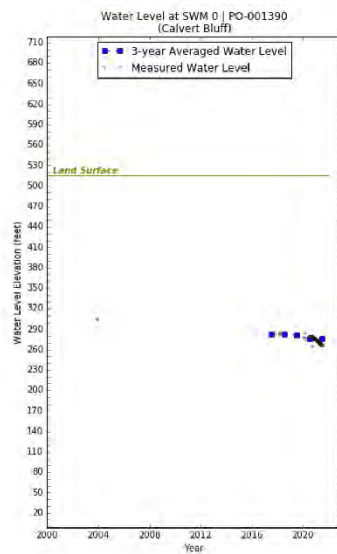
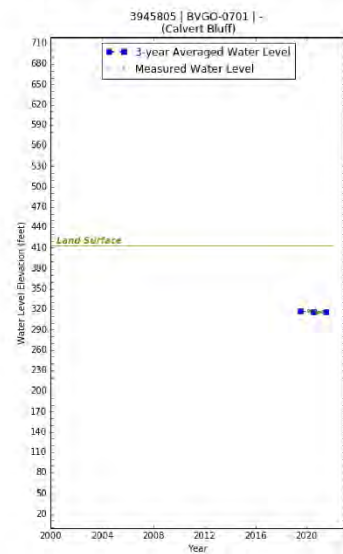
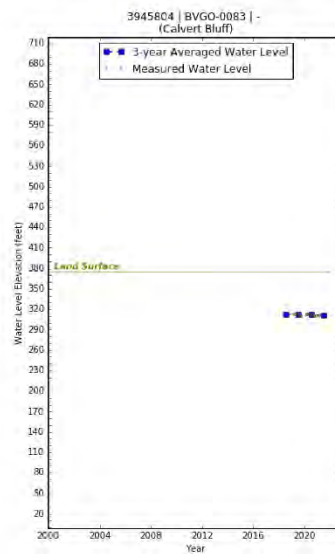
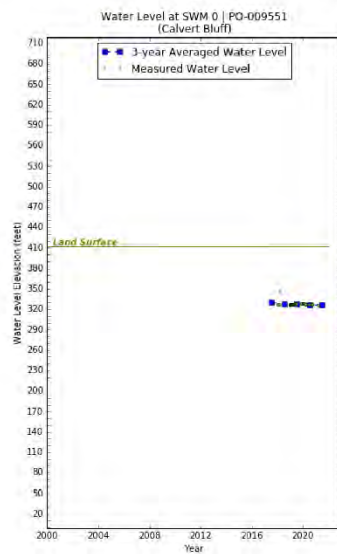
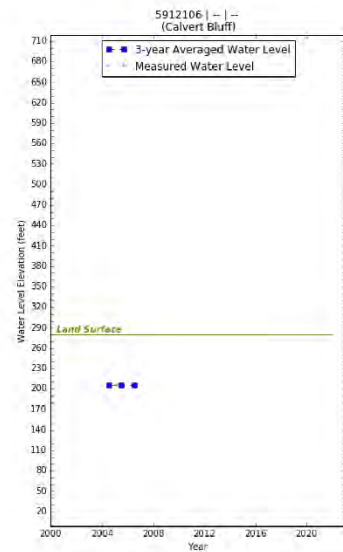
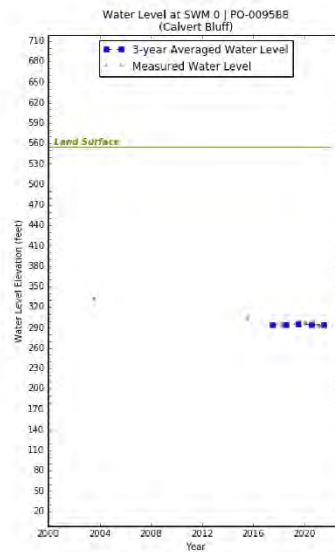
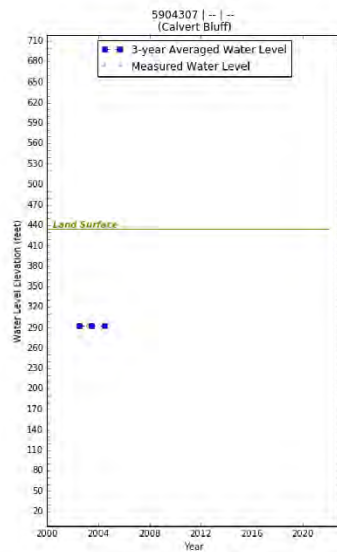
**Water Level Hydrographs for POSGCD Monitoring Wells**

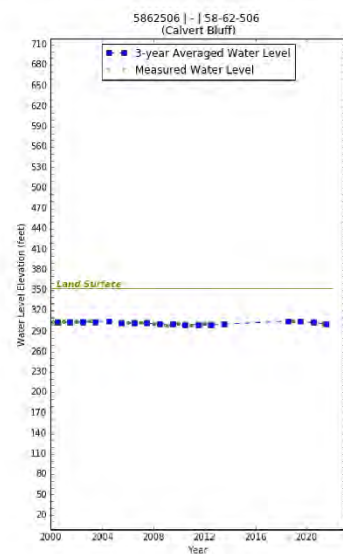
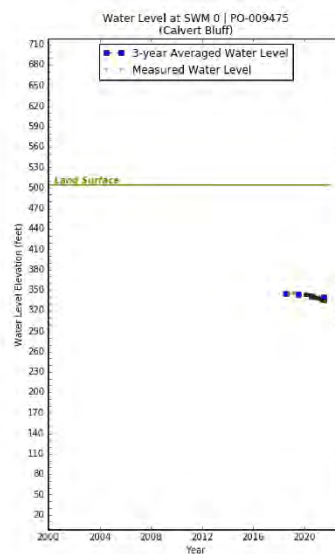
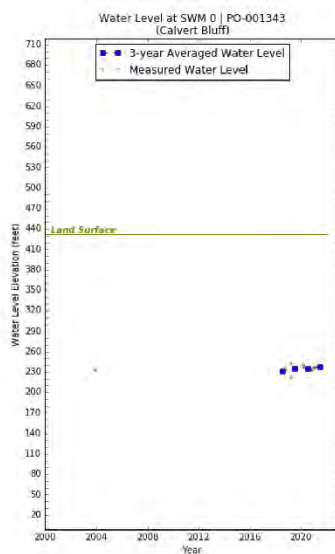
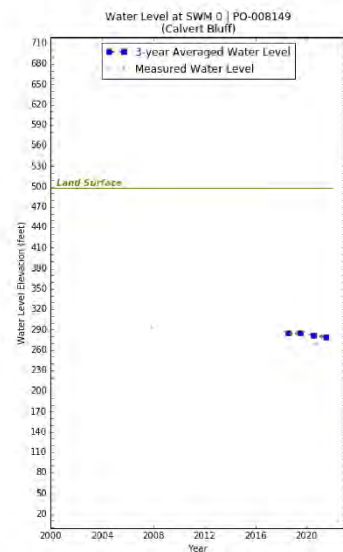
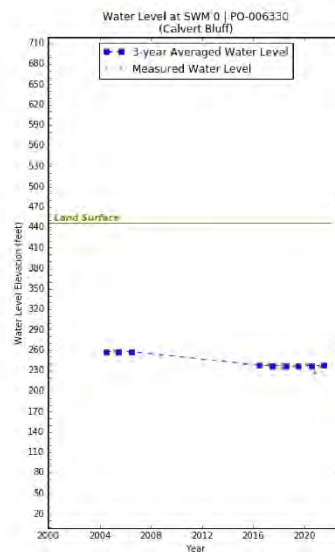
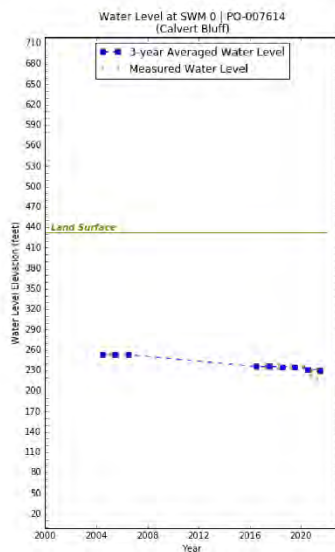
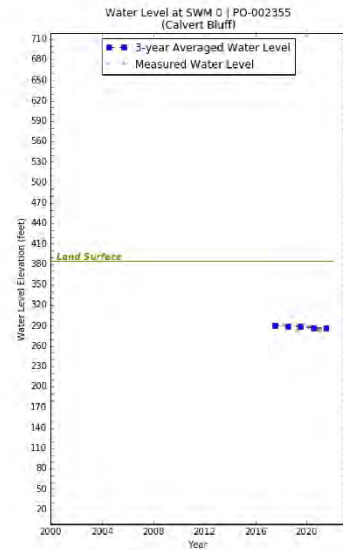
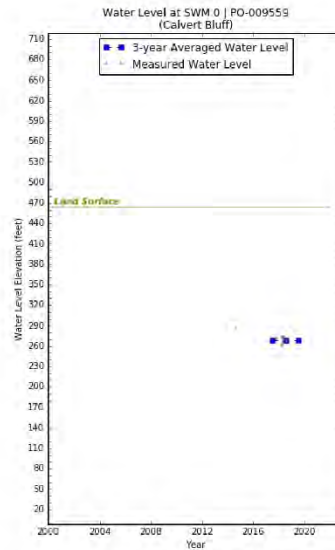
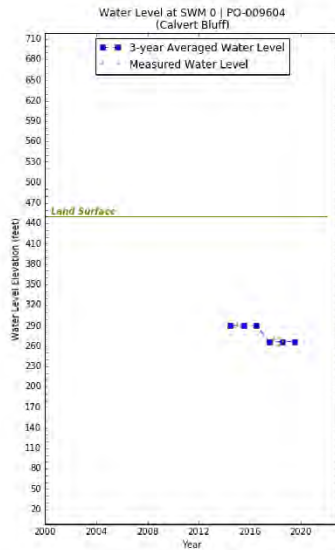




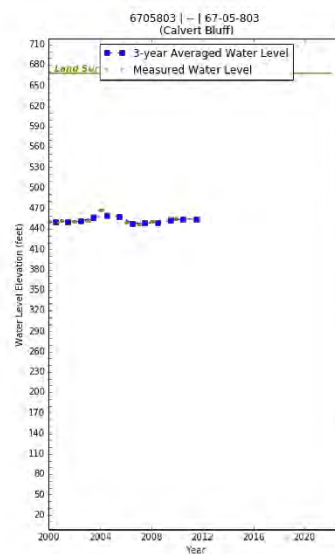
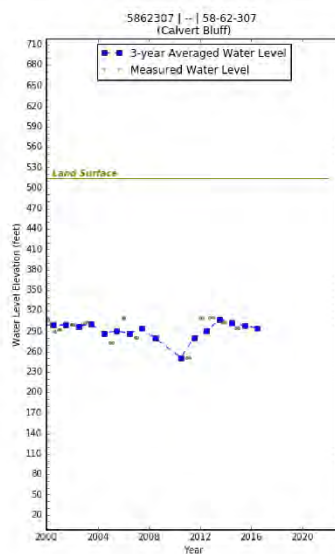
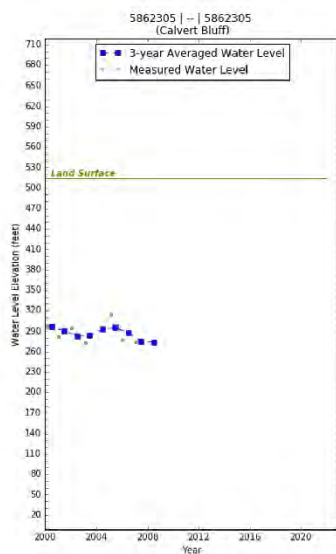
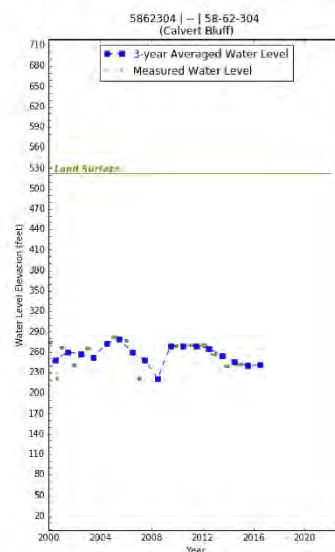
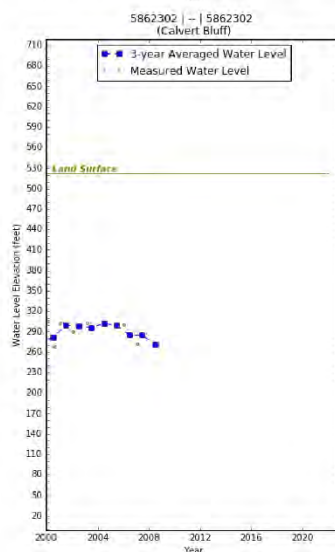
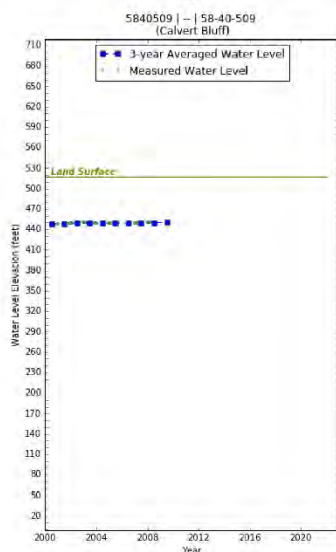
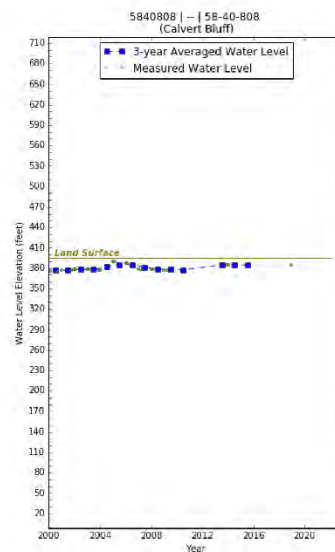
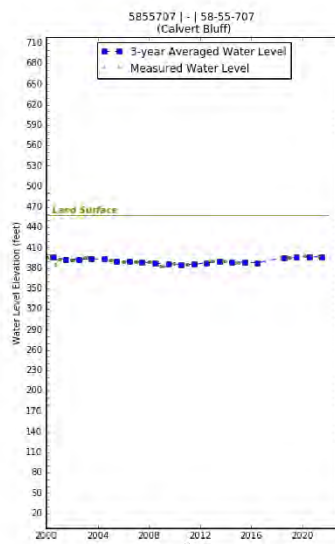
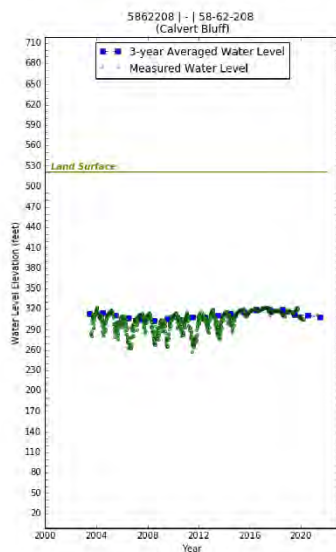


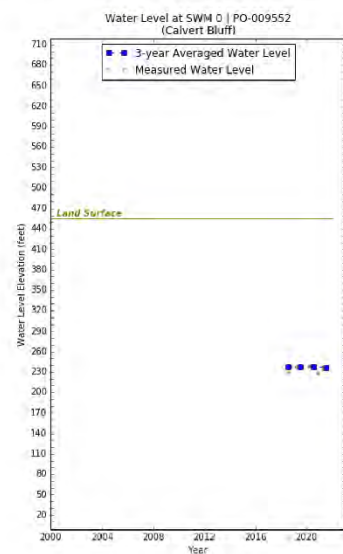
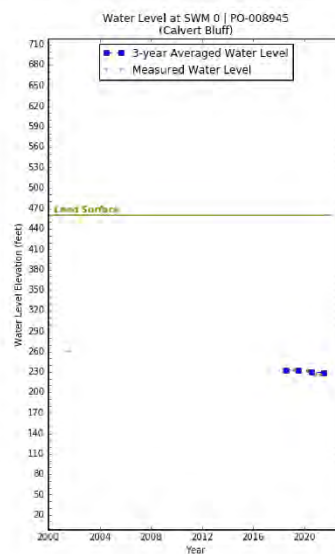
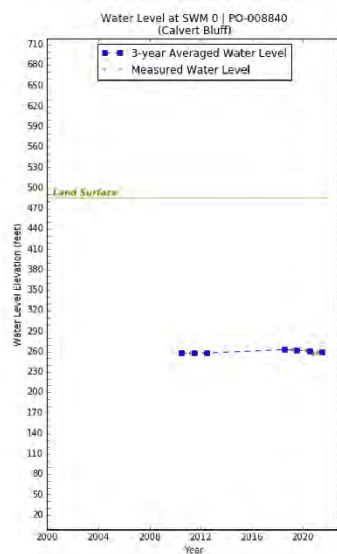
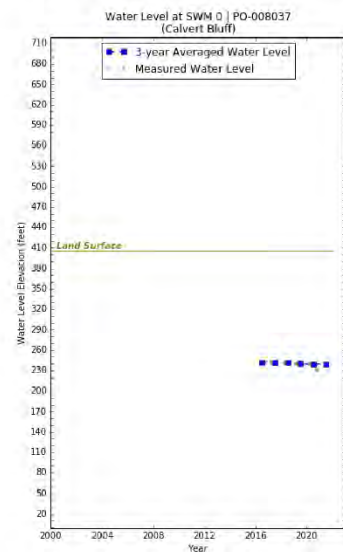
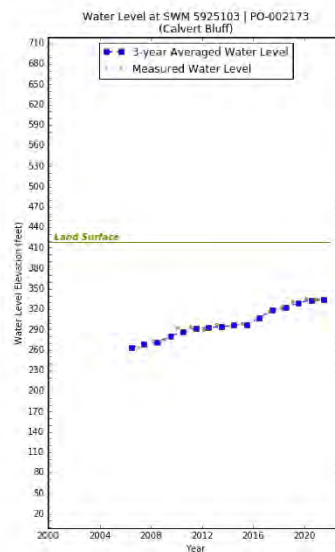
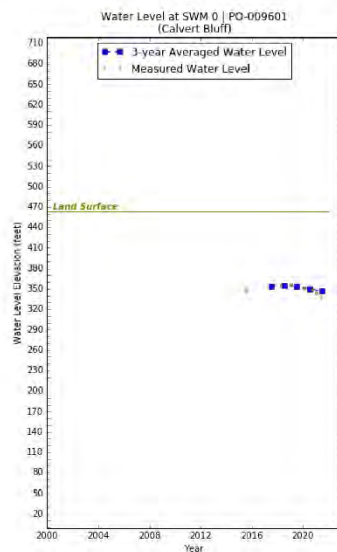
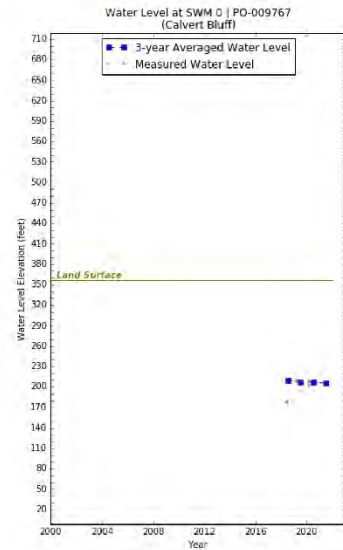
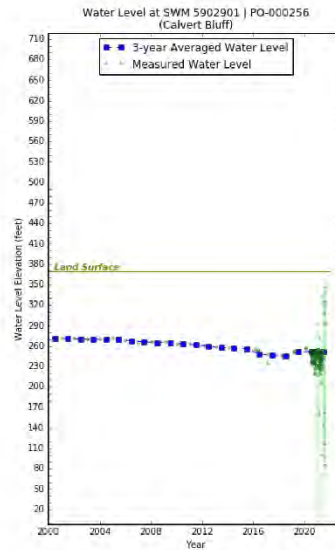
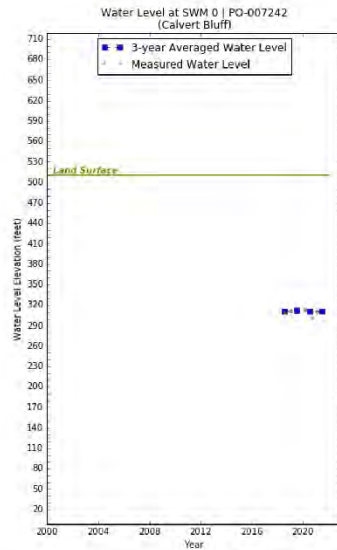




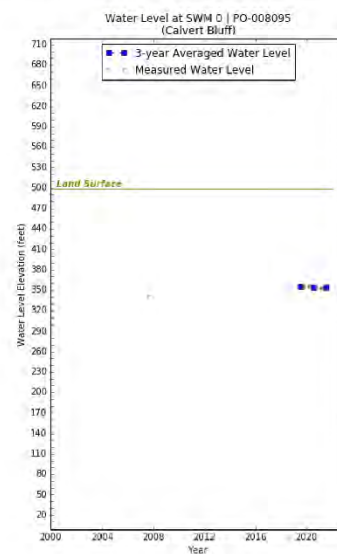
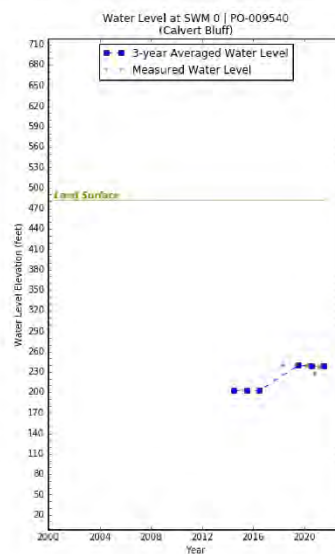
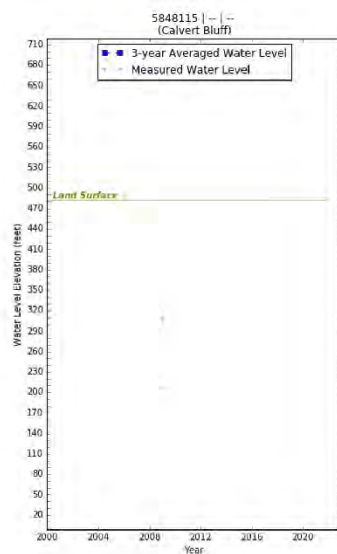
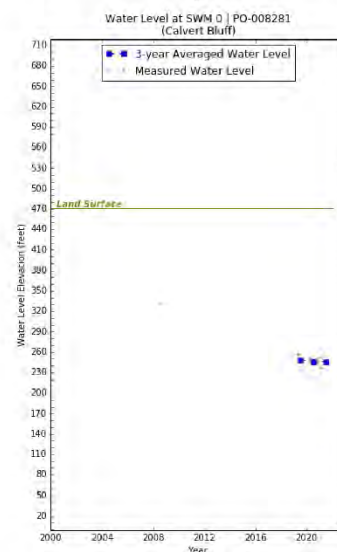
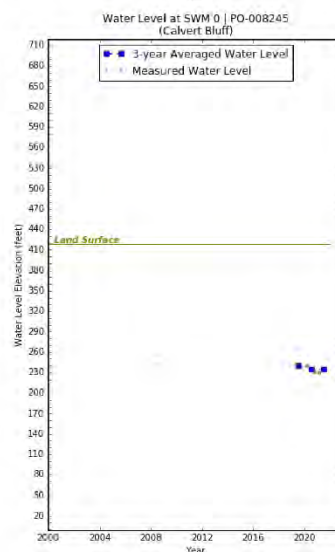
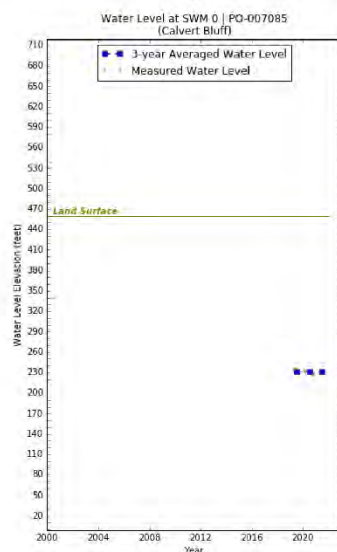
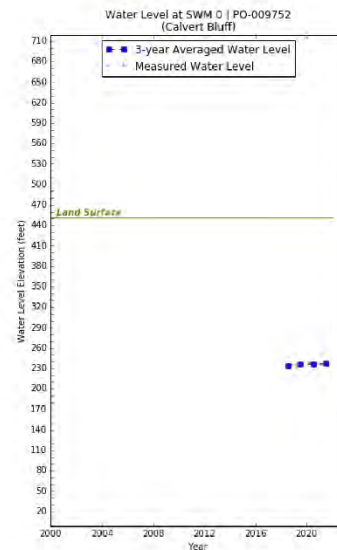
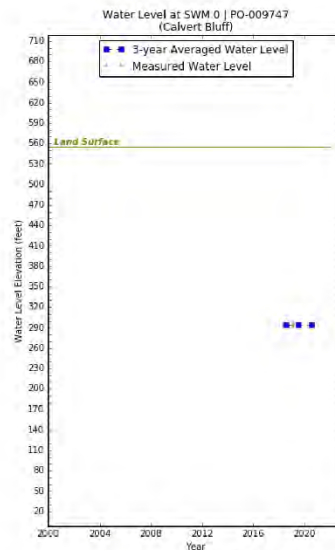
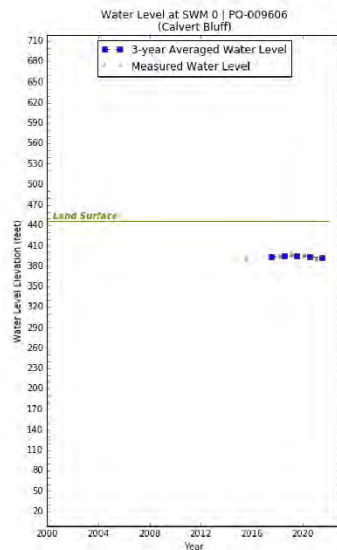


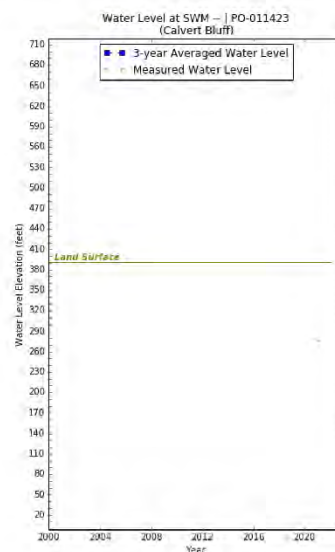
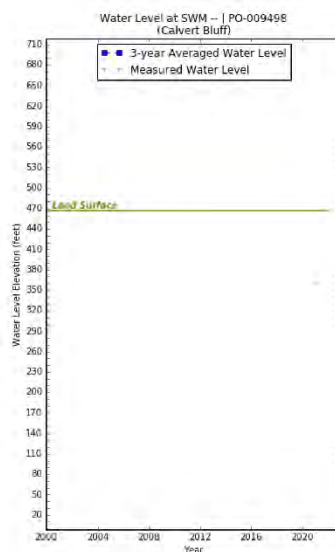
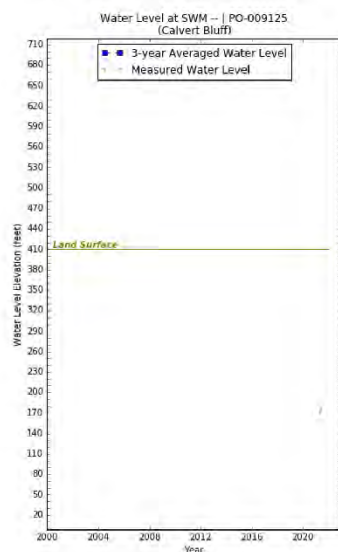
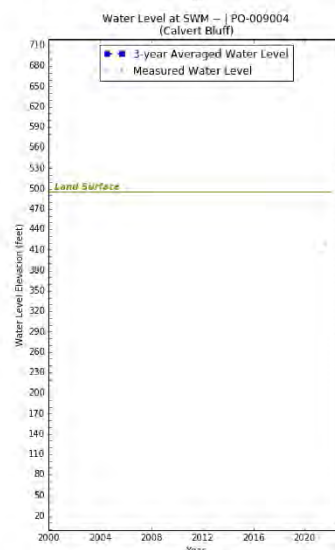
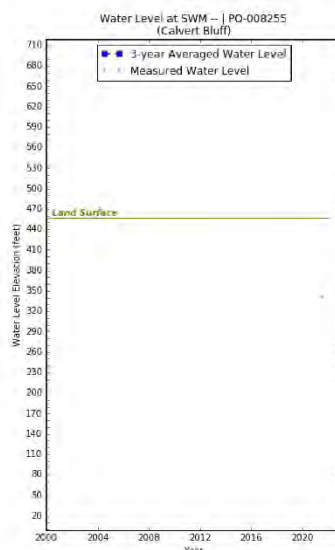
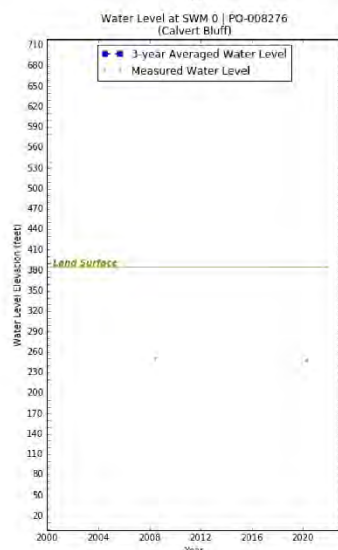
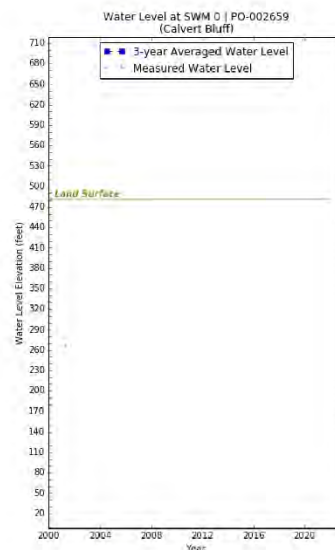
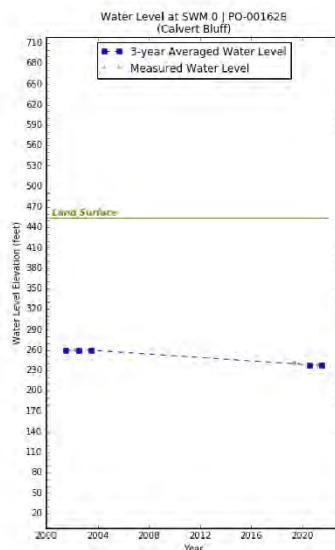
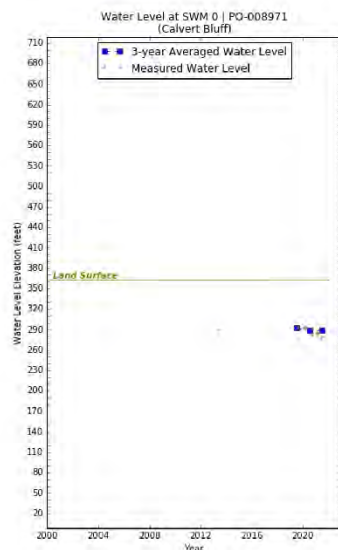


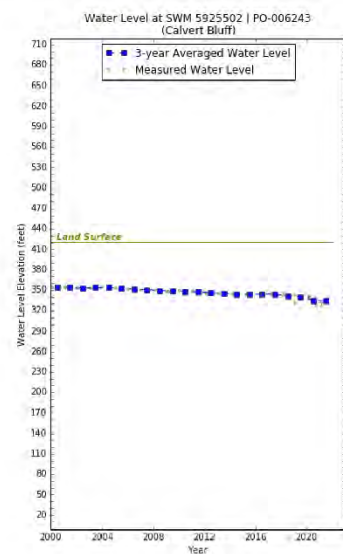
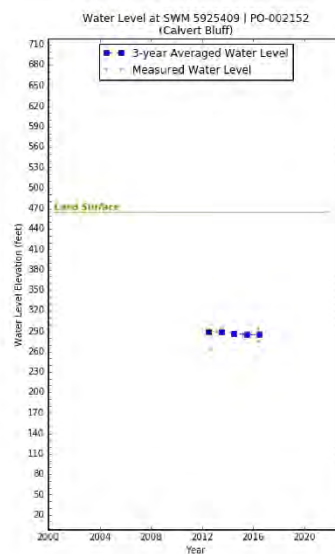
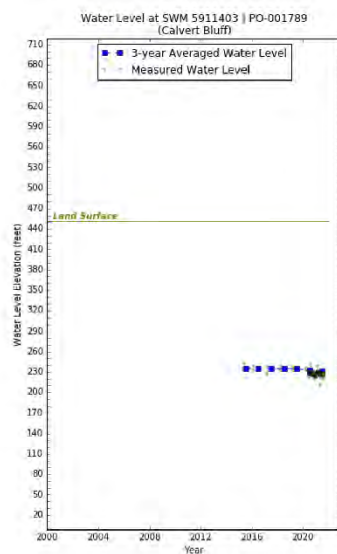
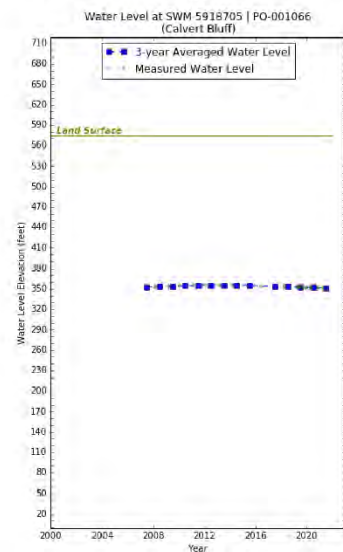
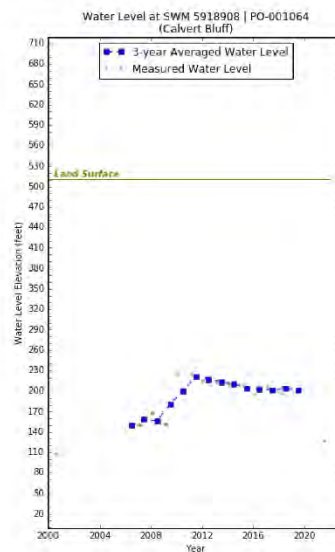
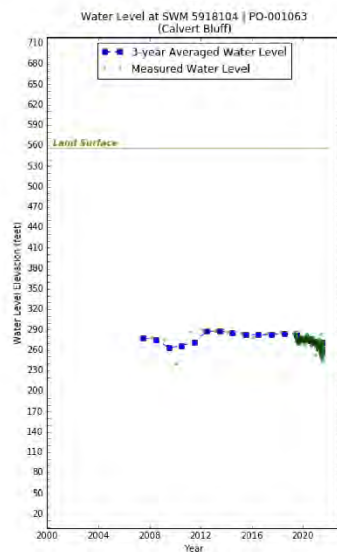
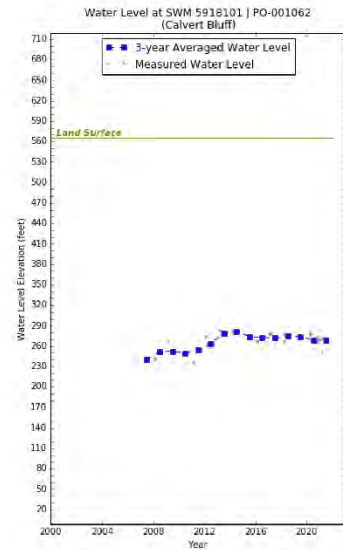
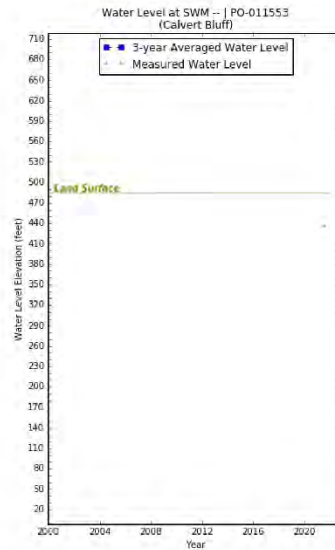
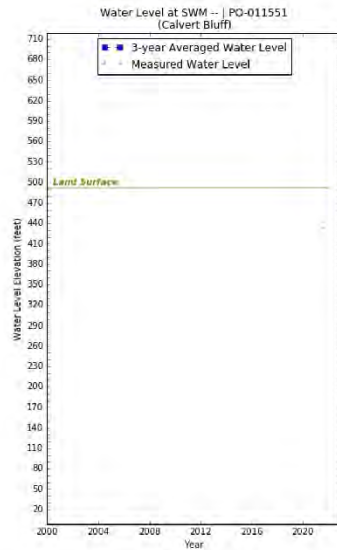


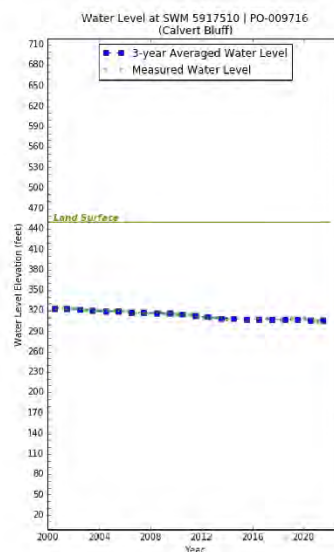
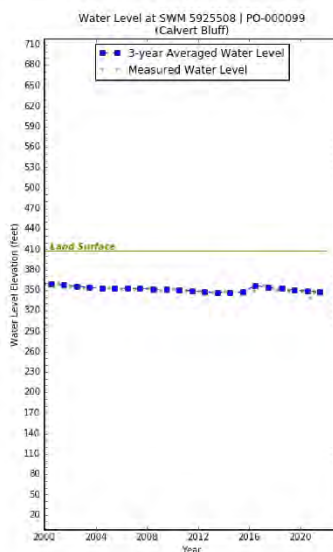
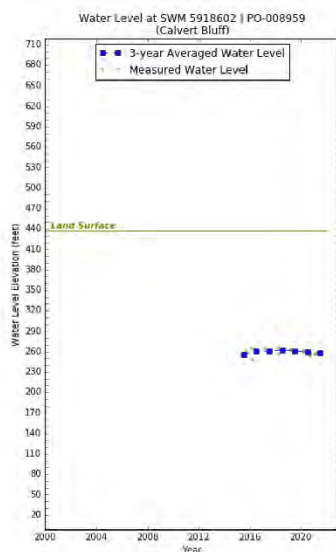
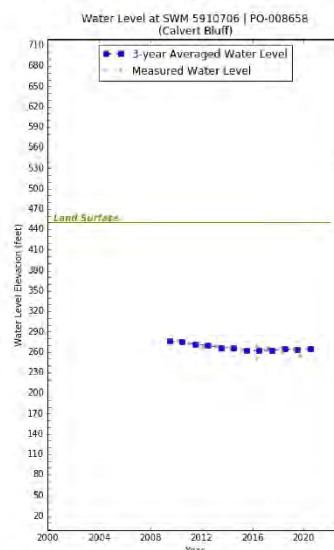
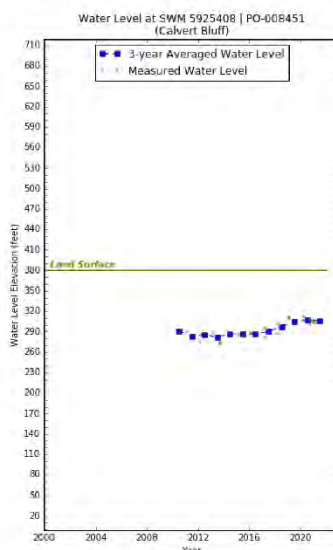
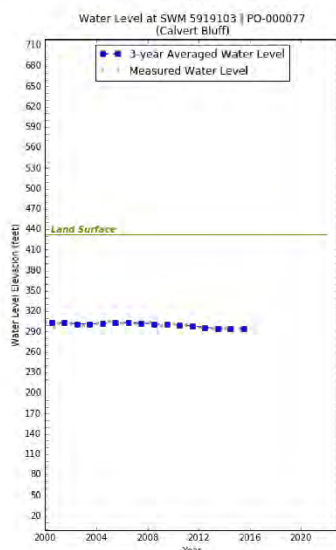
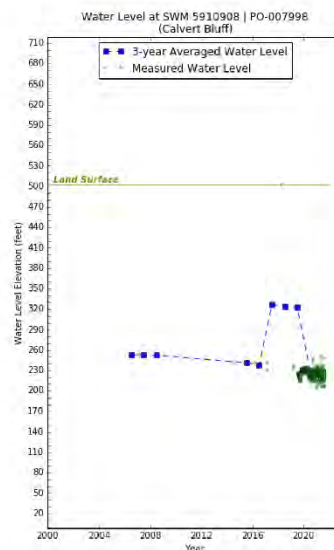
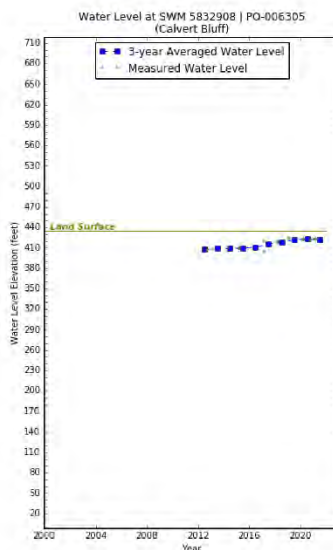
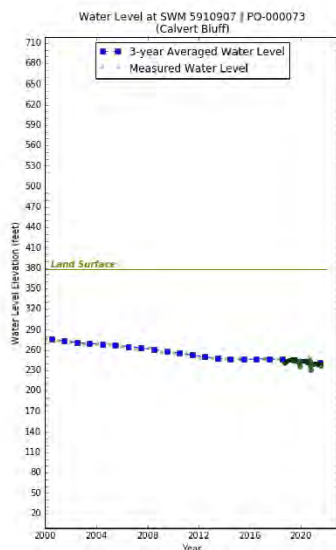




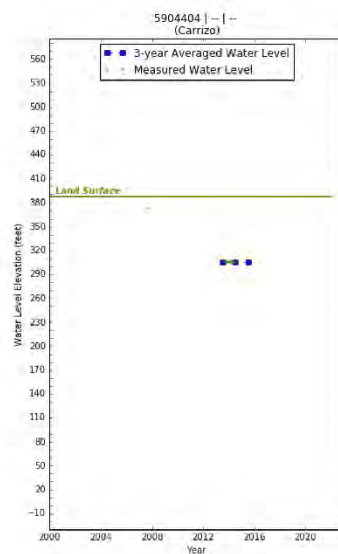
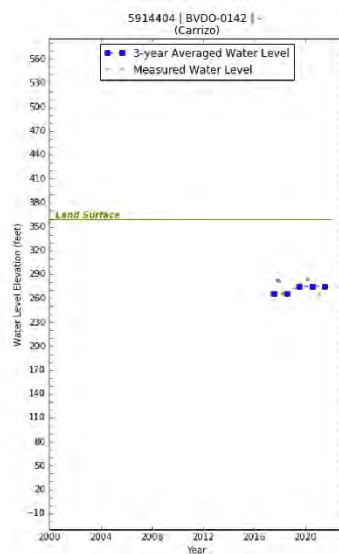
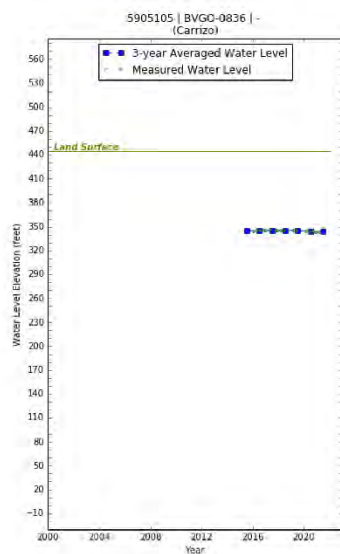
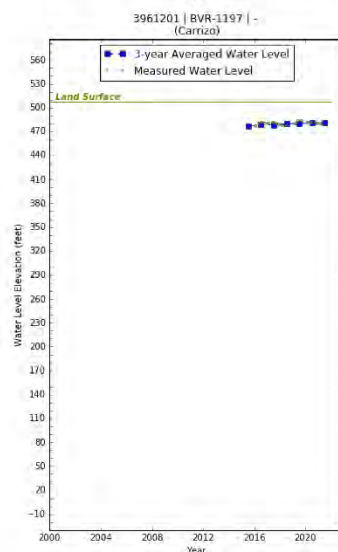
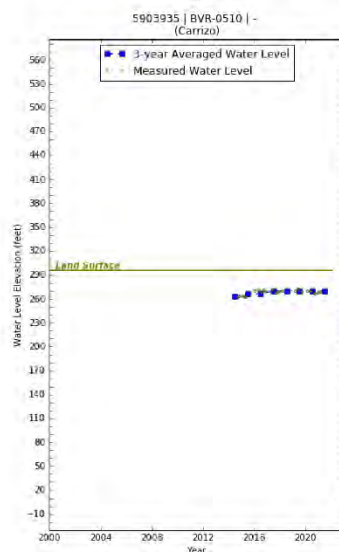
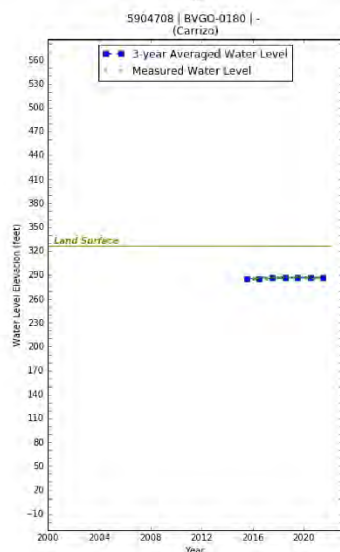
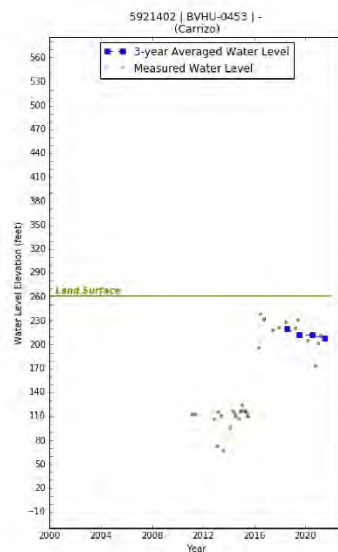
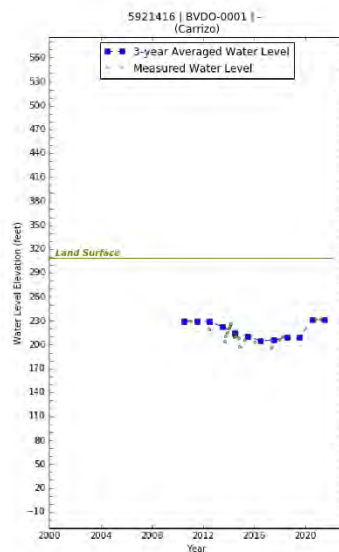
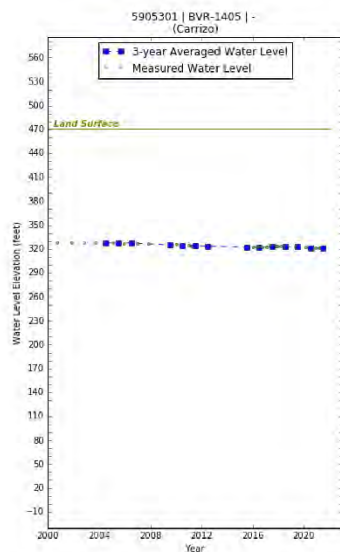




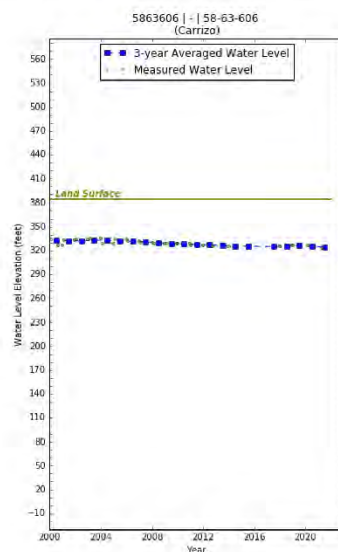
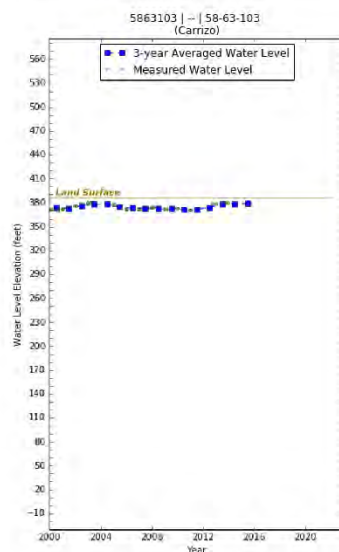
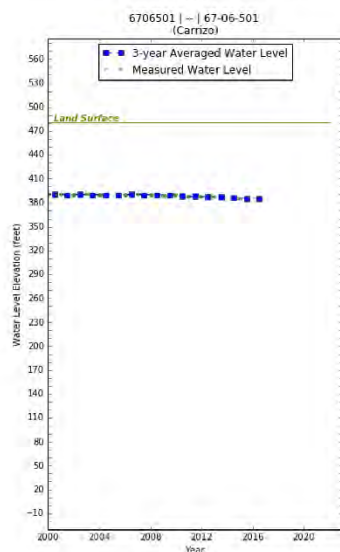
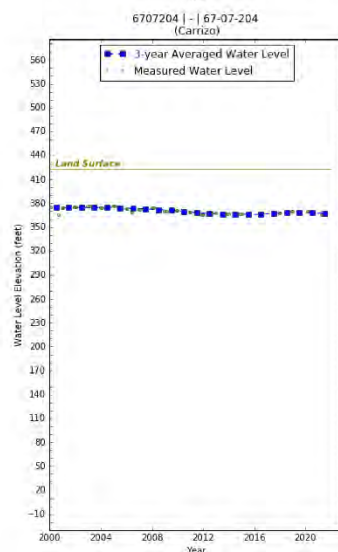
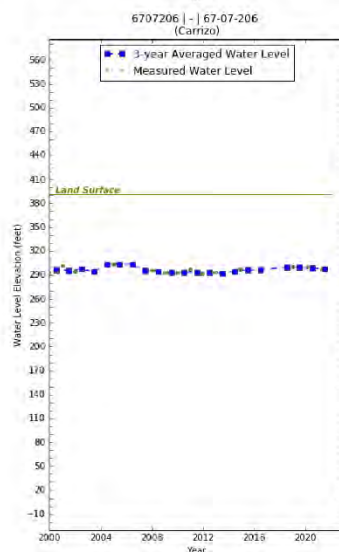
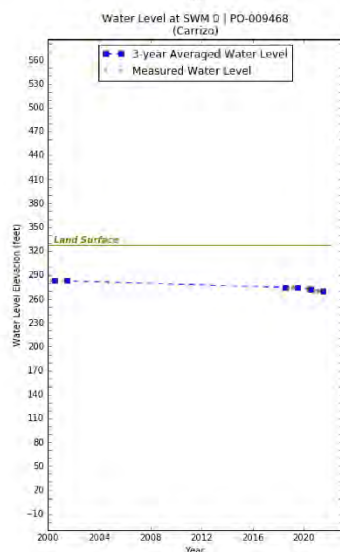
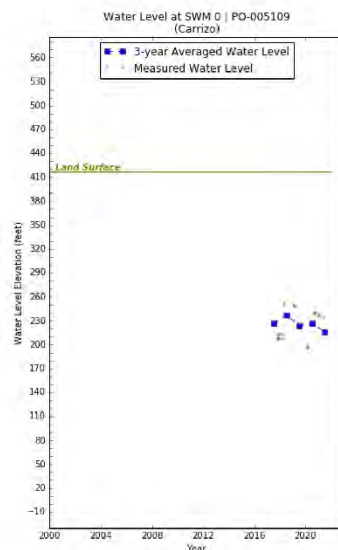
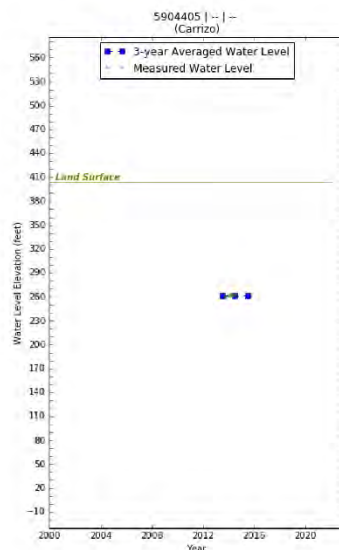
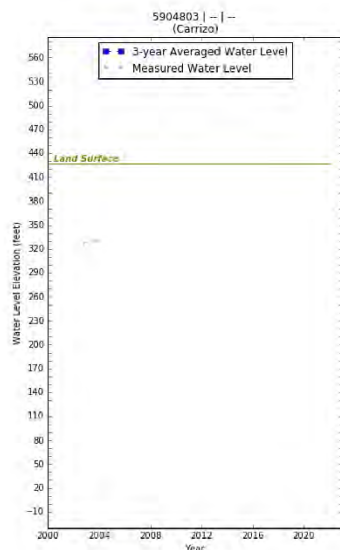


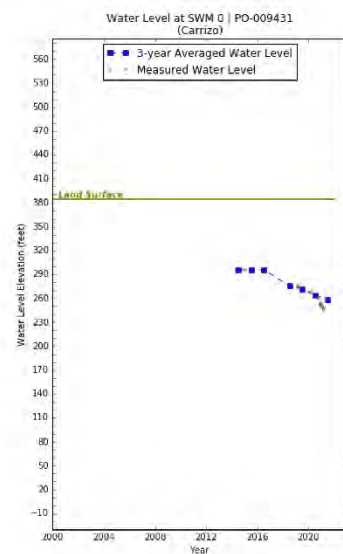
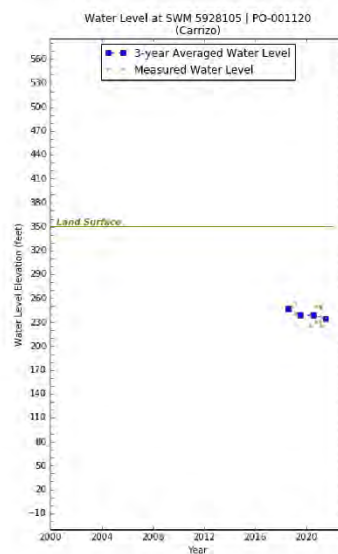
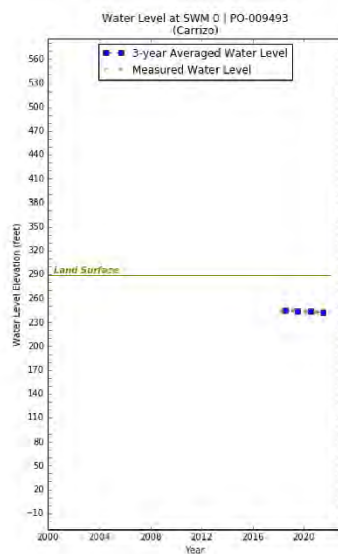
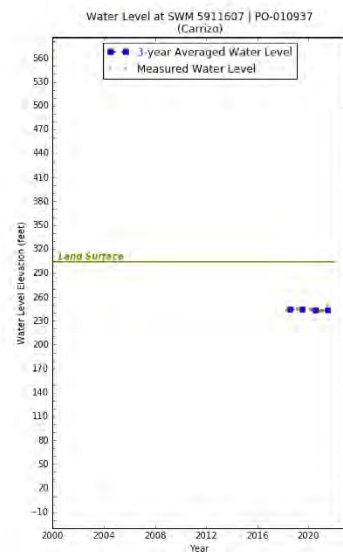
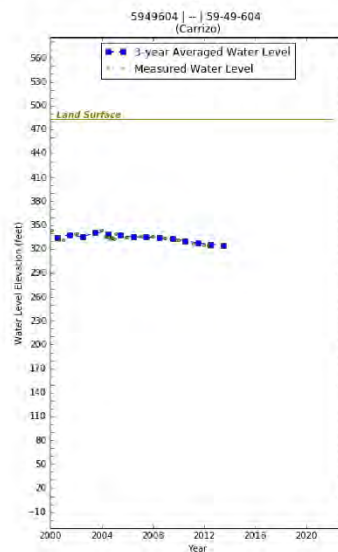
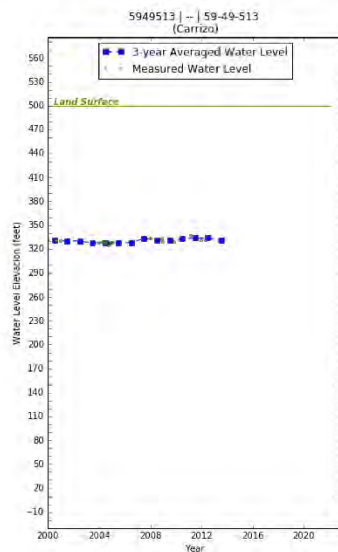
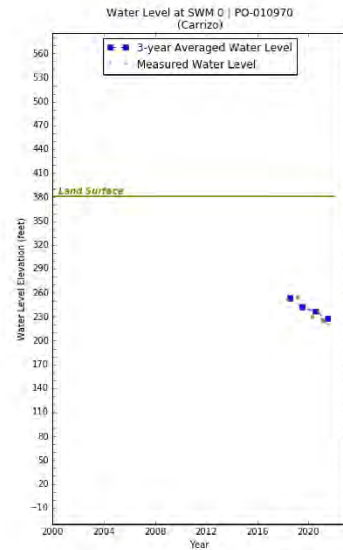
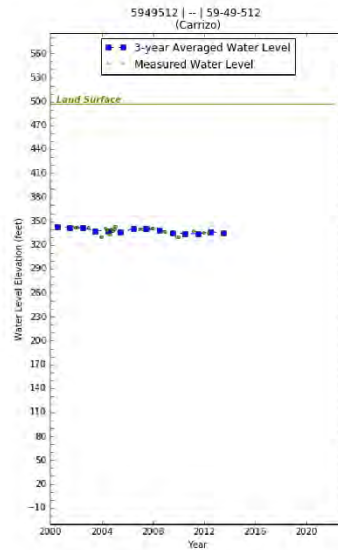
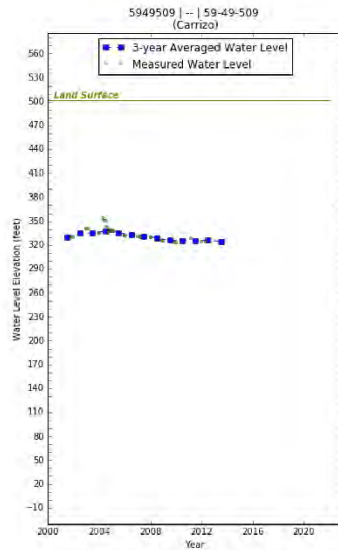


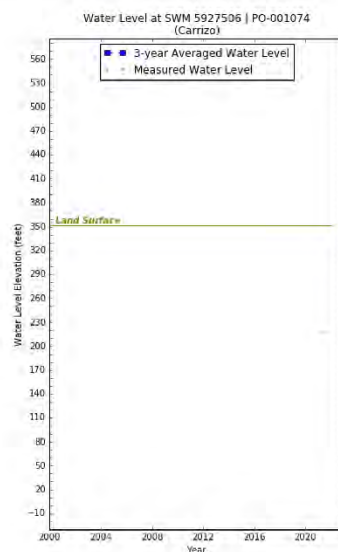
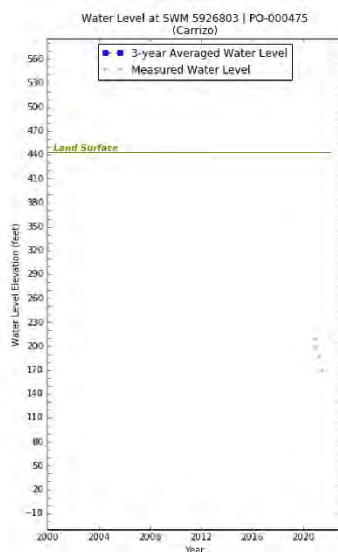
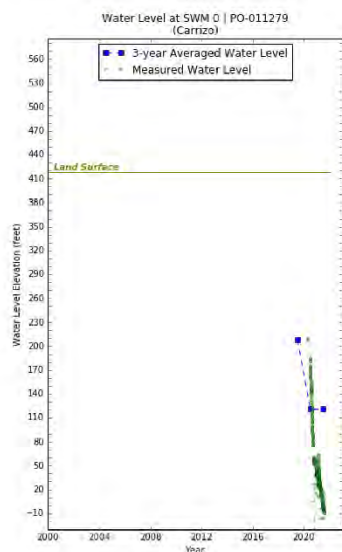
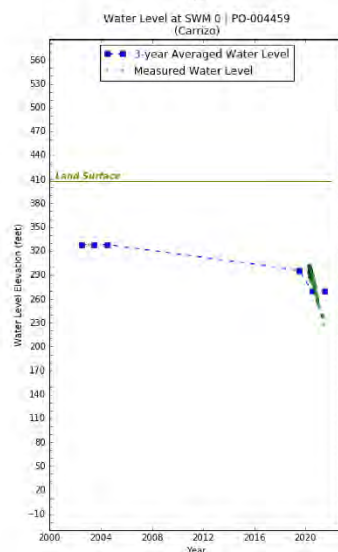
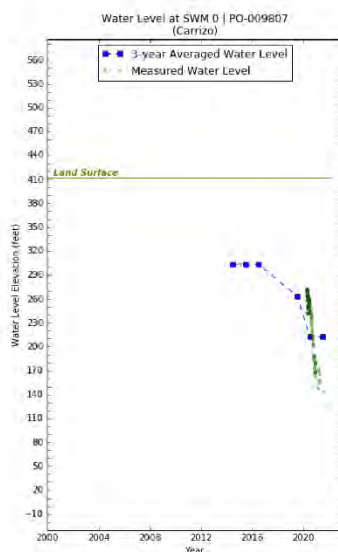
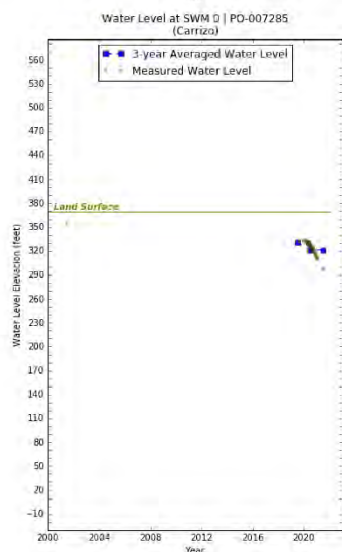
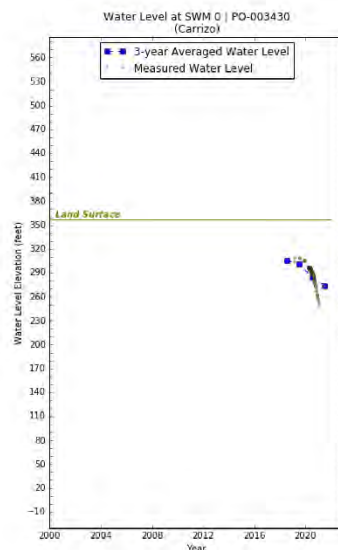
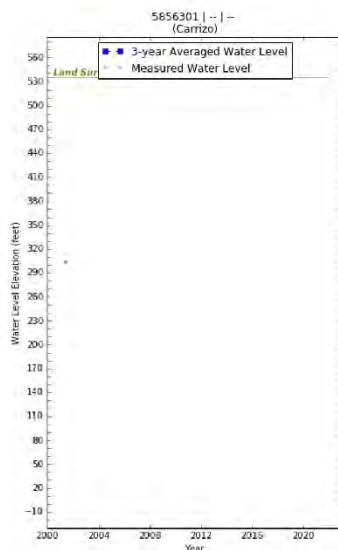
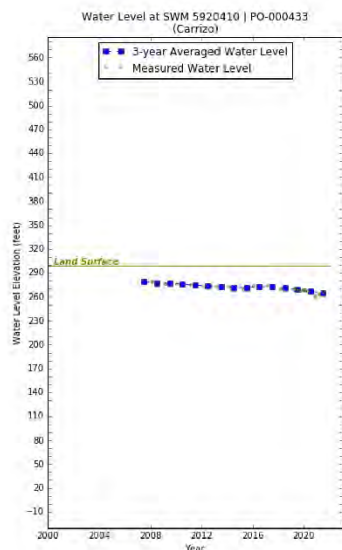


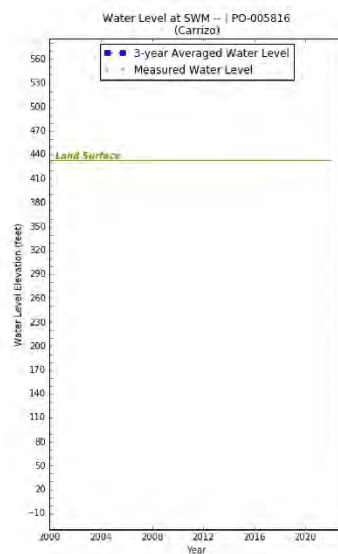
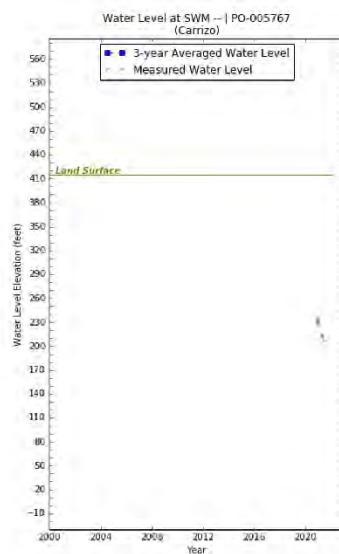
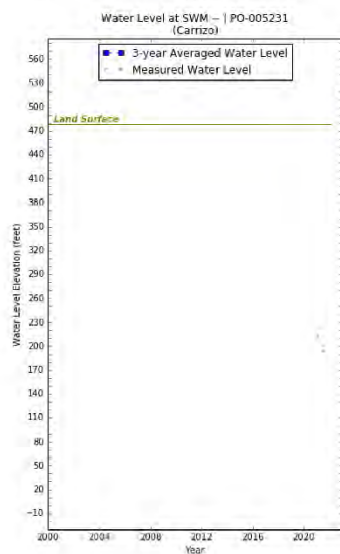
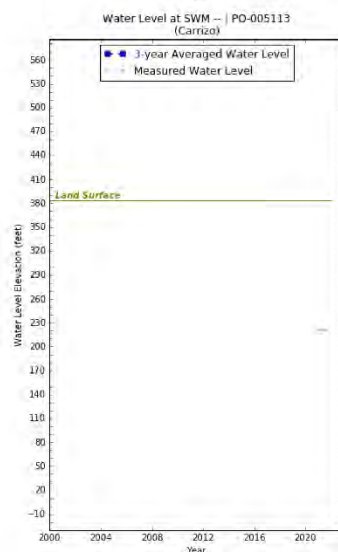
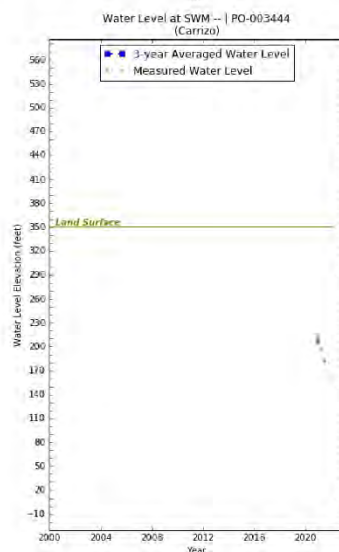
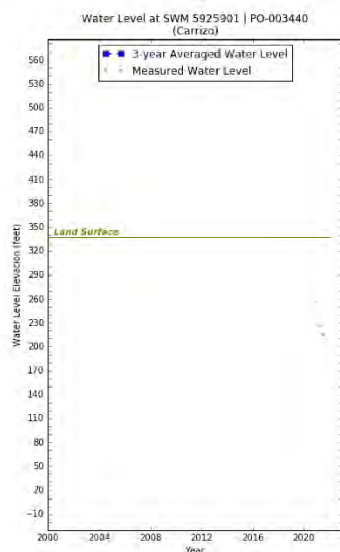
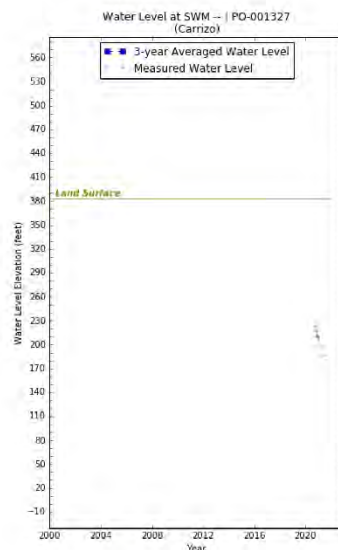
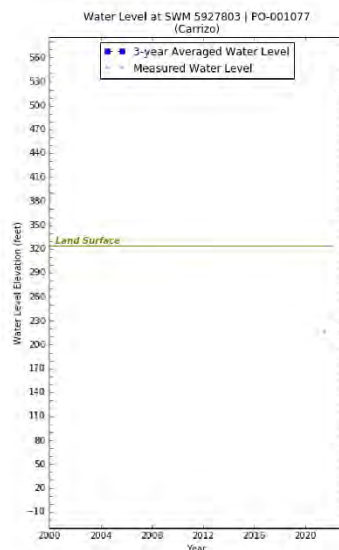
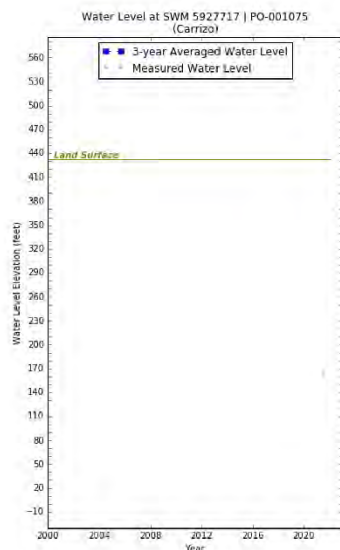




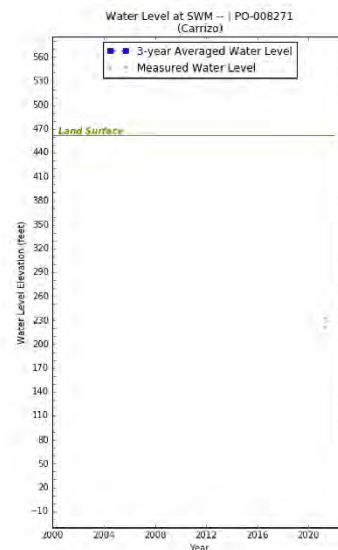
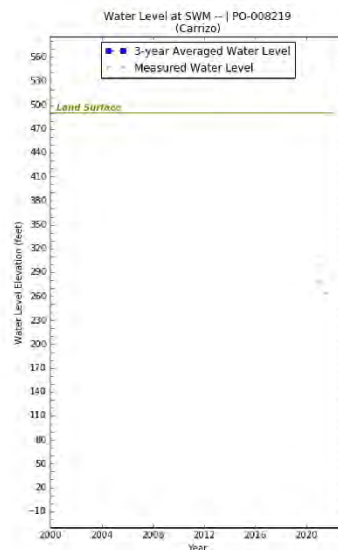
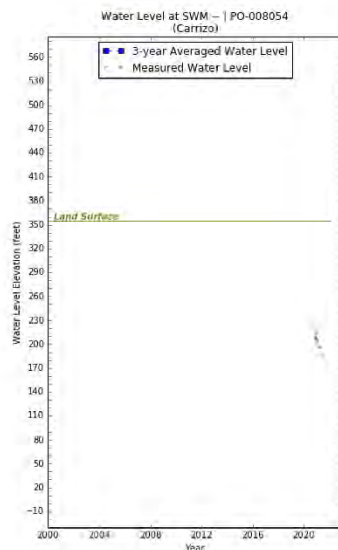
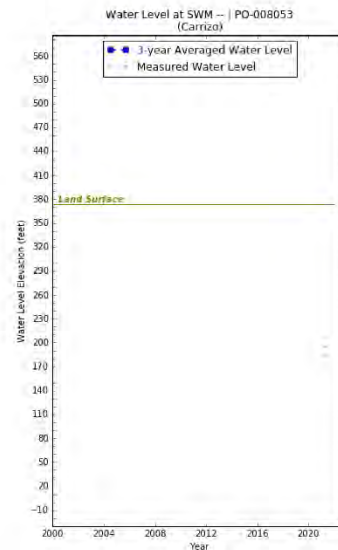
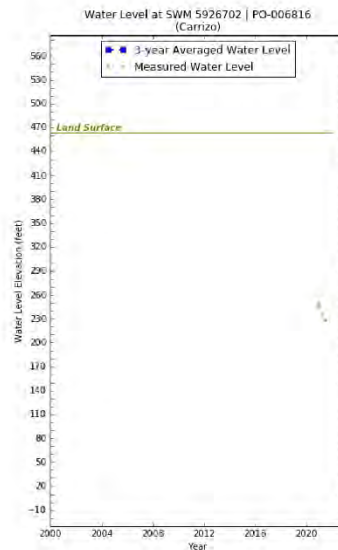
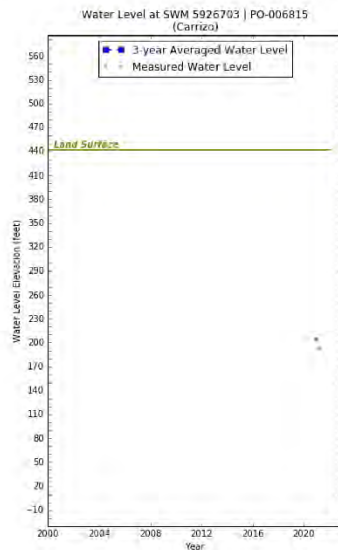
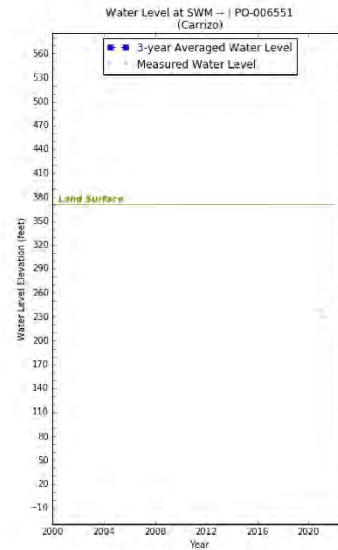
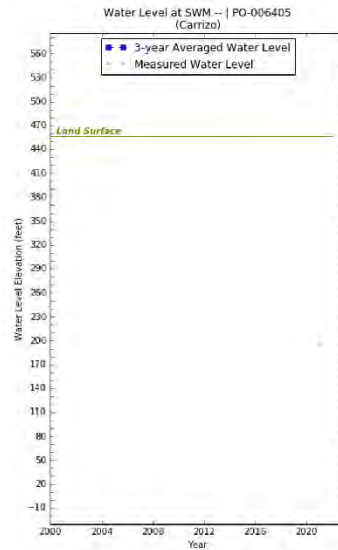
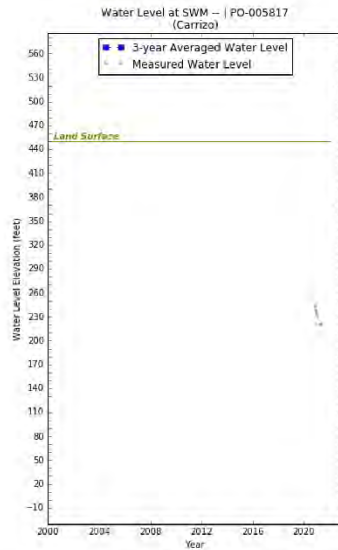




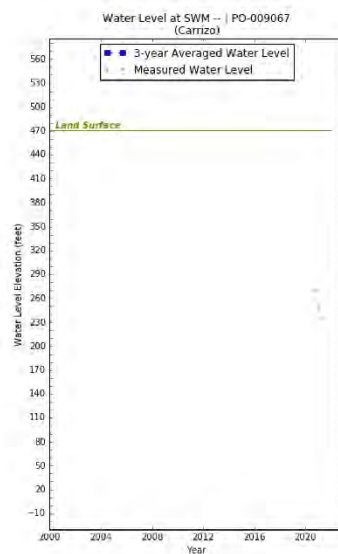
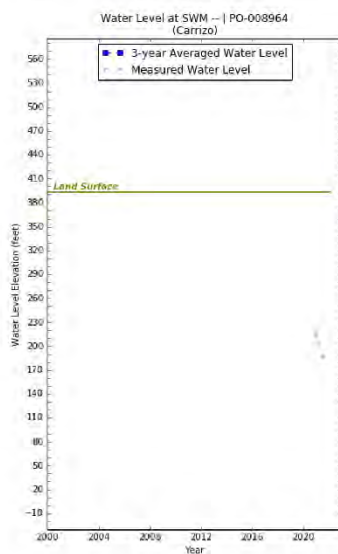
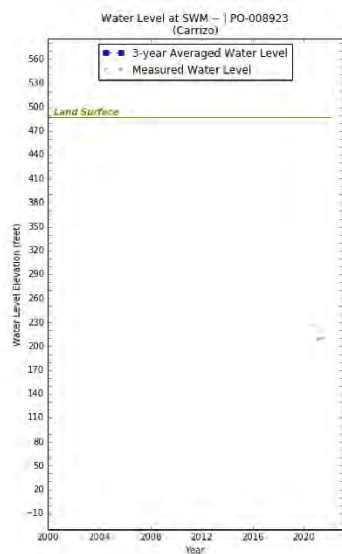
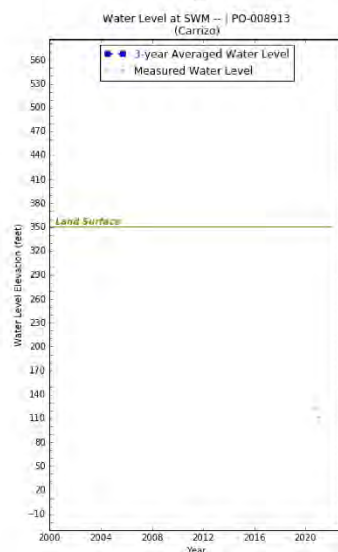
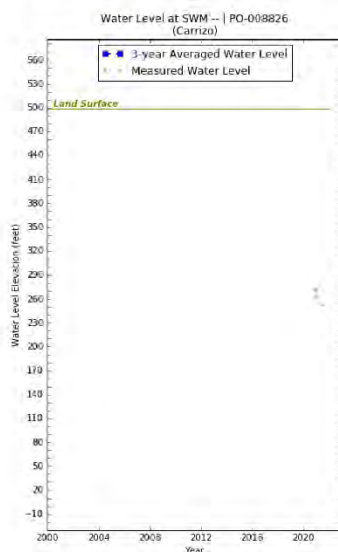
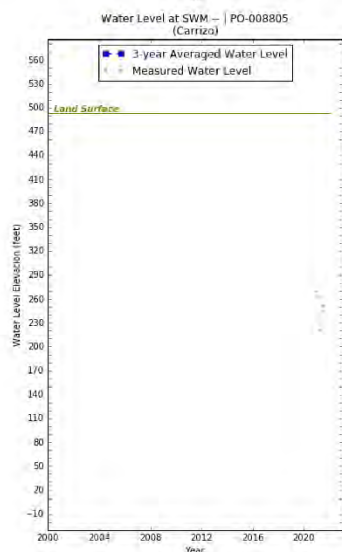
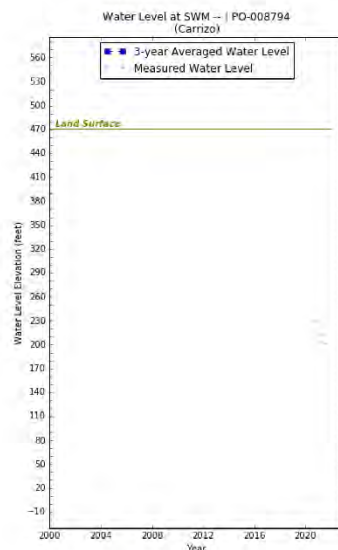
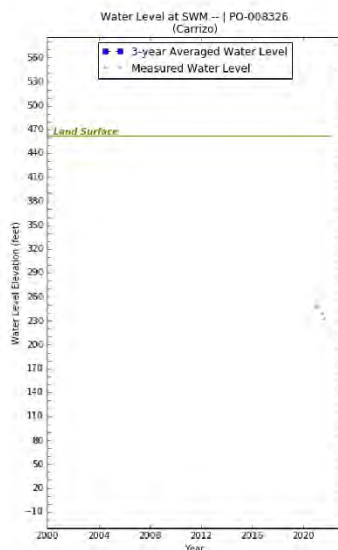
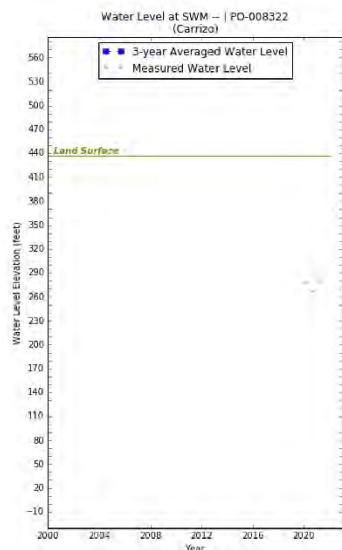


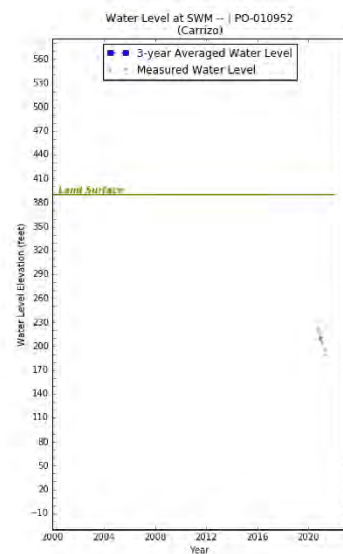
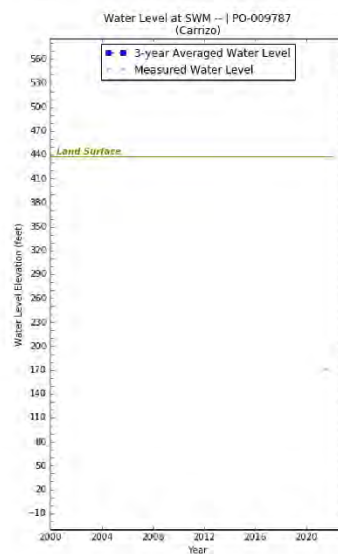
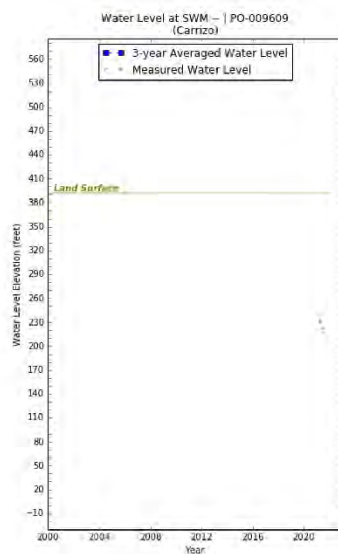
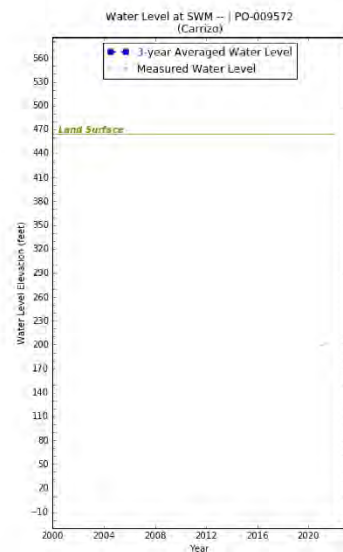
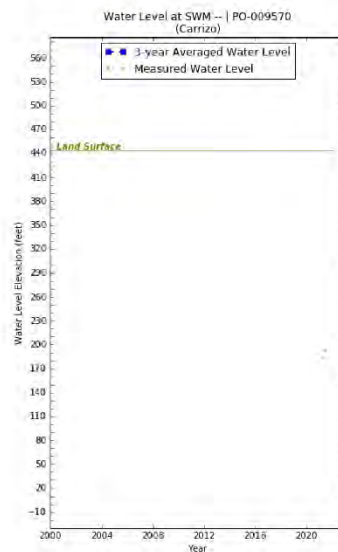
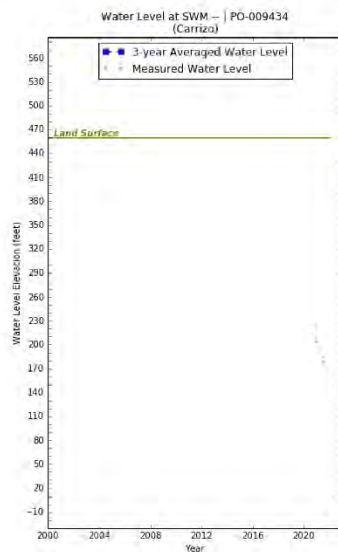
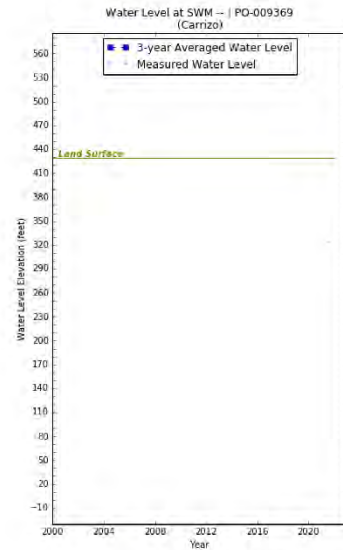
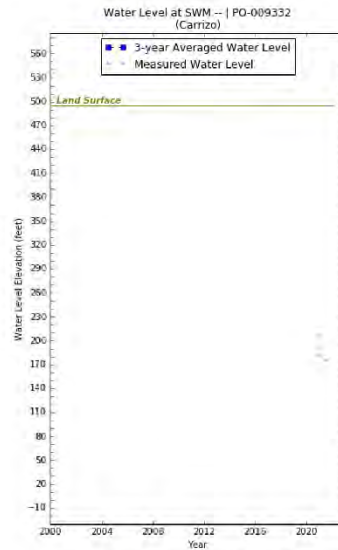
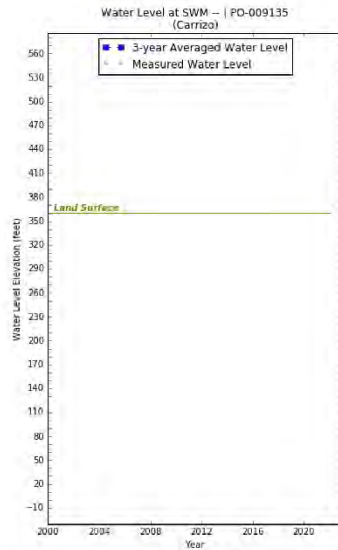


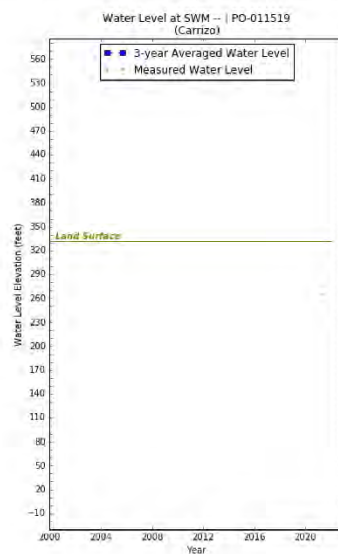
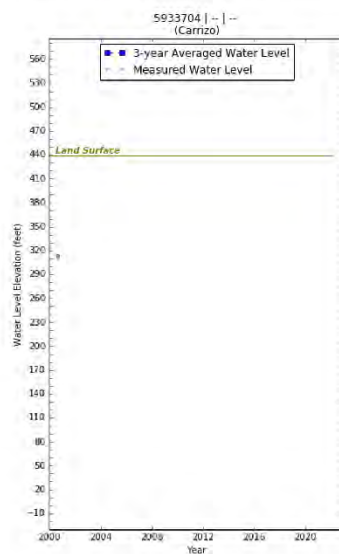
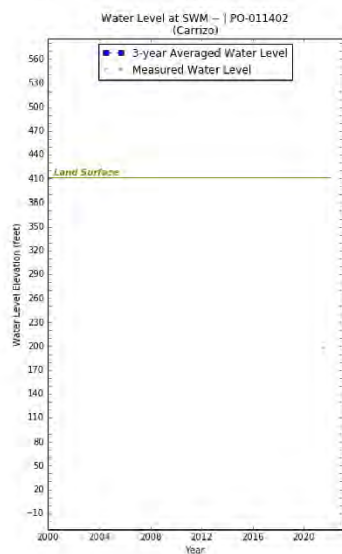
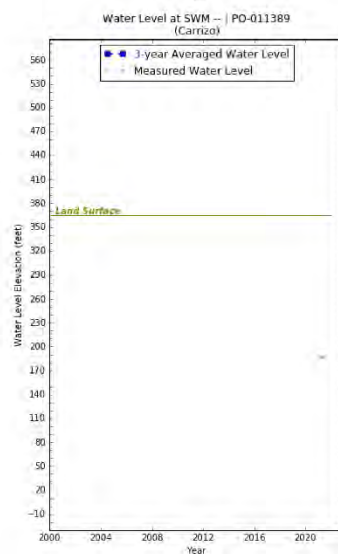
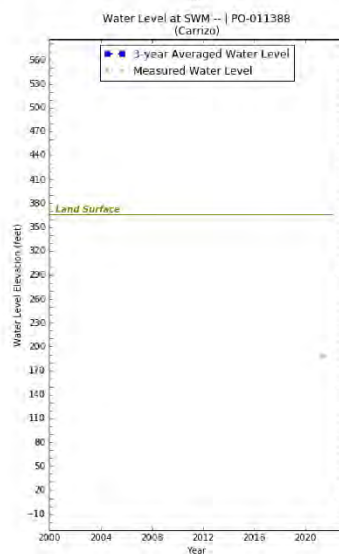
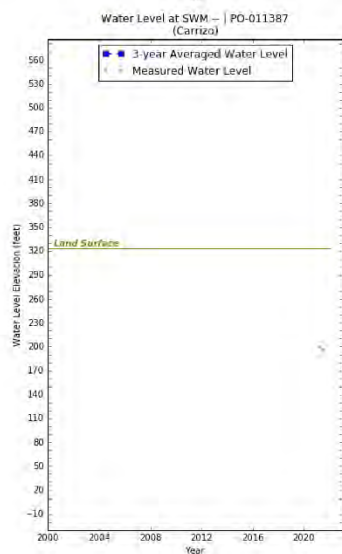
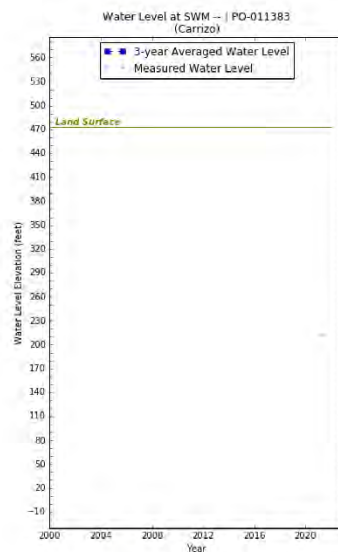
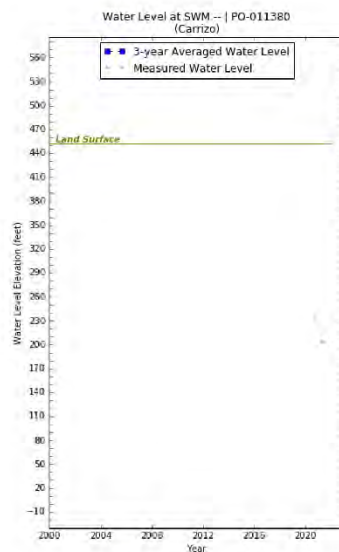
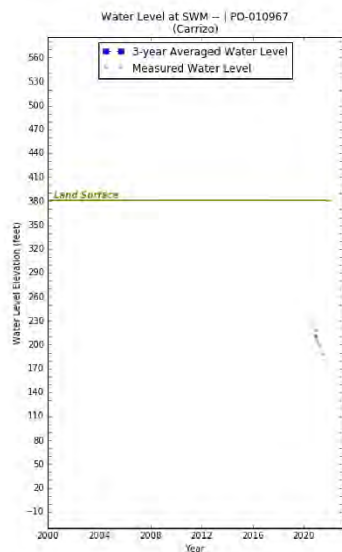


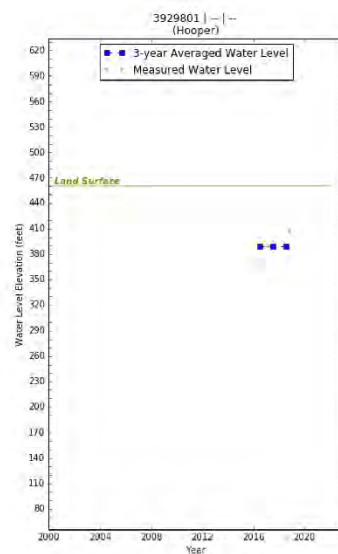
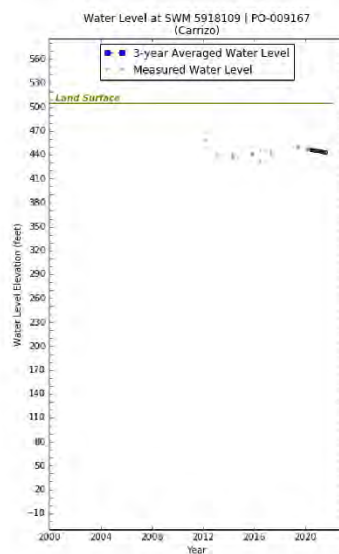
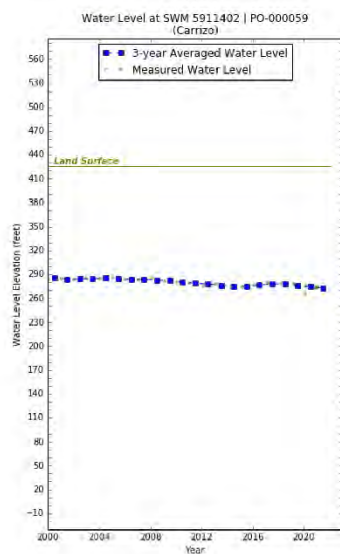
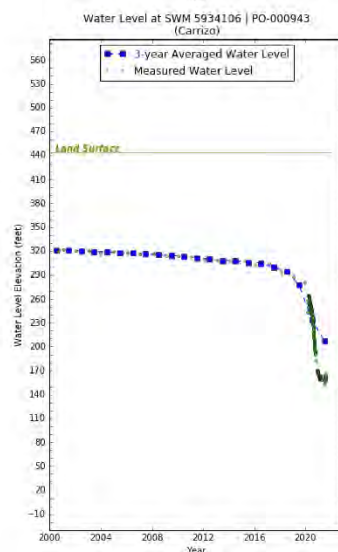
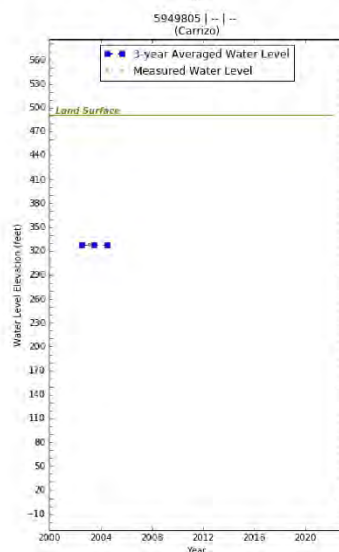
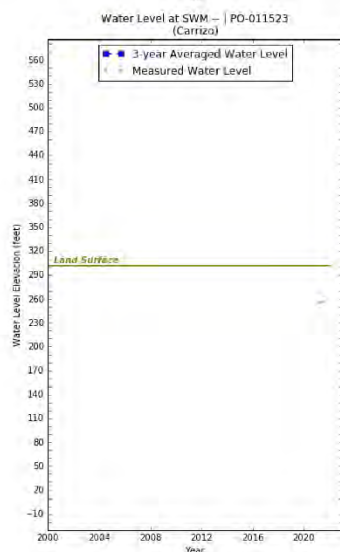
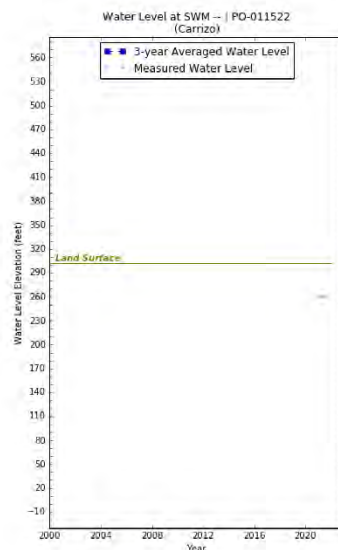
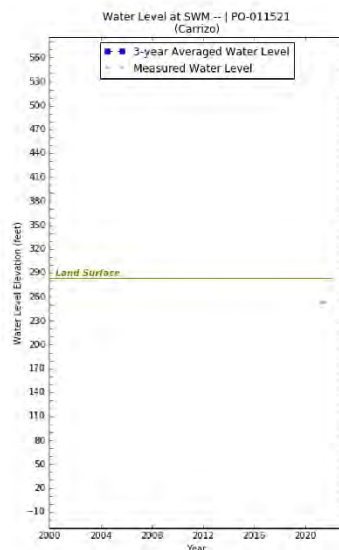
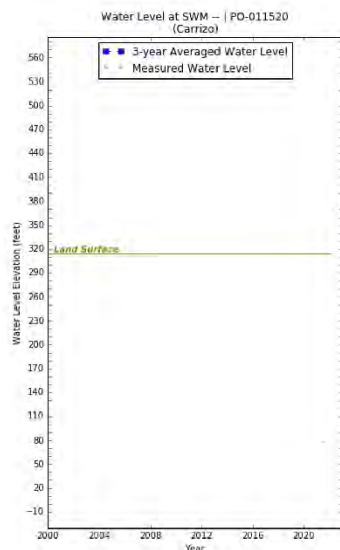




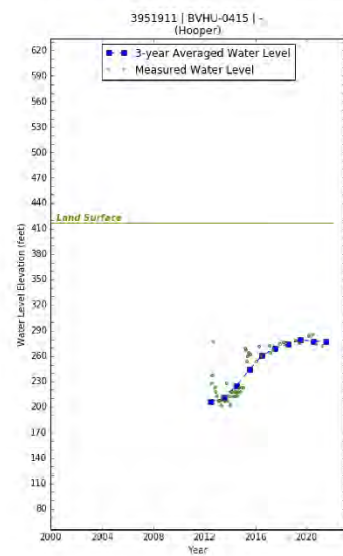
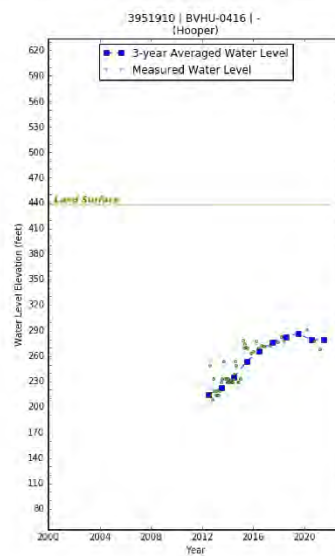
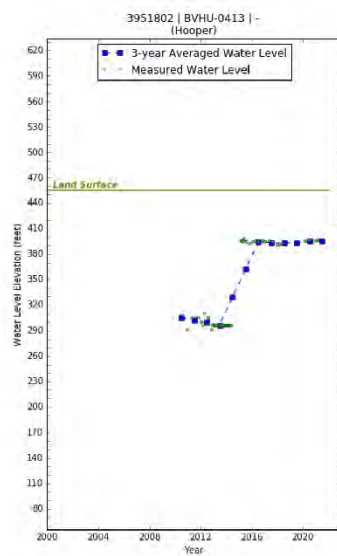
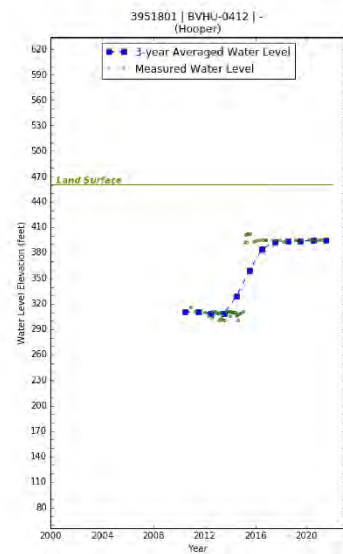
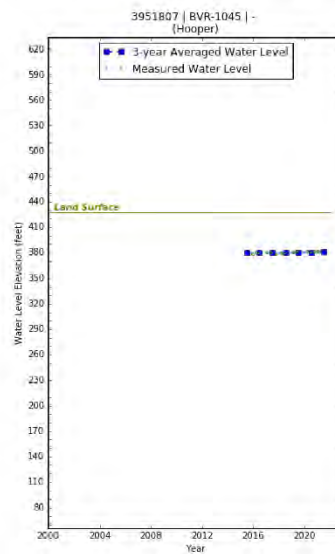
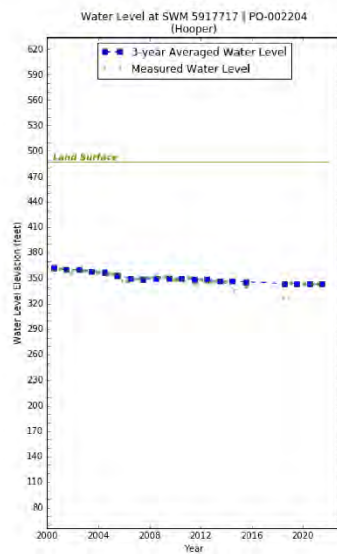
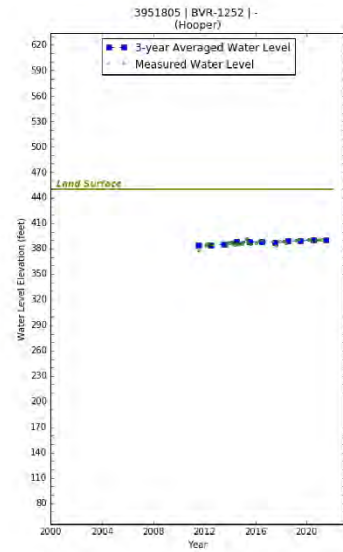
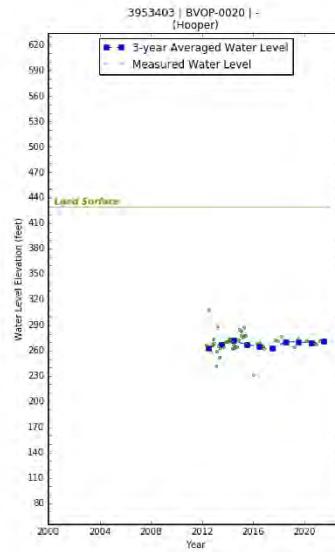
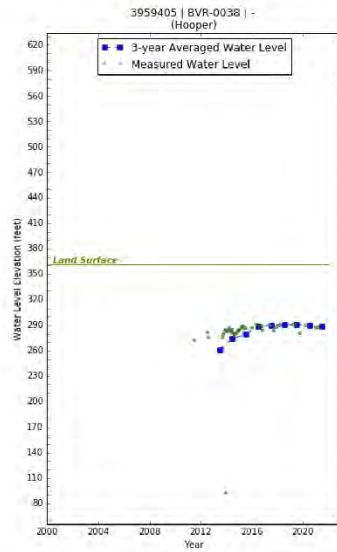




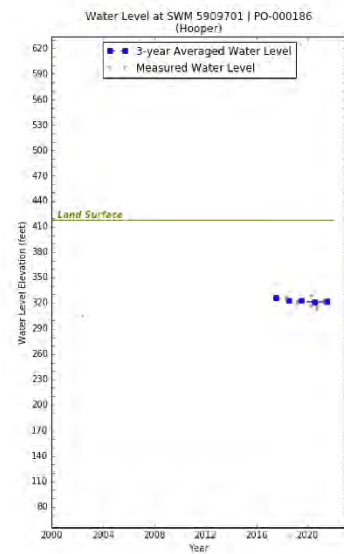
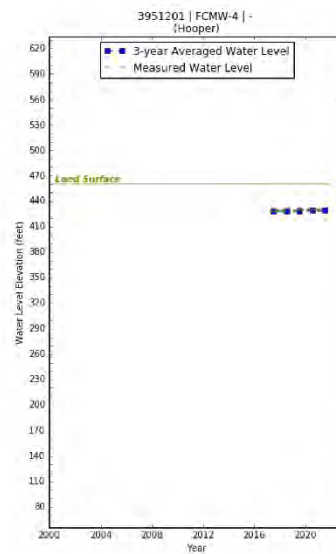
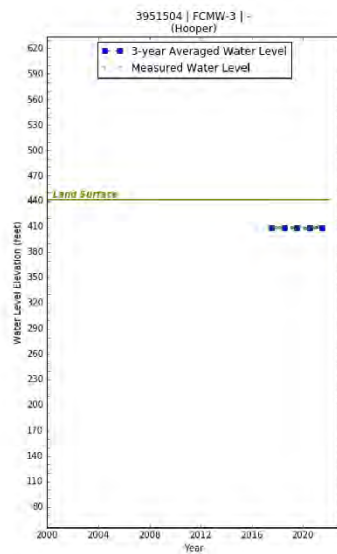
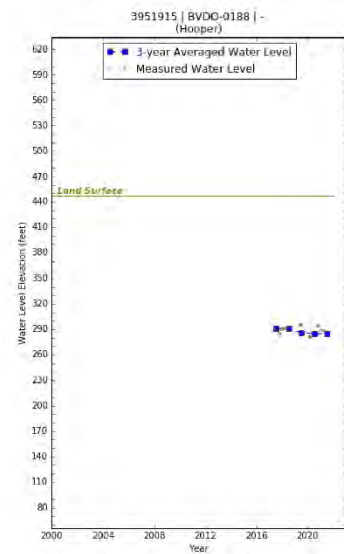
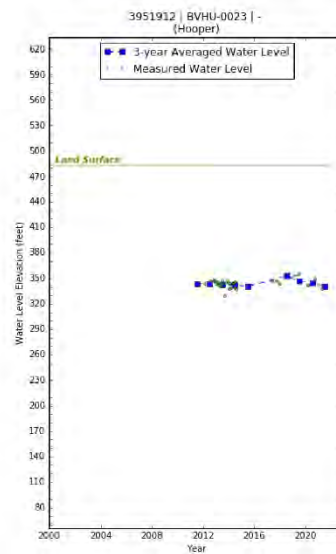
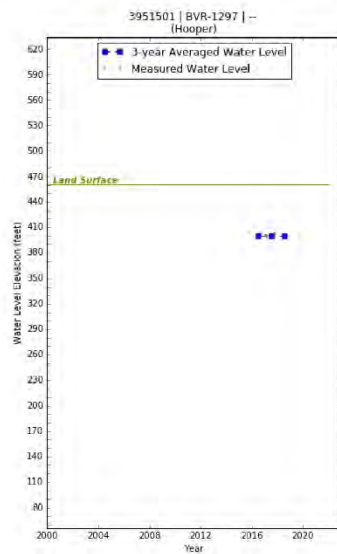
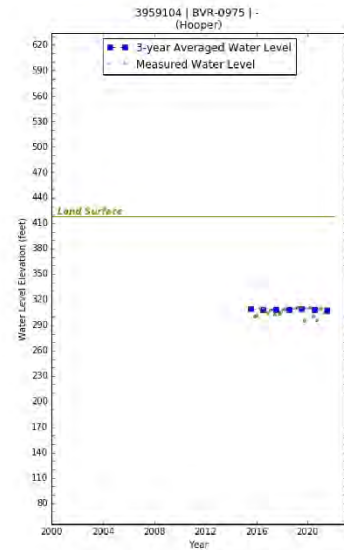
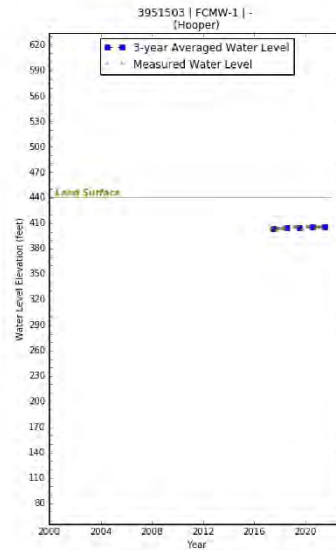
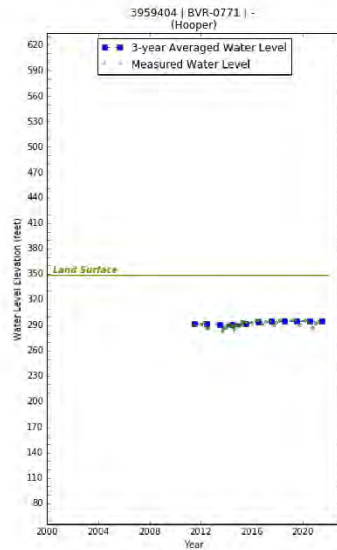


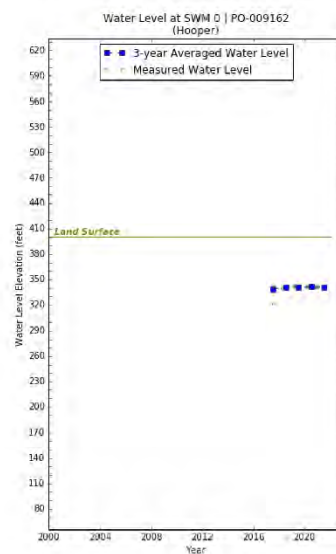
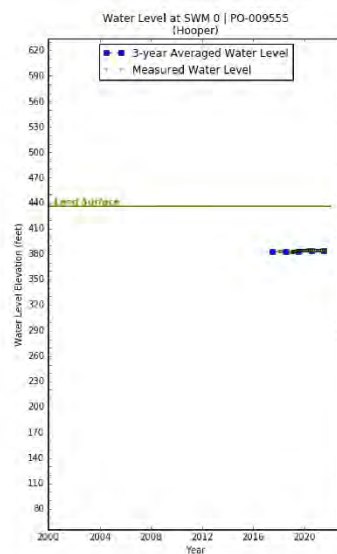
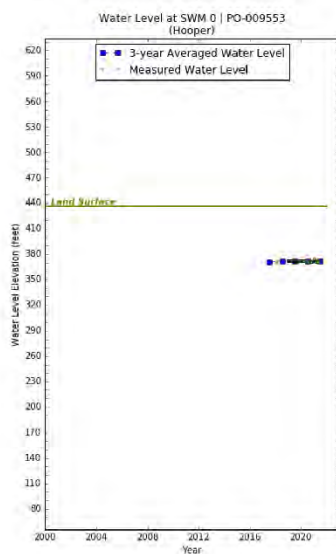
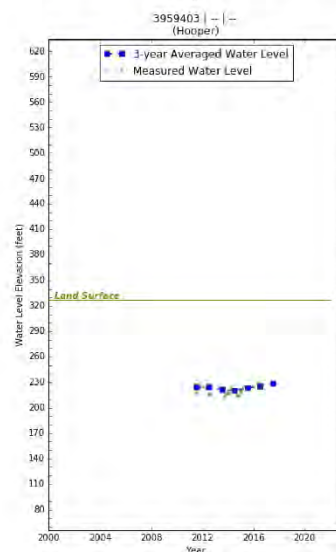
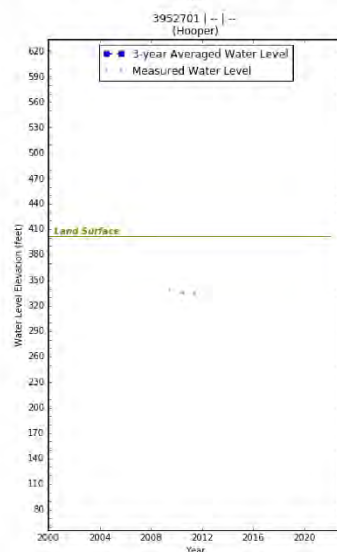
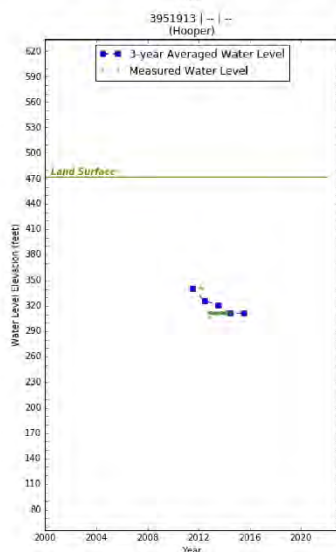
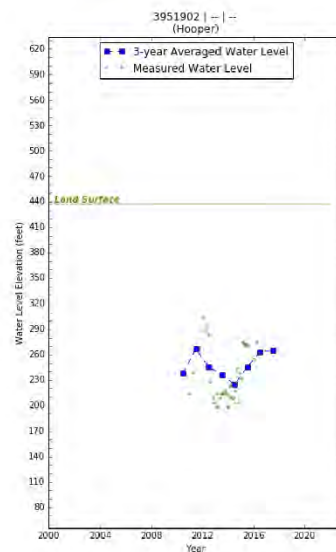
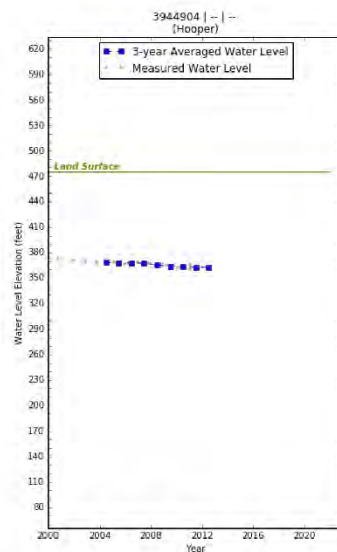
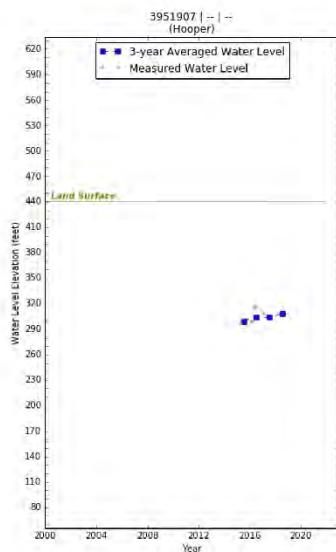


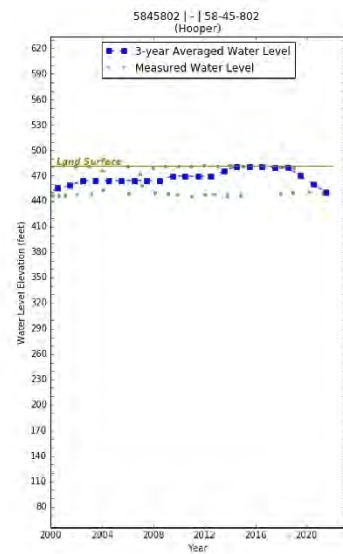
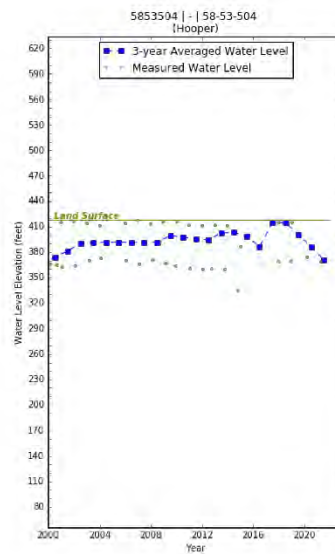
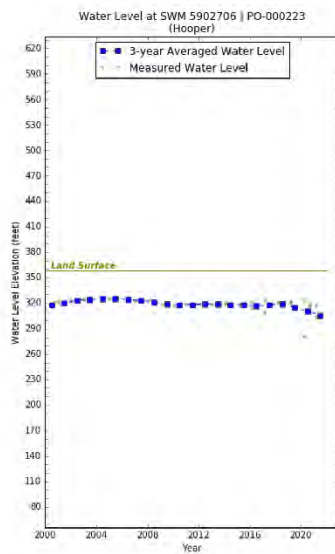
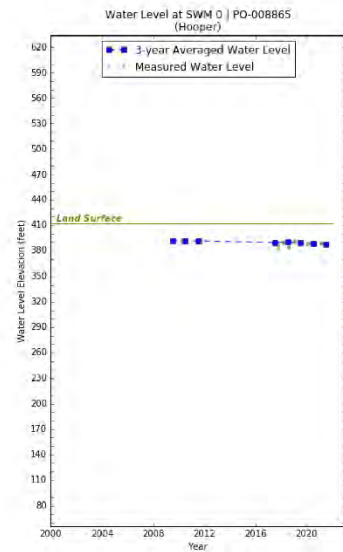
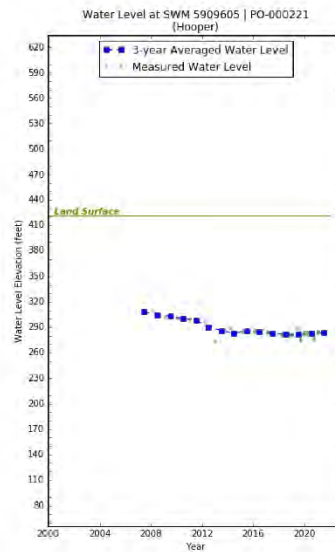
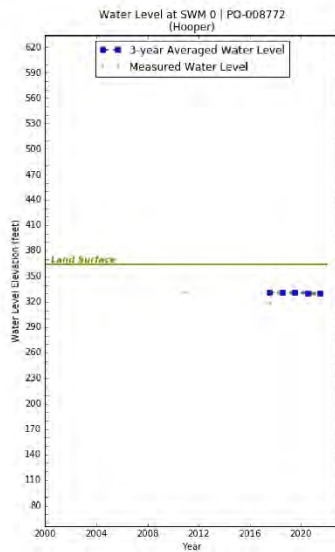
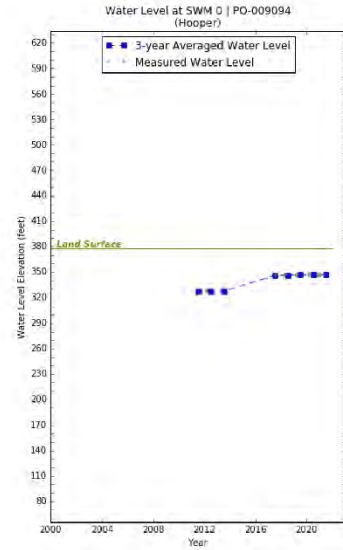
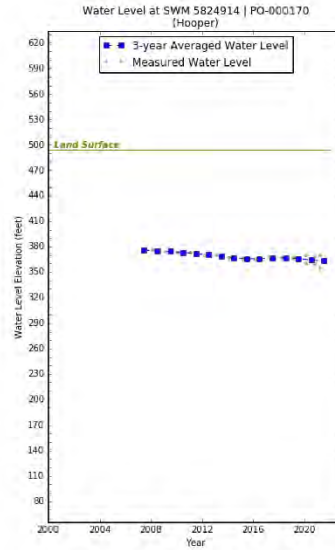
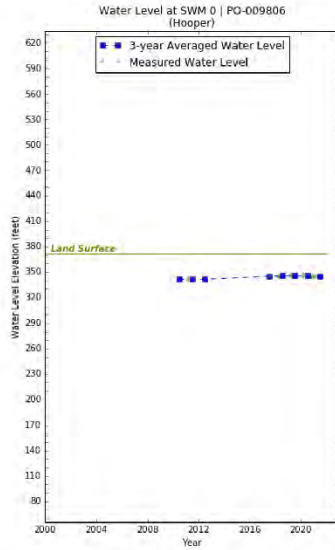


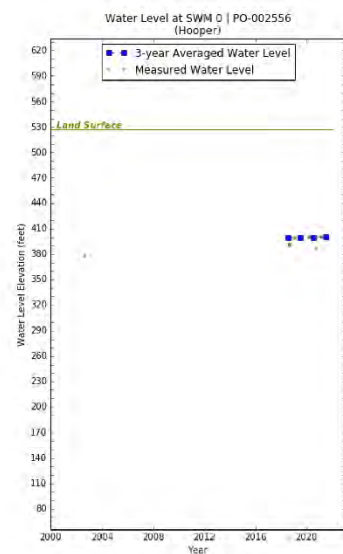
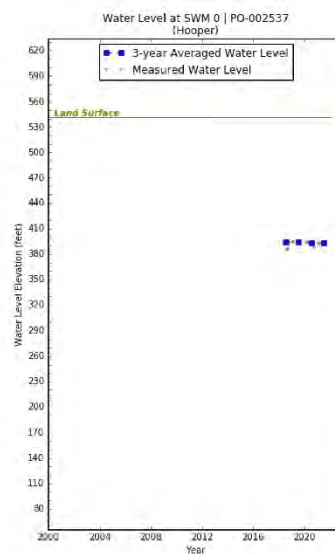
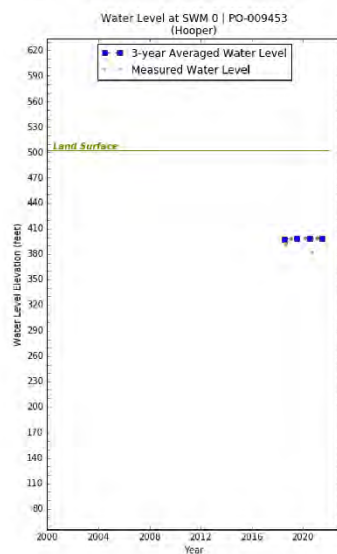
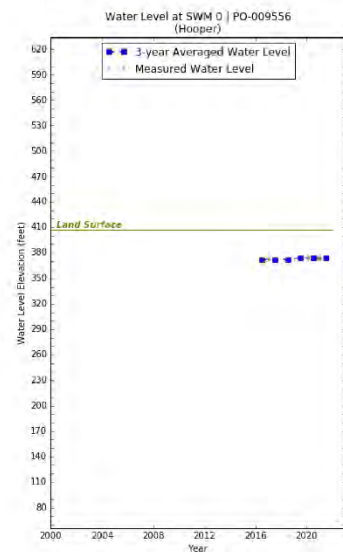
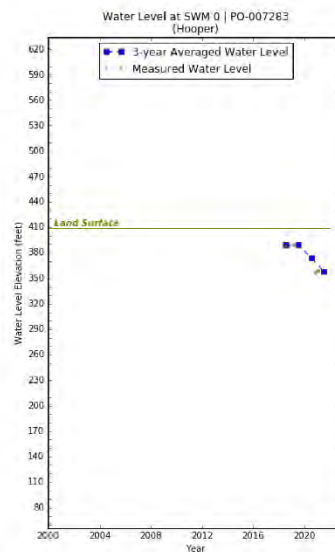
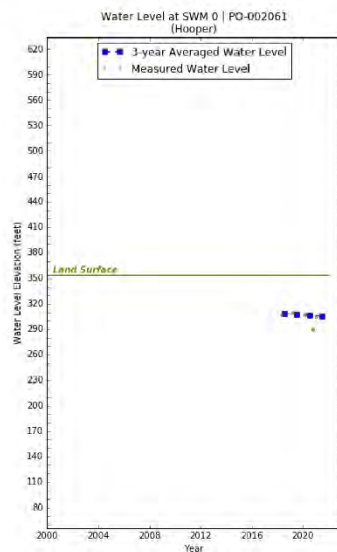
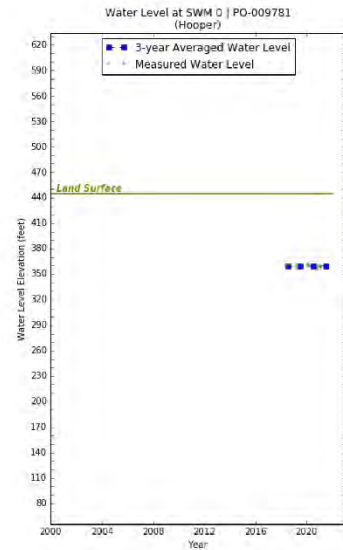
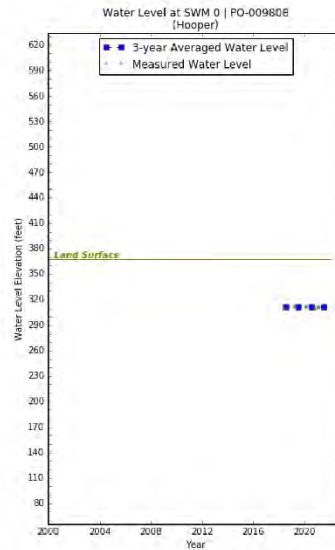
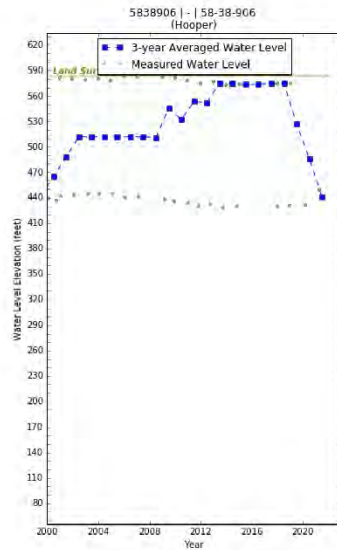




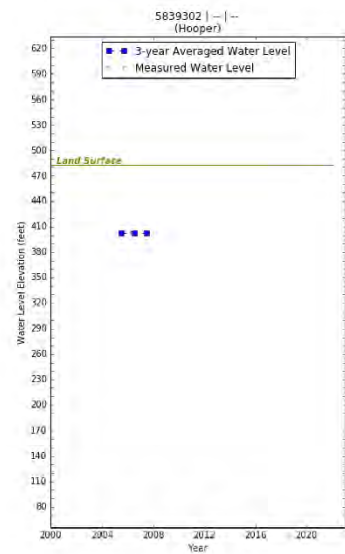
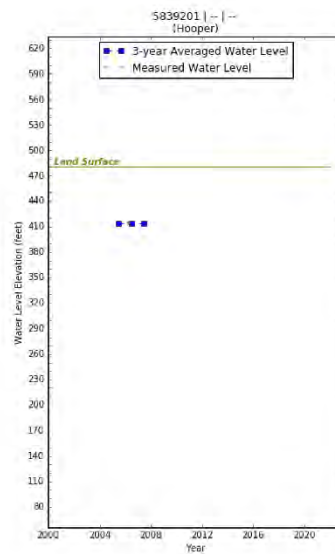
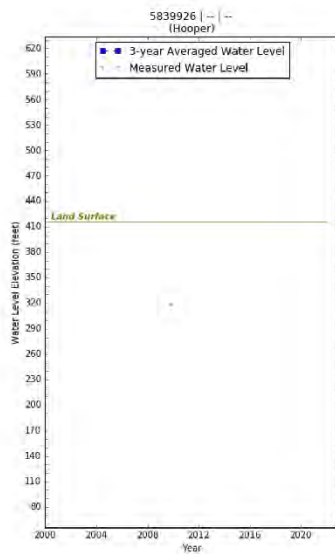
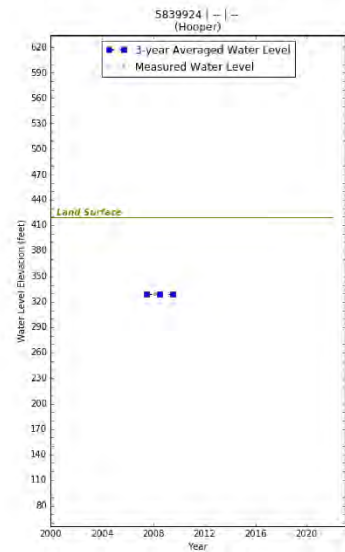
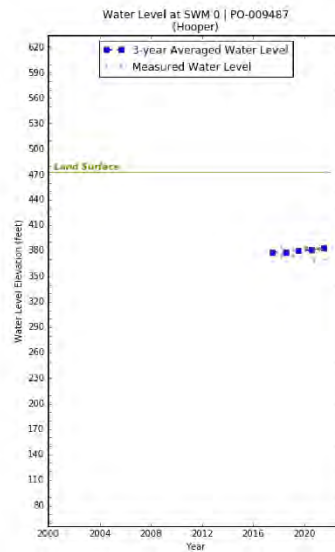
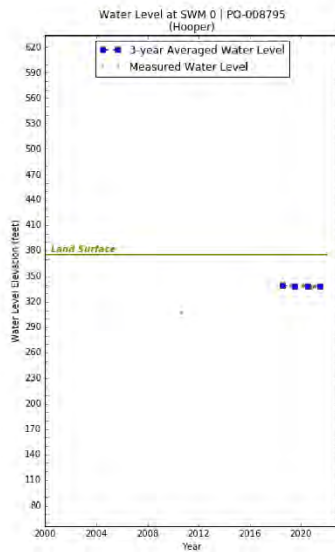
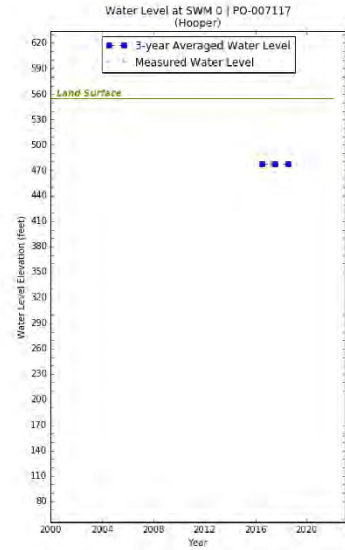
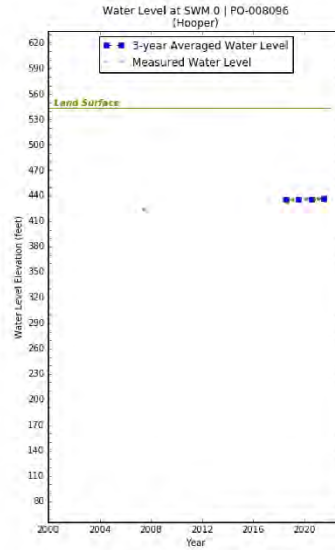
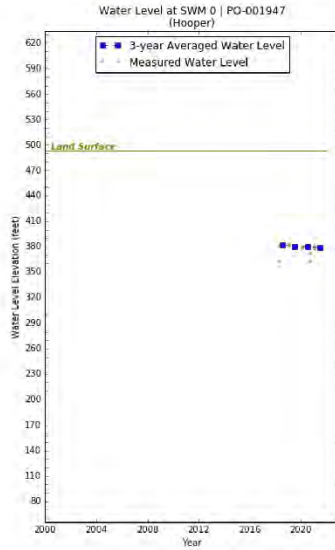




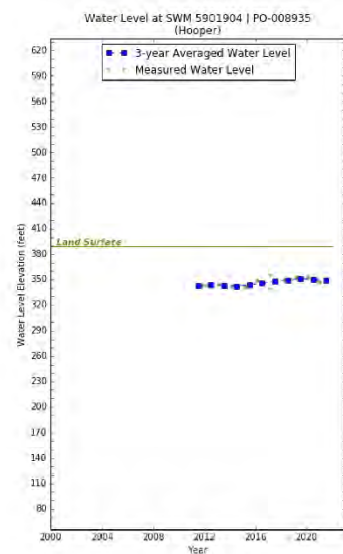
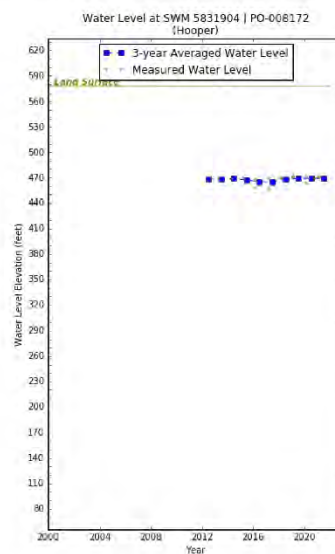
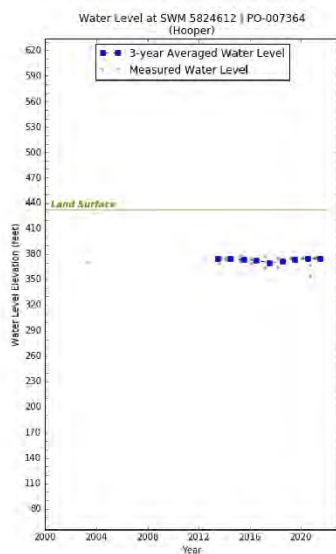
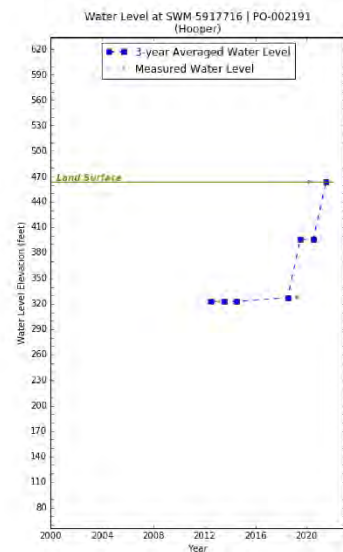
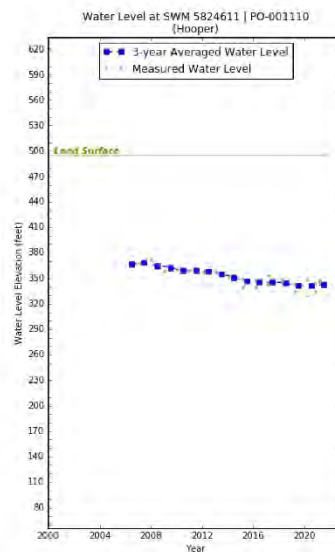
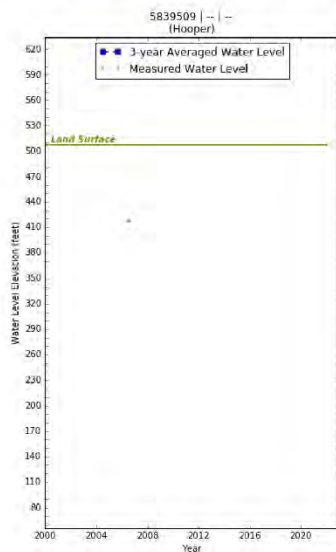
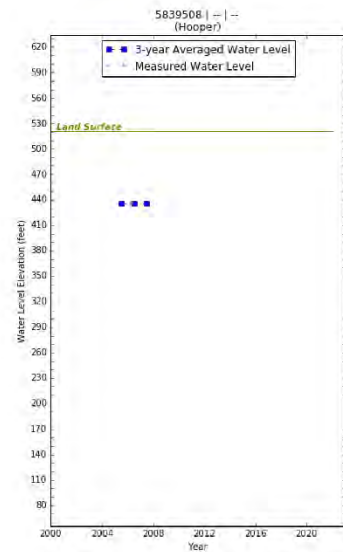
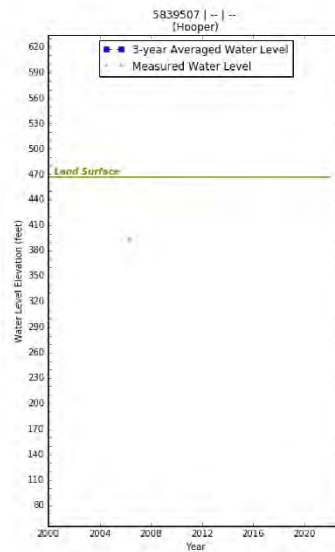
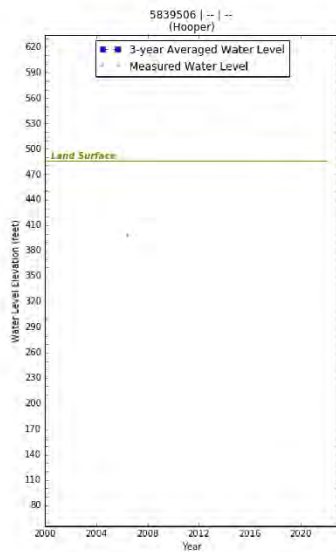


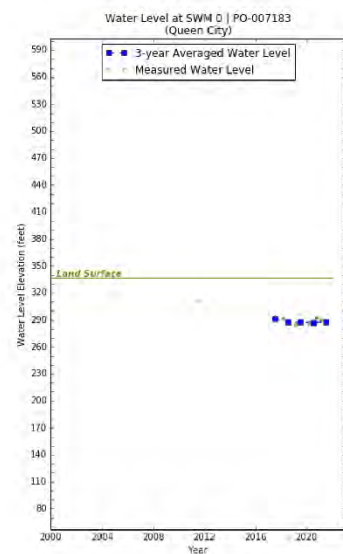
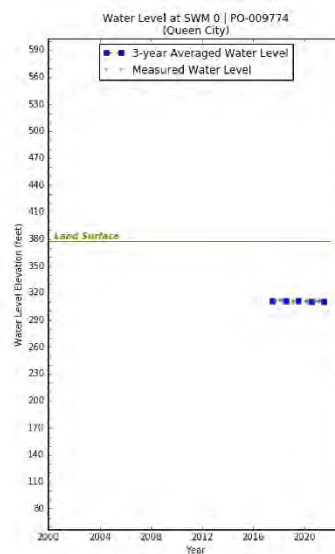
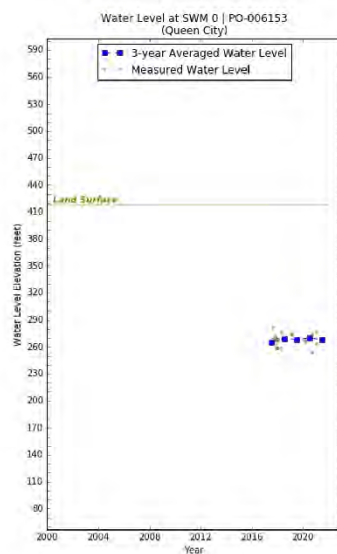
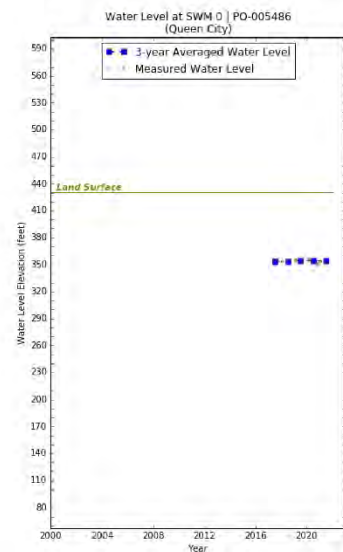
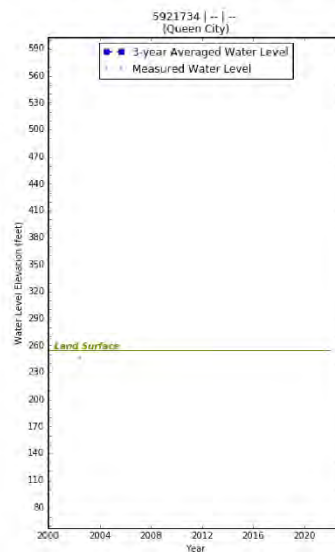
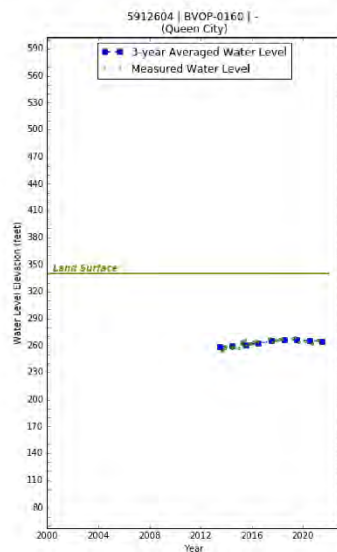
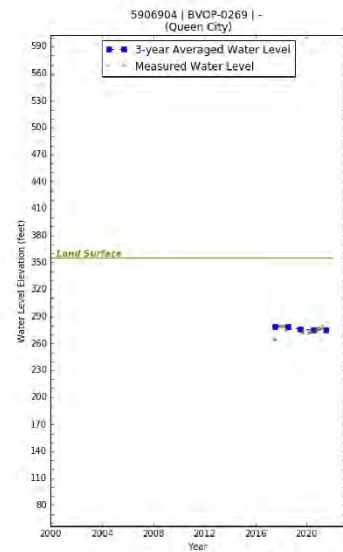
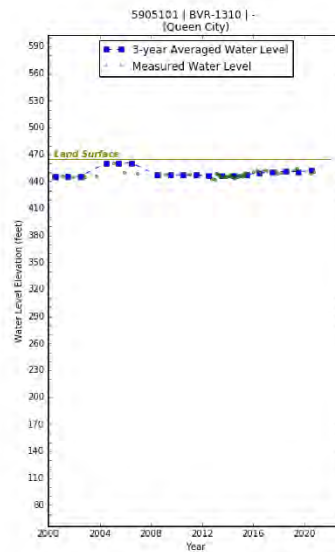
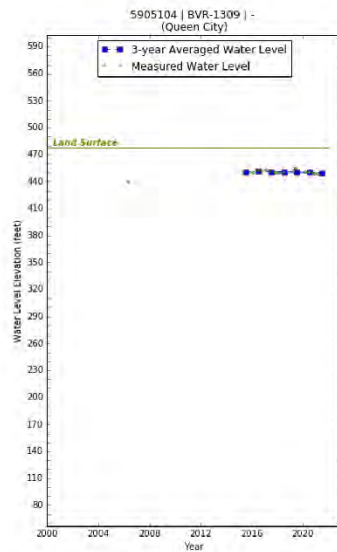


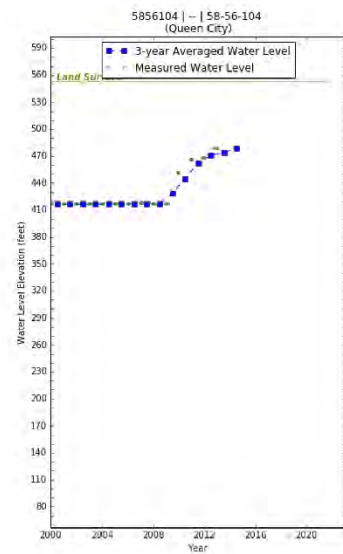
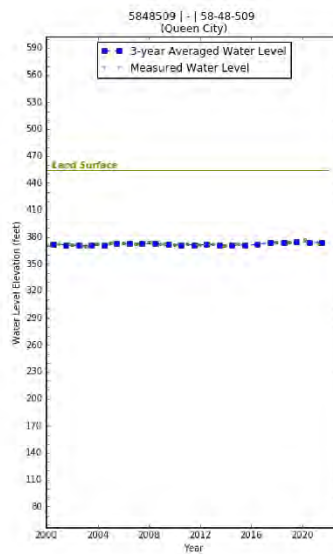
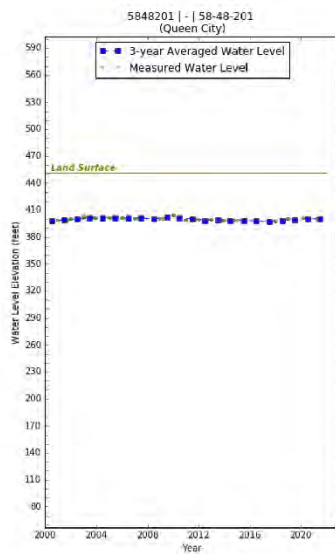
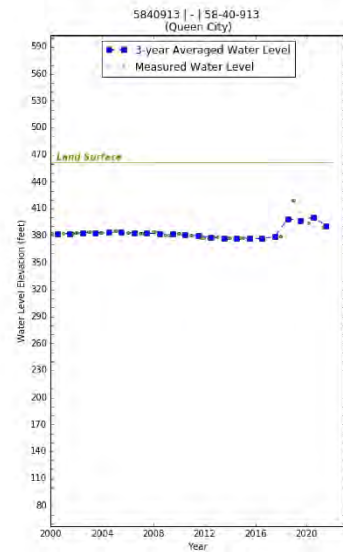
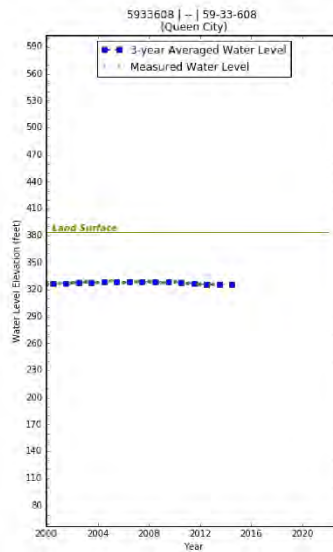
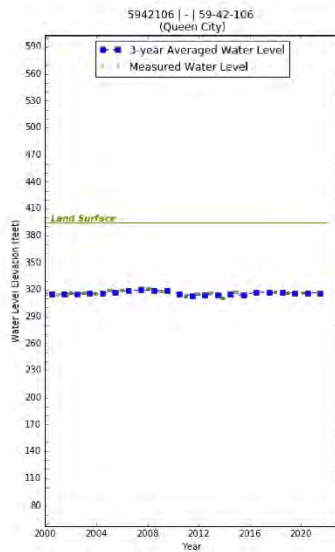
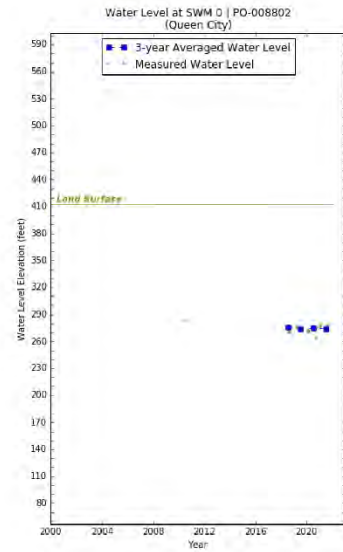
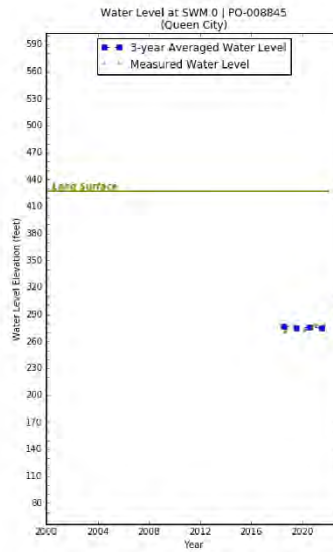
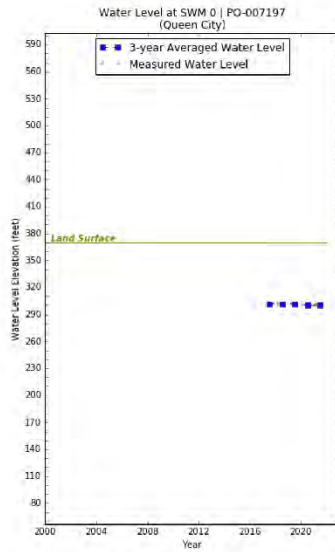


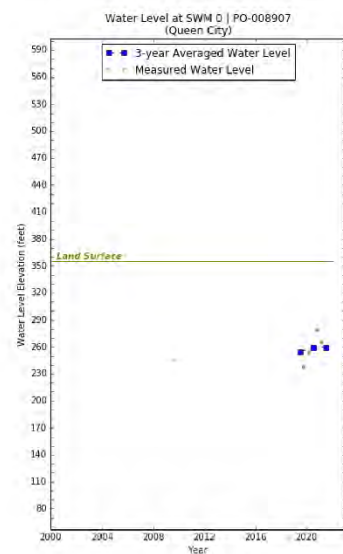
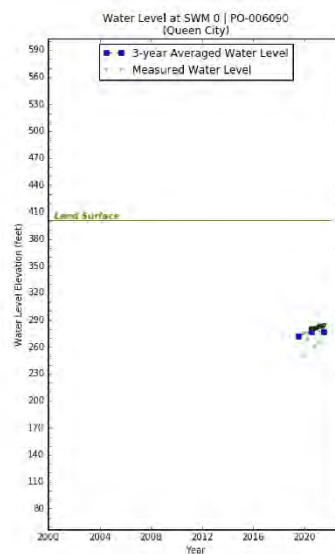
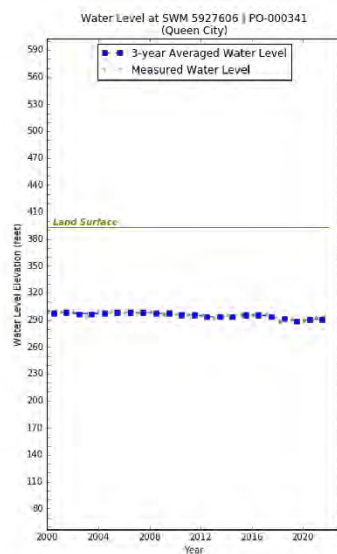
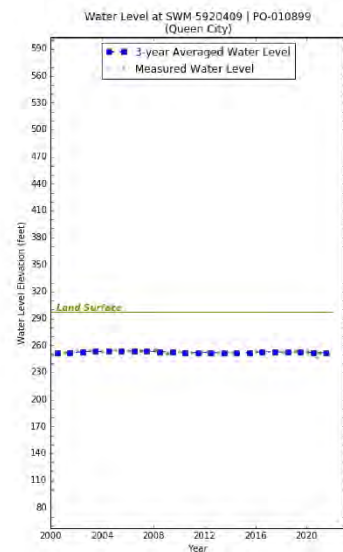
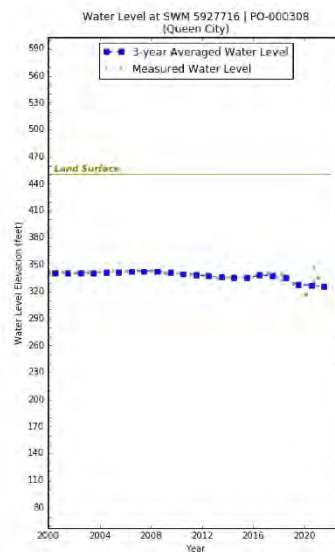
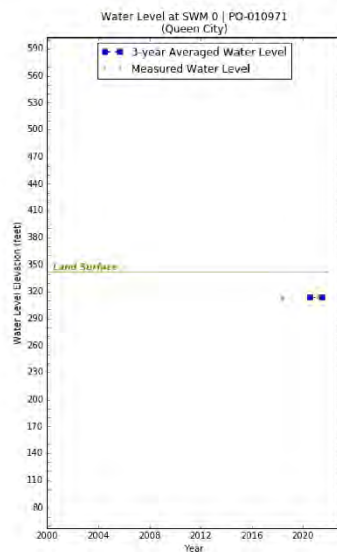
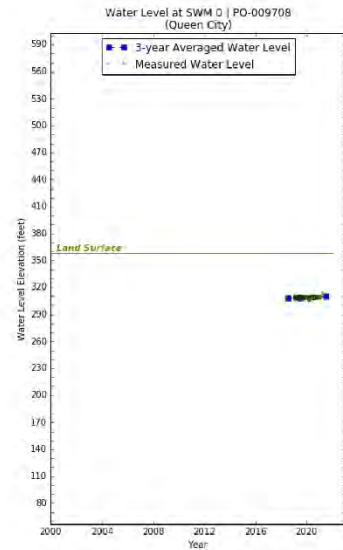
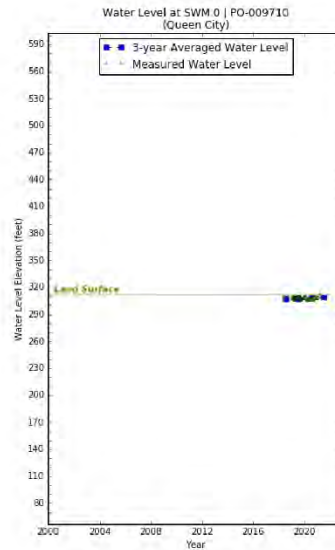
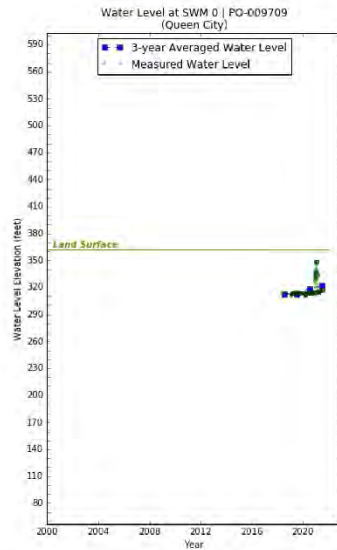




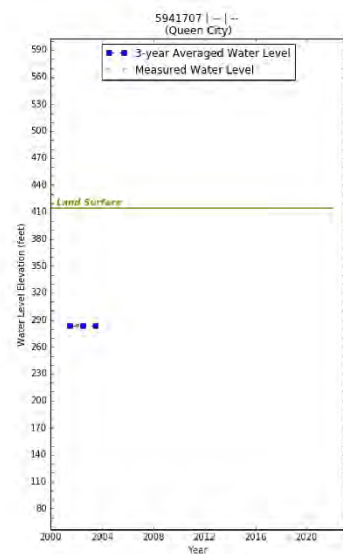
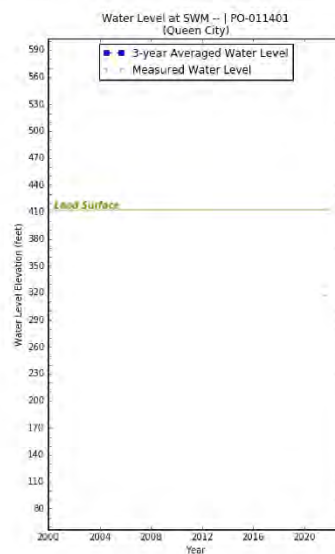
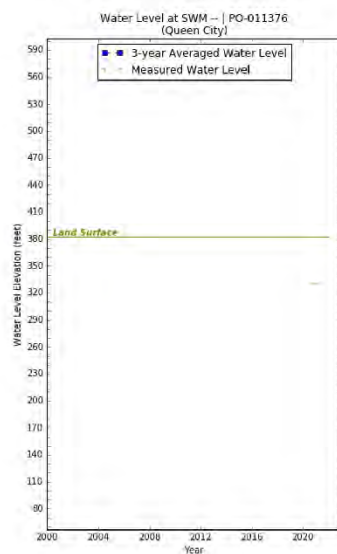
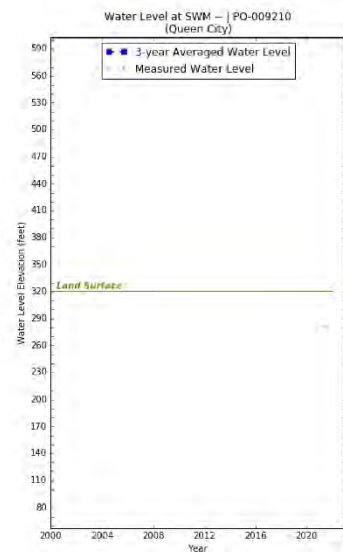
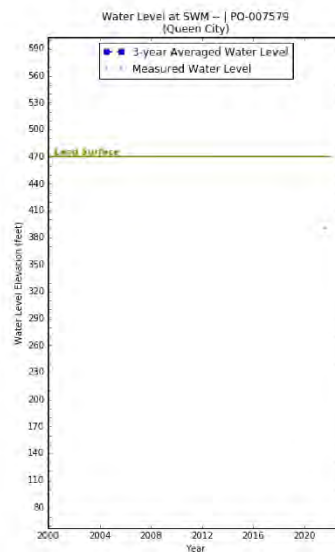
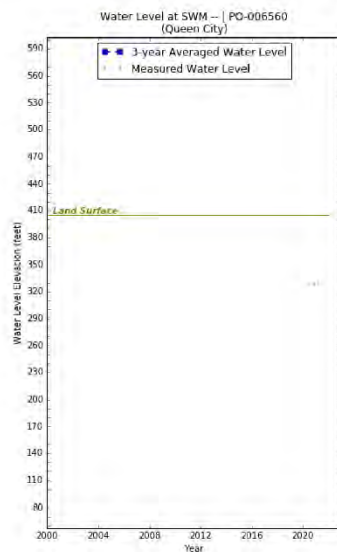
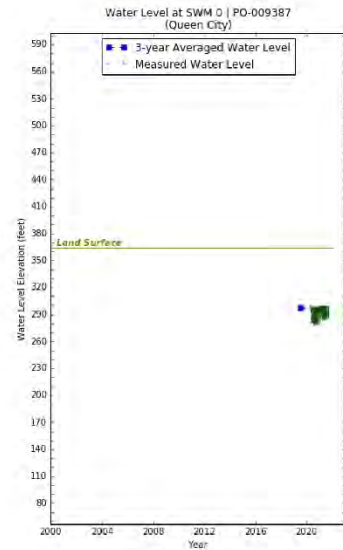
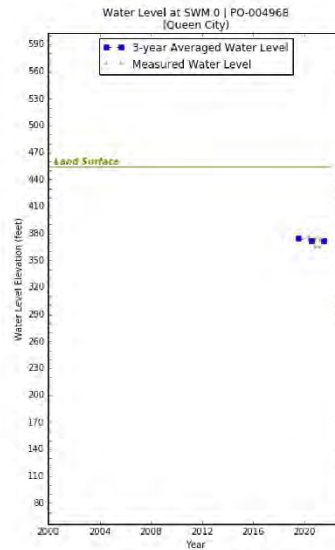
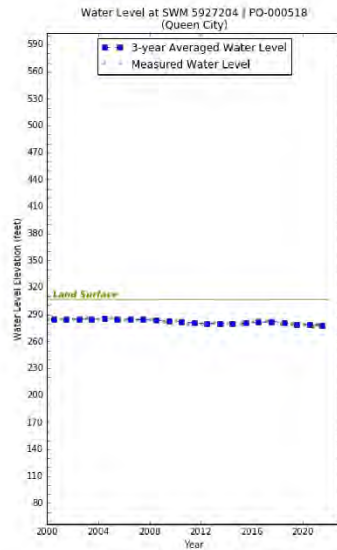




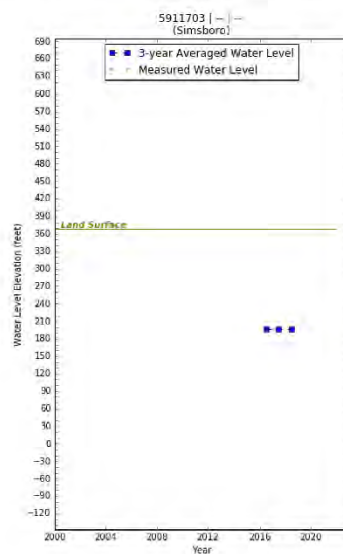
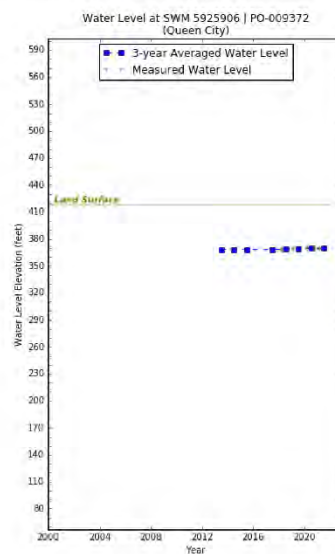
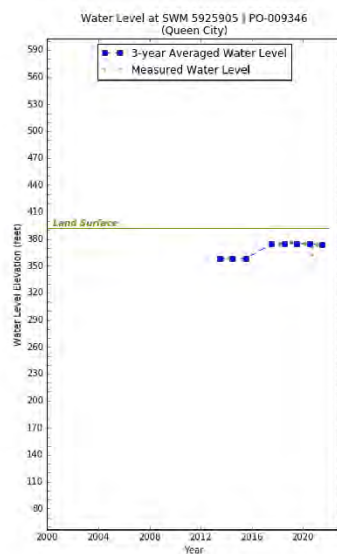
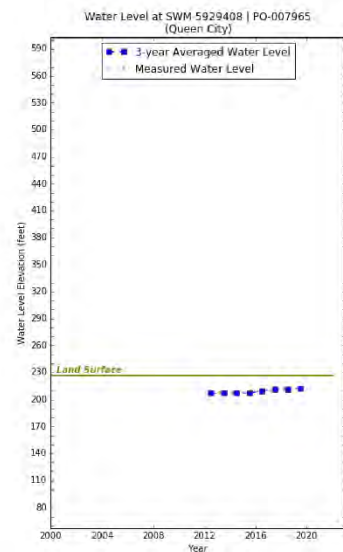
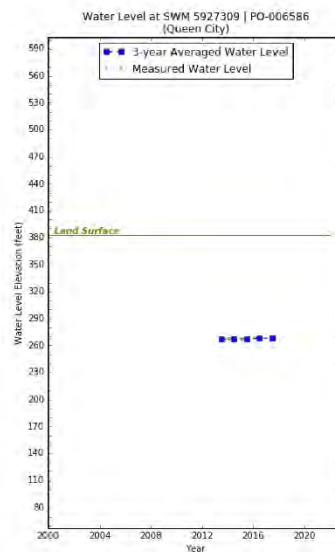
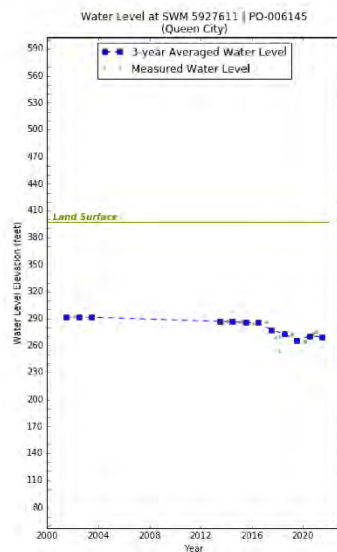
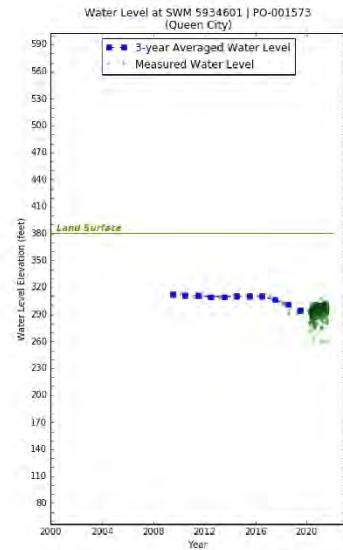
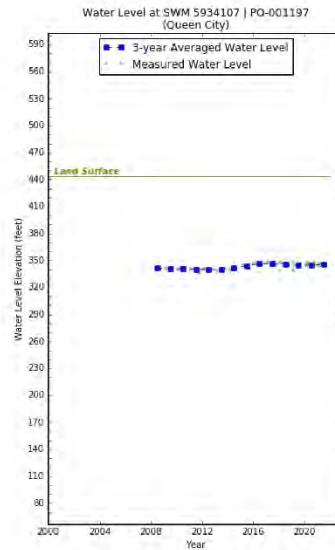
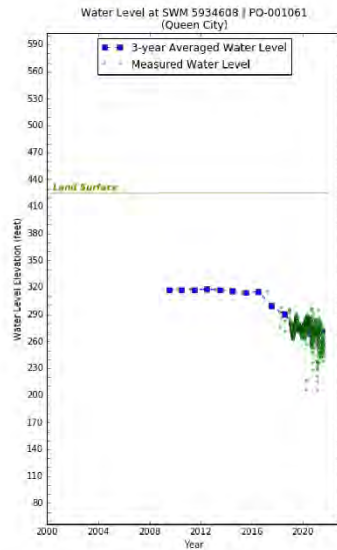


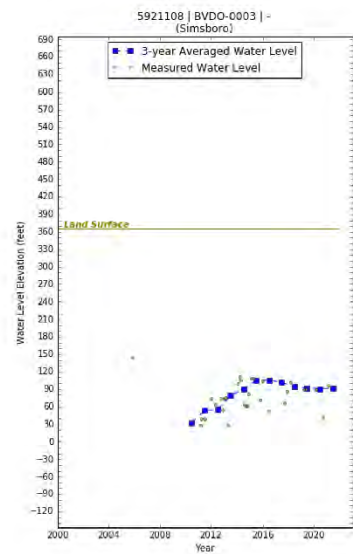
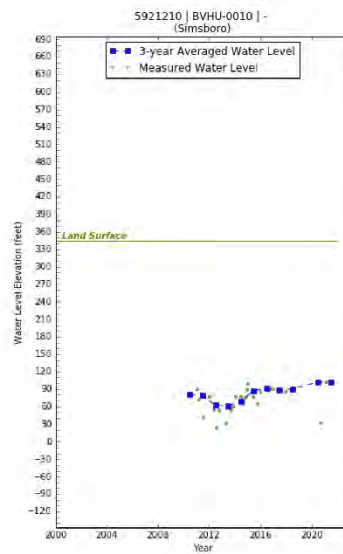
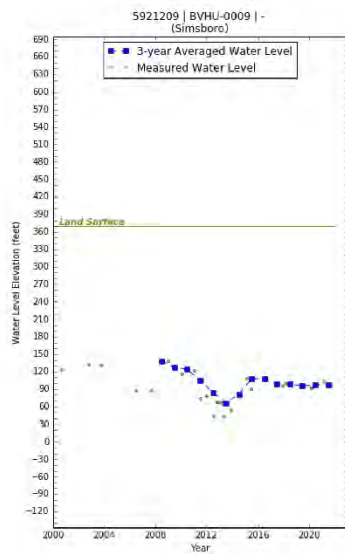
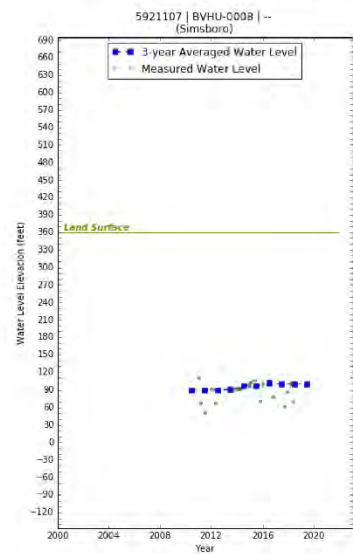
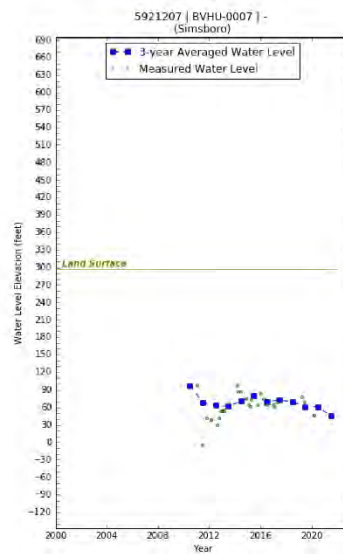
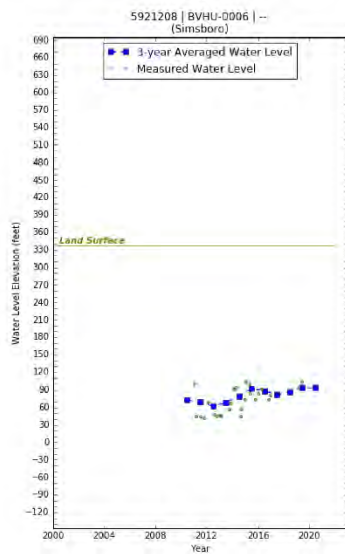
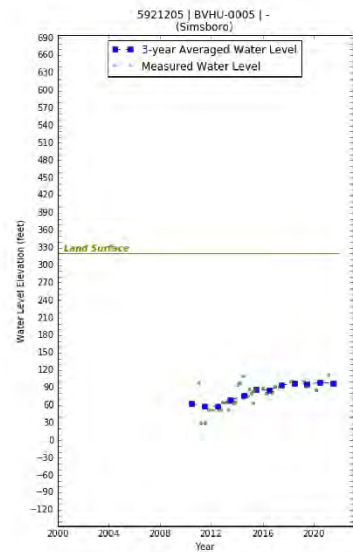
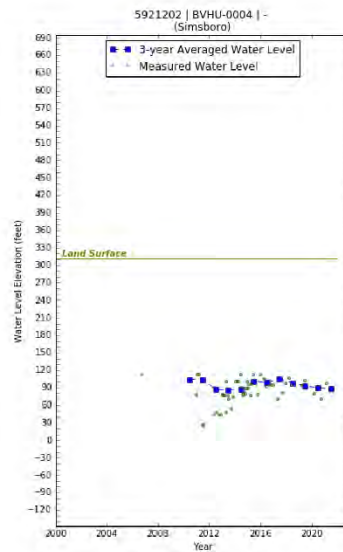
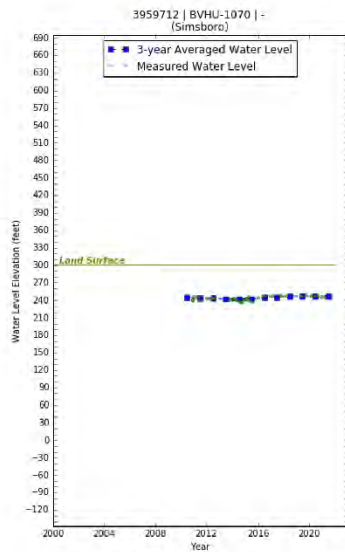


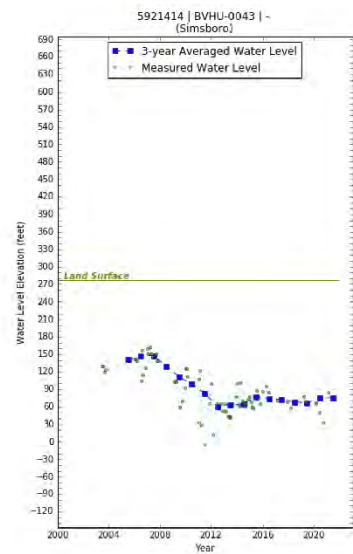
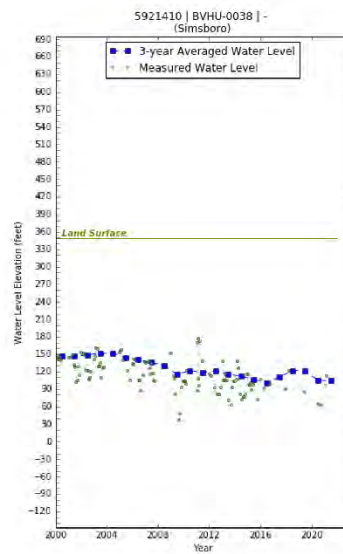
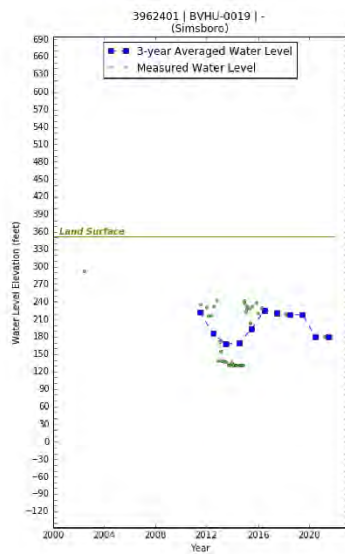
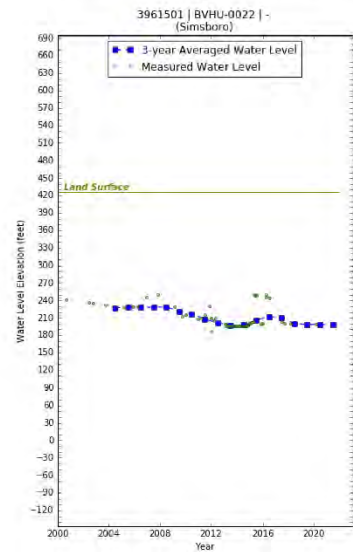
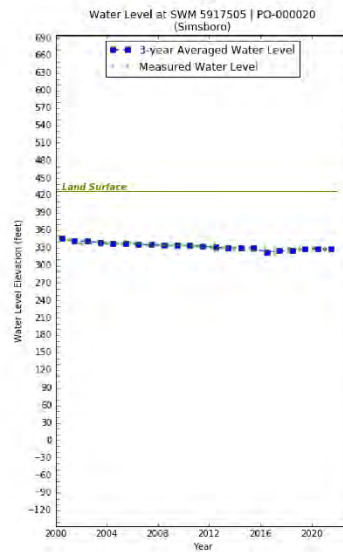
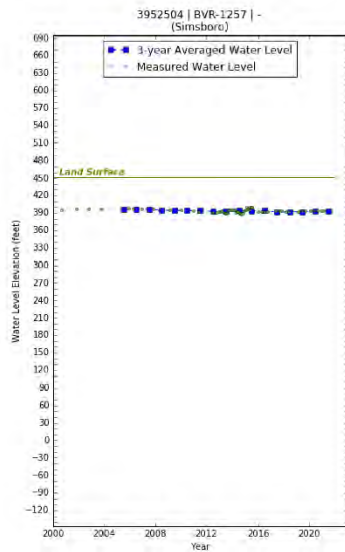
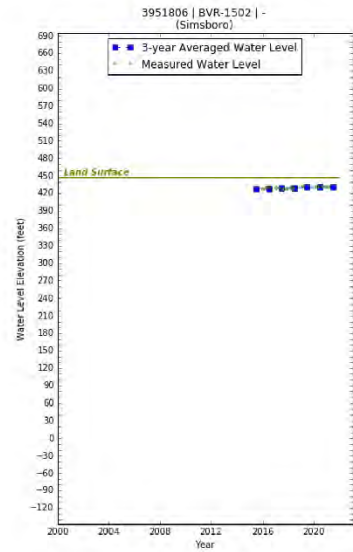
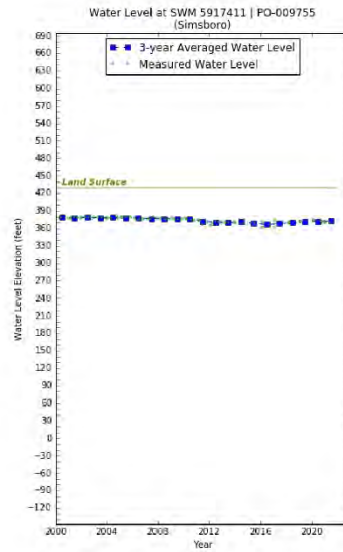
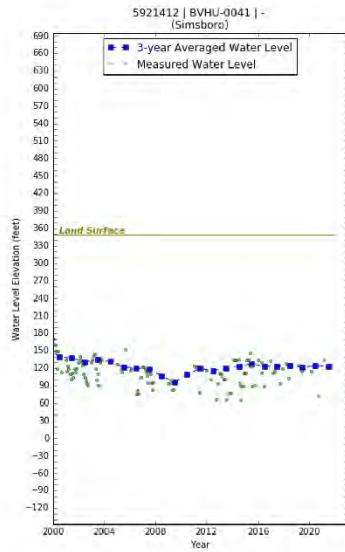


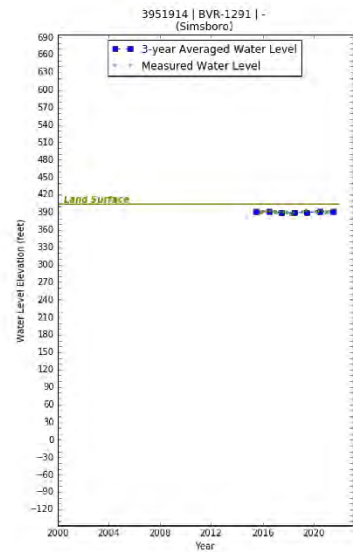
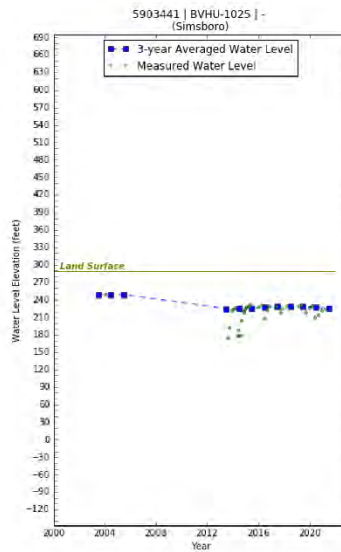
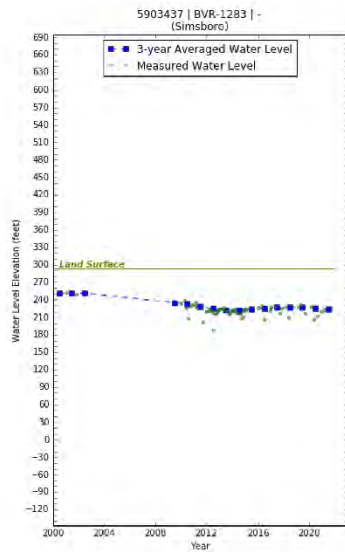
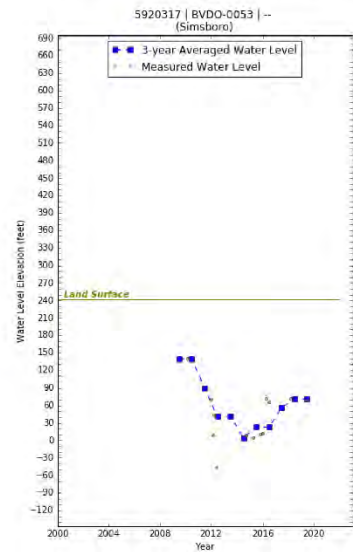
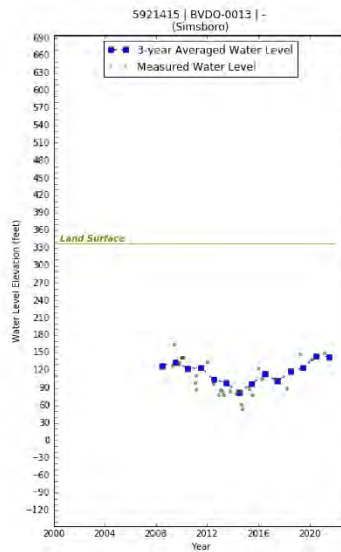
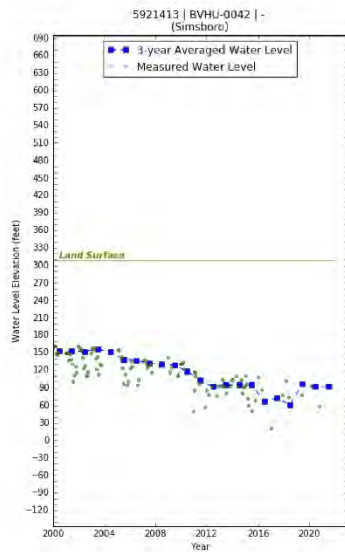
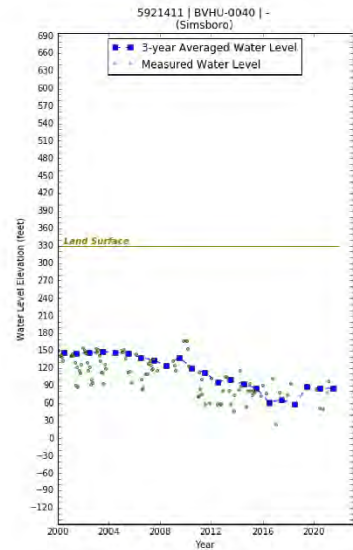
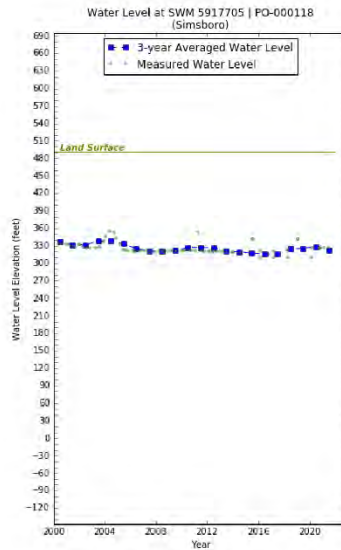
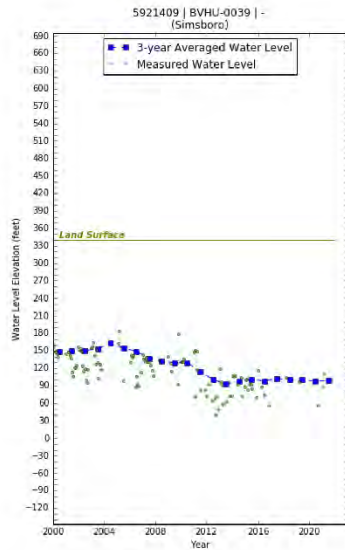




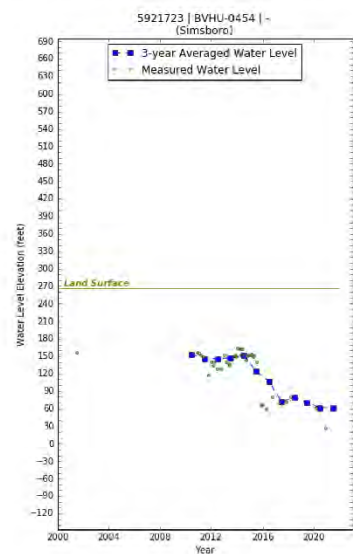
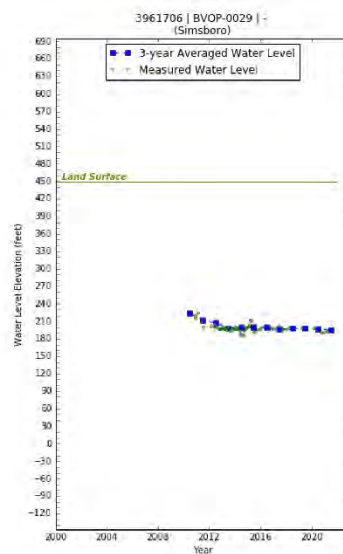
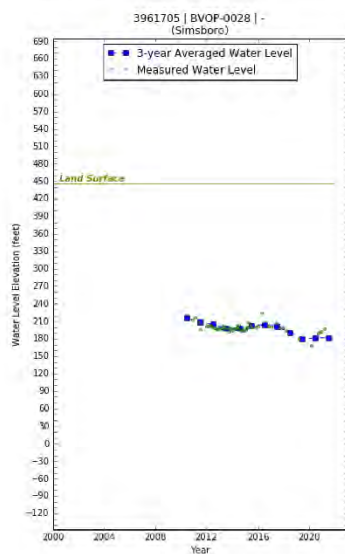
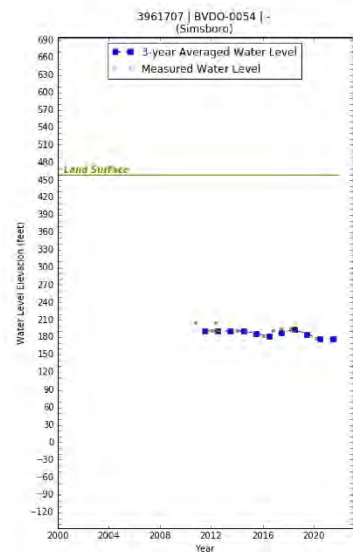
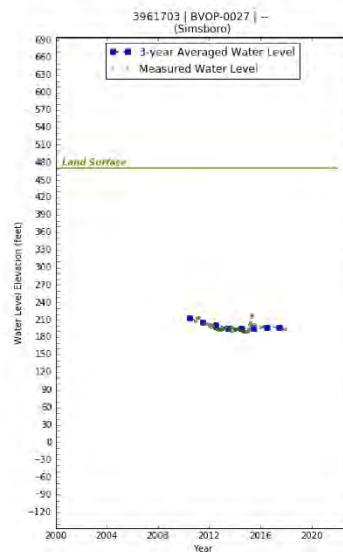
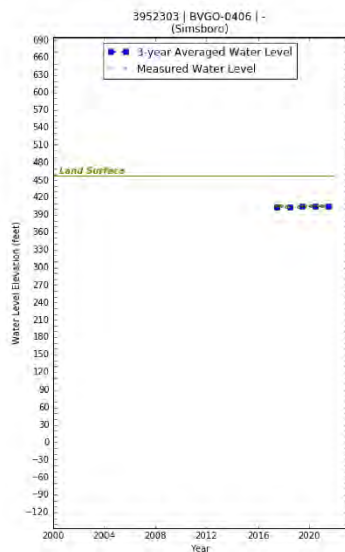
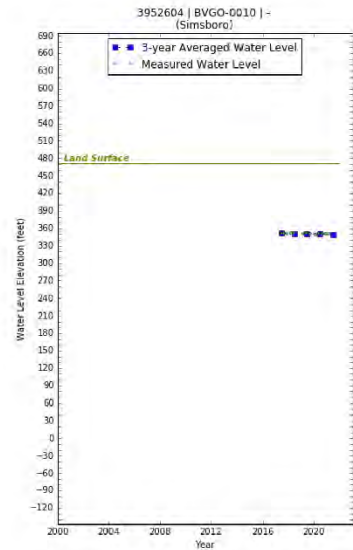
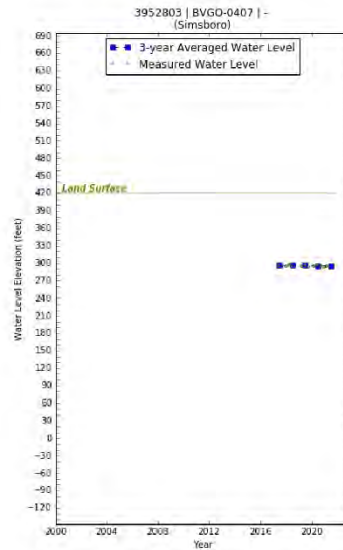
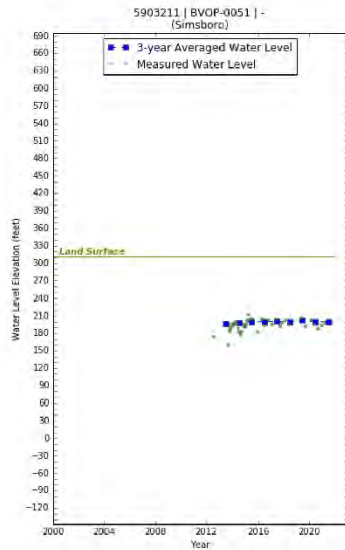




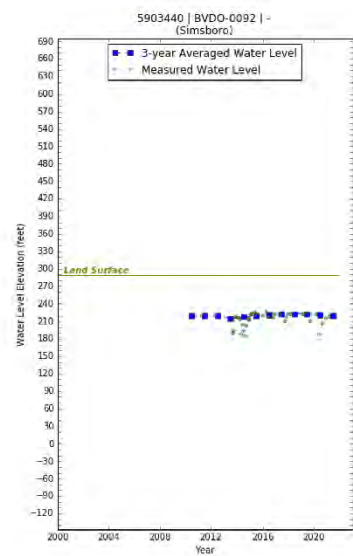
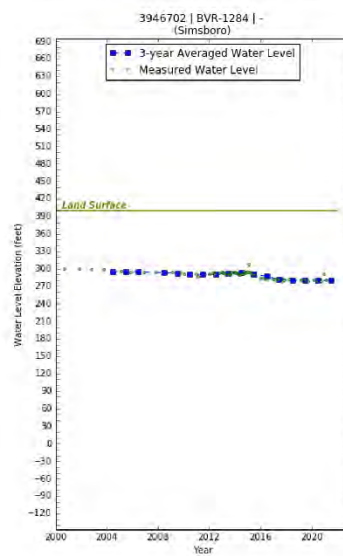
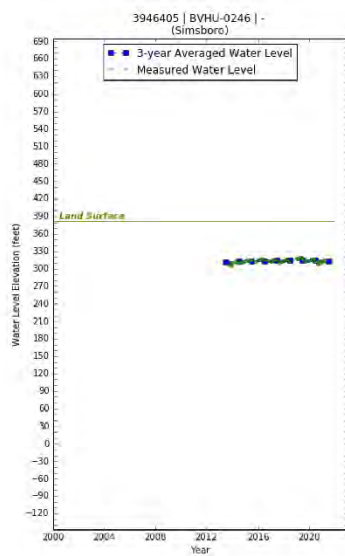
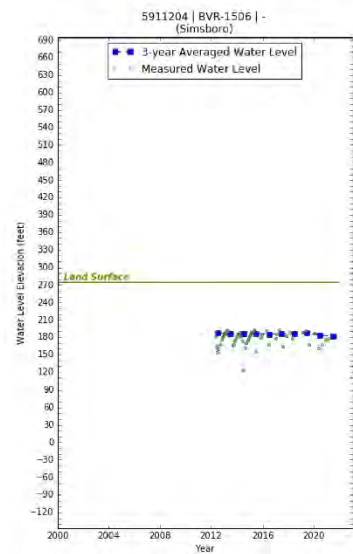
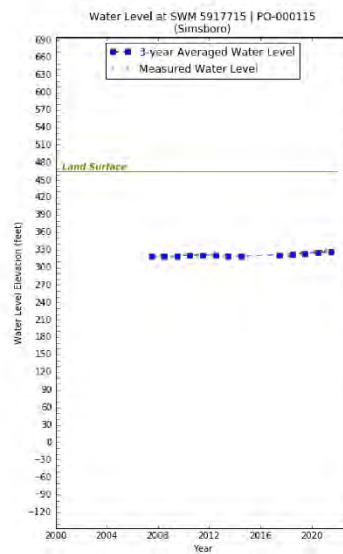
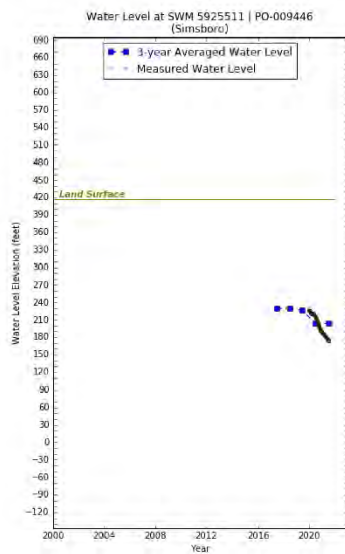
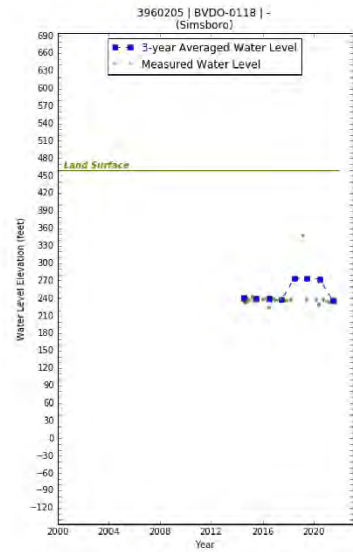
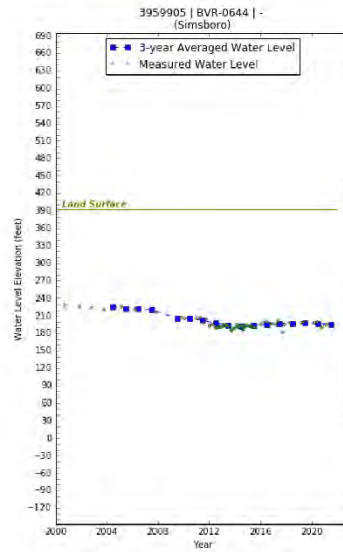
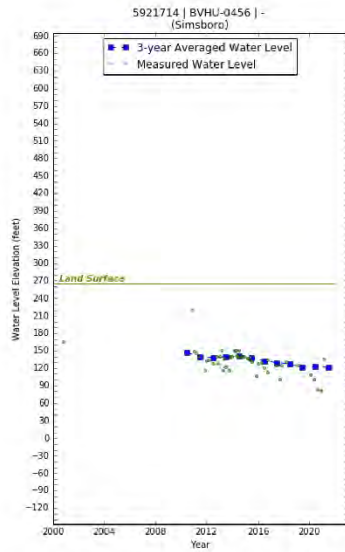


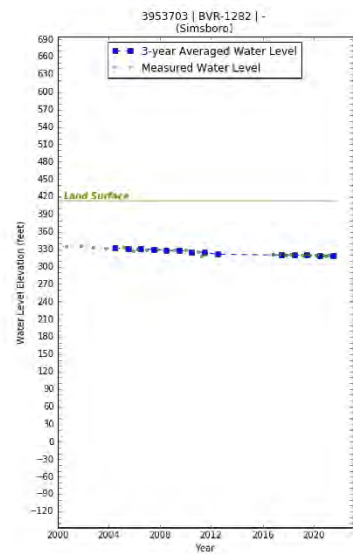
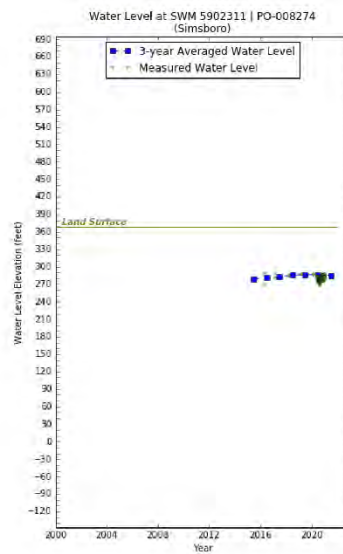
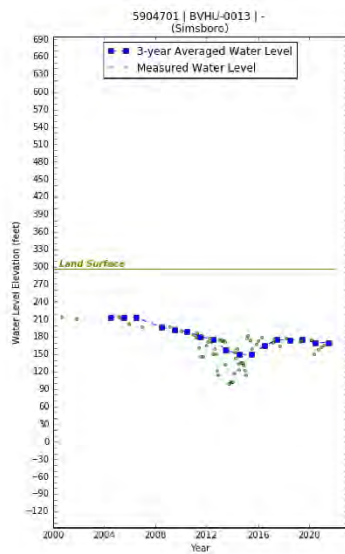
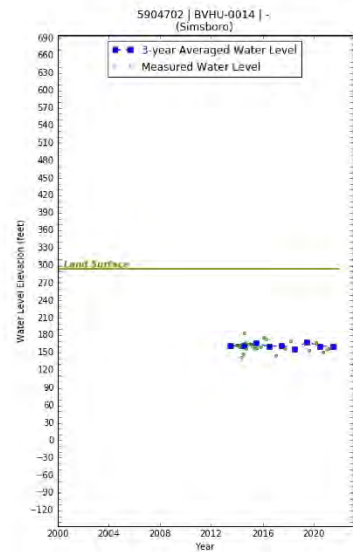
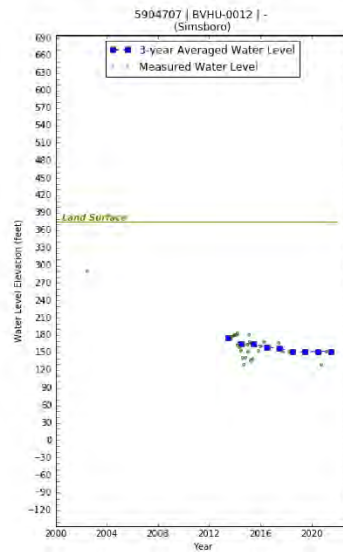
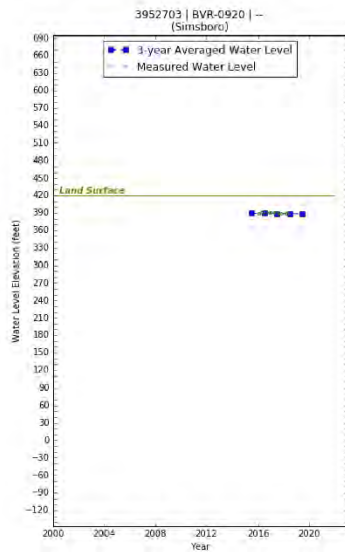
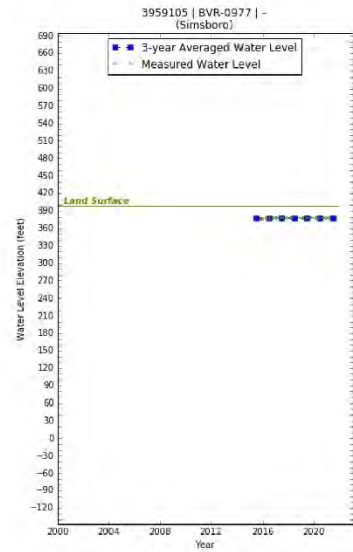
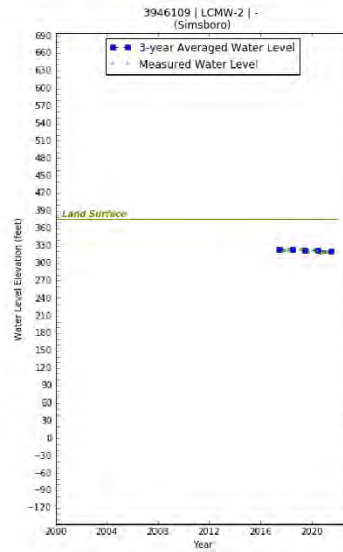
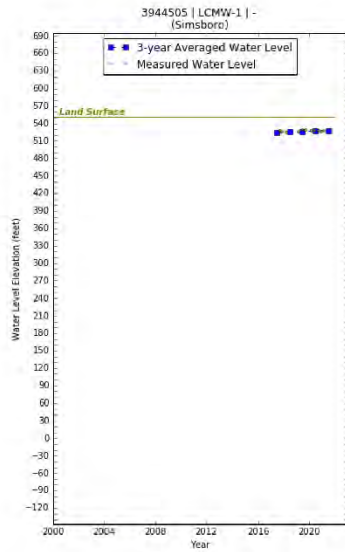


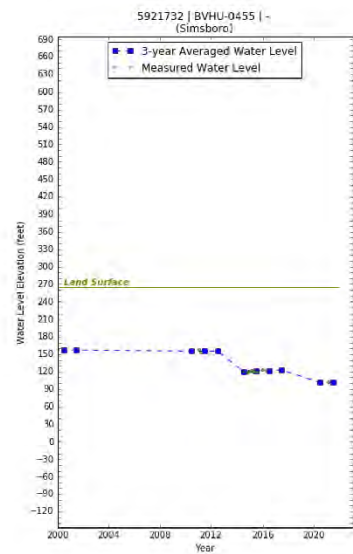
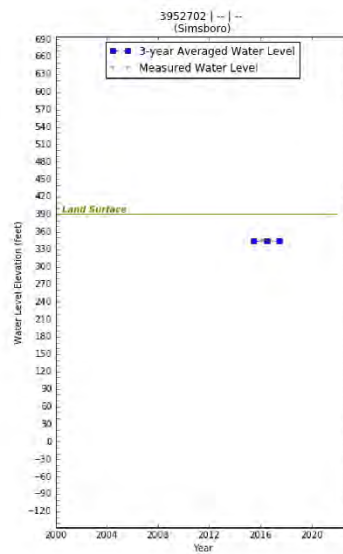
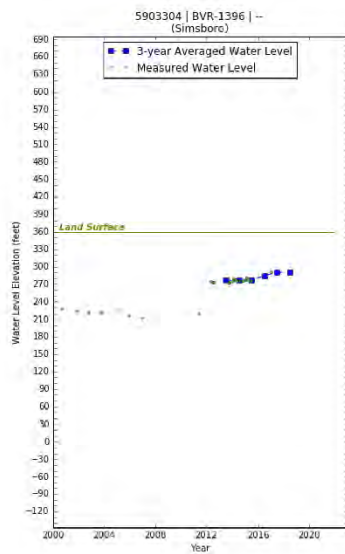
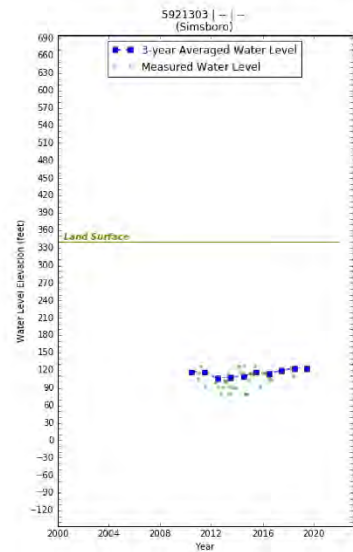
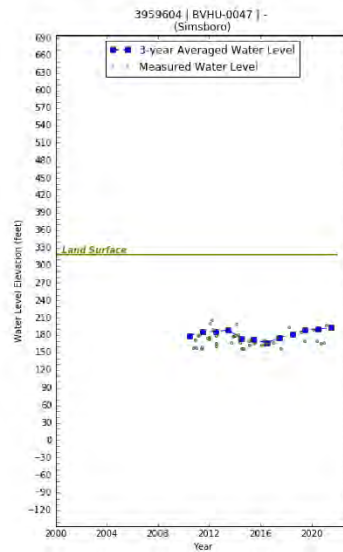
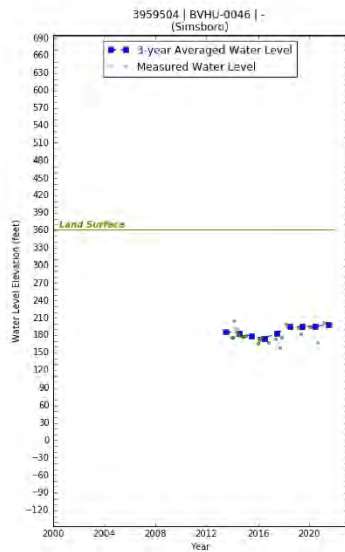
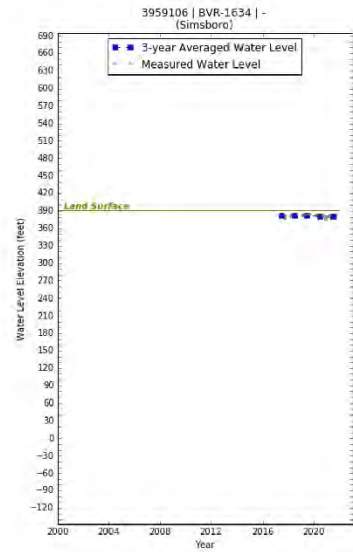
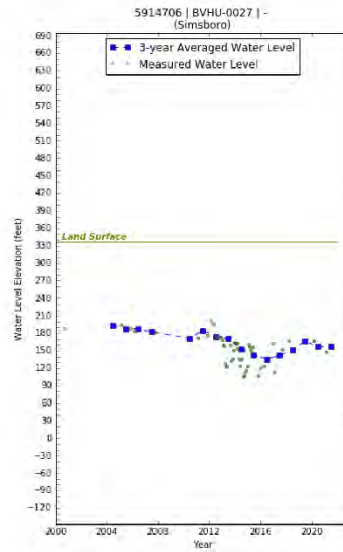
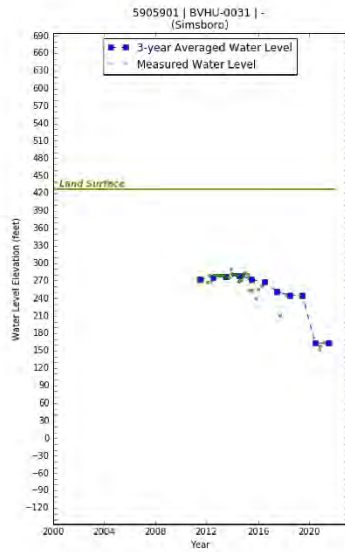


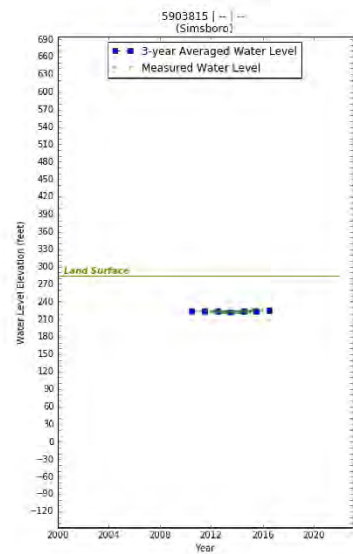
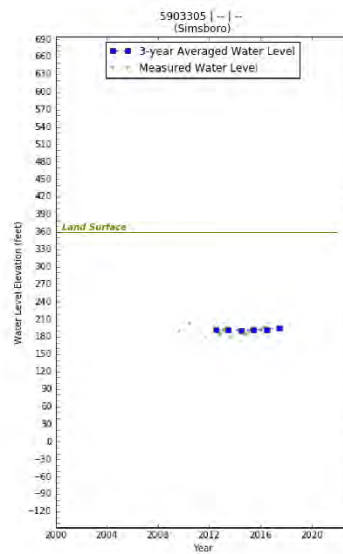
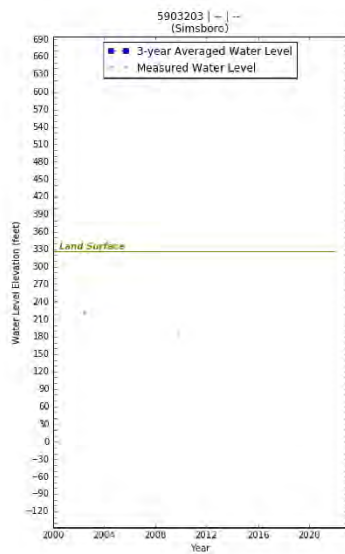
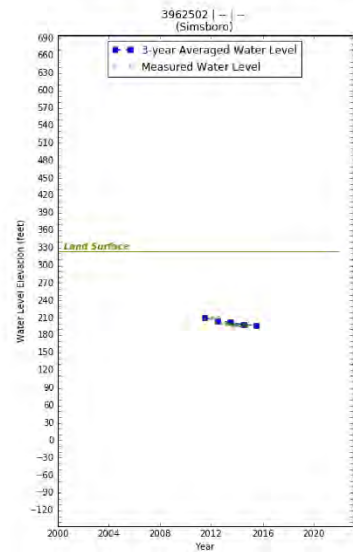
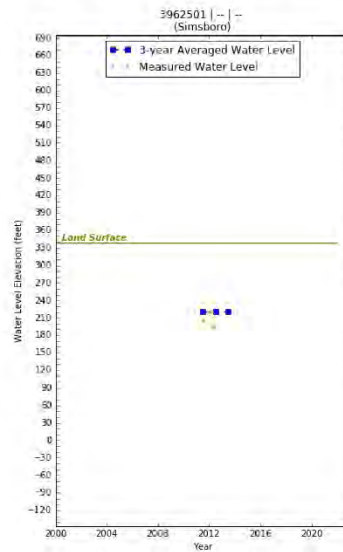
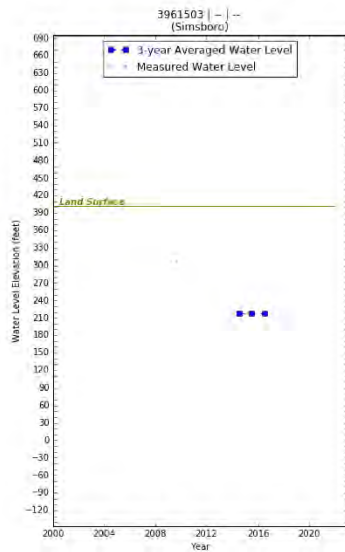
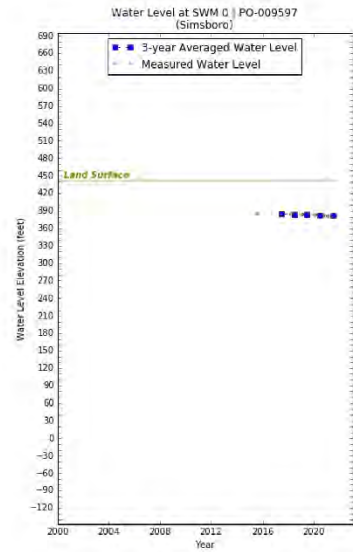
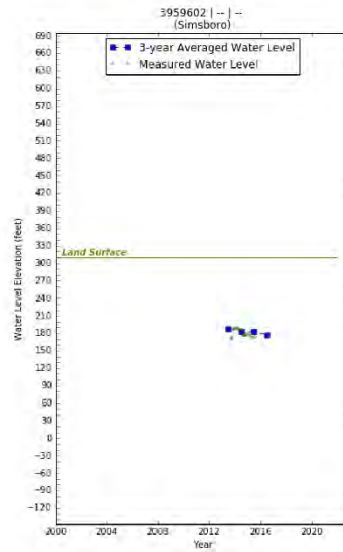
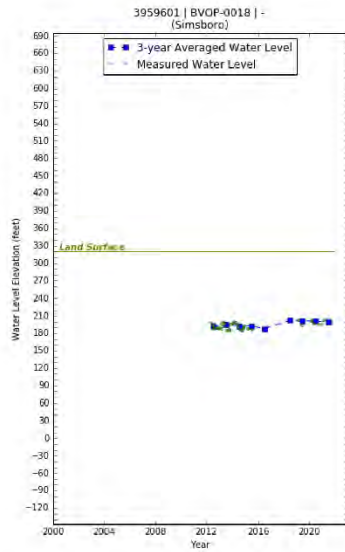




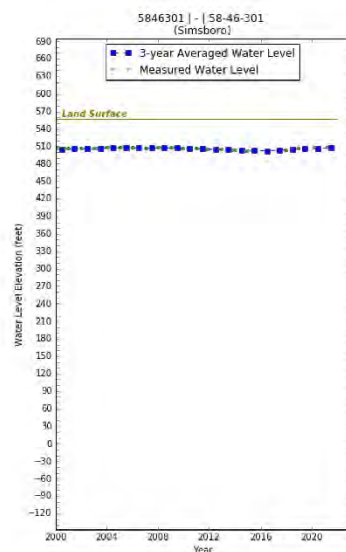
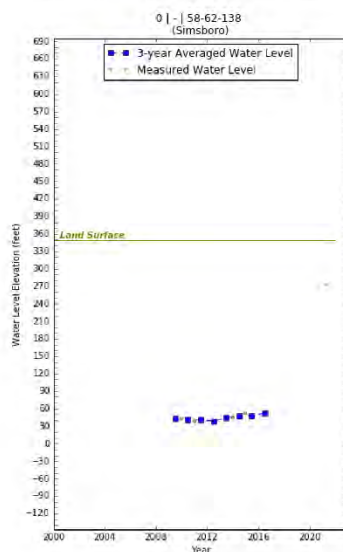
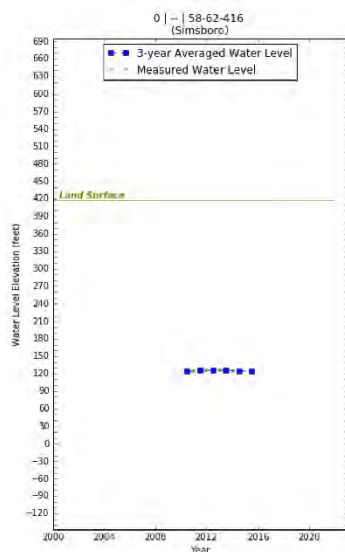
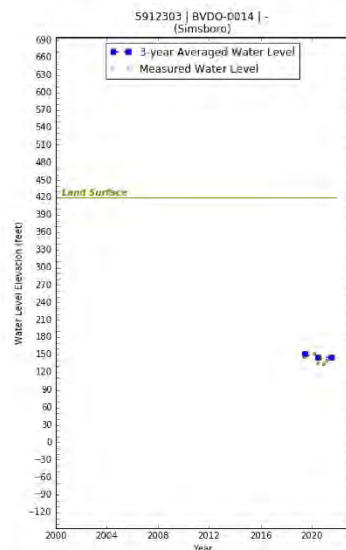
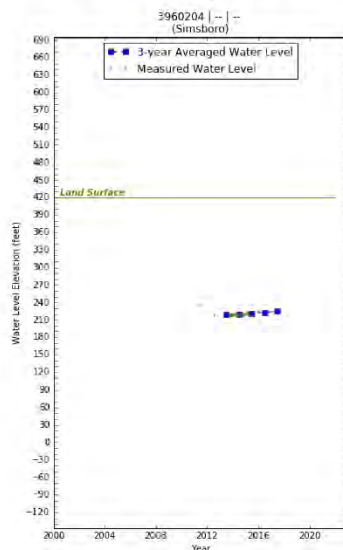
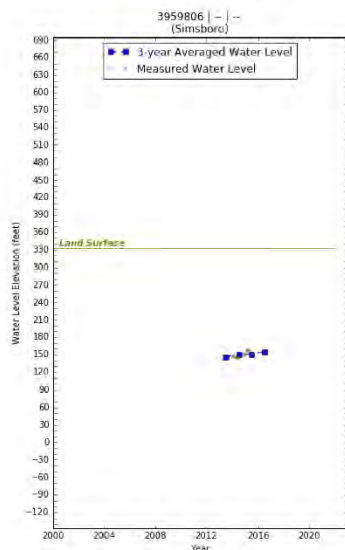
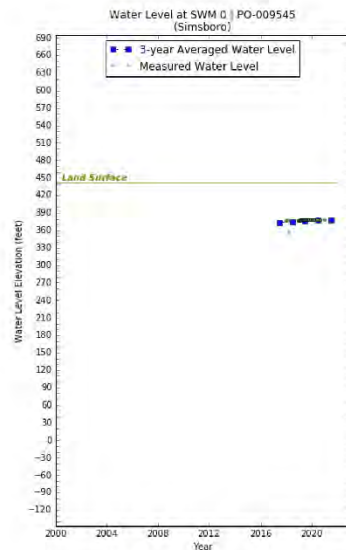
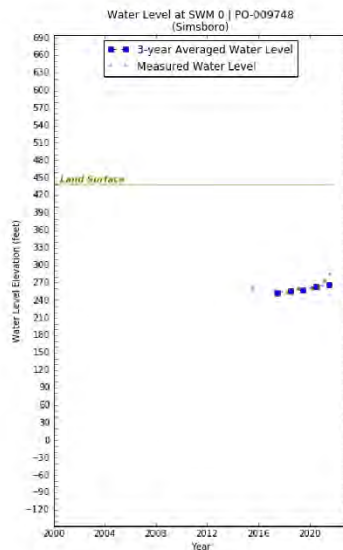
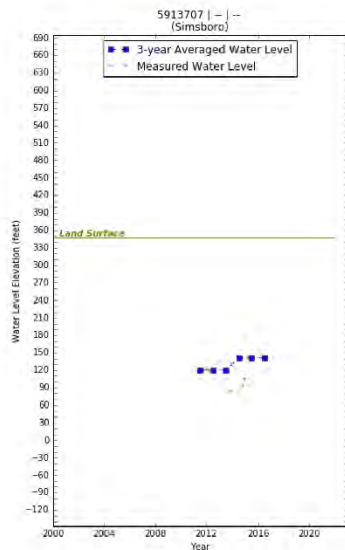




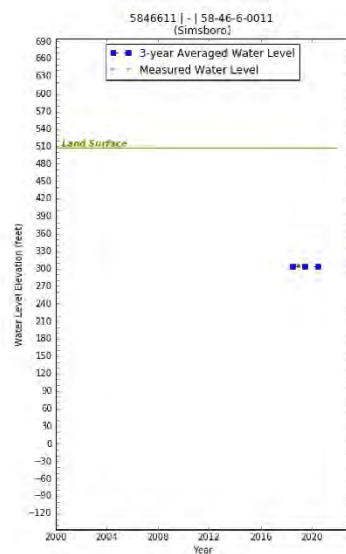
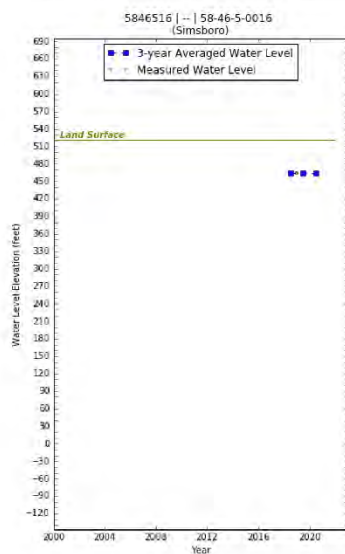
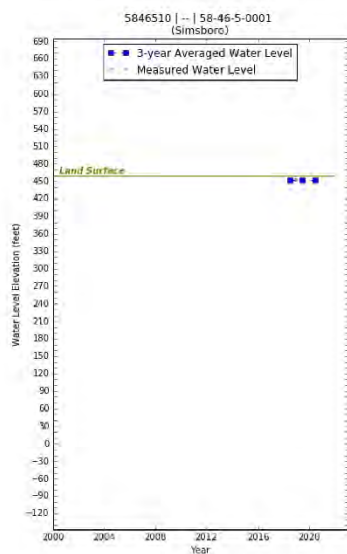
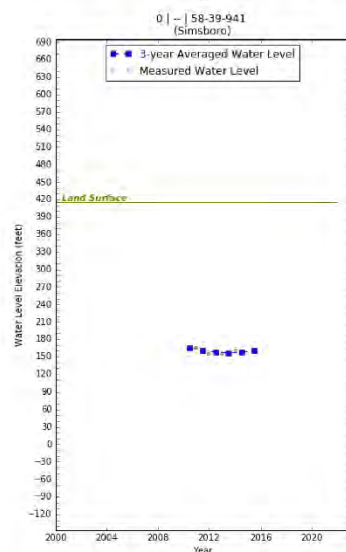
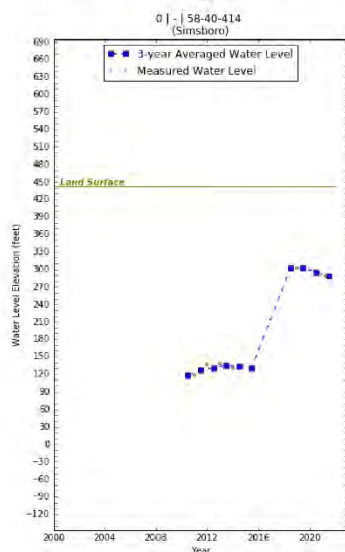
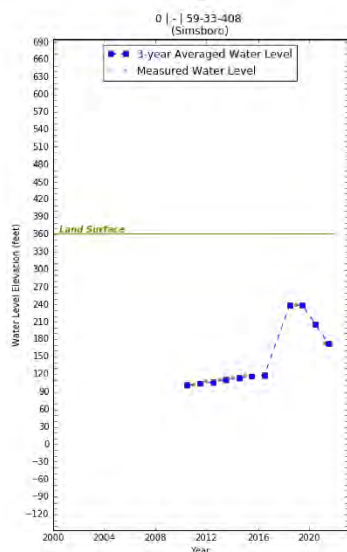
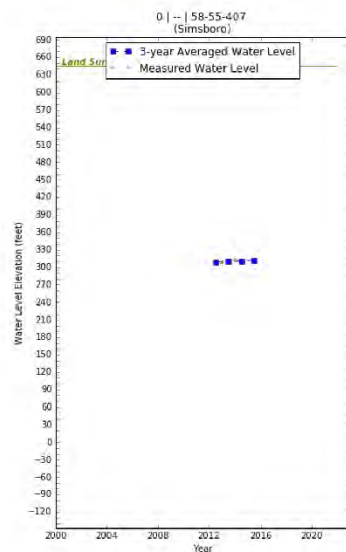
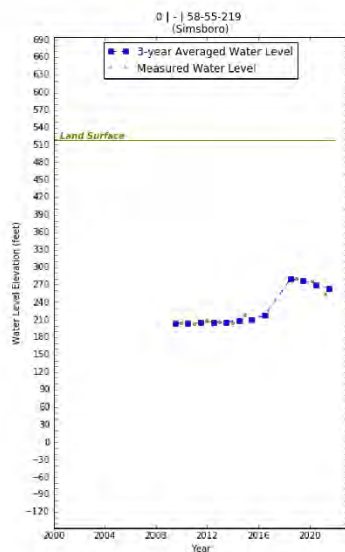
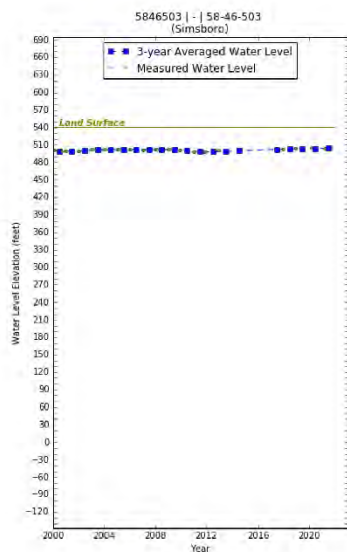


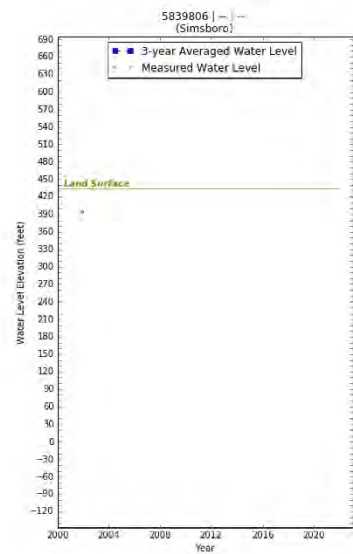
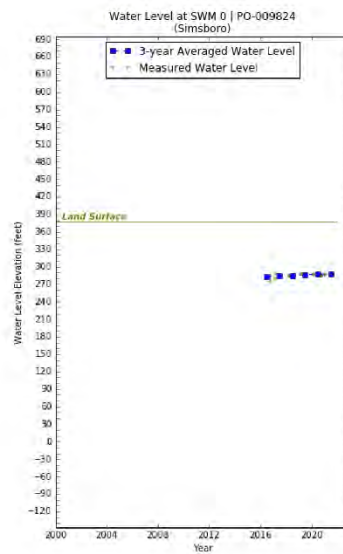
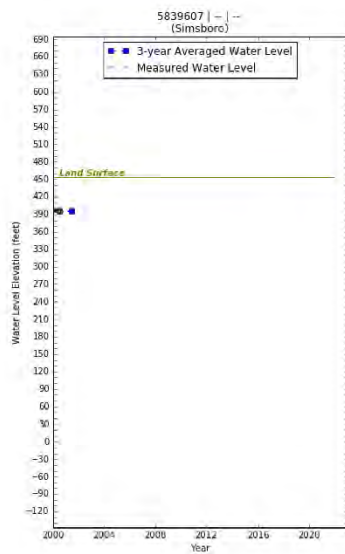
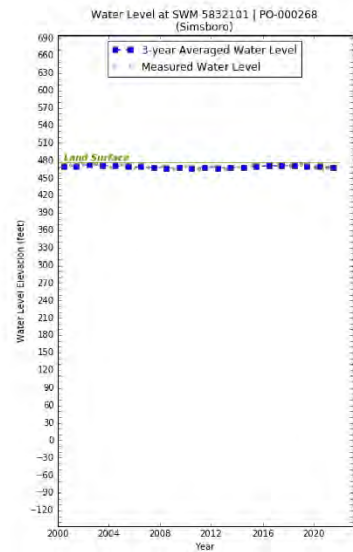
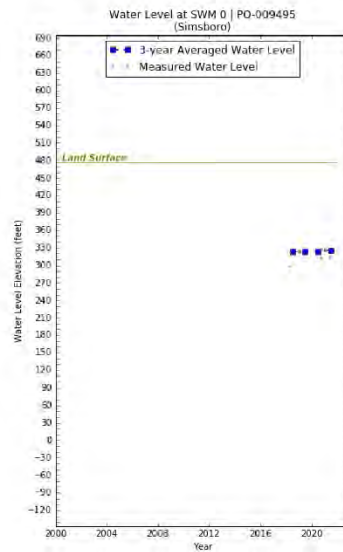
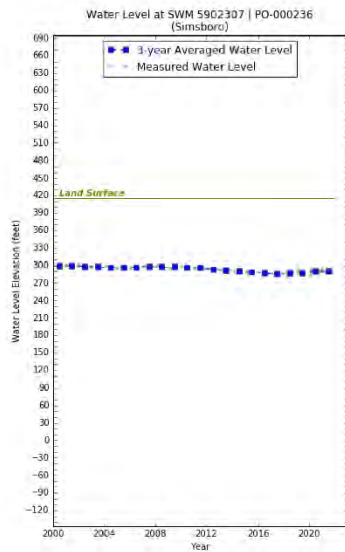
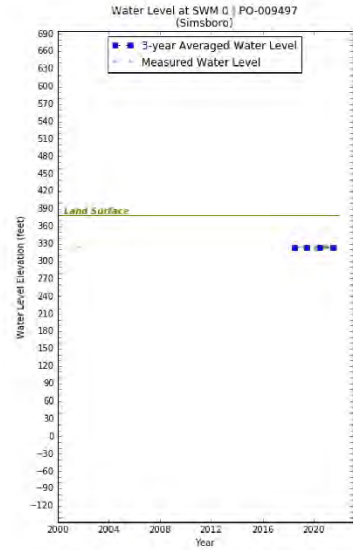
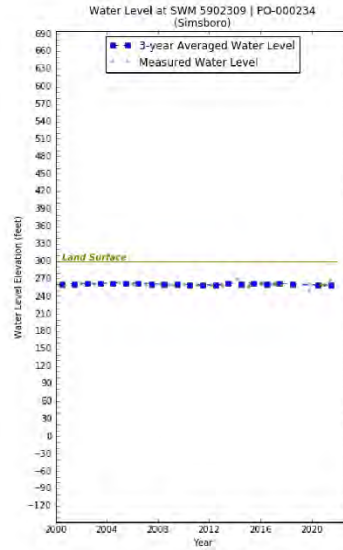
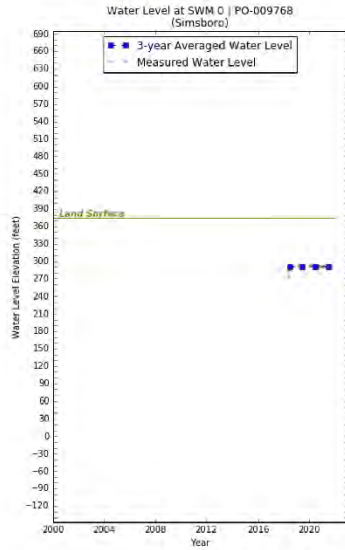


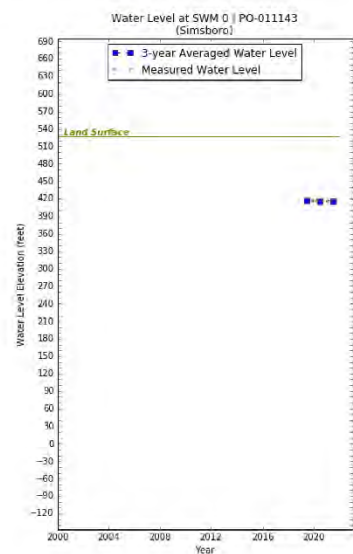
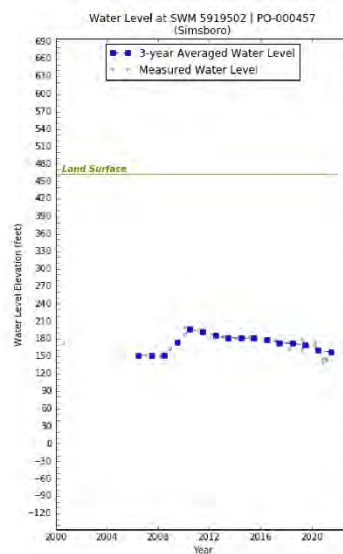
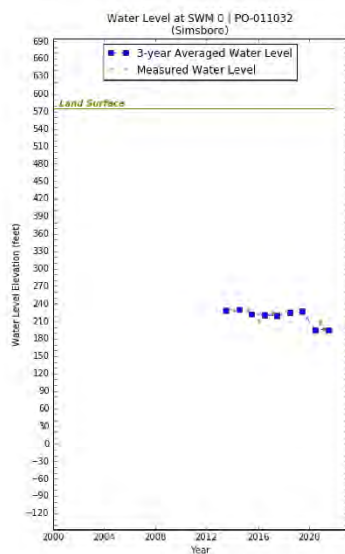
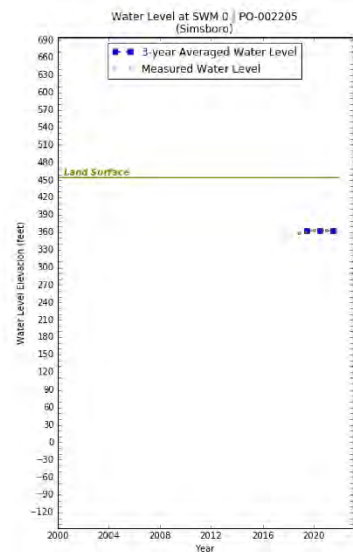
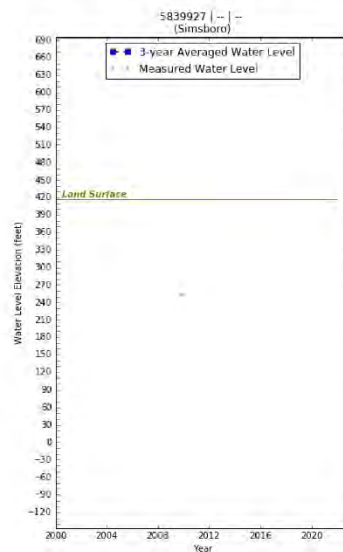
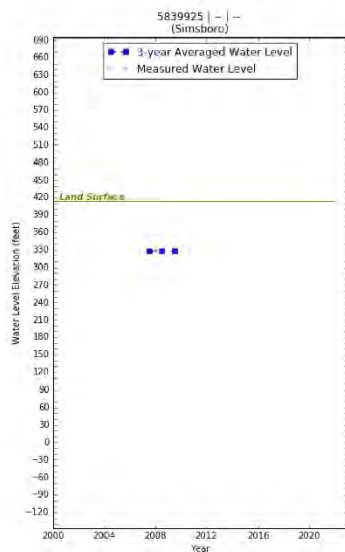
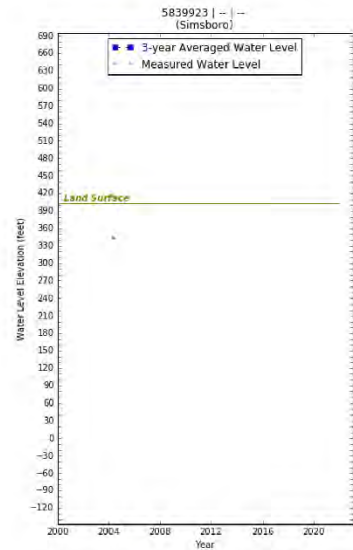
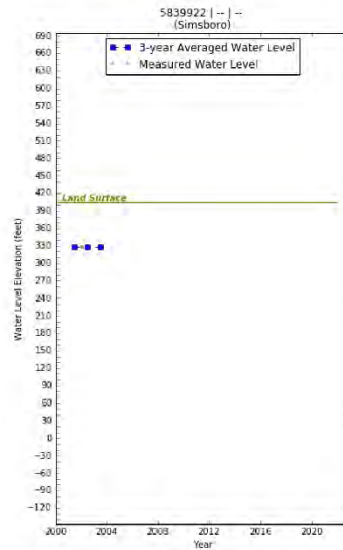
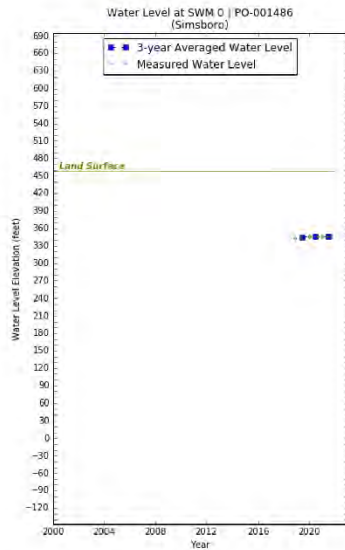


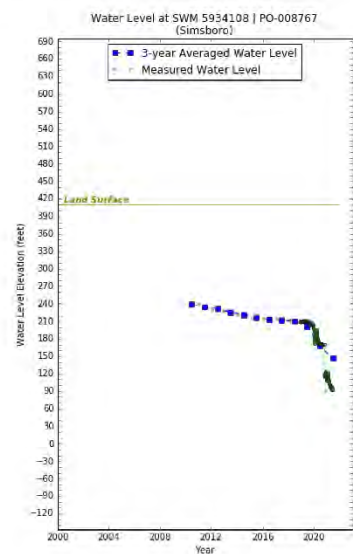
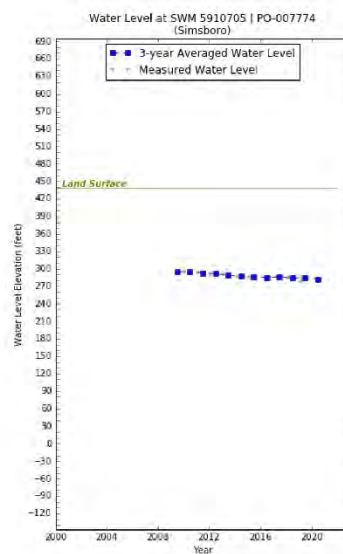
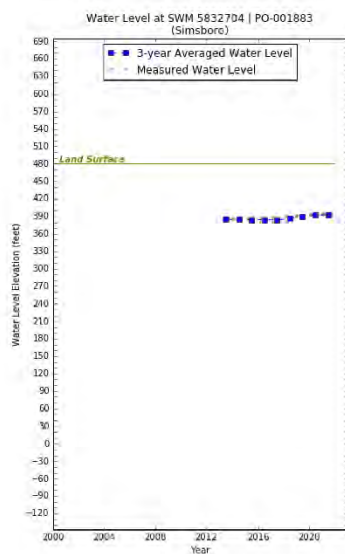
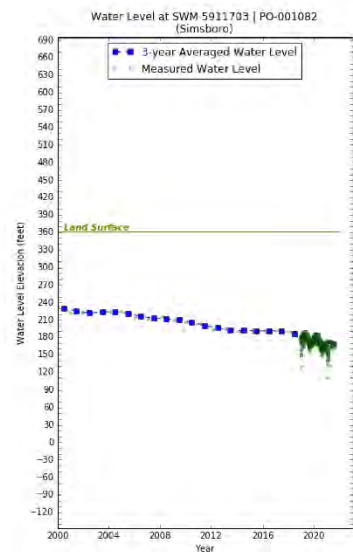
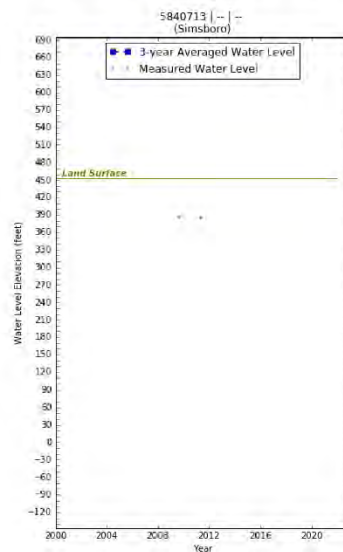
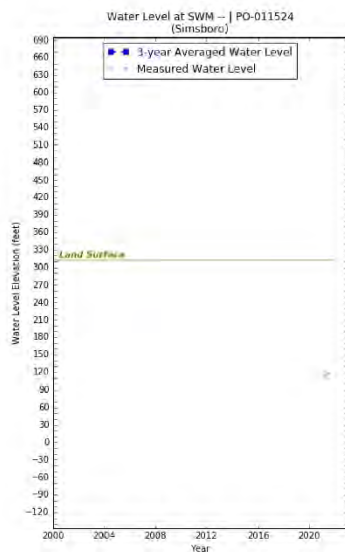
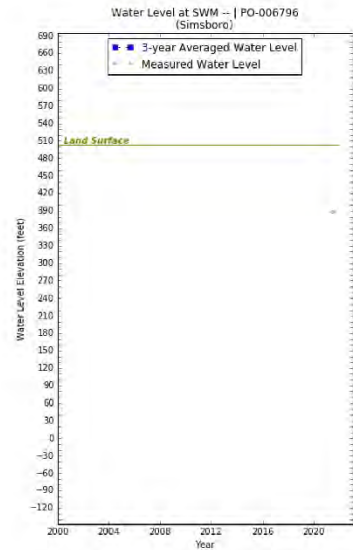
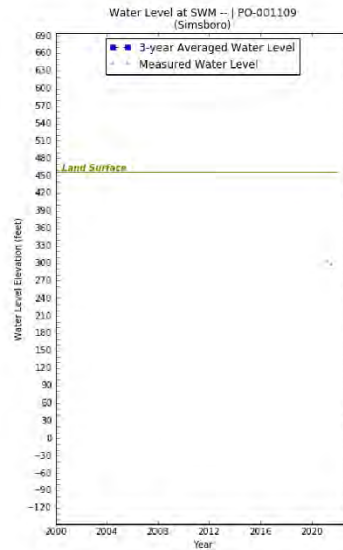
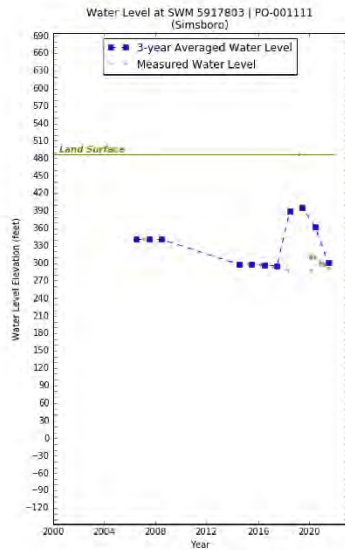




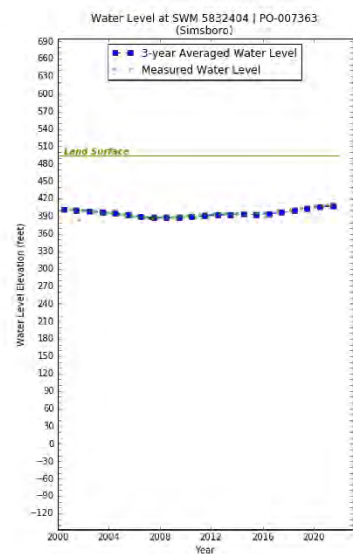
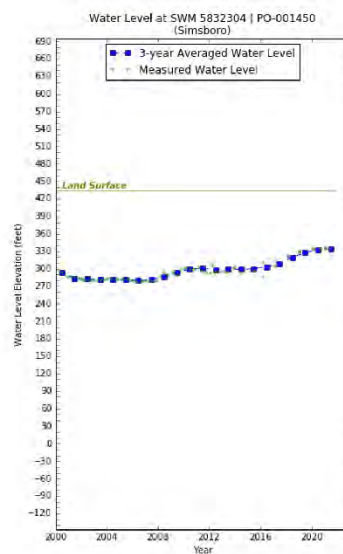
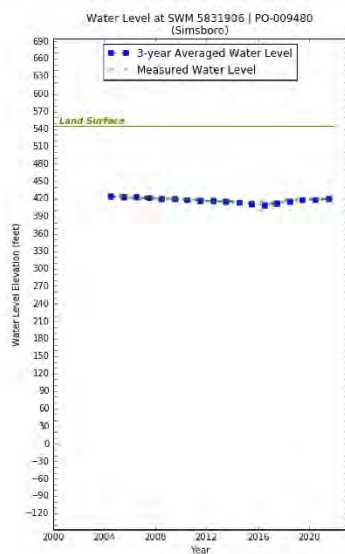
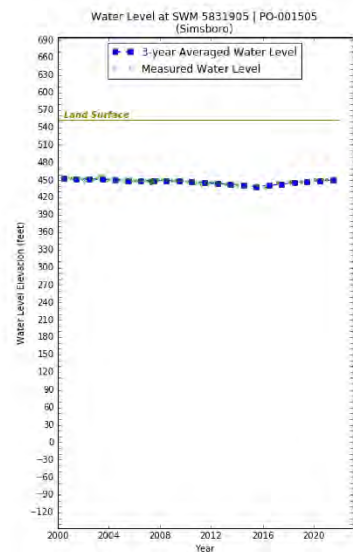
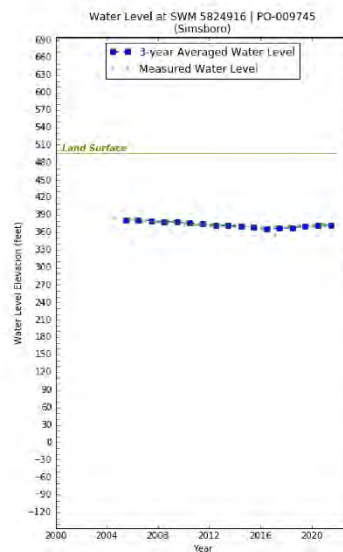
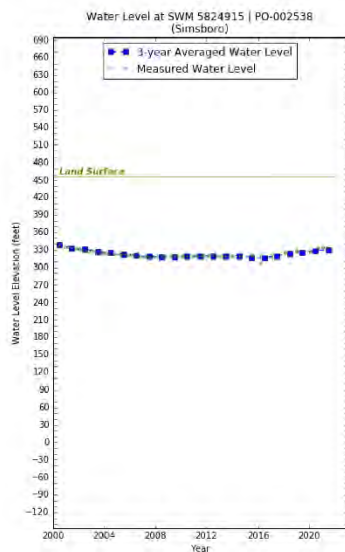
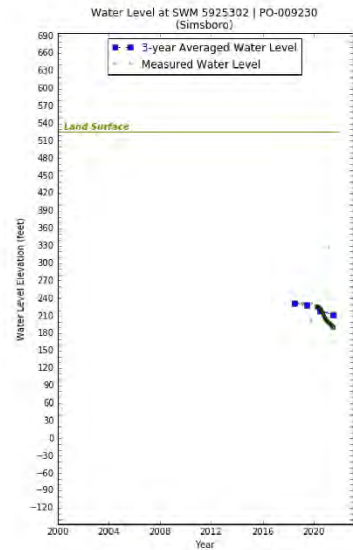
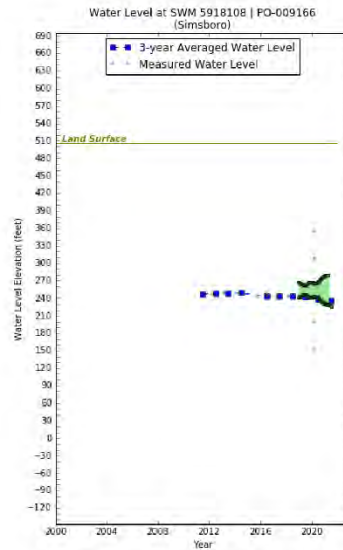
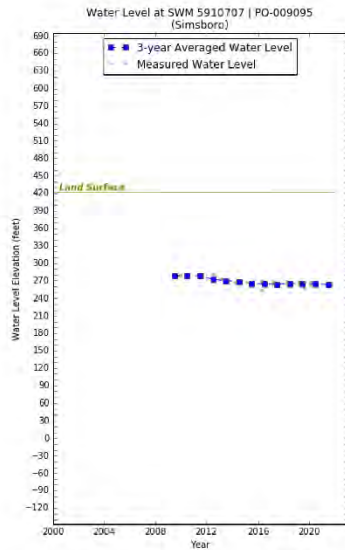




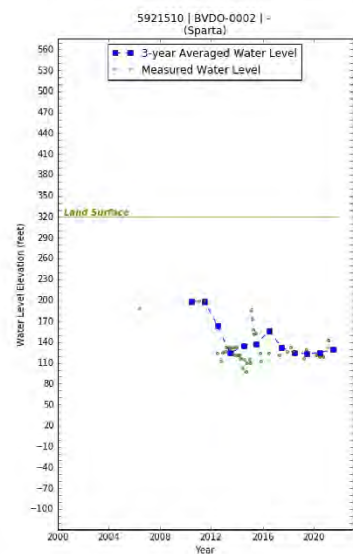
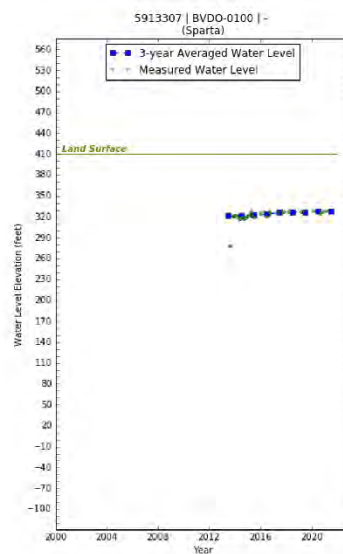
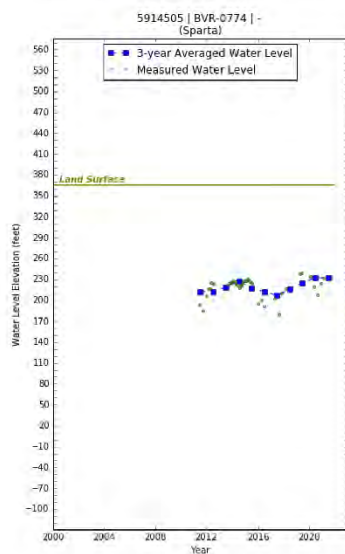
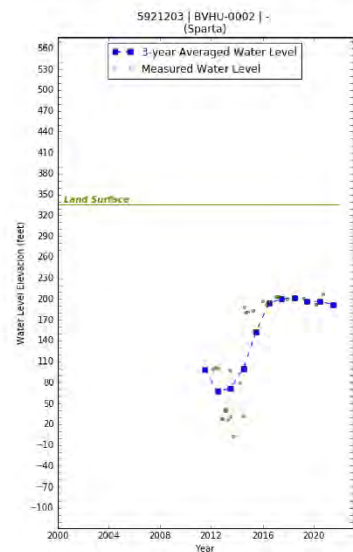
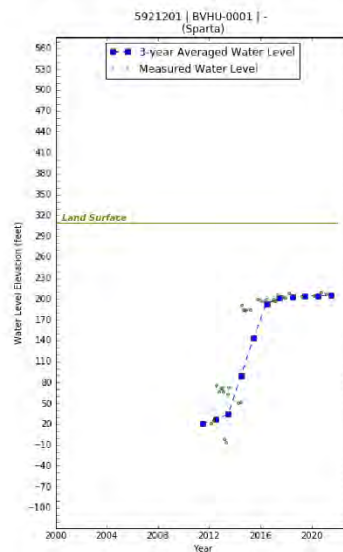
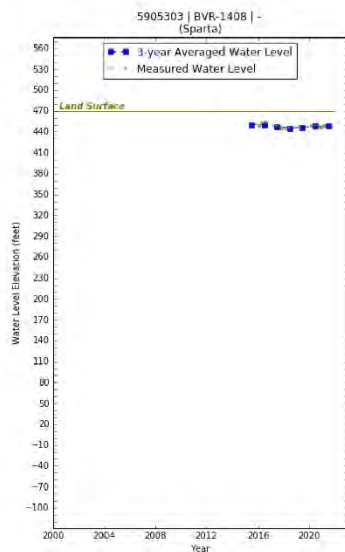
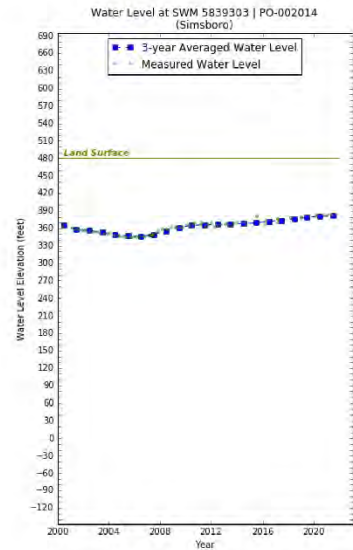
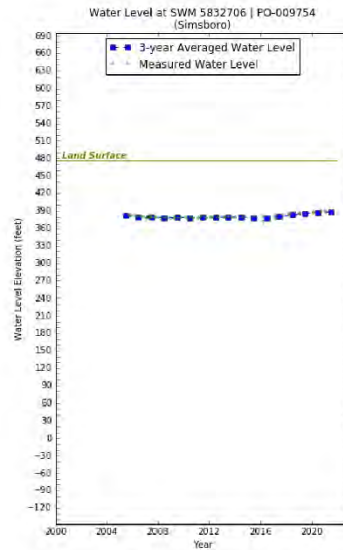
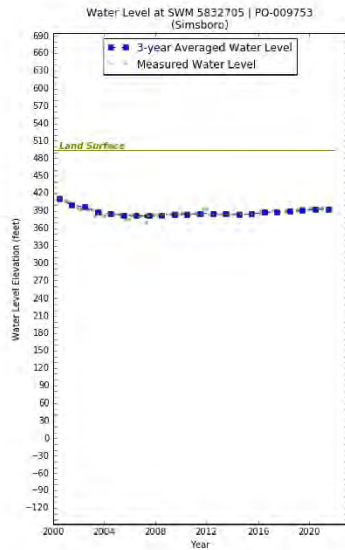


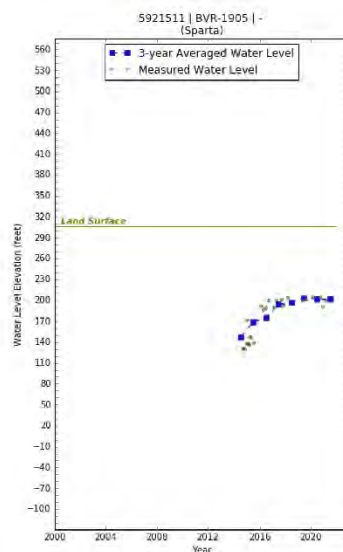
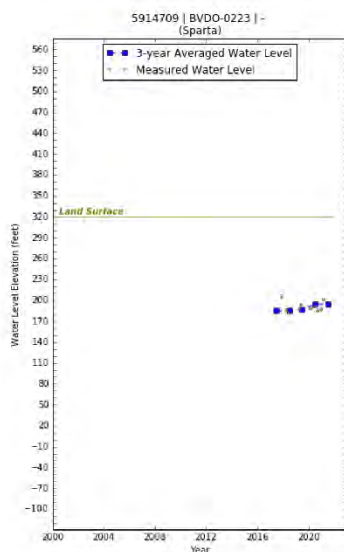
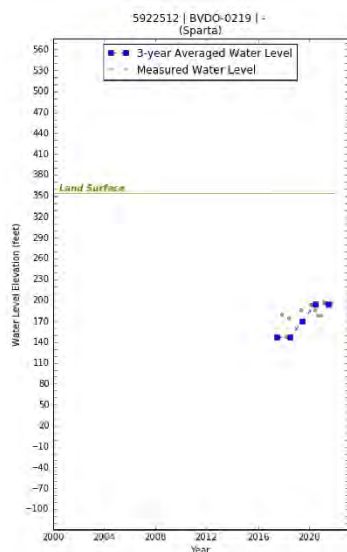
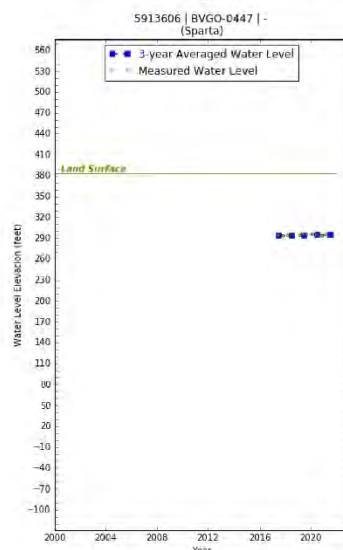
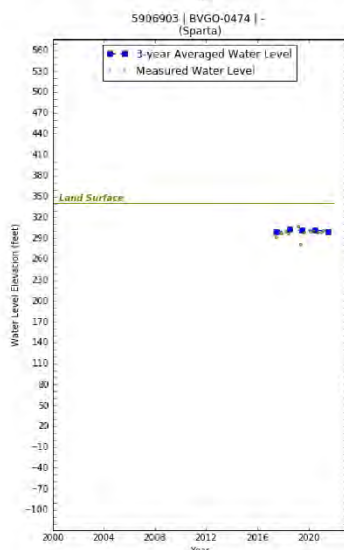
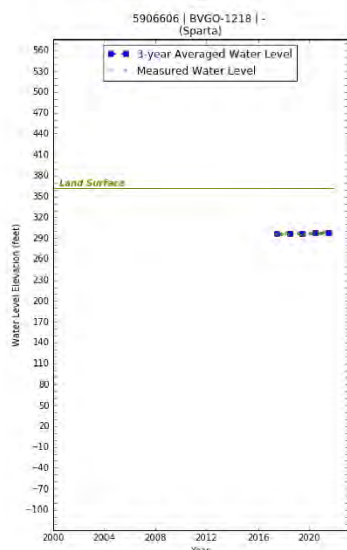
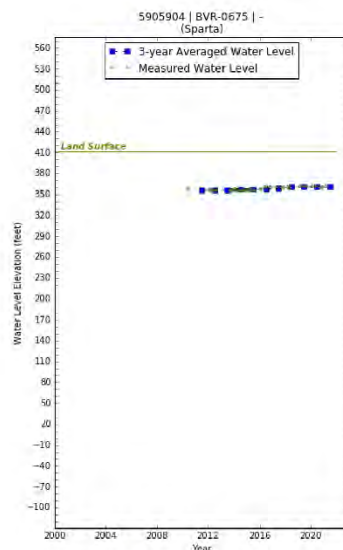
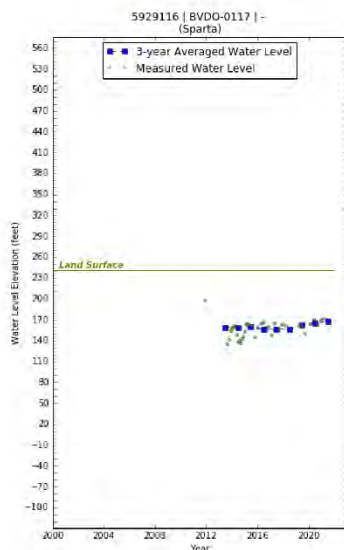
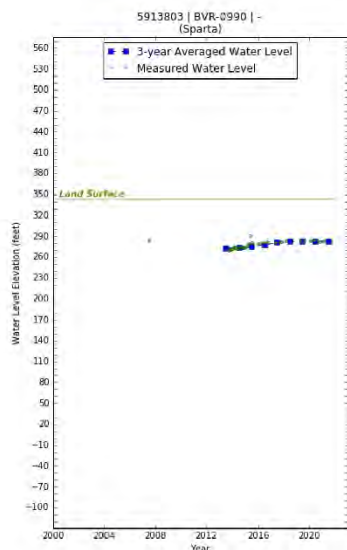


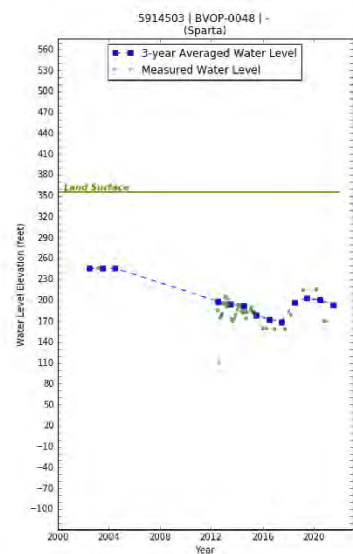
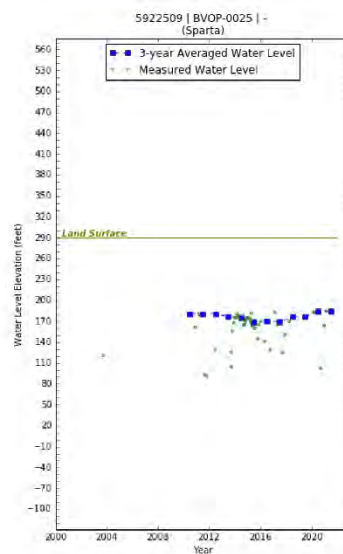
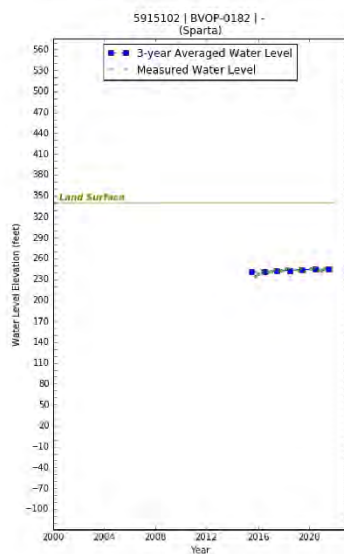
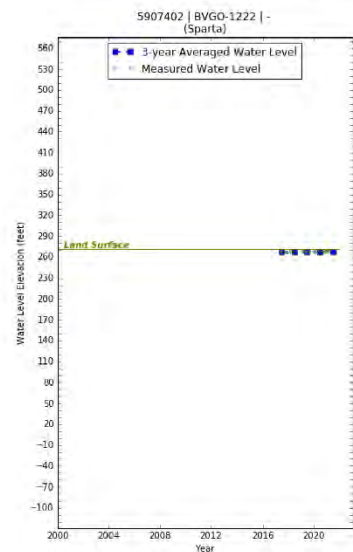
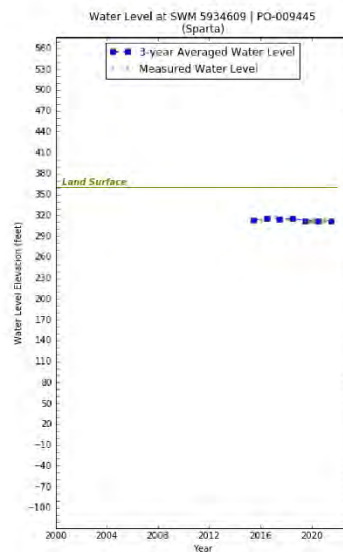
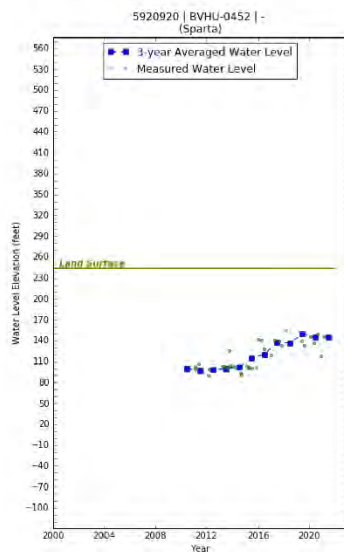
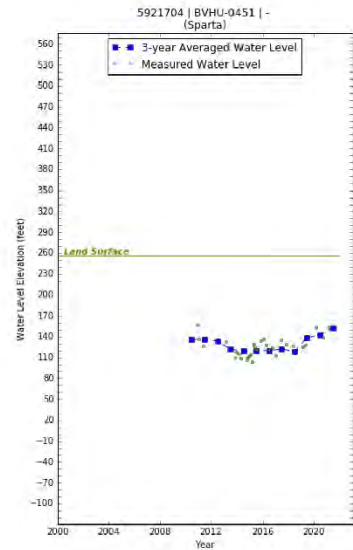
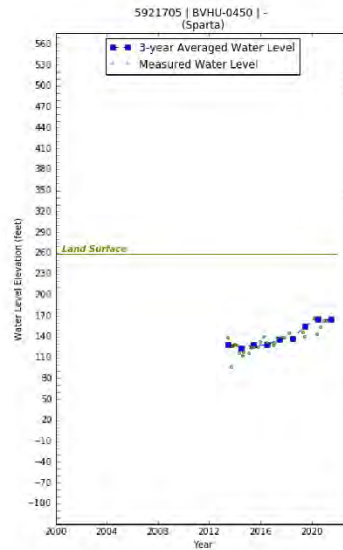
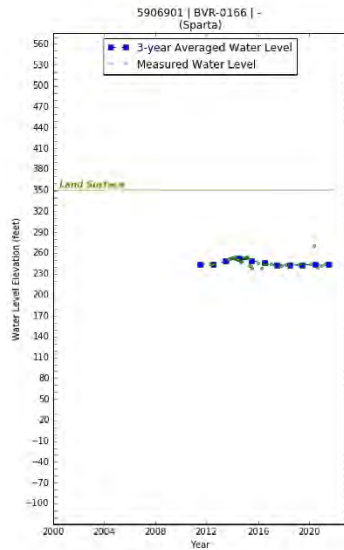


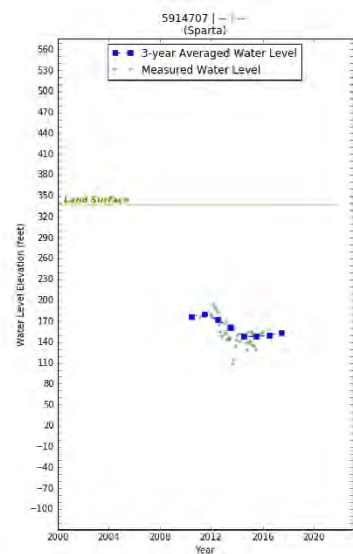
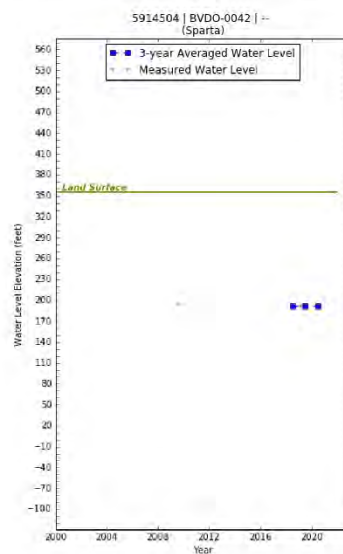
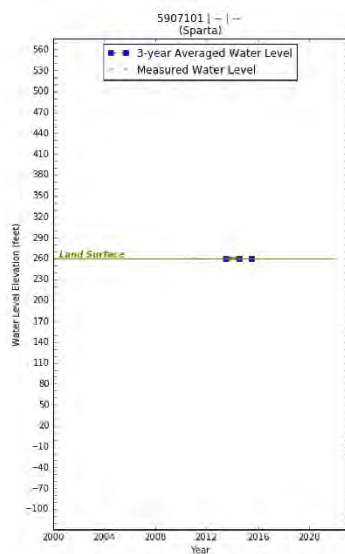
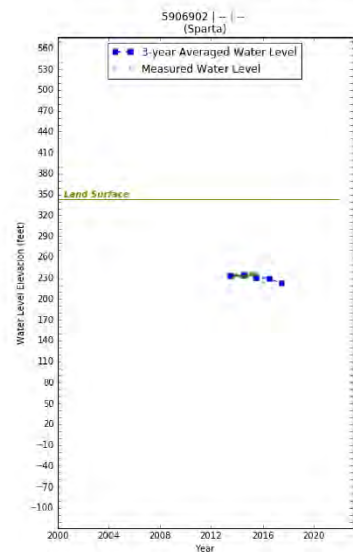
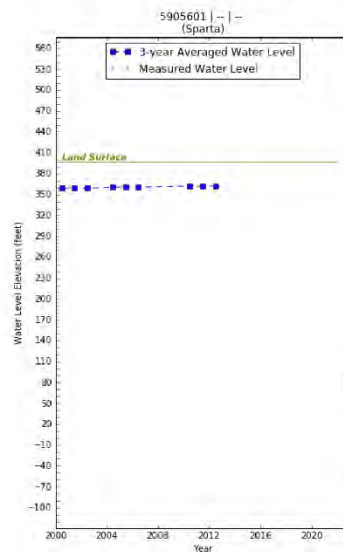
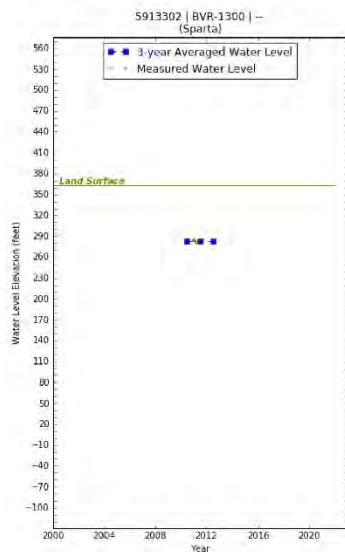
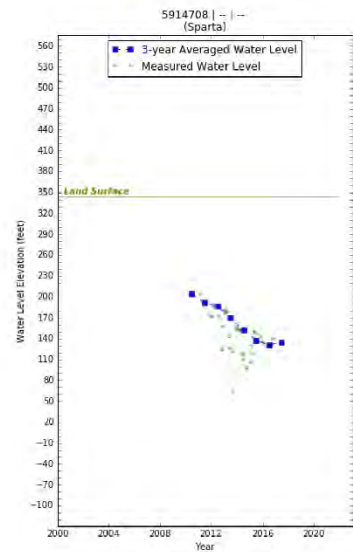
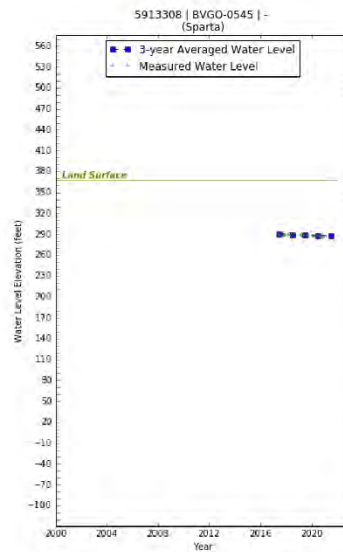
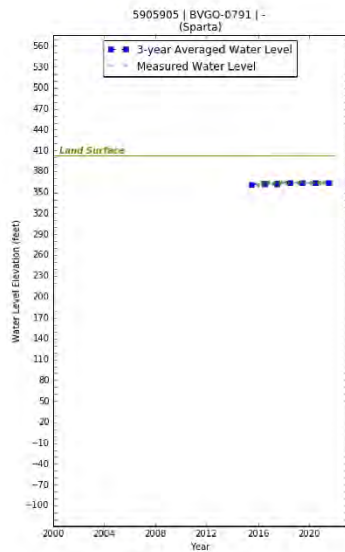




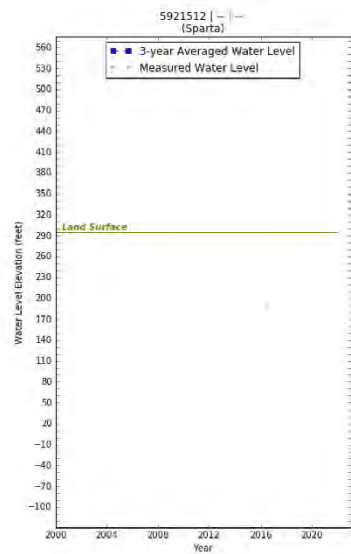
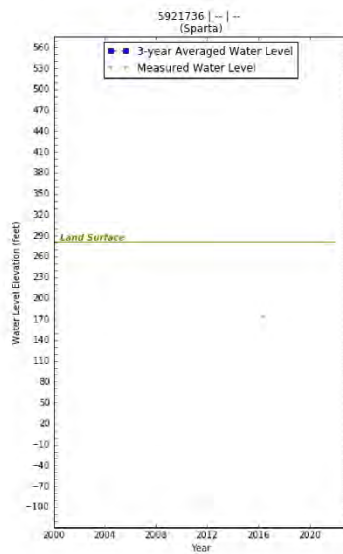
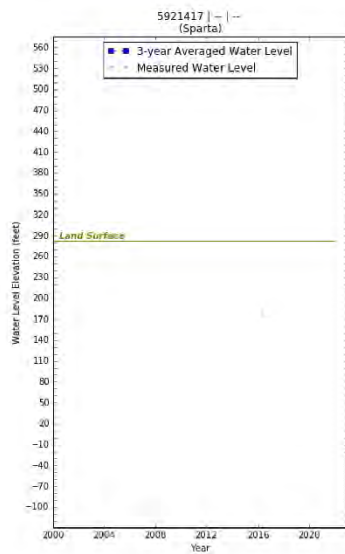
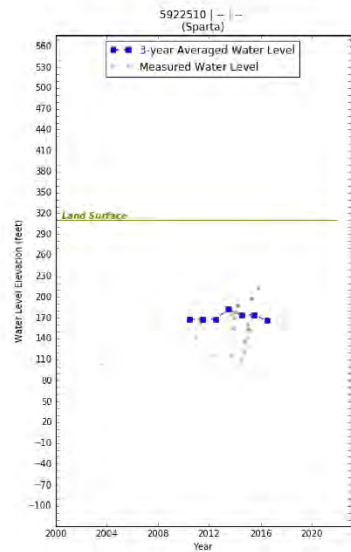
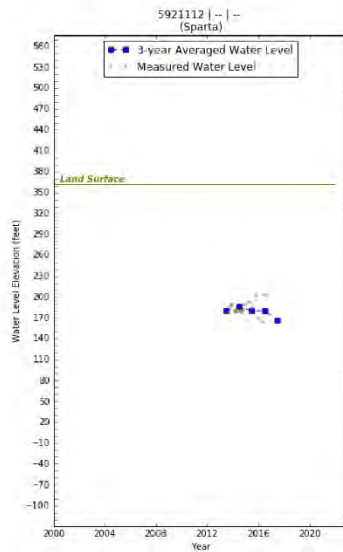
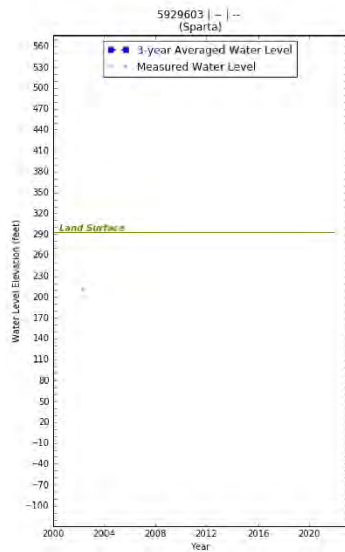
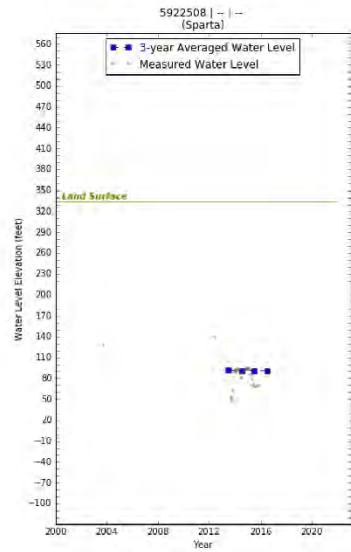
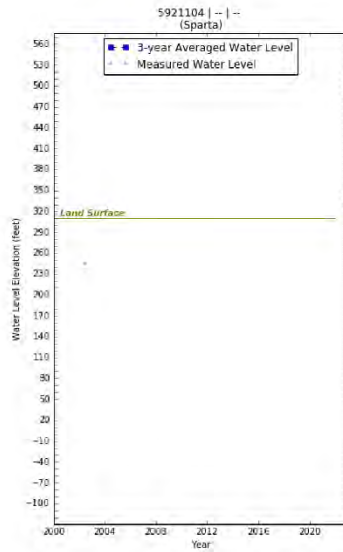
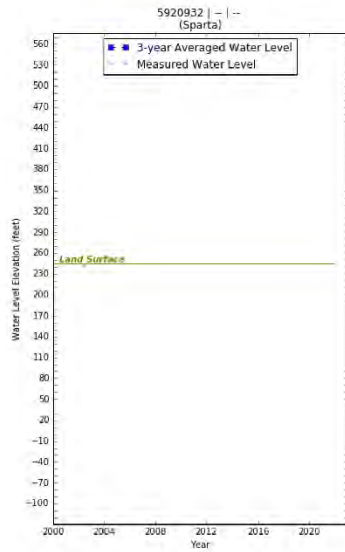




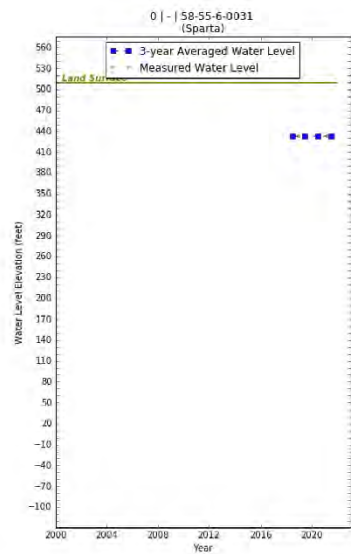
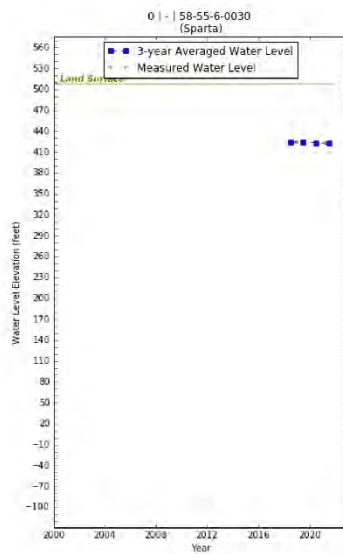
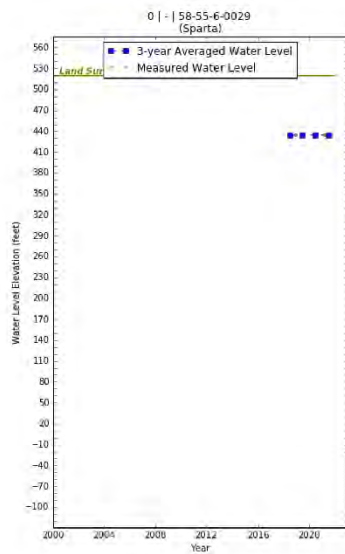
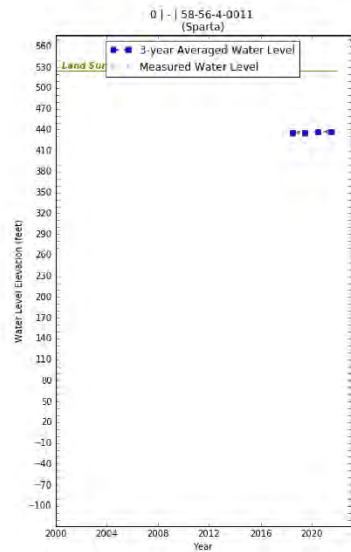
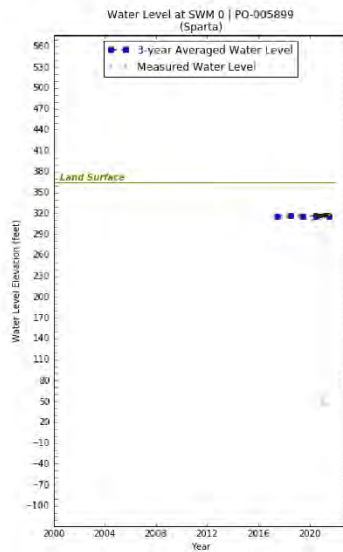
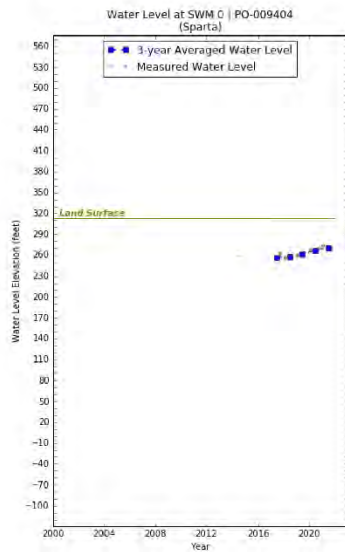
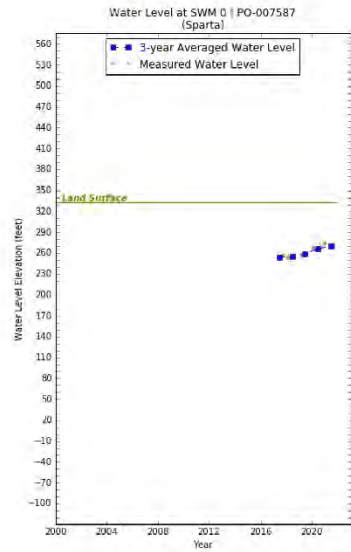
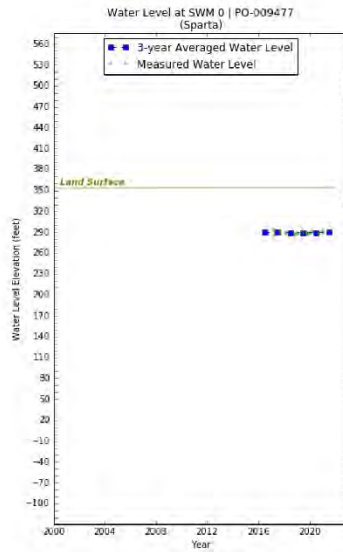
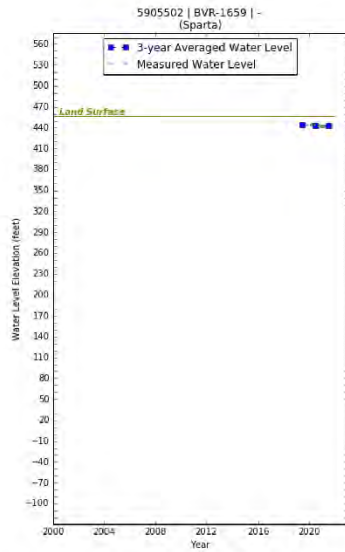


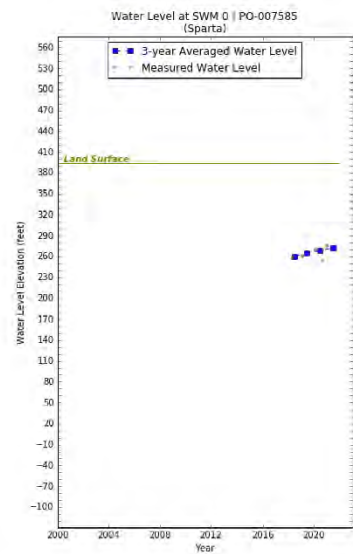
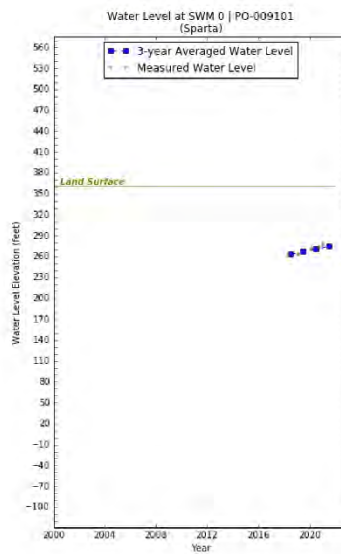
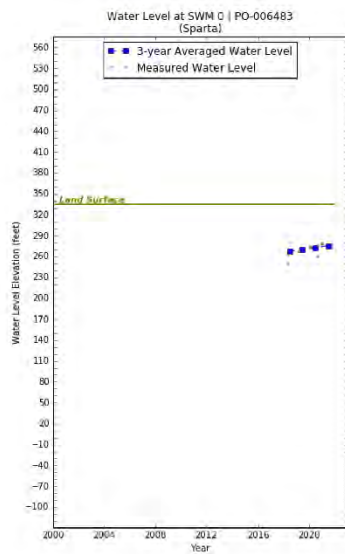
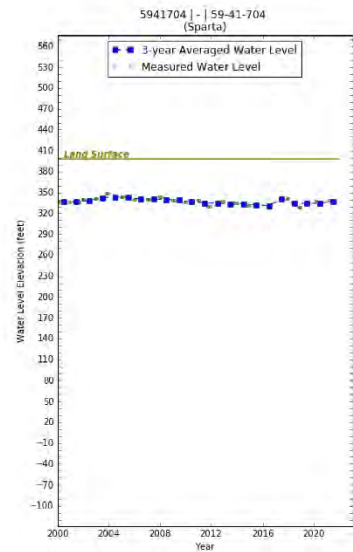
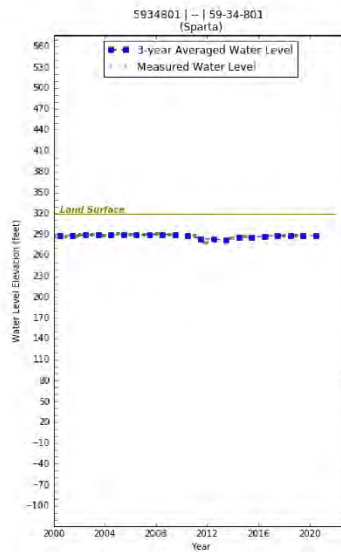
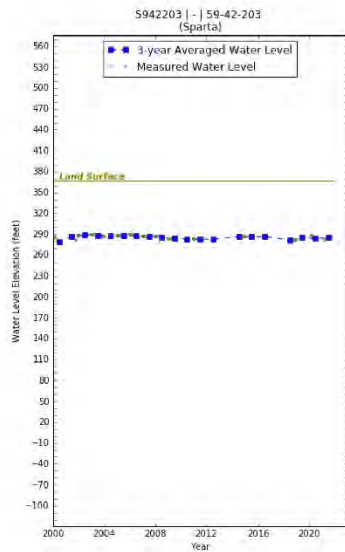
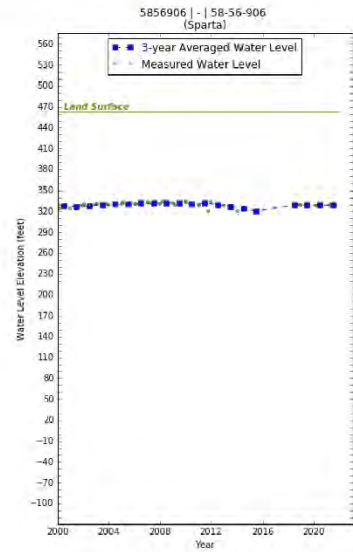
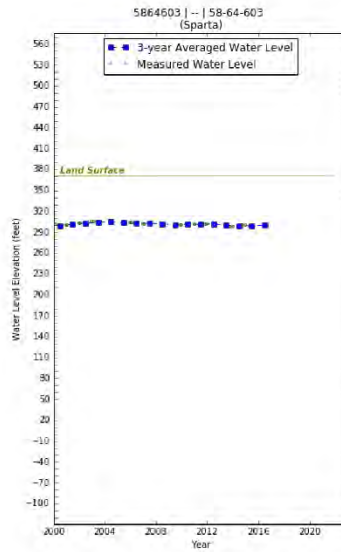
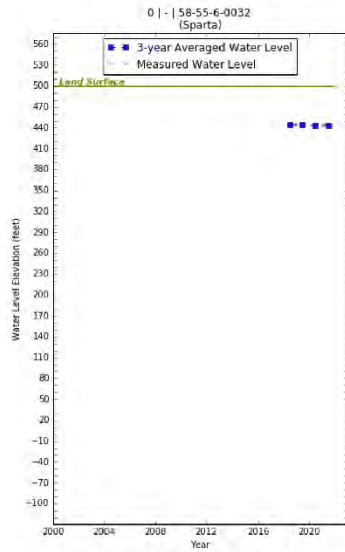


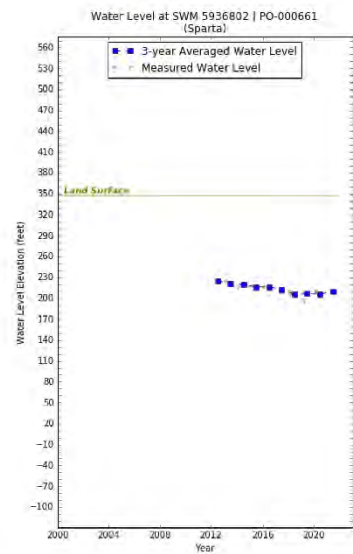
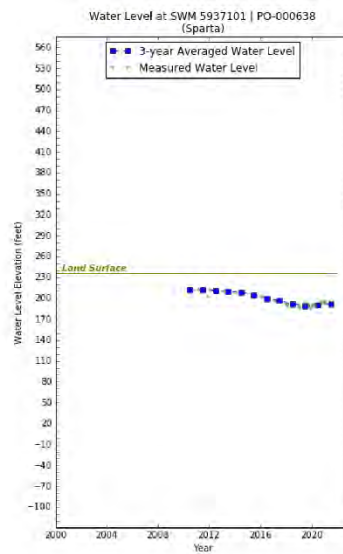
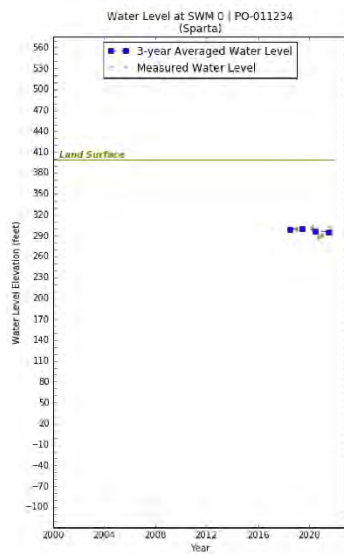
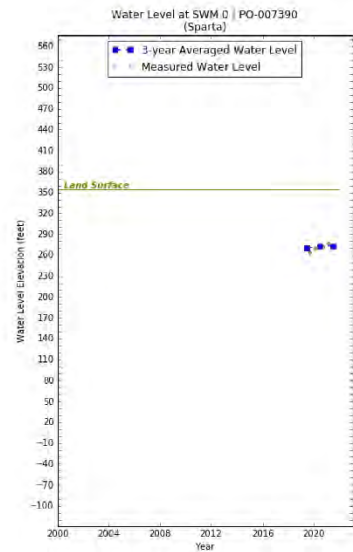
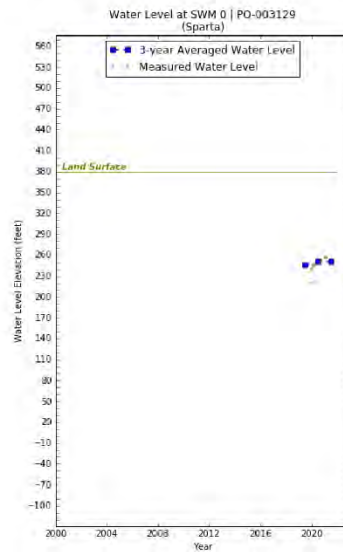
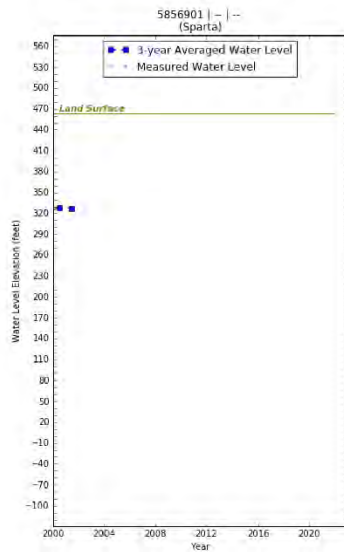
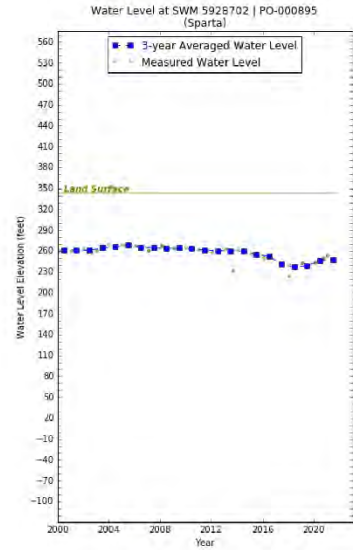
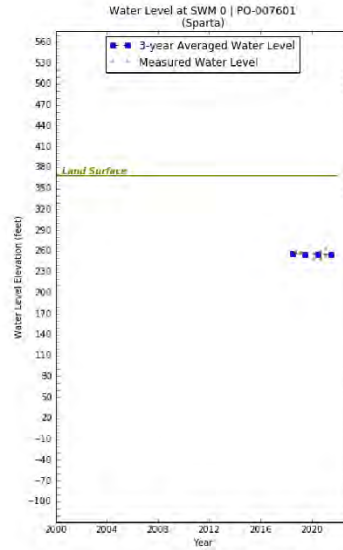
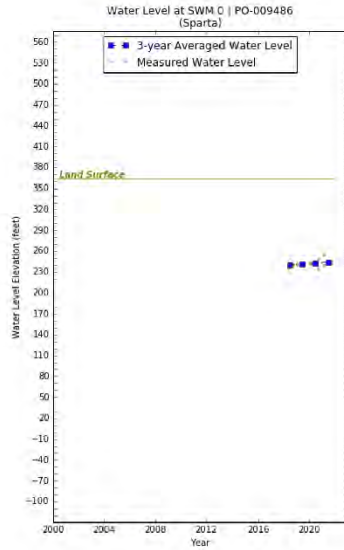












**APPENDIX E**

**POSGCD Monitoring Protocols for Measuring Water Levels and Water  
Quality**

## **I. WATER LEVEL MEASUREMENT PROTOCOLS**



## I-A. Steel Tape (wetted-tape) method

### Appropriate Wells for this method:

- |  |  |
|--|--|
| ✓ water levels < 500 ft<br>(< 200 ft for best results) | X does NOT have angled casing  |
| ✓ an estimated water level is available                | X is NOT pumping   |
|  | X is NOT flowing   |
|  | X does NOT have water dripping into well<br>or condensing on well casing |

### Required Materials:

Graduated steel tape.

Non-lead break-away weight (to attach to the end of the tape, if necessary)

Non-toxic blue carpenter's chalk

Clean rag.

Pencil or pen.

Water-level measurement field form.

Two wrenches with adjustable jaws or other tools for removing well cap.

Cleaning supplies for water-level tapes.

### Steps:

1. If well is equipped with a submersible pump, confirm and record that the pump is not in operation. If the pump is operating, no water-level measurement should be taken or recorded. Obtain permission to collect measurement at a later time.
2. Record how long the pump has been off prior to taking the measurement. If the well has been pumped less than 24 hours prior to taking the measurement, try to reschedule the measurement for another time when the pump can be shut down for the recommended 24 hours. If rescheduling is not possible, mark the **Less than 24 hrs** box on the field form. Estimate how long the well has been off and enter the time since pumping.
3. Identify a port or opening that provides access for the steel tape.
4. Measure and record the height of this opening above ground level. Record this as the measuring point correction value (**MP correction**). Describe the measuring point in the official record for the well, and use the same measuring point each time when measuring the

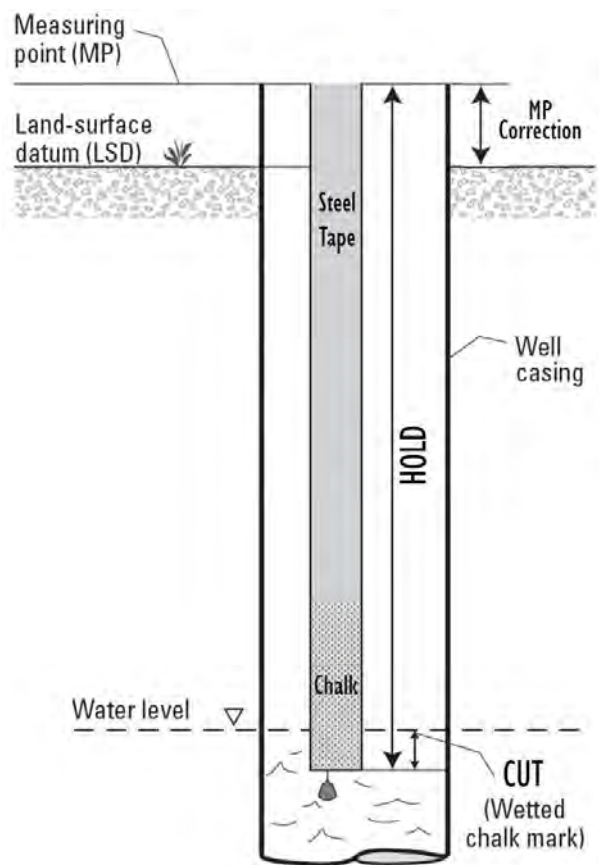


Figure C-1 Steel tape diagram (modified from USGS, 2011)

water level. If not possible, record the height of the measuring point above land surface each time the static water level is measured.

5. Chalk the lowest 20 feet of the tape using a piece of blue carpenter's chalk.
6. Review recent measurements from the well and calculate a depth that is 10 feet lower than the last recorded static water level. Record this as the HOLD value.
7. Pinch the thumb and index finger on the tape at the HOLD value. Lower the weight and tape into the well the thumb and index finger meet the MP. The weight and tape should be lowered into the water slowly to prevent splashing.
8. Bring the tape to the surface. Record the length of the wetted chalk as the CUT value.
9. Subtract the CUT from the HOLD and record this number as the **Depth to water from MP**.
10. Remove the wet chalk, wait 5 minutes and then make a check measurement by repeating steps 5 through 9 using a different HOLD value (1-2 feet lower or deeper) than that used for the original measurement.
11. If the check measurement does not agree with the original measurement within 0.02 foot, continue to make measurements until the measurements agree. If measurements continue to be unreliable, note in field log and reschedule the water-level measurement for a future date.
12. Subtract the **MP correction** from the **Depth to water from MP** value to get the depth to water below land-surface datum (LSD). Record the water level as the **Depth to Water from Land Surface**. Note: If the water level is above LSD, record the depth to water in feet below land surface as a negative number.
13. Record date and time of measurement.
14. After completing the water-level measurement, remove the chalk and clean the lowest 30 feet with bleach wipes (0.525% sodium hypochlorite) or a chlorine bleach solution (minimum 0.5% sodium hypochlorite [NaOCl] and water). This will reduce the possibility of contamination of other wells from the tape.
15. Replace cap on any port in discharge head or casing. Leave the well and pump in the same condition as you found it prior to measurement.

#### *Data Recording*

Scan and enter handwritten field water level measurements and notes into the official POSGCD digital database within 2 weeks of the measurement.

#### *Other considerations*

Periodically check the tape for rust, breaks, kinks, and stretching.

Calibrate the tape annually by comparing to an unused (unstretched) tape.

## I-B. Electric Tape (E-Line) method

### *Appropriate Wells for this method:*

- ✓ water levels < 500 ft  
(< 200 ft for best results)
- ✓ dripping or condensation on inside casing is OK

- X does NOT have very low specific conductance
- X does NOT have angled casing

### *Required Materials:*

Electric tape and supply reel.  
Clean rag.  
Pencil or pen.  
Water-level measurement field form.  
Two wrenches with adjustable jaws or other tools for removing well cap.  
Cleaning supplies for water-level tapes.  
Replacement batteries

### *Steps:*

1. If well is equipped with a submersible pump, confirm and record that the pump is not in operation. If the pump is operating, no water-level measurement should be taken or recorded. Obtain permission to collect measurement at a later time.
2. Record how long the pump has been off prior to taking the measurement. If the well has been pumped less than 24 hours prior to taking the water-level measurement, try to reschedule the measurement for another time when the pump can be shut down for the recommended 24 hours. If rescheduling is not possible, mark the **Less than 24 hrs** box on the field form. Estimate how long the well has been off and enter the time since pumping.
3. Identify a port or opening that provides access for the steel tape.

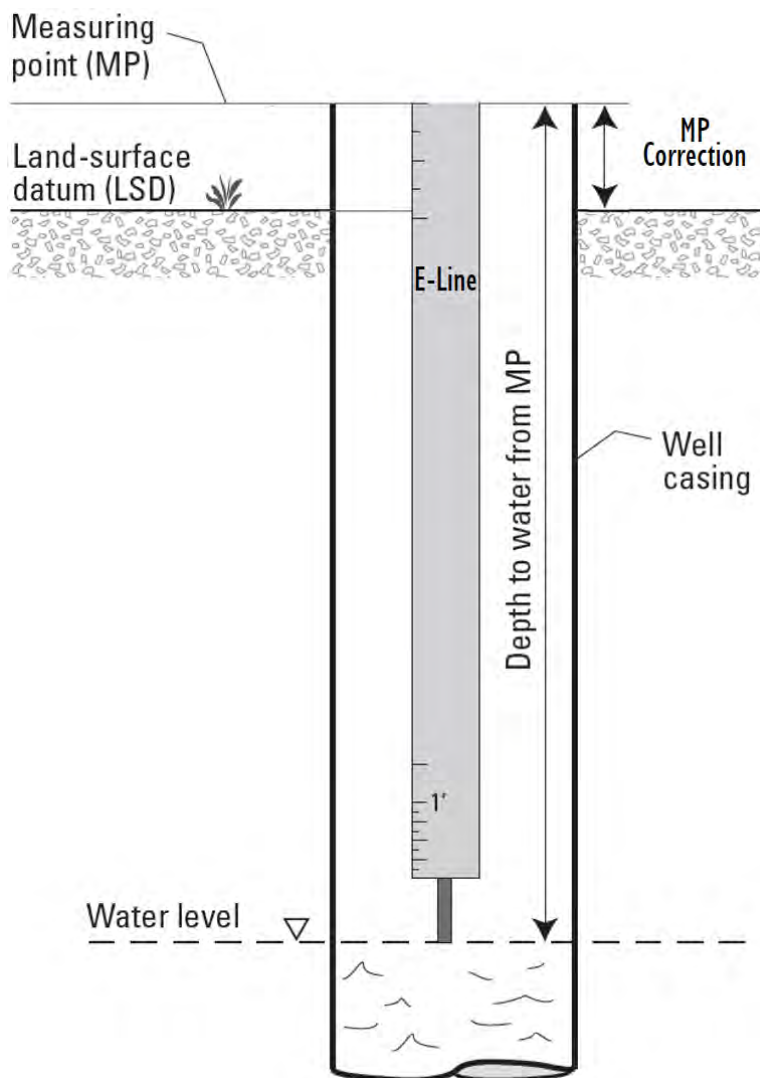


Figure C-2 Electric tape diagram (modified from USGS, 2011)

4. Measure and record the height of this opening above ground level. Record this as the measuring point correction value (***MP correction***). Describe the measuring point in the official record for the well, and use the same measuring point each time when measuring the water level. If not possible, record the height of the measuring point above land surface each time the static water level is measured.
5. Prior to lowering the tape down the well, dip the probe into tap water to check whether the electric tape is working properly.
6. Lower the tape slowly into the well until the indicator shows that the probe has made contact with the water surface.
7. Retract the e-line about one foot above the water surface and slowly lower again until the probe makes contact with the water surface.
8. Hold the electric line with a fingertip at the measuring point. Based on the 0.01 feet markings on the electric line, determine depth to water to the nearest 0.01 of a foot and record this value as the ***Depth to water from MP***.
9. Retract the e-line about 5 feet, wait five minutes and then repeat the measurement.
10. If the check measurement does not agree with the original measurement within 0.05 foot, continue to make measurements until the measurements agree. If measurements continue to be unreliable, note in field log and reschedule the water-level measurement for a future date.
11. Subtract the ***MP correction*** from the ***Depth to water from MP*** value to get the depth to water below land-surface datum (LSD). Record the water level as the ***Depth to Water from Land Surface***. Note: If the water level is above LSD, record the depth to water in feet below land surface as a negative number.
12. Record date and time of measurement.
13. After completing the water-level measurement, remove the chalk and clean the lowest 30 feet with bleach wipes (0.525% sodium hypochlorite) or a chlorine bleach solution (minimum 0.5% sodium hypochlorite [NaOCl] and water). This will reduce the possibility of contamination of other wells from the tape.
14. Replace cap on any port in discharge head or casing. Leave the well and pump in the same condition as you found it prior to measurement.

#### *Data Recording*

Scan and enter handwritten field water level measurements and notes into the official POSGCD digital database within 2 weeks of the measurement.

#### *Other considerations*

Periodically check the tape for rust, breaks, kinks, and stretching.

Calibrate the tape annually by comparing to an unused (unstretched) steel tape and/or checking measurements against measurements from a calibrated steel tape.

Check battery strength regularly.

## I-C. Air Line method

### *Appropriate Wells for this method:*

- ✓ Air line is already installed or can be installed
- ✓ Depth of air line is known

### *Required Materials:*

1/8 or 1/4-inch diameter air line (seamless copper tubing, brass tubing, galvanized pipe or flexible plastic tubing)

suitable pipe tee for connecting an altitude or pressure gauge to air line.

Calibrated altitude gauge (readings in feet) or pressure gauge (readings in psi), and spare gauges.

Compressed air source (ex. tire pump) and corresponding valve stem (ex. Schrader valve)

Small open-end wrench

Wire or electrician's tape

Graduated steel tape

Blue carpenter's chalk

Clean rag

Field notebook

Pencil or pen

Water-level measurement field form

### *Steps:*

1. If well is equipped with a submersible pump, confirm and record that the pump is not in operation. If the pump is operating, no water-level measurement should be taken or recorded. Obtain permission to collect measurement at a later time.
2. Record how long the pump has been off prior to taking the measurement. If the well has been pumped less than 24 hours prior to taking the water-level measurement, try to reschedule the measurement for another time when the pump can be shut down for the recommended 24 hours. If rescheduling is not possible,

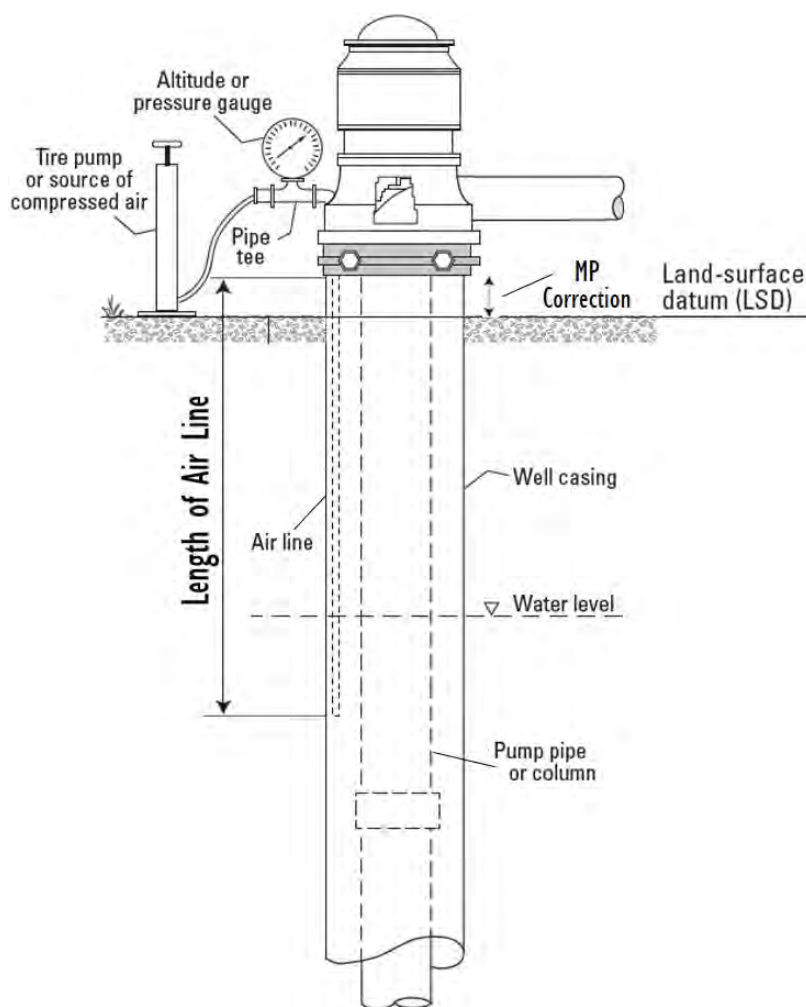


Figure C-3 Air line diagram (modified from USGS, 2011)



mark the **Less than 24 hrs** box on the field form. Estimate how long the well has been off and enter the time since pumping.

3. Attach a pipe tee to the top end of the air line. On the opposite end of the pipe tee, attach a Schrader valve stem.
4. Use a wrench to connect an altitude gauge (readings in feet) or a pressure gauge (readings in psi) to the fitting on top of the pipe tee.
5. Connect a compressed air source to the valve stem fitting on the pipe tee.
6. Add compressed air to the air line and make sure that the gauge shows pressure is increasing. If the gauge does not move, this means there is a leak. Check connections and retry until problem is fixed. If problem cannot be fixed, retry with a different pressure gauge. If problem still cannot be fixed, measurement by air line is not possible.
7. Continue adding compressed air to the air line until gauge pressure stops increasing. This means all the water has been purged from the air line. Record this maximum pressure as the pressure at the bottom of the air line.
8. Remove the compressed air and make sure that the gauge shows pressure slowly decreasing. If the pressure instead decreases sharply to zero, this means there is a leak in the air line (ex. the tubing is cut or severed). If the pressure does not change, this means there is a blockage in the air line (ex. the tubing is plugged or crushed). In these cases, retry with a different pressure gauge. If problem cannot be fixed, measurement by air line is not possible until air line is replaced.
9. If air line and pressure gauge are working correctly, then after removing the compressed air, the gauge should slowly decrease and eventually stop at a constant pressure. Once the gauge holds constant for 5 minutes, record the gauge reading as the pressure of the water above the bottom of the air line.
10. Repeat steps 7 through 9 until gauge readings are consistent.
11. a) If using an altitude gauge (reads in feet), subtract the gauge reading from the total length of air line. Record this value as **Depth to water from MP**.  
b) If using a pressure gauge (reads in psi), multiply the gauge reading by 2.31 to convert pressure to feet. Subtract this value from the total length of air line. Record this value as **Depth to water from MP**.
12. Subtract the **MP correction** from the **Depth to water from MP** value to get the depth to water below land-surface datum (LSD). Record the water level as the **Depth to Water from Land Surface**. Note: If the water level is above LSD, record the depth to water in feet below land surface as a negative number.
13. Record date and time of measurement.
14. Replace cap on any port in discharge head or casing. Leave the well and pump in the same condition as you found it prior to measurement.

#### *Data Recording*

Scan and enter handwritten field water level measurements and notes into the official POSGCD digital database within 2 weeks of the measurement.

#### *Other considerations*

If possible, air line length and measurement accuracy should be verified using an independent method (ex. steel tape measurement).

The altitude/pressure gauge should be periodically calibrated.

## I-D. Transducer method

### *Appropriate Wells for this method:*

- |   |  |
|---|--|
| ✓ Transducer is already installed or can be installed | X Water levels do NOT fluctuate beyond range of transducer |
| ✓ Has reliable power supply                           |  |

### *Required Materials:*

Vented submersible pressure transducer (most installations) or non-vented submersible pressure transducer (for telemetry installations)  
Perforated PVC pipe to provide protective housing for transducer (necessary in pumping wells)  
Transducer Cables  
Suspension system for the transducer and cables (ex. wire ties)  
Power supply  
Computer with appropriate adapters and transducer software  
Graduated steel tape  
Blue carpenter's chalk  
Clean rag  
Field notebook  
Pencil or pen  
Contact-burnishing tool (ex. artist's eraser)  
Multi-meter  
Spare desiccant  
Replacement batteries  
Water-level measurement field form

### *Steps (Initial Installation):*

1. Based on known well characteristics, choose the appropriate type of transducer for the well. For wells with little or no pumping, a 30 psi transducer (which allows 69 feet of submergence) is sufficient. In high-volume pumping wells, a 100 psi transducer (which allows for up to 197 feet of submergence) may be necessary.
2. For pumping wells, determine the depth to the pump and manufacture a protective sleeve that is long enough to extend well head down to just above the pump. This will be used to isolate the transducer from any frequency or electrical noise that may be generated by the pump.

3. Prior to going to field, install manufacturer supplied software to computer(s) that will be used to interface with the transducers and make sure software is working correctly.
4. Follow manufacturer's instructions to install transducer onto cable and connect transducer cable to computer, allowing software to establish signal to transducer.
5. In the software, input settings for data recording task. Start with a data collection frequency of one measurement per hour. After signal is established and transducer programmed, disconnect transducer from computer.

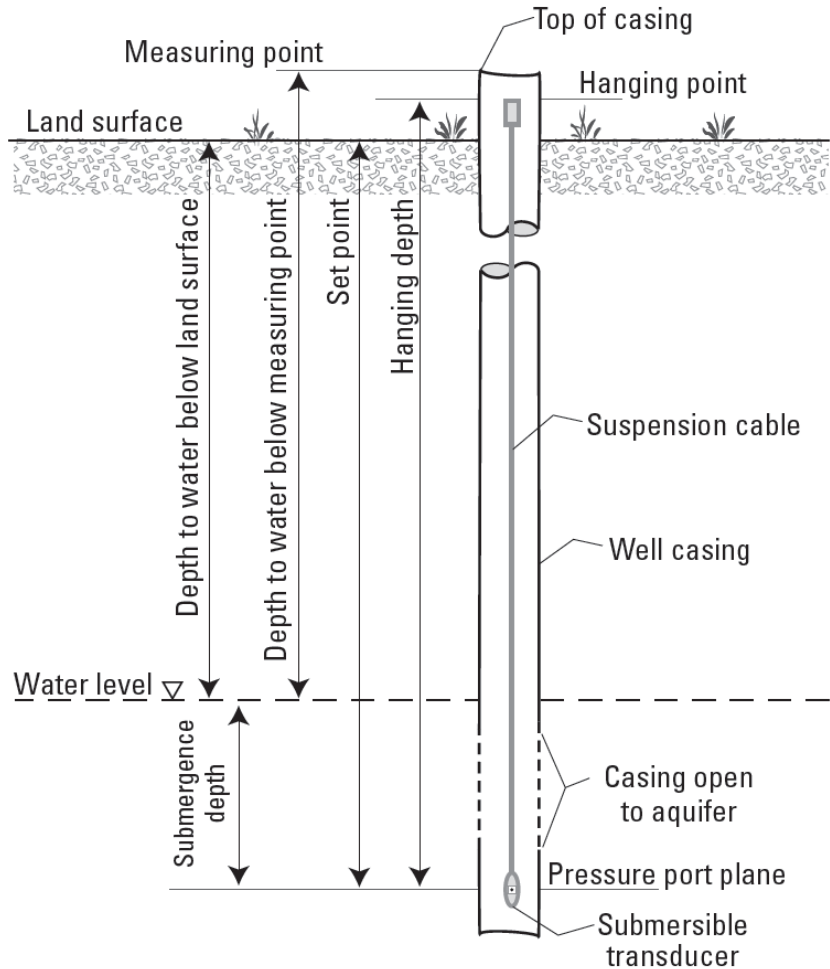


Figure C-4 Transducer diagram (modified from USGS, 2011)

6. Measure the water level in the well with a steel tape following the steel tape measuring protocol.
7. Install transducer in well by lowering it (with its protective pipe, if used) into the well slowly until it is submerged below the water level measured with the steel tape. **\*\*Do NOT allow the transducer to free fall into the well.\*\***
8. Continue lowering the transducer until it is deep enough that it will not go dry under anticipated water levels. For wells with little to no pumping (30 psi transducer), lower the transducer to approximately 50 feet below depth to water. For wells with high-volume pumping (100 psi transducer), lower the transducer to either the depth to the pump or 150 feet below depth to water, whichever is shallower.
9. Secure transducer and cable following manufacturer's recommendations to keep unit stable.
10. Mark the cable at the hanging point so that any future slippage can be determined.
11. Reconnect transducer to computer and ensure that the channel, scan intervals, and other functions selected are correct. Activate the data logger and set the correct time. Check that the water level measured is consistent with the water level measured with the steel tape. Make sure the data logger is operating prior to disconnecting from computer.
12. Record well and measuring point (MP) configuration, including the MP correction length above the land surface, the hanging point, and the hanging depth.

13. If necessary, install an instrument shelter that will protect the transducer and data logger from vandalism and weather.

#### *Steps (Existing Installation):*

1. Every 3-4 months (or life expectancy of desiccant), retrieve groundwater data by connecting transducer cable to computer and using data logger software.
2. Record the current water level displayed by the sensor.
3. Measure the water level in the well with a steel tape following the steel tape measuring protocol and record this value.
4. If the water-level measurement and transducer reading differ by more than 1 foot:
  - a. Check that the transducer is working by raising the transducer in the well slightly and taking a reading. Return transducer exactly to its original position after this check.
  - b. Check for other causes of measurement inconsistency such as cable kinks or slippage.
  - c. Recalibrate or replace the transducer if necessary and reset the instrumentation to reflect the proper depth to water.
  - d. Note ALL changes in the record.
5. If the water-level measurements retrieved from the transducer over the past months show any periods of flat-lining, this means the transducer went dry and indicates that the water level fluctuation exceeded the range of the transducer. If a 30 psi transducer is being used, replace the transducer with a 100 psi transducer and lower it to a deeper depth. If a 100 psi transducer is being used, lower the transducer to a deeper depth. If problem persists, continuous water level monitoring may not be possible at that well.
6. Perform basic maintenance checks:
  - a. Check the charge on the battery and the charging current supply to the battery using a multimeter and replace batteries as necessary
  - b. Check connections to the data logger and tighten as necessary.
  - c. If corrosion is occurring, burnish contacts.
  - d. Check desiccant and replace if necessary.
7. Verify the logger channel and scan intervals, document any changes to the data logger program, and reactivate the data logger to resume data collection. Make sure the data logger is operating prior to disconnecting cable from computer.
8. Repeat Steps 1 through 6.

#### *Data Recording*

Scan and enter handwritten field water level measurements and notes into the official POSGCD digital database within 2 weeks of the measurement.

Process downloaded transducer data and enter into the official POSGCD digital database within 2 weeks of collection.

If data is collected remotely via telemetry, upload to the official POSGCD digital database weekly every Sunday at midnight.

#### *Other considerations*

Transducers should be checked against other water level measurement methods regularly.

Transducers may need to be periodically recalibrated and/or replaced.

## **II. Water Quality Measurement Protocols**



## II-A. Specific conductance meter (TDS)

### *Appropriate Wells for this method:*

- |                                   |                                 |
|-----------------------------------|---------------------------------|
| ✓ Direct water sample retrievable | X Does NOT have high TDS values |
| ✓ Approx. TDS range known         | (that exceed range of meter)    |

### *Required Materials:*

Specific conductance meter  
Standard solution for instrument calibration  
Deionized water  
Plastic wash bottle  
Kimwipes  
Pencil or pen  
Water-level measurement field form  
Lab collection container & lab-specific instructions [if sending sample to outside testing facility]

### *Steps:*

1. The meter should be calibrated on-site with two conductivity standards that bracket the expected conductivity of the sample. Pick these two standards and verify that they are not expired.
2. Bring standard solutions to the temperature of well water by suspending the standards in a bucket into which well water is flowing. Allow at least 15 minutes for temperature equilibration.
3. Rinse the probe with deionized water and blot dry.
4. Connect the probe to the meter and place the probe in one of the standardizing solutions.
5. Set the selector knob to conductivity and allow the reading to stabilize. Adjust the reading using the knob on the back of the instrument until the reading matches that of the standard.
6. Remove the conductivity probe from the standard solution, rinse with deionized water, and blot dry.
7. Repeat steps 4 through 6 with the second standardizing solution.
8. Submerge multimeter into well water and wait for temperature, pH and conductivity values to stabilize. Record temperature, pH and conductivity once readings have stabilized.
9. If taking a grab sample for further laboratory testing, acquire clean water sample from well after multimeter readings have stabilized. Follow the lab-specific instructions for collection and packaging of grab sample.
10. Remove probe, rinse with deionized water, and blot dry.
11. Turn meter off, disconnect probe, and pack both in their case.

### *Data Recording*

Scan and enter handwritten field water level measurements and notes into the official POSGCD digital database within 2 weeks of the measurement.  
Process downloaded transducer data and enter into the official POSGCD digital database within 2 weeks of collection.

#### *Other considerations*

Meters need to be calibrated before each measurement.

Calibration standard solutions need to be replaced regularly.

Meters need regular maintenance and should be checked and calibrated periodically.

**APPENDIX F**  
**POSGCD Health and Safety Plan for**  
**Performing Well and/or Tap Sampling Activities**

Health and Safety Plan for  
Performing Well and/or Tap Sampling Activities within the  
POSGCD Jurisdiction, Milam and Burleson Counties, Texas

Prepared for:

Post Oak Savannah Groundwater Conservation District  
310 East Avenue C  
Milano, Texas 76556

Prepared by:



INTERA Incorporated  
9600 Great Hills Trail., Suite 300W  
Austin, Texas 78759

October 2021  
version 2.0

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### **TABLES**

Table 1	Site Health and Safety Equipment Inventory Checklist
Table 2	Emergency Phone Numbers

### **FIGURES**

Figure HASP-1	Hospital Location Map- Rockdale Hospital
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### **FORMS**

Form 1	Site Personnel Acknowledgement Form
Form 2	Safety Meeting Attendance Form
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Form 4	Site Visitor Log

### **APPENDICES**

Attachment A	Health and Safety Requirements for Heavy and Light Equipment
Attachment B	Heat and Cold Stress Casualty Prevention Plan
Attachment C	Safety Data Sheets

### 1.0 INTRODUCTION

Post Oak Savannah Groundwater Conservation District (POSGCD) performs groundwater well sampling activities for multiple residences and public suppliers located within the POSGCD jurisdiction in Milam and/or Burleson Counties, Texas. This Health and Safety Plan (HASP) establishes guidelines and requirements for the safety of personnel during the performance of the field activities. The specific field activities addressed by this plan are defined in Section 4.0. Employees of POSGCD are required to abide by the provisions of this plan.

The health and safety guidelines and requirements presented are based on a review of available information and an evaluation of potential hazards. This HASP outlines the health and safety procedures and equipment required for activities at this site. This is a dynamic document. In the event that the contents of this HASP need to be changed, site personnel shall be informed of the change(s) and shall then be responsible for abiding by the protocol of those revisions. The Project Manager, the Project Health and Safety Officer, or the Site Safety Officer may modify this plan in response to additional information obtained regarding the potential hazards to personnel and conditions at the site. Consultation between the Project Manager and a Health and Safety Officer is recommended before establishing HASP modifications.

### 2.0 POLICY

POSGCD considers the prevention of illness, injury, and accidents in the workplace to have greater importance than any other facet of the work. Safety shall always take precedence over expediency or shortcuts, and every attempt shall be made to reduce the possibility of injury, illness, or accident occurrence. Site activities assigned under a subcontract or purchase order issued shall be conducted in accordance with the established safety regulations of the Occupational Safety and Health Administration (OSHA), and other applicable Federal, State, County, and City regulations. Personnel, including POSGCD subcontractors, lower tier subcontractors, consultants, and service personnel, who perform any task in relation to site activities or are visitors to the site, shall adhere to the provisions of these requirements. This HASP does not apply to owner representatives.

### 3.0 KEY PERSONNEL

**Project Manager:** Bobby Bazan (956-735-1782 (m), 512-399-7001(o))

For this project, the Project Manager has the following responsibilities:

- Supervise the preparation and implementation of an approved HASP for this project;
- Ensure that the project is performed in a manner consistent with the HASP; and
- Ensure compliance with the HASP by POSGCD personnel.

The Project Manager has the authority to take the following actions:

- Suspend field activities if the health and safety of personnel are endangered, pending further consideration by the Project Health and Safety Officer or the Site Safety Officer (SSO); and
- Dismiss or suspend an individual from field activities for infractions of the HASP, pending further consideration by the Project Health and Safety Officer or the SSO.

**Project Health and Safety Officer:** Bobby Bazan (512-455-9900)

The Project Health and Safety Officer has the following responsibilities:

- Coordinate with the Project Manager as required in matters of health and safety;
- Develop a HASP for the project and to submit it to the Project Manager for approval;
- Appoint or approve a SSO to assist in implementing the HASP;
- Monitor compliance with the approved HASP;
- Assist the Project Manager in seeing that proper health and safety equipment is available for the project; and
- Approve personnel to work on this site according to appropriate medical monitoring, and health and safety training.

The Project Health and Safety Officer has the authority to take the following actions:

- Suspend work or otherwise limit exposure to personnel if the HASP appears to be unsuitable or inadequate;
- Direct personnel to change work practices if they are deemed to be hazardous to health and safety of personnel; and
- Remove personnel from the project if their actions or condition endangers their health and safety or the health and safety of co-workers.

**Site Safety Officer (SSO):** Bobby Bazan (512-455-9900)

The SSO has the following responsibilities:

- Direct health and safety activities on site;
- Report safety-related incidents or accidents to the Project Manager and the Project Health and Safety Officer;
- Assist the Project Manager in implementing the HASP; and
- Maintain health and safety equipment on site, as specified in the HASP.

The SSO has the authority to take the following actions:

Suspend field activities if the health and safety of personnel are endangered, pending further consideration by the Project Manager and the Project Health and Safety Officer; and  
Dismiss or suspend an individual or subcontractor from field activities for infractions of the HASP, pending further consideration by the Project Manager and the Project Health and Safety Officer.

### 4.0 SITE ACTIVITIES

Post Oak Savannah Groundwater Conservation District (POSGCD) performs groundwater well sampling activities for multiple residences and public suppliers located within the POSGCD jurisdiction in Milam and/or Burleson Counties, Texas. This Health and Safety Plan encompasses activities required to complete the assessment objectives.

Activities for the groundwater well sampling activities include:

- Meeting or communicating with well owner to determine which wells will be sampled;

- If not personally performing the water sampling, the POSGCD representative will then escort subcontracted field personnel to each well for sampling activities;

- For water level measurements:

  - Documenting location of well to be sampled in field notebook and with photographs;

  - Documenting the measured field parameters in field notebook or appropriate POSGCD field measurement form;

- For water quality sampling:

  - Identifying the tap located at, or nearest, to the wellhead;

  - Purging the water well in accordance with Texas Commission on Environmental Quality (TCEQ) standard operating procedure (SOP) number 7.9;

  - Documenting location of tap to be sampled in field notebook and with photographs;

  - Documenting the measured field parameters during well purging including pH, conductivity, temperature, dissolved oxygen, turbidity and ORP;

  - Collecting a representative sample in accordance with TCEQ SOP No. 7.10 in laboratory containers provided by the laboratory;

  - And ice preservation of all samples collected for delivery to the analytical laboratory.

Groundwater quality samples will be submitted to DHL Analytical in Round Rock, Texas and samples will be analyzed for TAL metals plus cations by EPA method 6020A, anions by method E300, alkalinity by method M2320 B, dissolved silica by HACH 8185, specific conductance by method M2510 B, and volatile organic compounds (VOCs) by EPA method 8260C.

### 5.0 HAZARD ASSESSMENT

An assessment of the hazards has been made for each of the activities specified in Section 4.0.

The following hazards have been identified:

- Physical hazards associated with slips, trips, and falls;
- Physical hazards associated with driving from one site to the next;
- Physical hazards associated with water well sampling and heavy lifting;
- Physical hazards associated with extreme weather;
- Biological hazards related to insect and snake bites; and
- Chemical hazards of collecting potentially impacted groundwater samples.

On-site personnel and site visitors shall be made aware of and protected against the potential hazards listed above.

#### 5.1 Physical Hazards

The on-site physical hazards that exist for well sampling primarily revolve around working on unfamiliar terrain around the well heads and driving from well location to well location. If POSGCD has not been to these well locations previously, care must be taken when walking around and determining sample locations near the well heads as there is a potential for on-site physical injury resulting from slips, trips and falls. Driving is a potential hazard so limit your distractions while behind the wheel, i.e. no texting or talking on mobile phones. Know your route to the next well location before you leave to avoid getting lost.

Additionally, multiple supplies and/or equipment may be used to assist in collecting the tap samples and heavy lifting may present itself. Use gloves when handling meters and sampling containers and ask someone to help when lifting heavy items. Do not try to lift by yourself or the potential of self-injury may occur.

Central Texas has the potential to be dramatic and extreme. In case of adverse weather or other environmental conditions, the SSO will determine if work can continue without compromising worker health and safety. The following adverse conditions could prompt a safety review:

- High winds;
- Extreme cold;
- Heavy precipitation;
- Fog; or
- Lightning storms.



### 5.2 Biological Hazards

Numerous types of pest organisms may be present at the site. Mosquitoes, bees, fire ants, chiggers or scorpions may be present at the site. Field personnel are encouraged to use insect repellents before venturing on site. Additionally, snakes may be present at the site and caution should be exercised especially around items such as tall grass and/or debris.

### 5.3 Chemical Hazards

For groundwater contamination sampling, field personnel will be collecting tap samples and analyzing them for TAL metals plus cations, anions, alkalinity, dissolved silica, specific conductance, and VOCs. It has not been confirmed whether groundwater is affected with these analytes so it is not known what chemical hazards exist at each residence. The best assurance of protection against potentially hazardous chemicals is avoidance. During the field event, it will be mandatory that field personnel wear safety glasses as to avoid potentially contaminated groundwater contact with the eyes. Nitrile gloves are also required when sampling to avoid potentially contaminated soil contact with the skin.

Ingestion of chemical hazards shall be controlled on this site by prohibiting eating, smoking, and drinking in the Exclusion Zone (refer to Section 6.2 for definitions of work zones), and by requiring field personnel to decontaminate themselves upon leaving the Exclusion Zone.

If contact is unavoidable in order to perform a required task, potential hazards will be minimized by using appropriate PPE to protect against exposure to dangerous or hazardous materials. Personal protective equipment (PPE) to protect the body against contact with known or anticipated chemical hazards has been divided into four categories by the EPA (i.e., Levels A, B, C, and D) according to the degree of protection afforded.

At this site, the levels of protection selected for activities specified in Section 4.0 are:

**Level D** – for site workers expected to come in direct contact with potentially impacted soil or water.

The following PPE is required for Level D Protection at the discretion of the SSO:

- Coveralls or appropriate work clothes;
- Safety-toed boots;
- Safety glasses or chemical splash goggles;
- Leather or heavy cotton gloves, as required, and nitrile gloves during sampling activities;
- Rain gear, as required;

Hard hat, if overhead equipment is present; and  
Hearing protection, if heavy machinery is present.

### **6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS**

Safety equipment and PPE are discussed in this section so protection of the head, eyes, skin, feet, and respiratory system can be better understood. The SSO has the authority to make PPE exceptions for site personnel if he/she deems it in the best interest of the field personnel's well being. Such a PPE exception (i.e., modification to the HASP) shall be based on site specific information such as air monitoring data, visual observations, and weather data/observations. One example of such a modification to the HASP would be to decrease the use of respirators, hard hats, or poorly breathable clothing if heat stress is a primary concern during site activities and the use of the PPE was intended for a low-risk precaution. Under no circumstances shall the SSO make a PPE exception/modification if personnel shall be without the protection needed to be safe or to properly protect their health. If it appears that proposed PPE is inadequate, site work shall be suspended until new PPE or planning allows personnel to work safely.

#### **6.1 Safety Equipment**

In addition to the personal protective equipment listed below, the following general safety equipment shall be available: OSHA-approved first-aid kit, fire extinguisher, insect repellent/treatment, rinse water, and decontamination water. Table 1 provides a checklist for the health and safety equipment.

##### **6.1.1 Head Protection**

Hard hats shall be worn on-site when overhead hazards are present such as during drilling activities and when light and/or heavy equipment is on-site. Drilling and heavy equipment is not scheduled during this field event so hard hats are not warranted.

##### **6.1.2 Eye Protection**

For water quality sampling, POSGCD personnel working on site shall wear safety glasses. Additionally, when personnel are performing activities where the potential exists for increased exposure due to splash, dust, particle, or vapor, safety goggles, face shields, or full-face masks shall be worn as appropriate.

##### **6.1.3 Skin Protection**

POSGCD personnel working on site shall wear cotton clothing. Due to risks of working near electrical hazards and the possibility of electric shocks, cotton clothing, unlike synthetic materials, will be less likely to melt onto the skin and produce a more severe injury.

At the discretion of the SSO, site personnel may be required to wear disposable, chemically resistant clothing, and inner and outer gloves during soil excavation and/or sampling. This PPE shall be disposed of at the decontamination station after each use or when they become worn or punctured. The suit materials selected shall be resistant to the known or anticipated chemicals at the site. If the disposable protective suits appear to be deteriorating under chemical action, the SSO shall be notified. The seams between the sleeves and gloves, and the pant legs and boots shall be taped to prevent exposure in these areas.

### **6.1.4 Hearing Protection**

At the discretion of the SSO, site personnel may be required to wear hearing protection, such as ear plugs, if loud noises exist on site and are considered a hazard to one's hearing.

### **6.1.5 Footwear**

Personnel engaged in field activities at the site shall wear safety-toed boots at all times. If required by the site-specific HASP or the SSO, footwear may also need to be chemical resistant or boot covers may need to be added.

## **6.2 Decontamination**

During field activities, if equipment needs to be decontaminated it will be carefully decontaminated as specified below.

### **6.2.1 Equipment Decontamination**

For water quality sampling, POSGCD plans to sample directly from the tap if possible but if downhole sampling equipment is required only disposable equipment will be utilized; therefore, decontamination is not needed. However, if non-disposable equipment is used and contacts potentially contaminated media, it will be decontaminated upon completion of field activities. Spray bottles with distilled water and a liquinox/water mixture will be on site if decontamination is warranted.

### **6.2.2 Personnel Decontamination**

Personnel decontamination facilities are to be established, if needed, and are to include the following:

- Hand and face wash; and
- Receptacles for disposal of used personal protective equipment (PPE).

This field effort will include personnel wearing appropriate PPE prior to initiating work at the site each day and will remove and throw away disposable PPE before leaving the site and/or moving to the next sampling location. Used nitrile gloves and disposable

spoons will be disposed of in trash bags and the trash bags will be dumped in trash receptacles at the end of each day.

### **6.3 Medical Examination/OSHA Training**

For potentially hazardous field activities such as contaminated water sampling, POSGCD plans to use appropriately trained subcontractors. Subcontractors involved in potentially hazardous field activities shall provide for medical examinations for their employees. Records of proof of medical examination shall be provided to POSGCD by other subcontractors and maintained in the project files.

In the case of potentially hazardous field activities, project personnel on site shall be 40-hour OSHA HAZWOPER trained. Proof of certification shall be available. If a field office is established, a copy of employees' certificates shall be kept in a file on site during work activities and in the project file in the office after the field activities are completed.

### **6.4 Site Activities Manager Notification**

Field personnel shall inform the SSO or his/her designated representative before entering the site. If any previously unidentified potential hazards are discovered during fieldwork, personnel shall notify the SSO for further instructions.

### **6.5 Project Safety Meetings/Compliance Agreement**

A safety meeting shall be conducted by the SSO at the start of each field effort, and thereafter, at the beginning of each day, or as appropriate, due to changing field conditions or the start of new tasks. Safety concerns associated with that day's activities shall be discussed. An attendance record shall be kept for safety meetings.

During the first safety meeting or prior to commencement of fieldwork, POSGCD personnel shall be provided with a copy of this HASP. Personnel shall be given the opportunity to review the plan and ask any questions. A log will be maintained where by project personnel will sign signifying that they have read and understood the HASP.

Project safety information shall be recorded in a field logbook. As appropriate, safety information shall include the following:

- Names of POSGCD, subcontractor, and visitor personnel;
- Dates and times for entry and exit of personnel at the site;
- Lists of accidents, injuries, illnesses, and incidences of safety infractions;
- Air quality and personal exposure monitoring data, if necessary; and
- Other information related to safety matters.

Accidents, illnesses, and/or other incidents shall be reported immediately to the SAM, the SSO, and/or the Project Health and Safety Officer.

### 6.6 Prohibitions

The following activities are prohibited at the site:

- Smoking, eating, drinking, chewing gum or tobacco, and storing food or food containers in the sampling area;
- Approach or entry into areas or spaces where toxic or explosive concentrations of gases or dust may exist without proper equipment available to enable safe entry and exit; and
- Unauthorized entry into confined spaces.

Field personnel shall practice good personal hygiene to avoid ingesting contaminants or spreading contaminated materials.

### 6.7 Site Visitors

Visits involving entry to the site by persons not directly involved in tasks identified in the Work Plan are discouraged. Persons designated Site Visitors shall be briefed by the POSGCD SSO as to on-site procedures, conditions, and hazards and shall be required to sign the project safety log before entering the site. Site Visitors shall be accompanied by authorized POSGCD site personnel while on site and shall be expected to follow directives from the SSO. Site Visitors shall provide their own PPE required for the area that they are visiting and shall be expected to follow applicable procedures and protocols.

## 7.0 LABORATORY CONSIDERATIONS

The laboratory directors or contacts shall be informed of any known contaminant levels in the samples that would require special handling procedures to prevent risks to the health and safety of laboratory personnel.

## 8.0 CONFINED SPACE ENTRY

A confined space is a space that by design has limited openings for entry and exit, unfavorable natural ventilation that could contain or produce dangerous air contaminants, and is not intended for human occupancy without the proper training and procedures. If any confined spaces are encountered, they are not to be entered and shall be reported to the SSO.

## 9.0 SHIPPING OF SAMPLES

Although it is highly unexpected, hazardous materials will be shipped by or under the supervision of a DOT trained member of the POSGCD staff or subcontracted personnel.



### 10.0 HAZARD COMMUNICATION (HAZCOM) PROGRAM

The Hazard Communication (Hazcom) Program is an important component of this Health and Safety Plan. The Hazcom Program designates the project personnel responsible for the implementation and maintenance of hazardous chemical labeling, and employee training and information requirements. The Hazcom Program also includes the hazardous chemical list for the site, and describes the labeling and information requirements associated with the hazardous chemicals likely to be used on-site.

#### 10.1 Roles of Personnel

The SSO shall be the administrator of the site's Hazcom program in coordinating labeling, training, SDS (Safety Data Sheet, formerly known as Material Safety Data Sheet) information, hazardous chemical listings, subcontractor and client Hazcom communications and information exchange, and any necessary trade secret requests. The SSO shall also maintain the site's written Hazcom Program and monitor the implementation and effectiveness of this program. Subcontractors are responsible for complying with applicable POSGCD policies on hazardous chemicals and for providing Hazcom information to the SSO for hazardous chemicals brought to the site; the SSO shall then incorporate the subcontractor Hazcom information into the site's overall Hazcom program. POSGCD site personnel, other than the SSO, are responsible for the following:

- Know the site location of the SDSs and the Hazcom written program.
- Identifying the Hazcom program administrator.
- Competence in reading a SDS and a label, and how to use the applicable sections for safe job performance.
- Understanding potential hazards associated with chemicals in your work area.
- Sending received SDSs to the SSO.
- Notify the SSO of products received with no labels or damaged labels or if you are uncertain of whether a SDS is needed.

#### 10.2 Information and Training

The SSO shall also be responsible for informing and training on site project personnel of the requirements of this plan, and the location and availability of the written Hazcom Program, including the list of hazardous chemicals and their SDSs. The SSO shall be responsible for updating the Hazardous Chemicals List and the associated SDS information.

#### 10.3 Hazardous Chemical List

Hazardous chemicals are not known at these sites; however,alconox will be onsite if decontamination is warranted. The potential Hazardous Chemical List for the site during this assessment is:

Alconox

The SDS for this chemical is in Attachment D. In the event that additional chemicals are purchased for use on-site, the Hazcom guidelines shall be followed.

### **10.4 Safety Data Sheets**

SDSs for the chemicals identified on the Hazardous Chemical List are included as paper copies in Attachment D of this Health and Safety Plan (HASP). SDSs provide detailed information on specific chemicals, including potential hazardous effects, physical and chemical characteristics, and recommendations for appropriate protective measures. In order to maintain the SDSs in an accessible central place in the field, the SSO shall be responsible for keeping the HASP with the SDS (Attachment D) in the field vehicle at the site. Project personnel working on site shall be informed of its location and shall personally have access to the SDS information. The SSO is also responsible for ensuring that all SDSs are maintained and available, and that SDSs are obtained for new chemicals shipped to the site prior to their use.

## **11.0 EMERGENCIES/ACCIDENTS**

### **11.1 On-Site Personnel and Visitors**

Illnesses, injuries, and accidents occurring on site shall be addressed immediately in the following manner:

- Check the accident scene to determine if you or anyone else is in danger;
- Call the emergency phone number (911) if the emergency or accident appears serious. Emergency numbers are listed in Table 2;
- Begin care for the injured or exposed person(s) by removing them from immediate danger if a neck or back injury is not suspected;
- Render minor first aid as necessary; decontaminate affected personnel as necessary;
- Evacuate other personnel on site to a safe place until the SSO determines that it is safe for work to resume;
- Report the accident to the District Health and Safety Officer, the Project Health and Safety Officer, and the SSO immediately;
- Complete an Incident Investigation Report for near misses and injuries requiring medical attention;
- Collaborate with the District and Project Health and Safety Officer, the SSO, and the Project Manager to develop procedures to prevent a recurrence.

Should an emergency site evacuation become necessary for any reason, the SSO shall alert personnel to leave the site. An assembly point will be designated by the Site Manager/Health and Safety Officer at the beginning of the field work. Personnel shall not return to the site until an all-clear notification has been received from the SSO. In the event the accident is minor enough to transport the injured personnel to the hospital, follow the directions to the hospital provided on Figure HASP-1.

### **11.2 Surrounding Community**

In the highly unlikely event that a site emergency has the potential to affect the community surrounding the site, the SSO shall be responsible for notifying the police and the fire departments using the telephone numbers listed in Table 2. The SSO shall provide whatever technical assistance is needed by these agencies.

### **12.0 REFERENCES**

U.S. Code of Federal Regulations, 1995, Title 29, as cited.

### TABLES

**Table 1**  
**Site Health and Safety Equipment Inventory Checklist**  
Include items as applicable for site activities

<b>EMERGENCY RESPONSE</b>
OSHA-APPROVED INDUSTRIAL FIRST AID KIT FIRE EXTINGUISHER (1 per field vehicle) EYE WASH
<b>PERSONNEL PROTECTION</b>
INSECT REPELLENT SNAKE GUARDS SAFETY VESTS SAFETY GLASSES NITRILE GLOVES (Outer) IGLOO™ WATER COOLER/CUPS GATORADE™ DUCT TAPE CHEMICAL RESISTANT SAFETY-TOED RUBBER BOOTS OR BOOT COVERS HARD HAT
<b>PERSONNEL DECONTAMINATION</b>
4-MIL PLASTIC DROP CLOTHS PLASTIC WASHTUBS SPRAYER BRUSHES TRASH BAGS DETERGENT POTABLE OR DISTILLED WATER



Table 2  
Emergency Phone Numbers

EMERGENCY SERVICE	LOCATION OR NOTE	TELEPHONE NO.
Fire Department	Call Emergency No.	911 or 713-692-1945 (non-emergency)
Police Department	Call Emergency No.	911 or 713-222-5408 (non-emergency)
Ambulance	Call Emergency No.	911
Hospital – Rockdale Hospital – Little River Healthcare located at 1700 Brazos Avenue, Rockdale, TX 76567	Call Emergency No. Main Number	911 or (512) 446-4500
Poison Control Center	Call Emergency No.	911 or 800-764-7661
District Health and Safety Officer	Bobby Bazan	512- 399-7001 office 956-735-1782 mobile

## **FIGURES**

Figure HASP-1 Hospital Location Map- Rockdale Hospital

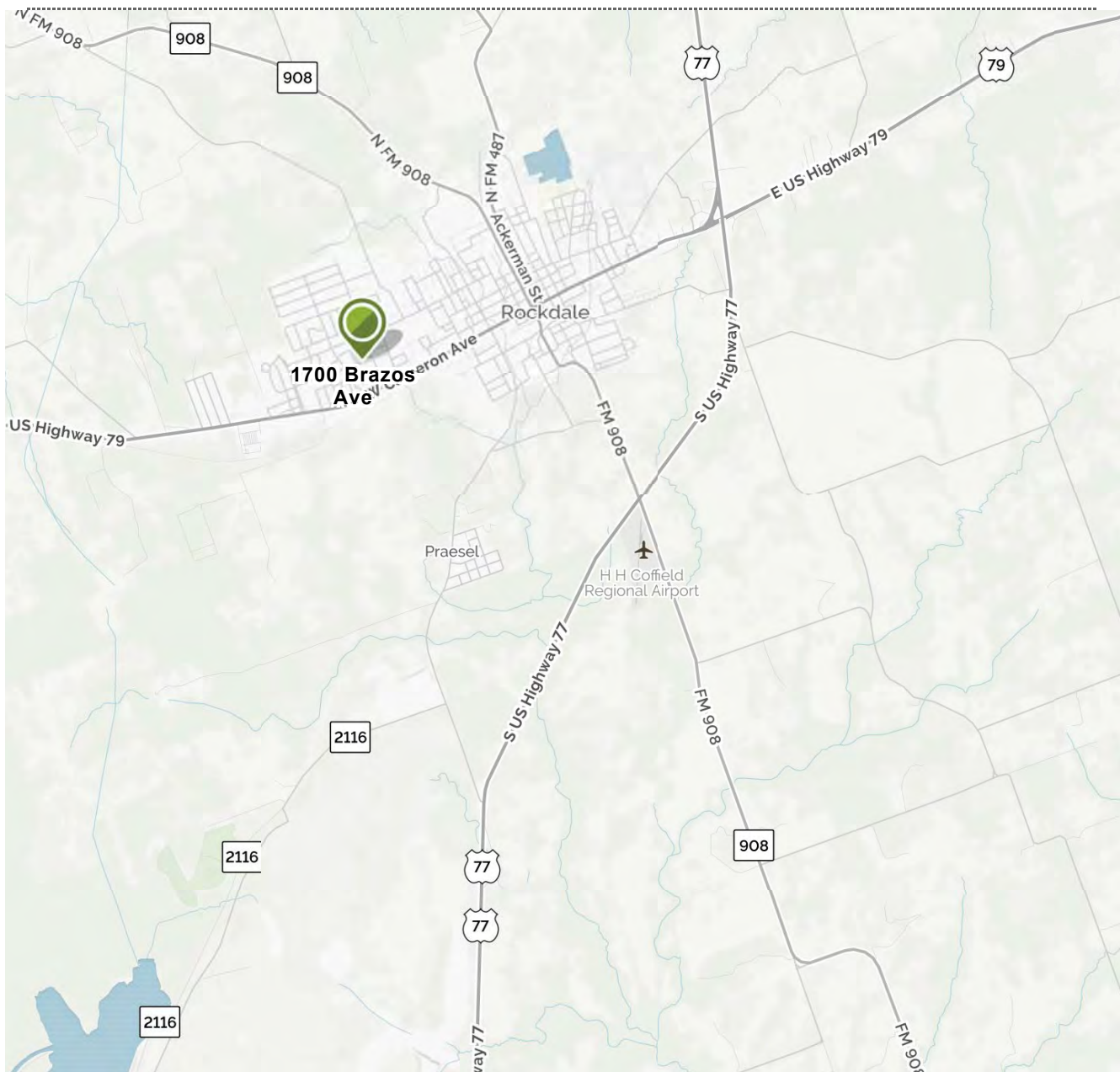
# Search Results for "1700 Brazos Ave, Rockdale, TX 76567-2518"

mapquest

page 1 of 1

Rockdale Hospital - Little River Healthcare 512-446-4500

1. 1700 Brazos Ave  
1700 Brazos Ave,  
Rockdale, TX 76567-2518



## **FORM 1**

Site Personnel Acknowledgement Form





## **FORM 2**

### Safety Meeting Attendance Form



## SAFETY MEETING ATTENDANCE FORM

Date: \_\_\_\_\_ Project Number: \_\_\_\_\_

Project Title & Task: \_\_\_\_\_

Has a Job Safety Analysis Form been completed for this task? ☐ Yes ☐ No (if no, fill it out now)

### SAFETY TOPICS PRESENTED (describe specifics)

Protective Clothing/Equipment \_\_\_\_\_

Emergency Procedures \_\_\_\_\_

Chemical Hazards \_\_\_\_\_

Confirm that Safety Data Sheets are available for listed hazardous chemicals/substances. ☐ Yes ☐ N/A

Location of Nearest Hospital \_\_\_\_\_

Physical Hazards \_\_\_\_\_

Location of Mobile Phone \_\_\_\_\_

Special Equipment \_\_\_\_\_

Other \_\_\_\_\_

### ATTENDEES

Printed Name

Signature

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Meeting Conducted by:

Printed Name

Signature

## **FORM 3**

### Incident Investigation Report Form

## INCIDENT INVESTIGATION REPORT FORM

Attach additional pages as necessary, if more than one employee was injured, each employee must fill out their own form. This form should also be used to report near-misses and property or environmental damage.

<b>Incident Investigator to fill out:</b>			
Reportable / Recordable / Non-Recordable / Near Miss / Property Damage / Environmental Damage		Case Number from OSHA 300 Log:	
<b>Site:</b>	<b>Project Number:</b>		
<b>SECTION 1: INCIDENT REPORT</b>			
<b><u>Employee Injured, Ill, or Deceased</u></b> (Skip this box for near-miss and property or environmental damage) Name: Address: Date of Birth: Date Hired: Male / Female		SECTION 1	
<b><u>Names and Project Roles of Other Affected Personnel</u></b> (Witnesses of incident and/or personnel involved in near-miss or property or environmental damage)			
<b>Site Project Manager</b>			
<b>Event Date</b>	<b>Event Time</b>		<b>Time Personnel Began Work</b>
<b>Exact Location of Event:</b> (description or address, if available)			
<b>Event Resulted in:</b> (circle one) Fatality / Injury / Illness / Near-Miss / Property Damage / Environmental Damage			
<b>If fatality, date of death:</b> ____ / ____ / ____			
<b>Nature of the Event:</b> (brief summary including body parts affected and/or property that was damaged)			
<b>Object or substance that directly harmed the employee or property:</b> (Leave blank if not applicable)			
<b>Task Being Performed Just Prior To The Incident:</b> (Describe the work objective, the specific activity being carried out, and any tools or equipment being used)			

<b>Incident Investigator to fill out:</b>	
Reportable / Recordable / Non-Recordable / Near Miss / Property Damage / Environmental Damage	Case Number from OSHA 300 Log:
<b>Site:</b>	<b>Project Number:</b>
<b>Did the incident involve a vehicle?</b> (include full description of vehicle and rental agency information if appropriate)	
<b>Full Description of Incident:</b> (include task being performed, how the event occurred, equipment being used at the time, materials involved, workplace condition, and any other impacts)	
<b>Was First Aid Given?</b> (Yes or No – Skip to next section if No)	
	<b>Name of First Aid Attendant(s):</b>
	<b>List First Aid Given:</b>
<b>Was Medical Treatment Beyond First Aid Necessary?</b> (Yes or No – Skip to next section if No)	
	<b>Was Employee Treated in an Emergency Room?</b> (Yes or No)
	<b>Was Employee Hospitalized overnight as an in-patient?</b> (Yes or No)
	<b>Type of Emergency Transportation:</b> (i.e., ambulance)
	Location of Medical Treatment Facility: Name: Address: Phone number:
	<b>Name of Doctor Providing Medical Treatment:</b>
	<b>Expected Length of Medical Leave Resulting from Incident:</b>
	<b>Medical Diagnosis:</b>
<b>Section 1 Completed by:</b> _____ <b>Title:</b> _____ <b>Phone:</b> _____ <b>Date:</b> _____	

**SECTION 1**



<b>Incident Investigator to fill out:</b>																															
Reportable / Recordable / Non-Recordable / Near Miss / Property Damage / Environmental Damage	Case Number from OSHA 300 Log:																														
<b>Site:</b>	<b>Project Number:</b>																														
<b>SECTION 2: INVESTIGATION REPORT</b> (to be filled out by Incident Investigator)																															
<b>Witness statements:</b> (attach sheets as necessary, or NA if no witnesses)																															
<b>Evidence collected:</b>																															
<b>Factors in Incident:</b> (check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Mental stress factor</td> <td><input type="checkbox"/> Fatigue</td> <td><input type="checkbox"/> Remote site health</td> </tr> <tr> <td><input type="checkbox"/> Alcohol/drugs</td> <td><input type="checkbox"/> Exposure to sound/noise</td> <td><input type="checkbox"/> Exposure to particulates</td> </tr> <tr> <td><input type="checkbox"/> Biological exposure</td> <td><input type="checkbox"/> Mechanical vibration</td> <td><input type="checkbox"/> Cold Stress</td> </tr> <tr> <td><input type="checkbox"/> Chemical exposure</td> <td><input type="checkbox"/> Travel health</td> <td><input type="checkbox"/> Heat Stress</td> </tr> <tr> <td><input type="checkbox"/> Exposure to ionizing radiation</td> <td><input type="checkbox"/> Exposure to non-ionizing radiation</td> <td><input type="checkbox"/> Pre-existing medical condition</td> </tr> <tr> <td><input type="checkbox"/> Exposure to gas or vapour</td> <td><input type="checkbox"/> Repetitive movements</td> <td><input type="checkbox"/> Working at height</td> </tr> <tr> <td><input type="checkbox"/> Other muscular stress</td> <td><input type="checkbox"/> Other health/exposure</td> <td><input type="checkbox"/> Workplace design</td> </tr> <tr> <td><input type="checkbox"/> Non-compliance</td> <td><input type="checkbox"/> Equipment/property design</td> <td><input type="checkbox"/> Lifting/Hoisting</td> </tr> <tr> <td><input type="checkbox"/> Electrical</td> <td><input type="checkbox"/> Equipment/property fire</td> <td><input type="checkbox"/> Equipment/property damage</td> </tr> <tr> <td><input type="checkbox"/> Equipment failure</td> <td><input type="checkbox"/> Housekeeping</td> <td><input type="checkbox"/> Not otherwise specified</td> </tr> </table>		<input type="checkbox"/> Mental stress factor	<input type="checkbox"/> Fatigue	<input type="checkbox"/> Remote site health	<input type="checkbox"/> Alcohol/drugs	<input type="checkbox"/> Exposure to sound/noise	<input type="checkbox"/> Exposure to particulates	<input type="checkbox"/> Biological exposure	<input type="checkbox"/> Mechanical vibration	<input type="checkbox"/> Cold Stress	<input type="checkbox"/> Chemical exposure	<input type="checkbox"/> Travel health	<input type="checkbox"/> Heat Stress	<input type="checkbox"/> Exposure to ionizing radiation	<input type="checkbox"/> Exposure to non-ionizing radiation	<input type="checkbox"/> Pre-existing medical condition	<input type="checkbox"/> Exposure to gas or vapour	<input type="checkbox"/> Repetitive movements	<input type="checkbox"/> Working at height	<input type="checkbox"/> Other muscular stress	<input type="checkbox"/> Other health/exposure	<input type="checkbox"/> Workplace design	<input type="checkbox"/> Non-compliance	<input type="checkbox"/> Equipment/property design	<input type="checkbox"/> Lifting/Hoisting	<input type="checkbox"/> Electrical	<input type="checkbox"/> Equipment/property fire	<input type="checkbox"/> Equipment/property damage	<input type="checkbox"/> Equipment failure	<input type="checkbox"/> Housekeeping	<input type="checkbox"/> Not otherwise specified
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<input type="checkbox"/> Alcohol/drugs	<input type="checkbox"/> Exposure to sound/noise	<input type="checkbox"/> Exposure to particulates																													
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<input type="checkbox"/> Non-compliance	<input type="checkbox"/> Equipment/property design	<input type="checkbox"/> Lifting/Hoisting																													
<input type="checkbox"/> Electrical	<input type="checkbox"/> Equipment/property fire	<input type="checkbox"/> Equipment/property damage																													
<input type="checkbox"/> Equipment failure	<input type="checkbox"/> Housekeeping	<input type="checkbox"/> Not otherwise specified																													
<b>Details:</b> (from Factors in previous section)																															

**SECTION 2**

<b>Incident Investigator to fill out:</b>																																																
Reportable / Recordable / Non-Recordable / Near Miss / Property Damage / Environmental Damage				Case Number from OSHA 300 Log:																																												
<b>Site:</b>			<b>Project Number:</b>																																													
<b>Actual Consequence Level</b> (1 to 5 from Section 3.0 of Incident Investigation Program)																																																
<p><b>Potential Risk Classification Table</b> (This table is used for any incident, near-miss, or property or environmental damage to determine if the Actual Consequence Level was a reasonably expected outcome or if the outcome could have been even worse. If the Maximum Reasonable Outcome was High or Critical, Corrective Actions must be put in place to lower future Reasonable Outcomes.)</p> <table border="1" style="margin: 20px auto; border-collapse: collapse; text-align: center;"> <tr> <th colspan="2" rowspan="2"></th> <th colspan="5">Consequence</th> </tr> <tr> <th>1 Minor</th> <th>2 Medium</th> <th>3 Serious</th> <th>4 Major</th> <th>5 Catastrophic</th> </tr> <tr> <th rowspan="5" style="writing-mode: vertical-rl; transform: rotate(180deg);">Probability</th> <th>A – Almost Certain</th> <td>Moderate</td> <td>High</td> <td>Critical</td> <td>Critical</td> <td>Critical</td> </tr> <tr> <th>B – Likely</th> <td>Moderate</td> <td>High</td> <td>High</td> <td>Critical</td> <td>Critical</td> </tr> <tr> <th>C – Possible</th> <td>Low</td> <td>Moderate</td> <td>High</td> <td>Critical</td> <td>Critical</td> </tr> <tr> <th>D – Unlikely</th> <td>Low</td> <td>Low</td> <td>Moderate</td> <td>High</td> <td>Critical</td> </tr> <tr> <th>E – Rare</th> <td>Low</td> <td>Low</td> <td>Moderate</td> <td>High</td> <td>High</td> </tr> </table>								Consequence					1 Minor	2 Medium	3 Serious	4 Major	5 Catastrophic	Probability	A – Almost Certain	Moderate	High	Critical	Critical	Critical	B – Likely	Moderate	High	High	Critical	Critical	C – Possible	Low	Moderate	High	Critical	Critical	D – Unlikely	Low	Low	Moderate	High	Critical	E – Rare	Low	Low	Moderate	High	High
		Consequence																																														
		1 Minor	2 Medium	3 Serious	4 Major	5 Catastrophic																																										
Probability	A – Almost Certain	Moderate	High	Critical	Critical	Critical																																										
	B – Likely	Moderate	High	High	Critical	Critical																																										
	C – Possible	Low	Moderate	High	Critical	Critical																																										
	D – Unlikely	Low	Low	Moderate	High	Critical																																										
	E – Rare	Low	Low	Moderate	High	High																																										
<b>Max Reasonable Consequence</b> (1 to 5)				<b>Max Reasonable Outcome</b> <input type="checkbox"/> Critical <input type="checkbox"/> High <input type="checkbox"/> Moderate <input type="checkbox"/> Low																																												
<b>Max Reasonable Probability</b> (A to E)																																																
<b>Summary of Investigation Findings:</b>																																																

<b>Incident Investigator to fill out:</b>	
Reportable / Recordable / Non-Recordable / Near Miss / Property Damage / Environmental Damage	Case Number from OSHA 300 Log:
<b>Site:</b>	<b>Project Number:</b>
<b>Corrective Actions Taken to Prevent Recurrence of Event:</b>	
<b>Date Corrective Actions Implemented:</b> ____ / ____ / ____	
<b>Risk Analysis:</b> (does the corrective action generate a new risk?)	
<div style="border: 1px solid black; padding: 5px; display: inline-block; transform: rotate(-90deg); transform-origin: center;">SECTION 2</div>	
<b>Section 2 Completed by:</b> _____ <b>Title:</b> _____ <b>Phone:</b> _____ <b>Date:</b> _____	

List of Necessary Contacts for Notification of Incident:

- INTERA Corporate Health and Safety Officer
- INTERA Branch Office Health and Safety Coordinator
- INTERA Project Manager, as applicable
- INTERA Human Resources Manager
- Client Project Manager, as applicable
- OSHA, as applicable

## **FORM 4**

Site Visitor Log

## SITE VISITOR LOG

Project Title & Task: \_\_\_\_\_ Project Number: \_\_\_\_\_

Date	Name/Signature	Company/Organization	Purpose of Visit	Arrival Time	Departure Time



## **ATTACHMENT A**

### Health and Safety Requirements for Heavy and Light Equipment

## **HEALTH AND SAFETY REQUIREMENTS FOR HEAVY AND LIGHT EQUIPMENT**

### **General**

1. Ensure operators have demonstrated skills and/or have attended training on the safe operation of heavy/light equipment.
2. Operate equipment according to Department of Transportation (DOT) regulations.
3. Meet manufacturer's minimum requirements for safe operation of equipment.
4. Daily inspect heavy/light equipment before use. Identify defective equipment, remove it from service, and do not use it until repaired.
5. Before operating heavy/light equipment, inspect work areas, and provide safeguards for identified hazards.
6. Ensure operator's manual is accessible for all heavy/light equipment.
7. Before operating heavy/light equipment greater than 20 horsepower with an operator's seat (excluding trucks), ensure it is equipped with approved roll over protection safety (ROPS), if required.
8. Ensure heavy/light equipment with an operator's seat and equipped with roll over protection safety (ROPS) is equipped with a seat belt.
9. When operating heavy/light equipment, wear a seat belt where provided.
10. Before exiting operator's seat from all heavy/light equipment, lower attachments to the ground and apply parking brake.
11. When riding on heavy/light equipment, ride only on designated positions.
12. Do not use heavy/light equipment as a lifting device unless the equipment and rigging have been load-tested.
13. Ensure all equipment operated during poor visibility or inclement weather is equipped with proper lighting and appropriate safety devices (e.g., windshield wipers, defroster).
14. If it created a hazard to persons in the immediate work area, do not operate equipment.
15. Operate all heavy/light equipment within manufacturer's recommended operating parameters.
16. When digging, drilling, driving objects, or trenching close to energized circuits, locate underground utilities (e.g., electrical lines, telephone, water, natural gas, and other piping systems) and take measures to prevent damage.
17. Be careful when using ladders, handrails, steps, etc., to climb on or off heavy/light equipment.
18. Chock all vehicles with dual wheels. Chock medium-and heavy-duty vehicles (one ton or greater) and, on extremely hilly and mountainous terrain, chock smaller vehicles (1/2 ton pickups and 3/4 ton service vehicles).
19. Wear footwear appropriate for the environment and for the equipment being used.

### **Operation of Light Equipment (Mowers, Tractors, chain Saws, Tamps, Etc.)**



1. For manual opening of tailgates on dump trucks, install and use handgrips.
2. Ensure farm tractors used with bush hogs are equipped with heavy-metal mesh guards for personal protection.
3. When engaged in a winching operation with light equipment, be positioned safely (e.g., behind the door).
4. When working in the bucket of an aerial lift, wear a fall protection harness.
5. When operating a chain saw, wear eye and face protection and, except when working from a bucket truck or wood pole, wear chaps.
6. When operating a weedeater with a blade (brushsaw), wear leggings or chaps and eye and face protection.
7. When operating a tamp (except for pole tamps), wear foot protection including toe and metatarsal guards.
8. Use the following required personal protective equipment:
  - a. Hard hats
  - b. Hearing protection
  - c. Safety glasses
  - d. Work gloves

### **Operation of Heavy Equipment (Bulldozers, Motor Graders, Packers, Core Drills, Etc.)**

1. When engaged in a winching operation, use heavy equipment equipped with heavy-metal mesh guards for protection.
2. Ensure all heavy equipment is equipped with back-up alarms and warning devices.
3. Ensure all heavy equipment is equipped with a fire extinguisher.
4. When clearing wooded areas, use heavy equipment equipped with closed clearing cab.
5. Safety glasses and heard hat are not required in the enclosed cab of bulldozers.
6. Use the following required personal protective equipment:
  - a. Hard hats
  - b. Hearing protection
  - c. Safety glasses

# **ATTACHMENT A** **EQUIPMENT SAFETY INSPECTION CHECKLIST** **FOR LIGHT EQUIPMENT**

Safety Inspector: \_\_\_\_\_ Site/Project: \_\_\_\_\_ Date: \_\_/\_\_/\_\_  
 License Plate: \_\_\_\_\_ Make/Model/Color: \_\_\_\_\_

Insert a check mark  if ok, or an  if there is an item deficiency.

<b>Date</b>							
<b>Tire inflation</b>							
<b>Lug nuts</b>							
<b>Exhaust System</b>							
<b>Brakes</b>							
<b>Parking brake</b>							
<b>Engine lubricants</b>							
<b>Engine Coolants</b>							
<b>Steering</b>							
<b>Windshield</b>							
<b>Windshield Wipers</b>							
<b>Heater / Defroster</b>							
<b>Head / tail lights</b>							
<b>Turn indicators</b>							
<b>Instrument gauges</b>							
<b><i>Initials of Operator</i></b>							

DESCRIPTION OF DEFICIENCIES: \_\_\_\_\_

\_\_\_\_\_

REMEDY FOR DEFICIENCIES: \_\_\_\_\_

\_\_\_\_\_

COMMENTS: \_\_\_\_\_

\_\_\_\_\_

# **ATTACHMENT B** **EQUIPMENT SAFETY INSPECTION CHECKLIST** **FOR HEAVY EQUIPMENT**

Safety Inspector: \_\_\_\_\_ Site/Project: \_\_\_\_\_ Date: \_\_/\_\_/\_\_  
 Equipment Type: \_\_\_\_\_ Equipment Number: \_\_\_\_\_

Insert a check mark ✓ if ok, an ✗ if there is an item deficiency, or "NA" if the item does not apply.

## **FROM THE GROUND**

Bucket or Blade	Excessive Wear or Damage, Cracks	
Bucket or Blade Cylinder & Linkage	Excessive Wear, Damage, Leaks, Lubricate	
Stick, Cylinder	Wear, Damage, Leaks, Lubricate	
Boom, Cylinders	Wear, Damage, Leaks, Lubricate	
Underneath Machine	Final Drive Leaks, Swing Drive Leaks, Damage	
Track Sag	Tightness, Wear	
Pivot Shafts	Oil Leaks	
Carbody	Cracks, Damage	
Undercarriage	Wear, Damage, Tension	
Steps and Handholds	Condition and Cleanliness	
Batteries & Hold Downs	Cleanliness, Loose Bolts & Nuts	
Windshield Wipers & Washers	Wear, Damage, Fluid Level	
Fire Extinguisher	Charge, Damage	
Engine Coolant	Fluid Level	
Primary/Secondary Fuel Filters	Leaks, Drain Water Separator	
Air Filter	Restriction Indicator	
Hydraulic Oil Tank	Fluid Level, Damage, Leaks	
Hydraulic Oil	Filter Leaks	
Radiator	Fin Blockage, Leaks	
Hydraulic Oil Cooler	Fin Blockage, Leaks	
AC Condenser	Fin Blockage, Leaks	
Lights and Mirrors	Damage	
Engine Oil Filter	Filter Leaks	
Hydraulic Oil Filter	Filter Leaks	
Overall Machine	Loose/Missing Nuts, Bolts, Guards, Cleanliness	

## **ENGINE COMPARTMENT**

Engine Oil	Fluid Level	
Gear Oil	Fluid Level, Leaks	
Fuel Tank	Fuel Level, Damage, Leaks	
All Hoses	Cracks, Wear Spots, Leaks	
All Belts	Tightness, Wear, Cracks	
Overall Engine Compartment	Trash or Dirt Buildup, Leaks	

## **INSIDE THE CAB**

Seat	Adjustment	
Seat belt & Mounting	Damage, Wear, Adjustment, Age	
Horn, Travel Alarm, Lights	Proper Function	
Indicators	Proper Function	
Monitor Panel	Proper Function	
Switches	Proper Function	
Travel Controls	Correct Operation	
Mirrors Adjustment	Adjustment, Cracks/Broken	
Heating and Cooling System	Proper Function	
Overall Cab Interior	Overall Cab Interior Cleanliness	

COMMENTS: \_\_\_\_\_



## **ATTACHMENT B**

### Heat and Cold Stress Casualty Prevention Plan

# HEAT & COLD STRESS

## CASUALTY PREVENTION PLAN

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## 1.0 HEAT STRESS CASUALTY PREVENTION PLAN

The increase in ambient air temperature and decreased body ventilation caused by protective outerwear creates an increase in the potential for injury, specifically, heat stress. Site personnel will be instructed in the identification of heat stress, the first-aid treatment procedures for the worker, and the prevention of heat stress casualties.

### 1.1 Sources of Heat Stress

Any process or job site that is likely to raise the workers deep core temperature (often listed as higher than 100.4 degrees F (38°C)) raises the risk of heat stress. Operations involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities have a high potential for inducing heat stress in employees. Outdoor operations conducted in hot weather especially those that require workers to wear semi-permeable or impermeable protective clothing, are also likely to cause heat stress among exposed workers.

Age, weight, degree of physical fitness, degree of acclimatization, metabolism, dehydration, use of alcohol or drugs, and a variety of medical conditions such as hypertension all affect a person's sensitivity to heat. However, even the type of clothing worn must be considered. Prior heat injury predisposes an individual to additional injury. Individual susceptibility varies. In addition, environmental factors include more than the ambient air temperature. Radiant heat, air movement, conduction, and relative humidity all affect an individual's response to heat.

### 1.2 Identification and Treatment of Heat Stress

Heat stress disorders include heat stroke (which can result in death), heat exhaustion (which can result in loss of consciousness, but responds well to treatment), heat cramps, heat rashes, and heat fatigue. The following sections list specifics on each condition, and how to treat the condition.

#### 1.2.1 Heat Stroke

Heat Stroke is the most serious heat related disorder and occurs when the body's temperature regulation fails and body temperature rises to critical levels. The condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency that may result in death.

**Symptoms:** The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature (between 107°F and 110°F). Unconsciousness follows quickly and death is imminent if exposure continues. The attack will usually occur suddenly.

**First Aid:** If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady, cool area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the worker's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

### 1.2.2 Heat Exhaustion

Heat exhaustion can be a precursor to heat stroke. However, unlike heat stroke, heat exhaustion responds readily to prompt treatment.

**Symptoms:** Usually begins with headache, nausea, vertigo, muscle weakness, thirst, and giddiness. Vomiting is common and the bowels may move involuntarily. The worker is very pale, his skin is clammy, and he may perspire profusely. The pulse is weak and fast, and breathing is shallow. Heat collapse may occur unless he lies down. This may pass, but sometimes it remains and death could occur.

**First Aid:** Immediately remove the worker to in a shady or cool area with good air circulation (in Zone 2, the Contamination Reduction Zone, if at a contaminated site). Remove all protective outer wear. Treat the worker for shock (make him lie down, raise his feet 6-12 inches and keep him warm, but loosen all clothing). If the worker is conscious, it may be helpful to give him sips of a salt-water solution (one teaspoon of salt to one glass of water). If the worker does not respond quickly to first aid, obtain professional medical assistance.

### 1.2.3 Heat Collapse

Heat collapse is often associated with heat exhaustion. In heat collapse, the brain does not receive enough oxygen because blood pools in the extremities. As a result, the exposed individual may lose consciousness. This reaction is similar to that of heat exhaustion and does not affect the body's heat balance. However, the onset of heat collapse is rapid and unpredictable and can be dangerous especially if workers are operating machinery or controlling an operation that should not be left unattended. The worker may also be injured when he or she faints.

**Symptoms:** Rapid loss of consciousness, other symptoms are similar to heat exhaustion or heat stroke.

**First Aid:** Check to see if the worker is breathing. If he or she is breathing, position the person on his or her back. Raise the worker's legs at least 12 inches above the ground. Remove all protective outer wear as gently as possible. Loosen any restrictive clothing or belts. If the worker does not regain consciousness within one minute, call 911. Check the person's airway to make sure it is not obstructed. Check again to see if the person is breathing, coughing, or moving. These are signs of positive circulation. If these signs are absent, start CPR until emergency personnel arrive. If the worker regains consciousness, follow first aid guidance under heat exhaustion.

### 1.2.4 Heat Cramps

Heat Cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution ( $\pm 0.3\%$  NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments. Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur.

**Symptoms:** Muscle cramps, often in the legs, but could occur in any portion of the body.

**First Aid:** Recent studies have shown that drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

### 1.2.5 Heat Rashes

Heat Rashes are the most common problem in hot work environments where the skin is persistently wetted by unevaporated sweat.

**Symptoms:** Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Heat rash papules may become infected if they are not treated.

**First Aid:** In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

### 1.3 Prevention of Heat Stress

**Acclimatize workers** by exposing them to work in a hot environment for progressively longer periods. NIOSH (1986) suggests that workers who have had previous experience in jobs where heat levels are high enough to produce heat stress may acclimatize with a regimen of 50% exposure on day one, 60% on day two, 80% on day three, and 100% on day four. For new workers who will be similarly exposed, the regimen should be 20% on day one, with a 20% increase in exposure each additional day.

**Replace Fluids** by providing cool (50°-60°F) water or any cool liquid (except alcoholic beverages) to workers and encourage them to drink small amounts frequently, e.g., one cup every 20 minutes. Ample supplies of liquids should be placed close to the work area. Although some commercial replacement drinks contain salt, this is not necessary for acclimatized individuals because most people add enough salt to their summer diets.

**Reduce the physical demands** by reducing physical exertion such as excessive lifting, climbing, or digging with heavy objects. Spread the work over more individuals, use relief workers or assign extra workers. Provide external pacing to minimize overexertion.

**Provide recovery areas** such as air-conditioned enclosures, rooms, or work trucks and provide intermittent rest periods with water breaks.

**Reschedule hot jobs** for the cooler part of the day, and routine maintenance and repair work in hot areas should be scheduled for the cooler seasons of the year.

A work/rest guideline will be implemented for personnel required to wear Level C protection. The maximum wearing time guidelines are as follows:

Ambient Temperatures	Maximum Wearing Time
Above 90° F	½ hour
80° - 90° F	1 hour
70° - 80° F	2 hours
60° - 70° F	3 hours
50° - 60° F	4 hours
40° - 50° F	5 hours
30° - 40° F	6 hours
Below 30° F	8 hours

A sufficient period will be allowed for personnel to “cool down.” This may require shifts of workers during operations.

#### 1.3.1 Personal Protective Equipment to Minimize Heat Stress



**Reflective clothing**, which can vary from vests and jackets to suits that completely enclose the worker from neck to feet, can reduce the radiant heat reaching the worker. However, since most reflective clothing does not allow air exchange through the garment, the reduction of radiant heat must more than offset the corresponding loss in evaporative cooling. For this reason, reflective clothing should be worn as loosely as possible. In situations where radiant heat is high, auxiliary cooling systems can be used under the reflective clothing.

**Auxiliary body cooling ice vests**, though heavy, may accommodate as many as 72 ice packets, which are usually filled with water. Carbon dioxide (dry ice) can also be used as a coolant. The cooling offered by ice packets lasts only 2 to 4 hours at moderate to heavy heat loads, and frequent replacement is necessary. However, ice vests do not tether the worker and thus permit maximum mobility. Cooling with ice is also relatively inexpensive.

**Wetted clothing** such as terry cloth coveralls or two-piece, whole-body cotton suits are another simple and inexpensive personal cooling technique. It is effective when reflective or other impermeable protective clothing is worn. This approach to auxiliary cooling can be quite effective under conditions of high temperature, good air flow, and low humidity.

## 1.4 Heat Stress Monitoring

Monitor workers who are at risk of heat stress, such as those wearing semi-permeable or impermeable clothing when the temperature exceeds 70°F, while working at high metabolic loads (greater than 500 kcal/hour). Personal monitoring can be done by checking the heart rate, recovery heart rate, oral temperature, or extent of body water loss.

Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by or 33%, while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by 33%.

The recovery heart rate can be checked by comparing the pulse rate taken at 30 seconds (P1) with the pulse rate taken at 2.5 minutes (P3) after the rest break starts. The two pulse rates can be interpreted using the following criteria.

Heart rate recovery pattern	P3	Difference between P1 and P3
Satisfactory recovery	<90	--
High recovery (Conditions may require further study)	90	10
No recovery (May indicate too much stress)	90	<10

Body temperature should be measured orally with a clinical thermometer as early as possible in the resting period, and before the worker drinks water. Oral temperature (TO) at the beginning of the rest period should not exceed 99° F. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the TO exceeds 99.7° F at the beginning of the next period, the following work cycle should be further shortened by 33%. TO should be measured again at the end of the rest period to make sure it has dropped below 99° F.

## 1.5 Heat Stress Training

Workers should be properly trained on the above Heat Stress program, and should be aware of the following:

- Knowledge of the hazards of heat stress;
- Recognition of predisposing factors, danger signs, and symptoms;
- Awareness of first-aid procedures for, and the potential health effects of, heat stroke;
- Employee responsibilities in avoiding heat stress;
- Dangers of using drugs, including therapeutic ones, and alcohol in hot work environments;
- Use of protective clothing and equipment; and
- Purpose and coverage of environmental and medical surveillance programs and the advantages of worker participation in such programs.

## **1.6 Heat Stress References**

<https://www.osha.gov/SLTC/emergencypreparedness/guides/heat.html>

## **2.0 COLD STRESS CASUALTY PREVENTION PLAN**

Anyone working in a cold environment may be at risk of cold stress. Some workers may be required to work outdoors in cold environments and for extended periods, which creates an increase in the potential for cold stress injury. Site personnel will be instructed in the identification of cold stress, the first-aid treatment procedures for the worker, and the prevention of cold stress casualties.

### **2.1 Sources of Cold Stress**

What constitutes extreme cold and its effects can vary across different areas of the country. In regions that are not used to winter weather, near freezing temperatures are considered "extreme cold." A cold environment forces the body to work harder to maintain its temperature. Whenever temperatures drop below normal and wind speed increases, heat can leave your body more rapidly. Wind chill is the temperature your body feels when air temperature and wind speed are combined. For example, when the air temperature is 40°F, and the wind speed is 35 mph, the effect on the exposed skin is as if the air temperature was 28°F. Cold stress occurs by driving down the skin temperature and eventually the internal body temperature (core temperature). This may lead to serious health problems, and may cause tissue damage, and possibly death.

Risk factors that contribute to cold stress include wetness/dampness, dressing improperly, and exhaustion, predisposing health conditions such as hypertension, hypothyroidism, and diabetes, and poor physical conditioning.

### **2.1 Identification and Treatment of Cold Stress**

In a cold environment, most of the body's energy is used to keep the internal core temperature warm. Over time, the body will begin to shift blood flow from the extremities (hands, feet, arms, and legs) and outer skin to the core (chest and abdomen). This shift allows the exposed skin and the extremities to cool rapidly and increases the risk of frostbite and hypothermia. Combine this scenario with exposure to a wet environment, and trench foot may also be a problem.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is soaked in perspiration. Special protection of the hands is required to maintain manual dexterity for the prevention of accidents. Additional caution shall be exercised when workers are exposed to vibration, since blood circulation in extremities may already be impaired. Eye protection shall be worn by workers employed out of doors in a snow and/or ice terrain.

Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Provisions must be made to prevent hypothermia and secondary freezing of damaged tissues, in addition to providing for first aid treatment.

#### **2.1.1 Hypothermia**

Hypothermia occurs when body heat is lost faster than it can be replaced and the normal body temperature (98.6°F) drops to less than 95°F. Hypothermia is most likely at very cold temperatures, but it can occur even at cool temperatures (above 40°F), if a person becomes chilled from rain, sweat, or submersion in cold water.

**Symptoms:** In the mild symptoms of hypothermia, the exposed worker is still alert, but he or she may begin to shiver and stomp the feet in order to generate heat. As the body temperature continues to fall, symptoms will worsen and shivering will stop. The worker may lose coordination and fumble with items in

the hand, become confused and disoriented, he or she may be unable to walk or stand, pupils become dilated, pulse and breathing become slowed, and loss of consciousness can occur. A person could die if help is not received immediately.

**First Aid:** Call 911 immediately in an emergency; otherwise seek medical assistance as soon as possible. Move the person to a warm, dry area. Remove wet clothes and replace with dry clothes, cover the body (including the head and neck) with layers of blankets; and with a vapor barrier (e.g. tarp, garbage bag). Do not cover the face.

If medical help is more than 30 minutes away, give warm sweetened drinks if alert (no alcohol), to help increase the body temperature. Never try to give a drink to an unconscious person. Place warm bottles or hot packs in armpits, sides of chest, and groin. Call 911 for additional rewarming instructions.

If a person is not breathing or has no pulse, call 911 for emergency medical assistance immediately. Treat the worker as per instructions for hypothermia, but be very careful and do not try to give an unconscious person fluids. Check him/her for signs of breathing and for a pulse. Check for 60 seconds. If after 60 seconds the affected worker is not breathing and does not have a pulse, trained workers may start rescue breaths for 3 minutes. Recheck for breathing and pulse, check for 60 seconds. If the worker is still not breathing and has no pulse, continue rescue breathing. Only start chest compressions per the direction of the 911 operator or emergency medical services. Reassess patient's physical status periodically.

### 2.1.2 Frostbite

Frostbite is an injury to the body that is caused by freezing of the skin and underlying tissues. The lower the temperature, the more quickly frostbite will occur. Frostbite typically affects the extremities, particularly the feet and hands. Amputation may be required in severe cases.

**Symptoms:** Reddened skin develops gray/white patches. Numbness in the affected body part, and the body part feels firm or hard. In severe cases, blisters may occur in the affected part.

**First Aid:** Follow the recommendations described above for hypothermia. Do not rub the affected area to warm it because this action can cause more damage. Do not apply snow/water. Do not break blisters. Loosely cover and protect the area from contact. Do not try to rewarm the frostbitten area before getting medical help; for example, do not place in warm water. If a frostbitten area is rewarmed and gets frozen again, more tissue damage will occur. It is safer for the frostbitten area to be rewarmed by medical professionals. Give warm sweetened drinks, if the person is alert. Avoid drinks with alcohol.

### 2.1.3 Trench Foot

Trench Foot or immersion foot is caused by prolonged exposure to wet and cold temperatures. It can occur at temperatures as high as 60°F if the feet are constantly wet. Non-freezing injury occurs because wet feet lose heat 25-times faster than dry feet. To prevent heat loss, the body constricts the blood vessels to shut down circulation in the feet. The skin tissue begins to die because of a lack of oxygen and nutrients and due to the buildup of toxic products.

**Symptoms:** Redness of the skin, swelling, numbness, blisters

**First Aid:** Call 911 immediately in an emergency; otherwise seek medical assistance as soon as possible. Remove the shoes, or boots, and wet socks. Dry the feet.

## 2.2 Prevention of Cold Stress

**Engineering controls** can be used to warm the work area. For example, radiant heaters may be used to warm workers in outdoor stations. If possible, shield work areas from drafts or wind to reduce wind chill.

**Safe work practices** should be used to help prevent cold stress. For example, it is easy to become dehydrated in cold weather. Workers should be provided with plenty of warm sweetened liquids (avoid alcoholic drinks). If possible, heavy work should be scheduled during the warmer part of the day. Workers should be assigned to tasks in pairs (buddy system), so that they can monitor each other for signs of cold stress. Workers should be allowed to interrupt their work, if they are extremely uncomfortable. Workers should be allowed frequent breaks in warm areas (including inside a heated truck). Acclimatize new workers and those returning after time away from work, by gradually increasing their workload, and allowing more frequent breaks in warm areas, as they build up a tolerance for working in the cold environment.

**Dressing properly** is extremely important to preventing cold stress. The type of fabric worn also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, silk and most synthetics, on the other hand, retain their insulation even when wet. The following are recommendations for working in cold environments:

Wear at least three layers of loose fitting clothing. Layering provides better insulation. Do not wear tight fitting clothing. An inner layer of wool, silk or synthetic helps keep moisture away from the body. A middle layer of wool or synthetic helps provide insulation even when wet. An outer wind and rain protection layer helps allows some ventilation to prevent overheating. Wear a hat or hood to help keep your whole body warmer. Hats reduce the amount of body heat that escapes from your head. Use a knit mask to cover the face and mouth (if needed). Use insulated gloves to protect the hands (water resistant if necessary). Wear insulated and waterproof boots (or other footwear).

## 2.3 Cold Stress Training

Workers should be properly trained on the above Heat Stress program, and should be aware of the following:

- Knowledge of the hazards and symptoms of cold stress.
- Monitor your physical condition and that of your coworkers.
- Dress properly for the cold.
- Stay dry in the cold because moisture or dampness (e.g. from sweating) can increase the rate of heat loss from the body.
- Keep extra clothing (including underwear) handy in case you get wet and need to change.
- Drink warm sweetened fluids (no alcohol).
- Use proper engineering controls, safe work practices, and personal protective equipment (PPE) provided by your employer.

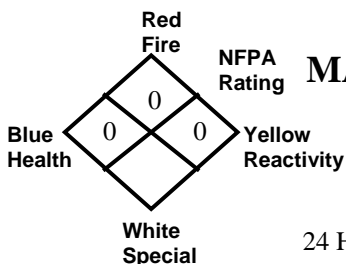
## 2.4 Cold Stress References

<https://www.osha.gov/SLTC/emergencypreparedness/guides/cold.html>  
<http://www.cdc.gov/niosh/topics/coldstress/>

## **ATTACHMENT C**

Safety Data Sheets



**Alconox®****MATERIAL SAFETY DATA SHEET**

**Alconox, Inc.**  
 30 Glenn Street  
 White Plains, NY 10603

24 Hour Emergency Number – Chem-Tel (800) 255-3924

**I. IDENTIFICATION**

Product Name (as appears on label)	ALCONOX
CAS Registry Number:	Not Applicable
Effective Date:	January 1, 2001
Chemical Family:	Anionic Powdered Detergent
Manufacturer Catalog Numbers for sizes	1104, 1125, 1150, 1101, 1103 and 1112

**II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION**

There are no hazardous ingredients in ALCONOX as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

**III. PHYSICAL/CHEMICAL CHARACTERISTICS**

Boiling Point (F):	Not Applicable
Vapor Pressure (mm Hg):	Not Applicable
Vapor Density (AIR=1):	Not Applicable
Specific Gravity (Water=1):	Not Applicable
Melting Point:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Not Applicable
Solubility in Water:	Appreciable-Soluble to 10% at ambient conditions
Appearance:	White powder interspersed with cream colored flakes.
pH:	9.5 (1%)

**IV. FIRE AND EXPLOSION DATA**

Flash Point (Method Used):	None
Flammable Limits:	LEL: No Data UEL: No Data
Extinguishing Media:	Water, dry chemical, CO <sub>2</sub> , foam
Special Fire fighting Procedures:	Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None

**V. REACTIVITY DATA**

Stability:	Stable
Hazardous Polymerization:	Will not occur
Incompatibility (Materials to Avoid):	None
Hazardous Decomposition or Byproducts:	May release CO <sub>2</sub> on burning

**VI. HEALTH HAZARD DATA**

Route(s) of Entry:	Inhalation? Yes Skin? No Ingestion? Yes
Health Hazards (Acute and Chronic):	Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Exposure may irritate mucous membranes. May cause sneezing.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggravated by powder.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs administer fluids. See a physician for discomfort.

**VII. PRECAUTIONS FOR SAFE HANDLING AND USE**

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	Material should be stored in a dry area to prevent caking.
Other Precautions:	No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

**VIII. CONTROL MEASURES**

Respiratory Protection (Specify Type):	Dust mask - Recommended
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are useful but not required.
Eye Protection:	Goggles are recommended when handling solutions.
Other Protective Clothing or Equipment:	None
Work/Hygienic Practices:	No special practices required

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THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH BUT NO WARRANTY IS EXPRESSED OR IMPLIED.

**APPENDIX G**  
**POSGCD Water Level Measurement Form**

Aquifer(s) _____		State Well No. _____	
Owner _____	Address: _____		
Land Surface Elevation : _____	County: _____		
Well Location: Lat: _____	Phone: _____		
Long: _____			
Pump: Type: _____	Depth: _____		ft.
Setting: _____			ft.
Remarks: _____	M.P. _____		ft. above land surface

## **APPENDIX H**

### **Generation of Water Level Surfaces for Measured Water Levels using Topo to Raster**

Topo to Raster tool is an interpolation method specifically designed for the creation of hydrologically correct digital elevation models (DEMs). It is based on the ANUDEM program developed by Michael Hutchinson (1988, 1989, 1996, 2000, 2011). The interpolation procedure has been designed to take advantage of the types of input data commonly available and the known characteristics of elevation surfaces. This method uses an iterative finite difference interpolation technique. It is optimized to have the computational efficiency of local interpolation methods, such as inverse distance weighted (IDW) interpolation, without losing the surface continuity of global interpolation methods, such as Kriging and Spline. It is essentially a discretized thin plate spline technique (Wahba, 1990) for which the roughness penalty has been modified to allow the fitted DEM to follow abrupt changes in terrain, such as streams, ridges and cliffs. (ESRI, 2021)

Topo to Raster acts conservatively in removing sinks and will not impose the drainage conditions in locations that would contradict the input elevation data. Such locations normally appear in the diagnostic file as sinks. Use this information to correct data errors, particularly when processing large datasets. The program acts conservatively in removing sinks and will not impose the drainage conditions in locations that would contradict the input elevation data. Such locations normally appear in the diagnostic file as sinks. Use this information to correct data errors, particularly when processing large datasets. (ESRI, 2021)

The application of Topo to Raster is implemented using the following procedure:

- Step 1:** Upload the annual water level values into ArcMap as point elevation data. Topo to raster parameters are generally set to the default settings, except for the drainage enforcement, input data type, and the output raster cell size and extent. The drainage enforcement is set to “NO\_ENFORCE” since the spatial resolution of the point elevation data generally does not allow for hydrologic sink feature identification. The input data type is set to “SPOT” to represent the point elevation data. The output raster cell size is generally set to 500 ft resolution. If too few water level points exist, the output raster cell size is then set to 2640 ft (0.5 miles). The output raster extent represents that aquifer management zone.
- Step 2:** Clip the *baseline* water level surface (Step 3a) to the Total Aquifer Management Zone extent using the Clip Raster toolbox in ArcGIS

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## **APPENDIX I**

### **Generation of Water Level Surfaces for Measured Water Levels using Ordinary Kriging**

The semivariogram plays a central role in the analysis of Ordinary Kriging, which is the most common geostatistical interpolation method. The semi-variogram is a measure of the spatial continuity of the data and how quickly the data values change on the average. **Figure I-1** provides a schematic of a semivariogram.

Conceptually, a semivariogram shows how the semivariance (i.e. half of the variance) of the data changes with an increase in the distance between the paired data values. In geostatistics, the distances between paired data at which the semivariance is calculated are called lags. For instance, if the lag is set at 100 ft, then the bins for which semivariances would be calculated at 100 ft, 200 ft, 300 ft, 400 ft, etc.,. Because points may not be spaced exactly at distances at intervals of 100 ft apart, the lag settings include a lag tolerance value that is typically set to half of the distance between lags. For the previous example, which would mean that the first lag of 100 ft would include all pairs of points that are between 50 and 150 ft from each other. In general, two observations closer together are more similar than two observations further apart. The underlying reason for generating a semivariogram is to characterize the spatial correlation between data points. There are two types of semivariogram: experimental and theoretical. The experimental semivariogram is constructed based on the analysis of the field data, which is expressed by the dots in Figure I-1. The theoretical semivariogram is generated by fitting a semivariogram model to the data, which is shown by the black line in Figure I-1.

$$\gamma(h) = \frac{1}{2N(h)} \sum_{i=1}^{N(h)} [z(u_i) - z(u_i + h)]^2 \quad \text{Eq I-1}$$

Where:

$\gamma(h)$  = semivariance as a function of lag distance  $h$ , ( $\text{ft}^2$ )  
 $h$  = the lag spacing vector (ft)  
 $z(u_i)$  = the elevation water level (ft) at spatial location  $u_i$ ,  
 $u_i$  = a vector of spatial coordinates (x,y) for the sample locations of each measured water level

- The experimental variogram must be modeled for two reasons: (1) there is a need to interpolate the variogram function for  $h$  values where too few or no experimental data pairs are available, and (2) the variogram measure  $\gamma(h)$  must have the mathematical property of “positive definiteness” for the corresponding covariance model. The three most commonly used theoretical variogram models are Gaussian, exponential, and spherical. The theoretical variogram has three attributes that summarize important aspects of the spatial data. These three attributes are described in Figure I-1 and below.  
**Range** – the maximum distance between points up to which there is information on the correlation/spatial relationship between two data points.
- **Sill** – the sample variance, which is a measure of the spread or variability in the data points that are not correlated.
- **Nugget Effect** – reflects measurement error and the discontinuity in the variogram at distances below the minimum lag distance

The application of Ordinary Kriging is implemented using the following procedure:

**Step 1:** Construct an experimental semivariogram using the annual average water levels for wells in a given management zone for a specific year.

**Step 2:** Fit an experimental variogram to the experimental variogram. In general, points at distance (x) and semivariance (y) values that are less than the minimum sill value are correlated, whereas points greater than the minimum sill value are not correlated. The point at which the sill begins represents the maximum distance between points where a spatial correlation is present, referred to as the range.

**Step 3:** Use the theoretical semivariogram model to perform Ordinary Kriging on mean water levels using the Krige function in R Studio, an open-source statistical computation software. Kriged points are then used to create a continuous water level surface.

**Step 4:** Clip the *end* water level surface to the Aquifer Management Zone extent using the Clip Raster toolbox in ArcGIS

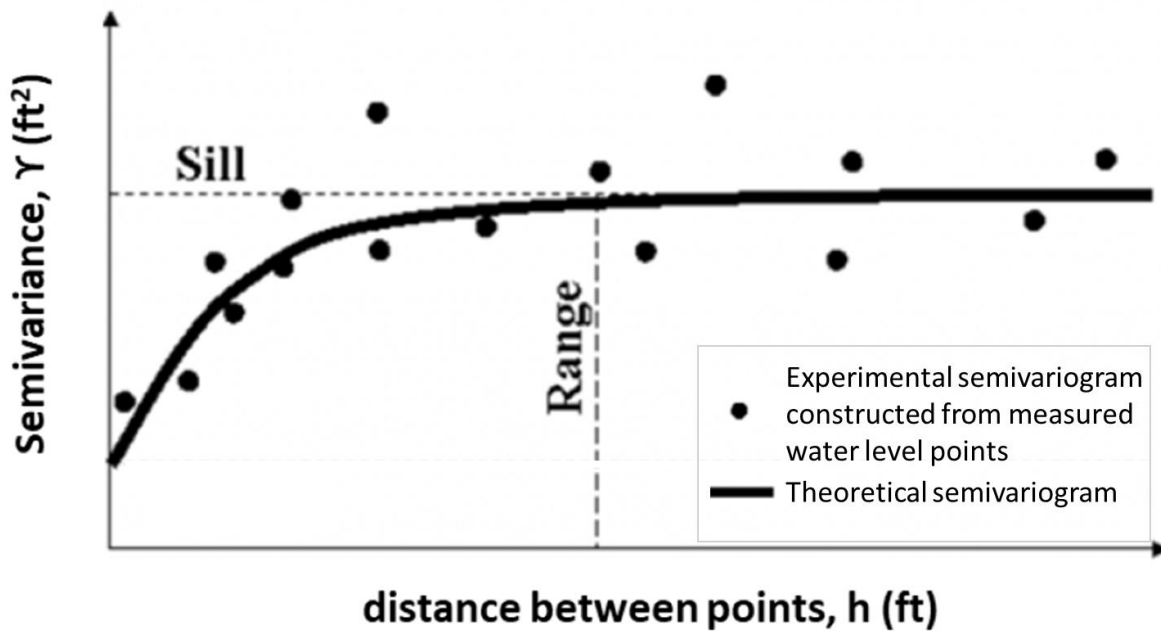


Figure I-1 Schematic diagram of experimental and theoretical semivariogram.

## **APPENDIX J**

### **Generation of Water Level Surfaces for Measured Water Level using Ordinary Kriging with Detrended Measured Water Levels**

A potential concern with using Ordinary Kriging to interpolate water level data is that its application presumes that there is no spatial trend in the data. However, the POSGCD management zones all exhibit spatial trends in their water level surfaces. The spatial trends in the water levels are the cause for groundwater to flow toward large pumping centers, toward streams, and toward the Gulf Coast. Several methods can be used to identify the spatial trend from water level data. Our assessment of the water level data found that the best tool for representing the trend in the water surface is the TWDB groundwater availability model (GAM) for the management zone of interest. The approach used to represent the trend is to smooth the water level surface simulated by the GAM.

The software selected for smoothing the simulated water surface is an open-source Python library used for scientific computing and technical computing. The algorithm is a moving average filter that smooths in two dimensions (northing and easting). **Figure J-1** shows an example of generating a trend surface for the Simsboro management zone using a water surface simulated by the version of the TWDB GAM for the central portion of the Sparta/Queen City/Carrizo-Wilcox aquifers

The application of Ordinary Kriging with Detrended Water Levels is implemented using the following procedure:

- Step 1:** Construct a spatial trend for the water level surface by smoothing the simulated water surface predicted by the GAM. The smoothing the respective simulated water level data in two-dimensional (northing and easting) is performed using an open-source computational Python library. See the left and middle panels of Figure H-1
- Step 2:** For each annual water level, calculate the difference between the measured value and value produced by the trend at the location of the measured data. The difference represents the detrended water level and will be called a residual. A contour map of the residual is shown in the right panel of Figure H-1.
- Step 3:** Construct an experimental and theoretical semivariogram for residuals. (see Appendix G for a explanation of an experimental and theoretical semivariogram).
- Step 4:** Interpolate the residuals at the well location to generate a continuous surface. If there is sufficient data to generate a credible theoretical semivariogram model, then perform Ordinary Kriging on the residuals to generate the continuous surface. If there is insufficient data to generate a theoretical semivariogram, use a theoretical variogram generated from a comparable water level data set. If appropriate, use a interpolation method other than Ordinary Kriging to interpolate the residuals.
- Step 5:** Combine the trend (i.e. smooth simulated water level) surface and interpolated residual surface to generate the final water level surface for the *baseline year* each *evaluation year* (**Figure J-2**).
- Step 6:** Clip the *baseline* water level surface to the Aquifer Management Zone extent using the Clip Raster toolbox in ArcGIS



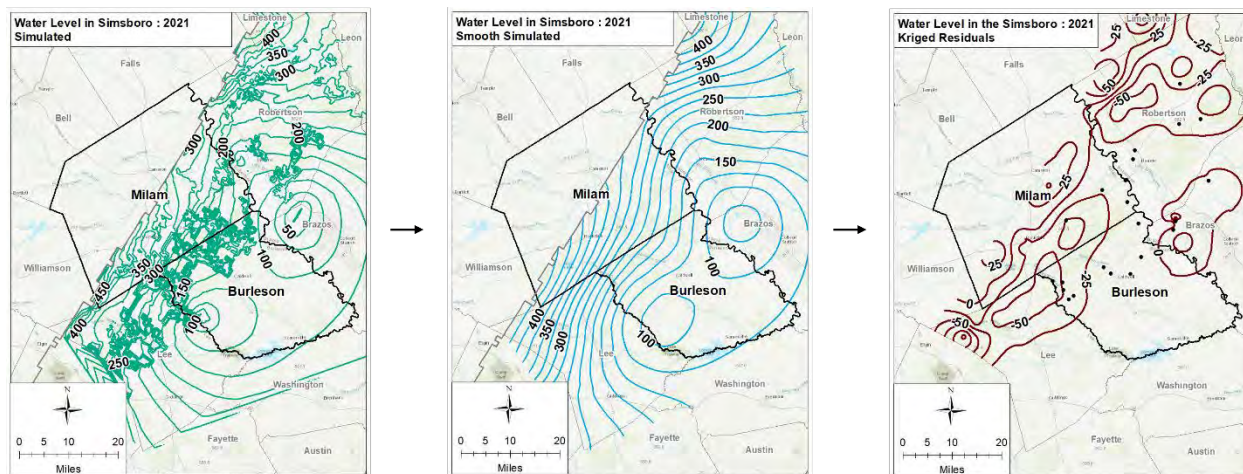


Figure J-1 Diagram showing simulated water level surface (left), smooth simulated water level surface (center), and residual water level surface (simulated minus measured water levels; right)

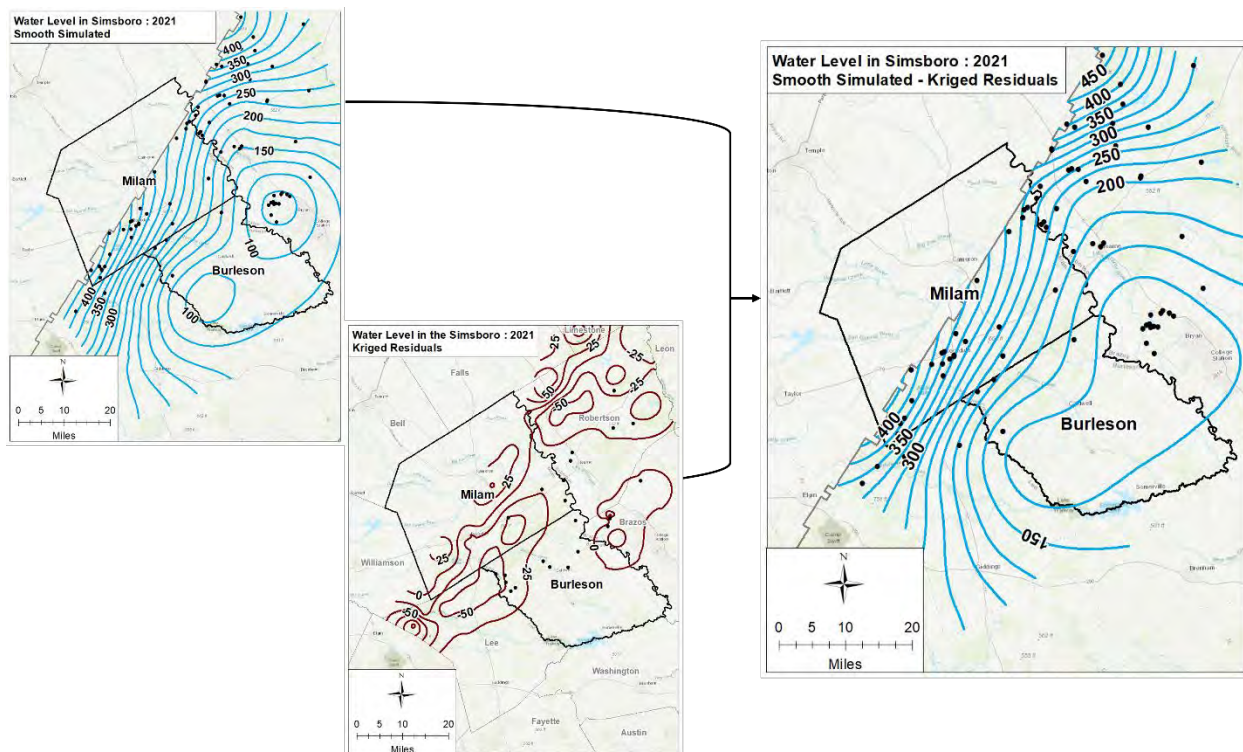


Figure J-2 Diagram showing steps to combine simulated water level surface (left) and Kriged residuals (middle; simulated minus measured water level) to generate final water level surface (right).