Draft: Groundwater Assistance Program Annual Needs Assessment 2019

Prepared for:

Post Oak Savannah Groundwater Conservation District
310 E Ave C
Milano, TX 76556

Prepared by:

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

December 2019

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Prepared by:

Steven C Young PE, PG

Jevon Harding PG

Ross Kushnereit

December 2019

EXECUTIVE SUMMARY

This report comprises the Post Oak Savannah Groundwater Conservation District (POSGCD) Groundwater Assistance Program (GWAP) Annual Needs Assessment for 2019. The objective of the GWAP Annual Needs Assessment is to identify eligible wells whose water levels are most likely to decline below the elevation of the pump setting as a result of regional groundwater production in GMA 12. To be eligible for funding under the GWAP, a well must be a part of the POSGCD monitoring well network and be either a low-capacity non-exempt permitted well or an exempt well used for domestic and/or livestock use.

A well was designated as a priority well if its simulated well water level in 2028 is below the elevation of its pump setting recorded in the POSGCD database. The simulated water levels were generated from groundwater availability model (GAM) simulations. This initial filtering process relies on assumptions that well data is accurate, future pumping scenarios are credible, historical pumping values are accurate, and groundwater models have low predictive uncertainty. Since these assumptions may not always be valid, some wells that are designated priority wells may not require assistance within the next 10 years or may not actually require assistance at all. Therefore, to find the priority wells most likely to require assistance within the next 10 years, a second more in-depth analysis identified those wells where the key assumptions appear to be valid. Those wells where the assumptions appeared to be met were assigned the status of high priority wells.

Nine hundred eighty-one wells have values for pump depths in the POSGCD database. Out of the 981 wells, 151 wells were assigned a priority well status because the simulated 2028 water level is lower than the elevation of the pump setting. Hydrographs of simulated water levels from 2000 to 2032 were created for all 151 priority wells. Each figure includes markers for the land surface elevation, the pump elevation and the elevation of the well screen. Out of the 151 wells, seven wells were identified as high priority wells. All seven high priority wells are screened in the Carrizo Aquifer. The POSGCD ID for these seven priority wells are: PO-00943, PO-009787, PO-008322, PO-008923, PO-008797,PO-008326, and PO-001120.

Based on the data, data analysis, and findings presented in the report, the following actions are recommended:

- The POSGCD Water Resource Specialist should verify the eligibility, review the analysis, and recommend appropriate action for the seven wells screened in the Carrizo Aquifer and designated as high priority wells.
- The actions that POSGCD undertakes for the high-priority Carrizo wells should include measuring water levels at each well at least one every four months and verifying the elevation of the pump setting.
- In early 2020, POSGCD should request that GMA 12 modify the DFC simulation for the Yegua-Jackson Aquifer because the current DFC simulation significantly over-predicts historical pumping from 2010 to 2020 and appears to have unrealistic projections for future pumping after 2020.

- In early 2020, POSGCD should evaluate whether the large increases in Carrizo-Wilcox pumping used in the GAM simulation from 2018 to 2028 are probable. Specifically, the high pumping rate of 100,000 AFY in Lee and Bastrop counties in 2028 does not appear likely. If these high pumping rates are not probable , then addition GAM simulations should be undertaken to better assess the vulnerability of the seven Carrizo wells to drawdown caused by future pumping.
- POSGCD should improve the GAMs to better reflect aquifer conditions in POSGCD. The priority should be given to the Sparta/Queen City/Carrizo-Wilcox GAM so that it will be better suited for predicting the drawdown impacts that will be caused by the pumping of more than 45,000 AFY associated with the Vista Ridge Project, which is scheduled to begin in 2020.
- POSGCD should develop a methodology for using measured water level data to help adjust for biases and error in the simulated water levels.

Study Limitations

The findings contained in this report represent INTERA's professional opinion arrived at in accordance with applicable professional standards and based upon analysis of information available at the time the report was produced. The report was prepared at the request of the Post Oak Savannah Groundwater Conservation District to support on-going assessment of the District's aquifers, groundwater resources, and management policies. This report is a technical analysis and may or may not be partially or wholly consistent with the POSGCD Board's policies or current thinking. Groundwater management consistent with Chapter 36 of the Water Code is an adaptive process based upon best available science. Therefore, updates and changes to the report findings may be appropriate as the best available science evolves

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ACRONYMS AND ABBREVIATIONS

AFY	acre-feet per year
CDFs	cumulative distribution functions
DEM	Digital Elevation Model
DFCs	Desired Future Conditions
ft	feet
ft^2/day	square feet per day
GAM	groundwater availability models
GMA	Groundwater Management Area
gpm	gallons per minute
GWAP	Groundwater Assistance Program
ID	identification
NED	National Elevation Dataset
MAG	Modeled Available Groundwater
POSGCD	Post Oak Savannah Groundwater Conservation District
PS-9	Pumping Scenario 9
USGS	United States Geological Survey

1.0 INTRODUCTION

This report comprises the Post Oak Savannah Groundwater Conservation District (POSGCD) Groundwater Assistance Program (GWAP) Annual Needs Assessment for 2019. According to the POSGCD GWAP documentation (POSGCD, 2018):

"The District will annually perform evaluations which will include the most recent information and data gathered from the District's Well Monitoring Network, including localized hydrogeological studies at monitoring locations, as well as Groundwater Availability Model (GAM) simulations, using the most recent Central Queen City/Sparta/Carrizo-Wilcox GAM, and including the most recent information on projected pumping in GMA 12."

This report documents the process by which these evaluations were carried out and the results of these evaluations. The report provides a priority assessment for wells that could potentially require assistance over the next 10 years and recommendations for improving the GWAP and the well evaluation process.

1.1 GWAP Background

The GWAP is meant to assist well-owners with low-capacity wells (typically domestic & livestock) whose water levels are projected to decline below the pump as a result of regional groundwater production in GMA 12. Although emergency assistance will be provided should the need arise, the main intent of the GWAP is to proactively identify -priority wells up to 10 years in advance of any adverse impact. The following sections describe the methodology used to identify priority wells that should be investigated by POSGCD Water Resource Management Specialist, who has the primary responsibility of recommending appropriate action.

2.0 DATA SOURCES

2.1 Eligible Wells

According to the POSGCD GWAP documentation (POSGCD, 2018):

"To be *eligible for assistance in the GWAP, a well must meet the following qualifications:*

1. *Well must be located in Milam or Burleson counties*
2. *Well must be functional and registered with the District*
3. *Well must be in the monitoring well network*
4. *Well must be either a low-capacity non-exempt permitted well that produces less than 50 gallons per minute OR an exempt well used for domestic and/or livestock use as defined in the District's Rules*
5. *Well must be completed in any aquifer in the District other than river alluvial or terraced formations.*
6. *Well may not be covered by a mitigation agreement included in a permit issued by the District or required by the State of Texas.*

POSGCD maintains an online database of all wells registered in the District (https://posgcd.halff.com). The HALFF database was used to help identify wells eligible for assistance. **Table 1** provides the total number of exempt wells in the POSGCD database that includes the pump depth and the well screen location. **Table 2** provides the number of exempt well included in Table 1 that are also a part of the POSGCD Monitoring Network.

Table 1 All Exempt Wells in POSGCD

Aquifer	Has Pump Depth Information	Has Screen Information	Has Pump Depth & Screen Information
Sparta	109	116	87
Queen City	117	118	95
Carrizo	72	69	57
Calvert Bluff	143	141	113
Simsboro	46	58	40 r
Hooper	129	100	77
Yegua-Jackson	311	284	250
TOTAL	927	886	719

Table 2 Only Exempt Wells currently in the POSGCD Monitoring Network

Aquifer	Has Pump Depth Information	Has Screen Information	Has Pump Depth & Screen Information
Sparta	6	15	5
Queen City	8	15	7
Carrizo	4	7	4
Calvert Bluff	25	43	23
Simsboro	18	32	18
Hooper	16	22	11
Yegua-Jackson	1	4	0
TOTAL	78	138	68

For the purpose of this report, a well was considered to be a low-capacity non-exempt permitted well (eligibility requirement #4) if the maximum production pumping capacity of the permitted well in the HALFF database is 50 gallons per minute (gpm) or less. If the maximum production capacity of the well is not listed in the database, a well would also be included if the average annual permitted production is less than 81 acre-feet, which is equivalent to pumping continuously at a rate of 50 gpm for an entire year. **Table 3** provides the total number of permitted wells that met requirement #4 and have a pump setting recorded in the POSGCD well database. **Table 4** provides the number of permitted wells in Table 3 that are also part of the POSGCD Well Monitoring Network.

Table 3 Permitted Wells in POSGCD with an average annual permitted production of 50 gallons per minute or less

Aquifer	Has Pump Depth Information	Has Screen Information	Has Pump Depth & Screen Information
Sparta	5	8	4
Queen City	4	7	4
Carrizo	3	3	3
Calvert Bluff	20	25	19
Simsboro	6	7	6
Hooper	5	6	5
Yegua-Jackson	11	11	8
Total	54	67	49

Table 4 Permitted Wells currently in the POSGCD Monitoring Well Network with an average annual permitted production of 50 gallons per minute or less

Aquifer	Has Pump Depth Information	Has Screen Information	Has Pump Depth & Screen Information
Sparta	0	0	0
Queen City	0	0	0
Carrizo	1	1	1
Calvert Bluff	0	0	0
Simsboro	1	1	1
Hooper	1	1	1
Yegua-Jackson	1	1	1
TOTAL	4	4	4

There are 981 exempt and low-capacity permitted wells with pump depth information in the POSGCD database. Out of these 981 wells, there are 82 in the POSGCD Monitoring Well Network and eligible for well assistance. In order to promote participation in the GWAP, the analyses presented in this report included all 981 wells in the analysis. Throughout the analysis, the wells will be referenced by their POSGCD ID. Any well owner can obtain the POSGCD ID for a well by contacting the POSGCD office in Milano, Texas.

2.2 Monitored Groundwater Water Levels

The POSGCD network of groundwater monitoring wells is continually being expanded to include additional wells. At the time this document was prepared, the POSGCD Monitoring Well network consists of the 235 wells shown in **Figure 1**. **Appendix A** provides information for the 235 wells in Figure 1, including their location, well depth, screened interval, and aquifer assignment. INTERA (2018) provides guidelines for the collection and analysis of the monitoring data. The current analysis considers all water level measurements recorded prior to Summer 2019.

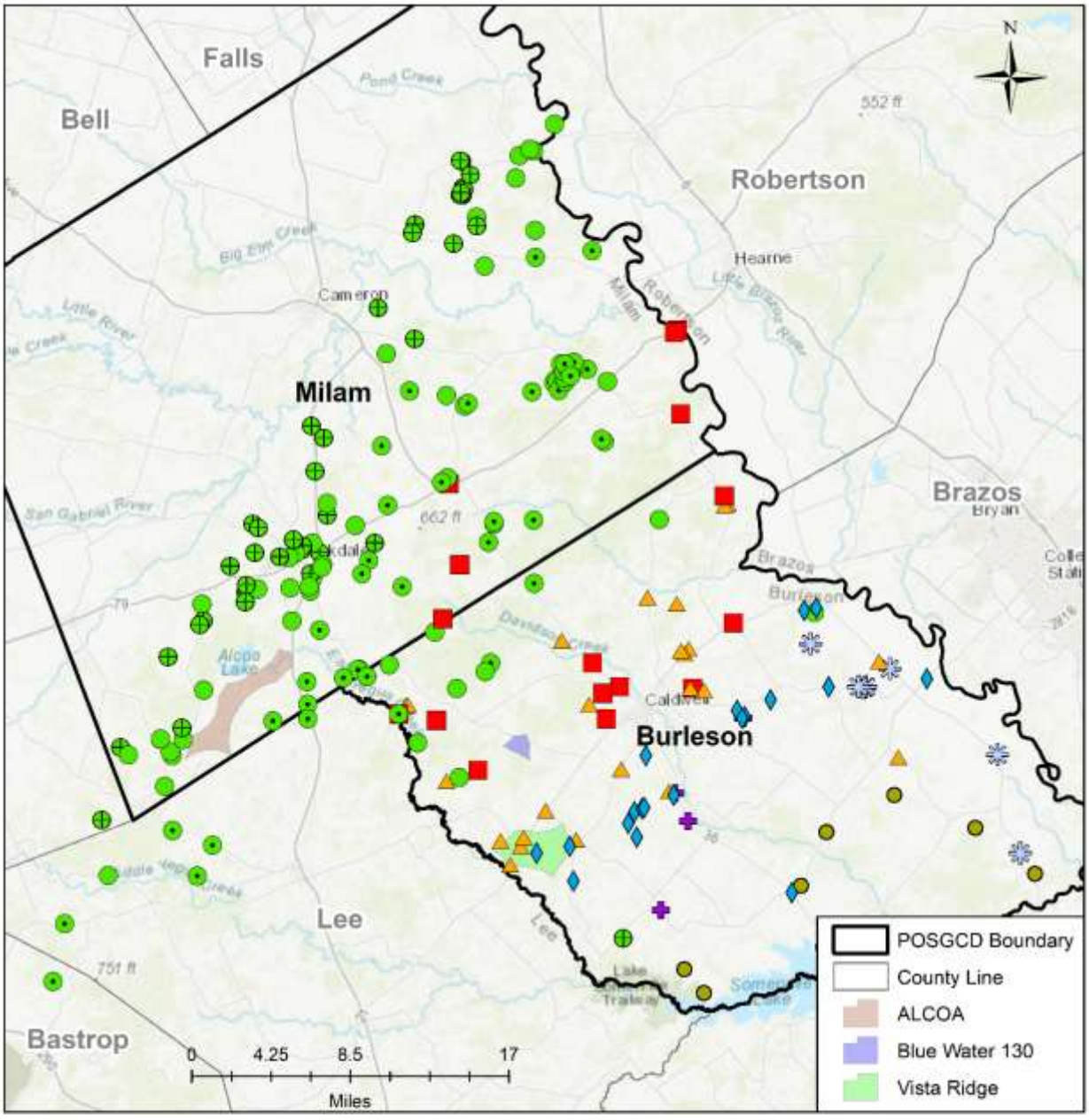

Figure 1 Monitoring wells in POSGCD Groundwater Monitoring Network

2.3 Modeled Groundwater Water Levels

The POSGCD has registered wells in the Yegua-Jackson, Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro, Hooper, and Brazos River Alluvium aquifers. As part of the regional planning process in Groundwater Management Area (GMA) 12, POSGCD uses the three groundwater availability models (GAMs) described in **Table 5** to simulate changes in water levels in response to future pumping in these aquifers. For this GWAP analysis, these three GAMs are considered to be the best available science for evaluating changes in future water levels in response to pumping. Because registered wells in the Brazos River Alluvium Aquifer are not eligible for GWAP assistance, no evaluations of simulated water levels were performed using the Brazos River Alluvium Aquifer.

Table 5 Three Groundwater Availability Models used by POSGCD to simulate impacts of pumping on water levels as part of the regional planning process

Groundwater Availability Model	Aquifers	Reference
Brazos River Alluvium Aquifer	Brazos River Alluvium	Ewing and Jigmond (2016)
Central Sparta, Queen City, and Carrizo-Wilcox Aquifers	Sparta, Queen City, Calvert Bluff, Simsboro, Hooper	Young and others (2018)
Yegua-Jackson Aquifer	Yegua-Jackson	Deeds and others (2010)

The POSGCD GWAP documentation (POSGCD, 2018) states that the GAMs will be used to perform GWAP annual assessments and that the GAM simulations will include the most recent information on projected pumping in GMA 12. For this study, two of the GAM pumping files presented in GMA 12's November 15, 2019 meeting were used. The water levels for wells in the Sparta, Queen City, and Carrizo-Wilcox Aquifers were simulated using the Central Sparta, Queen City and Carrizo-Wilcox Aquifer GAM (Young and others, 2018) and the GMA 12 Pumping Scenario 9 (PS-9). The PS-9 simulation is the most recent GMA 12 simulation performed to evaluate the compatibility of current Desired Future Conditions (DFCs) and Modeled Available Groundwater (MAG) using the GAM. The purpose of developing PS-9 model simulation was to achieve the GMA 12-wide DFCs by adjusting pumping in GMA-12 PS-7 modeling scenario. **Figure 2** shows the pumping rates by aquifer in PS-9. **Table 6** lists the pumping rates used in the GAM simulations for 2018 and 2028.

The water levels for wells in the Yegua-Jackson Aquifer were simulated using the Yegua-Jackson GAM (Deeds and others, 2010) and the Yegua-Jackson DFC simulation developed by GMA 12 during the last joint planning period. The DFC simulation was presented and discussed in the GMA 12 meeting held on November 15, 2019 at POSGCD offices in Milam, Texas (GMA 12 consultants, 2019). **Figure 3** shows the pumping rates by aquifer in the DFC simulation. **Table 6** lists the pumping rates used in the GAM simulations for 2018 and 2028.

Table 6 Pumping rates in POSGCD aquifers for years 2018 and 2018 for GMA 12 GAM runs for PS-9 using the Central Sparta, Queen City and Carrizo-Wilcox Aquifer GAM and for the DFC Run for the Yegua-Jackson Aquifer using the Yegua-Jackson GAM

GAM Run	Aquifer	Pumping Rate (AFY)	
		2018	2028
PS -9 for the Central Sparta, Queen City, and Carrizo-Wilcox GAM	Sparta	1070.1	672
	Queen City	502	288
	Carrizo	1189	10677
	Calvert Bluff	1553.	2434
	Simsboro	5080	42591
	Hooper	723	1981
Yegua-Jackson DFC Run	Yegua-Jackson	14683	14693

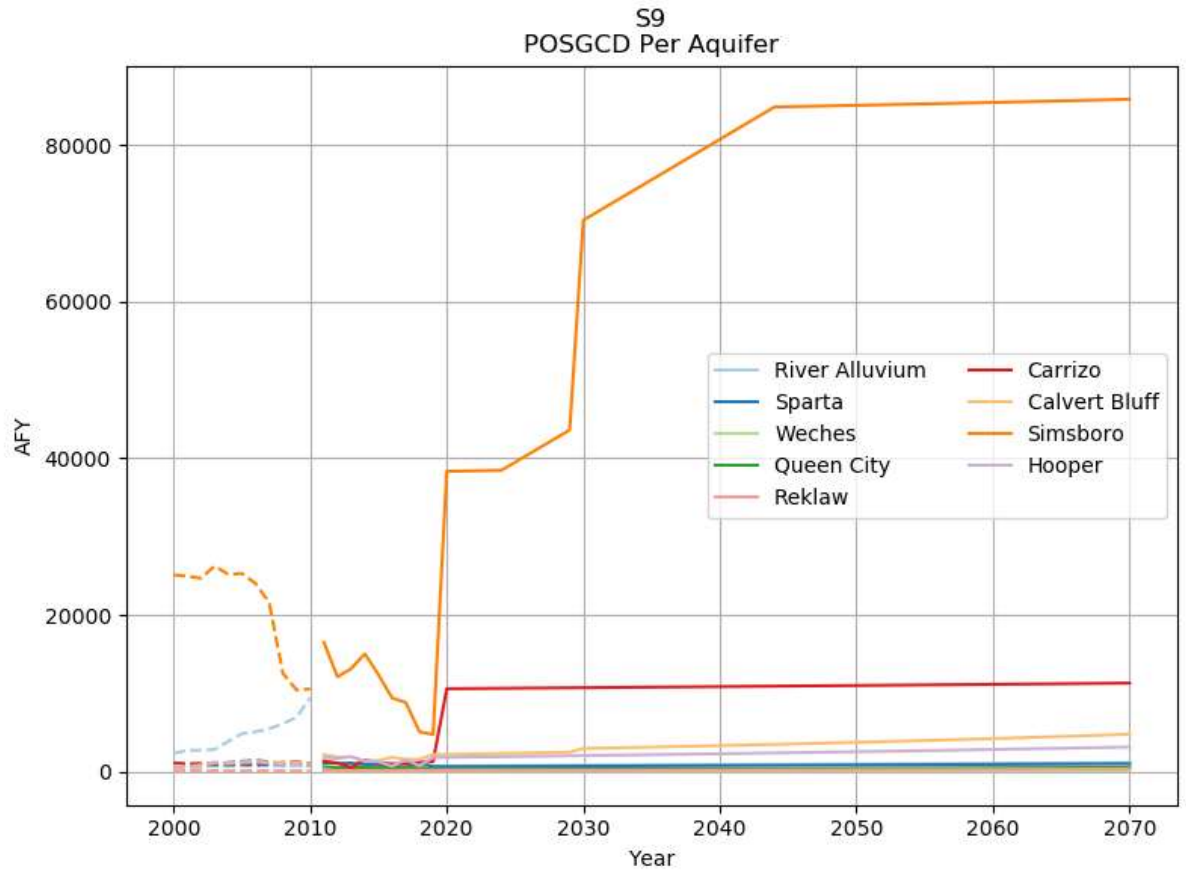

Figure 2 Pumping rates from the year 2000 to 2070 used in GMA-12 Pumping Scenario 9 that was used by GMA 12 (GMA 12 consultants, 2018) to simulate future water levels using the Central Sparta, Queen City, and Carrizo-Wilcox GAM (Young and others, 2018).

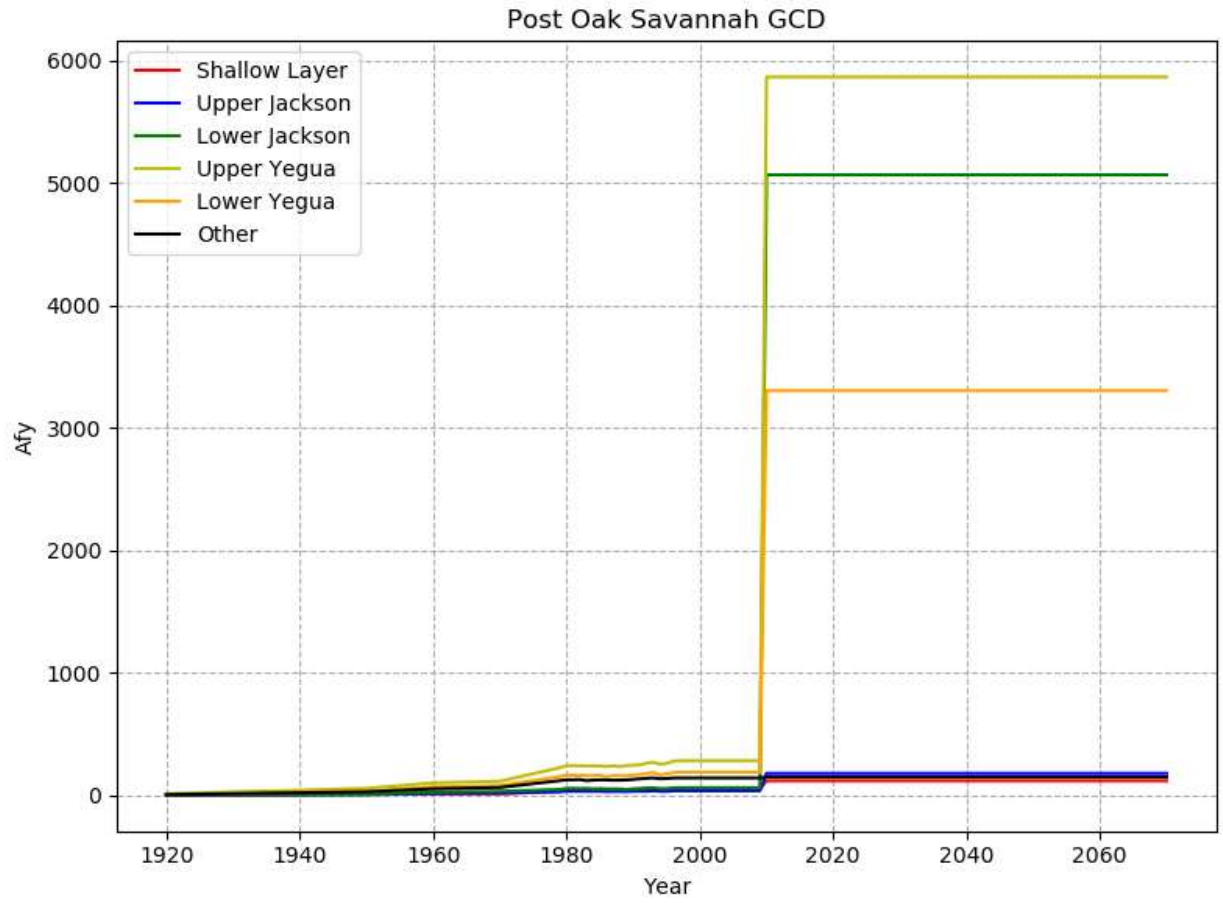

Figure 3 Pumping rates from the year 1920 to 2070 used in GMA-12 Yegua-Jackson DFC Run (GMA 12 consultants, 2018) that was used by GMA 12 to simulate future water levels in the Yegua-Jackson Aquifer.

3.0 GWAP ASSESSMENT

3.1 Priority Assessment Methodology

A primary issue of concern for the GWAP assessment is whether the water level will drop below the elevation of the pump setting. The pump elevation for each well is determined by subtracting the pump depth from the surface elevation, which is established from the 10-meter resolution National Elevation Dataset [NED] Digital Elevation Model [DEM]. The time period of interest is over a 10-year period. The 10-year period select for this GWAP assessment is from December 2018 to December 2028.

3.2 Results

3.2.1 Wells Considered a Priority based on Simulated 2028 Water Levels

Changes in water levels from 2018 to 2028 were simulated for 927 exempt wells and 54 low capacity permitted wells. These wells were selected for analysis because they have assigned depths to pumps in the POSGCD well database. A total of 151 wells with pumping data were considered a priority because their modeled 2028 water level is lower than the elevation of the pump setting. If the modeled water level in 2028 was less than 10 feet above the pump elevation, the well was considered to be approaching priority status. A total of 22 wells out of the 981 wells are approaching priority status. **Table 7** partitions the 151 priority wells by aquifer. Out of the 151 priority wells, 116 are in the Yegua-Jackson Aquifer. The next largest "priority" group consists of 17 wells located in the Carrizo Aquifer.

Table 7 Distribution of 151 Exempt and Low-Capacity Permitted Wells by Aquifer that are determined to be a priority or approaching priority status based on a comparison of simulated 2028 water levels and the elevation of the pump setting

Aquifer	Well Considered a Priority	2028 Water level minus Pump Level						Well Approaching Priority Status
		priority wells			wells approaching priority status			
		< -5 ft	> -5 & < -2 ft	> -2 & < 0 ft	> 0 & < 2 ft	> 2 & < 5 ft	> 5 & < 10 ft	
Sparta	1	0	1	0	0	0	1	1
Queen City	3	2	1	0	0	2	2	4
Carrizo	17	16	1	0	0	1	2	3
Calvert Bluff	3	3	0	0	0	0	1	1
Simsboro	9	9	0	0	0	0	0	0
Hooper	2	2	0	0	0	1	3	4
Yegua Jackson	116	112	3	1	1	2	8	11
TOTAL	151	144	6	1	1	6	15	24

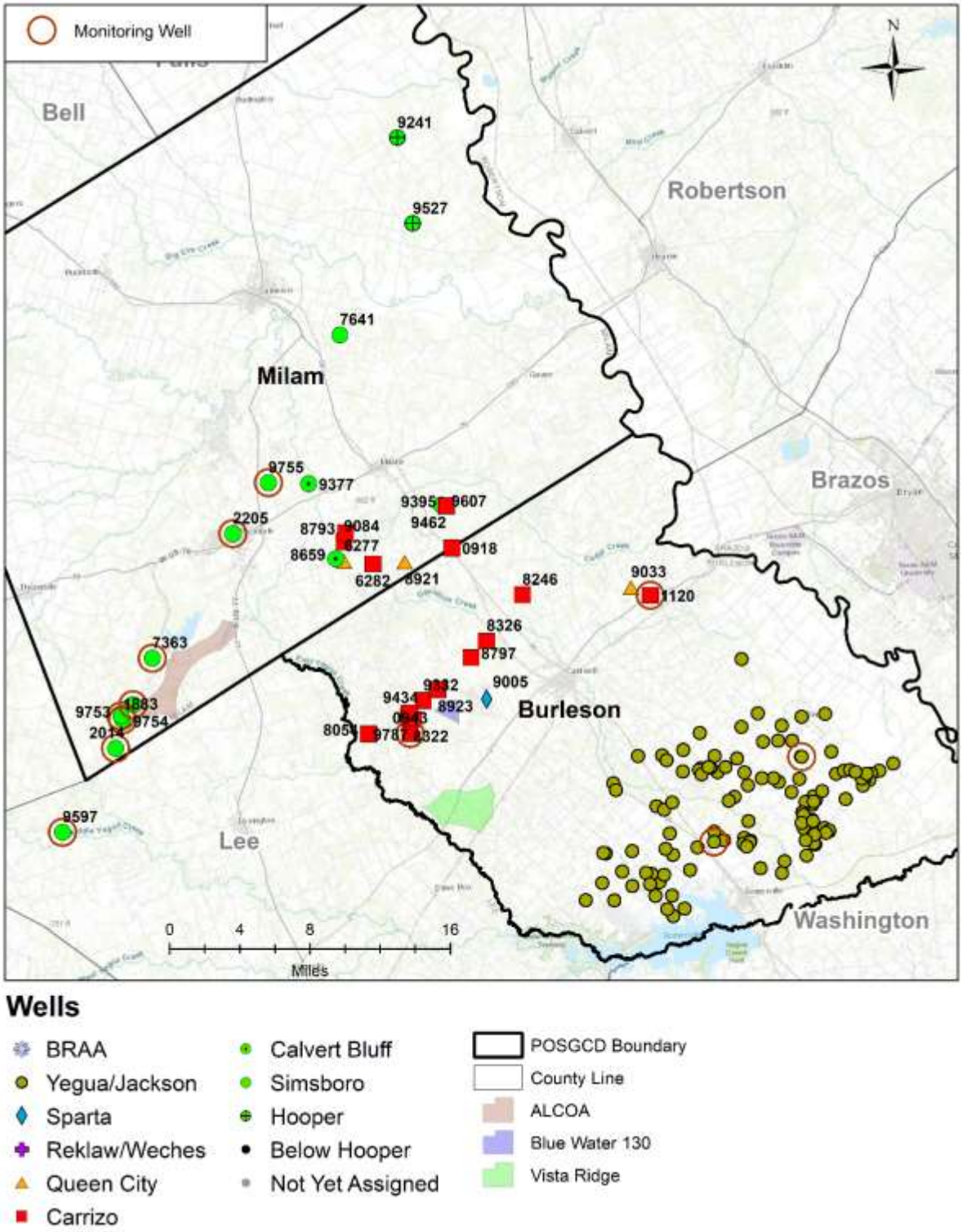

Figure 4 Wells where a modeled water Level for 2028 is below the elevation of the pump setting based on information in the POSGCD well database.

Figure 4 shows the location of the 151 wells that are considered a priority. Except for the wells located in the Yegua-Jackson Aquifer, the wells are labeled using their POSGCD identification (ID) number. The 116 wells located in the Yegua-Jackson Aquifer are not labeled because these wells are located too closely together to label each well unless the figure was notably enlarged. Figure 4 shows that, whereas the priority wells located in Yegua-Jackson are distributed relatively uniformly across the Yegua-Jackson Aquifer, most of the priority wells in the Simsboro and Carrizo aquifers are located in a relatively small region. In the Simsboro Aquifer, most of the priority wells are concentrated near the up-dip extent of the Simsboro aquifer. In the Carrizo Aquifer, most of the priority wells are primarily located along a line that is about five miles northwest of Route 21.

To help understand the relative risks associated with wells in different aquifers and how these risks change with the model predictions at different years, cumulative distribution functions (CDFs) were created for each aquifer. **Appendix B** presents CDFs for exempt wells. **Appendix C** presents CDFs for low-capacity permitted wells. **Figure 5** shows the CDF generated for the priority exempt wells located in the Calvert Bluff Aquifer. Listed below are comments that are intended to help understand the information that can be extracted from the CDFs presented in the appendices.

> Dashed Horizontal Purple line from the Y-axis: The dashed purple line intercepts the Y axis at the number 20. Extending the dashed purple line horizontally to the series of curves that represents years 1929 to 2028, one can estimate the range of the water column heights above the pump elevation for the 20 wells with the smallest water column heights. For the year 1929, the range for these 20 wells is between 115 ft and -40 ft. The value for 115 ft is determined by where the dotted green line intercepts the X axis. The value of -40 is determined by where the brown line for the year 1929 intercepts the X axis. Similarly, for the year 2018, the range for the 20 wells with the smallest water column heights is between 50 ft and -80 ft.
>
> Dashed Vertical Red line from the X-axis: The dashed red line intercepts the X axis at the number 0. Extending the dashed red line vertically to the series of curves that represents years 1929 to 2028, one can estimate the number of exempt wells with a simulated water level that is at, or below, the elevation of the pump setting. For the year 1929 and the year 2028, the estimated number of wells with a water level at, or below, the elevation of the pump setting is 2 wells and 3 wells, respectively. For the year 1929, the answer of 2 wells is obtained by extending the dashed red line upward until it intercepts the brown line for 1929, at which point one follows the horizontal blue line until it intercepts the Y-axis at 2 wells. For the year 2028, a similar process is performed by following the dashed horizontal blue line until it intercepts the Y axis at 3 wells.

Appendices D and **E** show the simulated water level for the priority wells from the year 2000 to the year 2032. Appendix D presents hydrographs for wells located in the Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro, and Hooper aquifers. Appendix E presents hydrographs for wells located in the Yegua-Jackson. Included in each plot are markers for the elevations associated with land surface, the pump elevation and the location of the well screen. If the well is included in the POSGCD monitoring network, then any measured water level in the POSGCD database is plotted so it can be compared to the simulated water levels.

Several observations can be gleaned from Appendices D and E that are relevant to the GWAP assessment. These observations are listed below and will be discussed later in the report.

- For some wells, there are measured water levels below the elevation of the pump setting
- For some wells, the simulated water levels are below the pump elevation during the entire time period from 2000 to 2032
- The majority of the Yegua-Jackson wells have hydrographs with a similar pattern. The pattern involves a nearly constant water level from 2000 to 2010 and then an exponential decline of water levels over time that causes the water level to drop below the elevation of the pump setting before 2018.

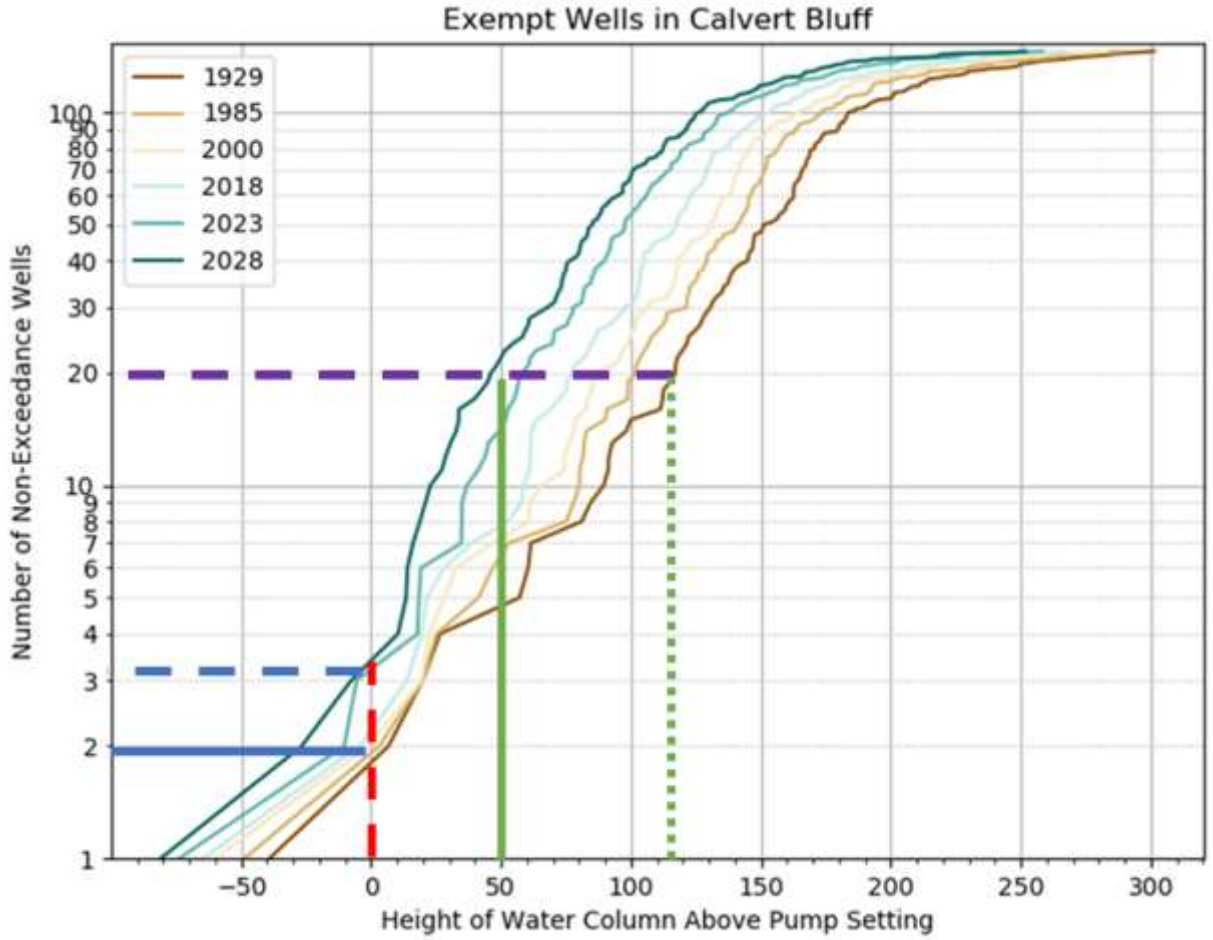

Figure 5 Plot of a cumulative distribution function (CDF) that shows how the elevation of the simulated water level relative to the elevation of the pump setting changes over time as a result of groundwater pumping causing declines in the water levels across POSGCD.

3.2.2 Priority Wells in the POSGCD Monitoring Well Network

One of the criteria for a well to be eligible for funding from the GWAP is for the well to be a part of the POSGCD Monitoring Well Network. Figure 4 shows the wells determined to be a priority based on a comparison of the elevation of the pump setting and the simulated 2028 water level. In Figure 4, the 12 wells considered a priority are surrounded by a red circle. **Table 8** partitions the 12 priority wells into two groupings. One grouping is based on aquifer. The other grouping is based on the difference between the simulated 2028 water level and the elevation of the pump setting.

Table 9 lists the POSGCD ID number for the 12 wells in Table 8 that are considered a priority. Out of the 12 priority wells, eight of the wells are located in the Simsboro aquifer. At these twelve Simsboro wells the simulated 2028 water level is between 7 and 72 feet below the elevation of the pump setting. The two wells located in the Yegua-Jackson Aquifer have simulated 2028 water levels that are 114 ft and 35 ft below the elevation of the pump setting. The two wells located in the Carrizo Aquifer have simulated 2028 water levels that are 34 ft and 18 ft below the elevation of the pump setting.

Table 8 Distribution of Exempt and Low-Capacity Permitted Wells by Aquifer that are part of the POSGCD Monitoring Well Network and are determined to be a priority or approaching a priority status based on a comparison of simulated 2028 water levels and the elevation of the pump setting

Aquifer	Well Considered a Priority	2028 Water level minus Pump Level						Well Approaching a Priority Status
		Priority wells			wells approaching priority status			
		< -5 ft	> -5 & < -2 ft	> -2 & < 0 ft	> 0 & < 2 ft	> 2 & < 5 ft	> 5 & < 10 ft	
Sparta	0	0	0	0	0	0	0	0
Queen City	0	0	0	0	0	1	0	1
Carrizo	2	2	0	0	0	0	0	0
Calvert Bluff	0	0	0	0	0	0	1	1
Simsboro	8	8	0	0	0	0	0	0
Hooper	0	0	0	0	0	0	1	1
Yegua Jackson	2	2	0	0	0	0	0	0
TOTAL	12	12	0	0	0	1	2	3

Table 9 Priority wells that are a part of the POSGCD Monitoring Well Network

POSGCD	Aquifer	2028 Water Level Minus Pump Level (ft)
PO-001120	Carrizo	-34
PO-000943	Carrizo	-18
PO-009597	Simsboro	-72
PO-001883	Simsboro	-49
PO-007363	Simsboro	-43
PO-009755	Simsboro	-33
PO-009754	Simsboro	-21
PO-002014	Simsboro	-13
PO-009753	Simsboro	-8
PO-002205	Simsboro	-7
PO-000618	Yegua-Jackson	-114
PO-009157	Yegua-Jackson	-35

3.2.3 Simulated Drawdowns

Figures 6 through **8** show the drawdown that occurs between 2018 and 2028 as simulated by the Central Sparta/Queen City/Carrizo-Wilcox GAM based on pumping in Run PS-9. Figure 6 shows the drawdown is ten feet or less across the majority of both the Sparta and Queen City Aquifers. For both aquifers, there is less drawdown in western Burleson County than in eastern Burleson County. The greatest drawdown in both aquifers occurs slightly north of College Station along the border with Brazos County.

In Figure 7, the pattern in the contours of drawdowns for both the Carrizo and Calvert Bluff aquifers are similar. The largest drawdown occurs in the vicinity of the Vista Ridge well field and the drawdown values decrease radially outward from there towards Robertson and Brazos counties. In the Carrizo Aquifer, the drawdowns are about 200 ft in the Vista Ridge wellfield, are generally less than 10 feet in northeast Milam County and are generally less than 50 feet along the county line with Brazos County. In the Calvert Bluff Aquifer, the drawdowns are about 140 ft near the Vista Ridge wellfield, are generally less than 10 feet in northeast Milam County and are generally from 40 to 60 feet along the county line with Brazos County.

In Figure 8, the pattern in the contours of drawdowns for the Simsboro and Hooper aquifers are similar to those for the Carrizo and Calvert Bluff aquifers shown in Figure 7. The largest drawdown occurs in the vicinity of the Vista Ridge well field and the drawdown values decrease radially outward from there towards Robertson and Brazos counties. In the Simsboro Aquifer, the drawdowns are about 500 feet in the Vista Ridge wellfield, are less than 25 feet across its outcrop in Milam County, and are about 150 feet along the county line with Brazos County. In the Hooper Aquifer, the drawdowns are greatest about five miles north of the Vista Ridge well field where they are about 140 feet. Across most of the outcrop for the Hooper Aquifer in Milam County, the drawdowns are less than 10 feet and along the county line with Brazos County, the drawdowns range between 40 and 60 feet.

Figure 9 shows the drawdown simulated by the Yegua-Jackson GAM that occurs between 2018 and 2028 based on the rates in the DFC Run adopted by GMA 12 during the last joint planning cycle. The drawdowns were generated by determining the maximum value for the different model layers that exist at each grid cell location. The largest drawdowns occur in the down-dip regions of the aquifer and they range between 40 feet and 60 feet. Across the up-dip regions of the aquifer, the drawdown values are typically less than 30 feet.

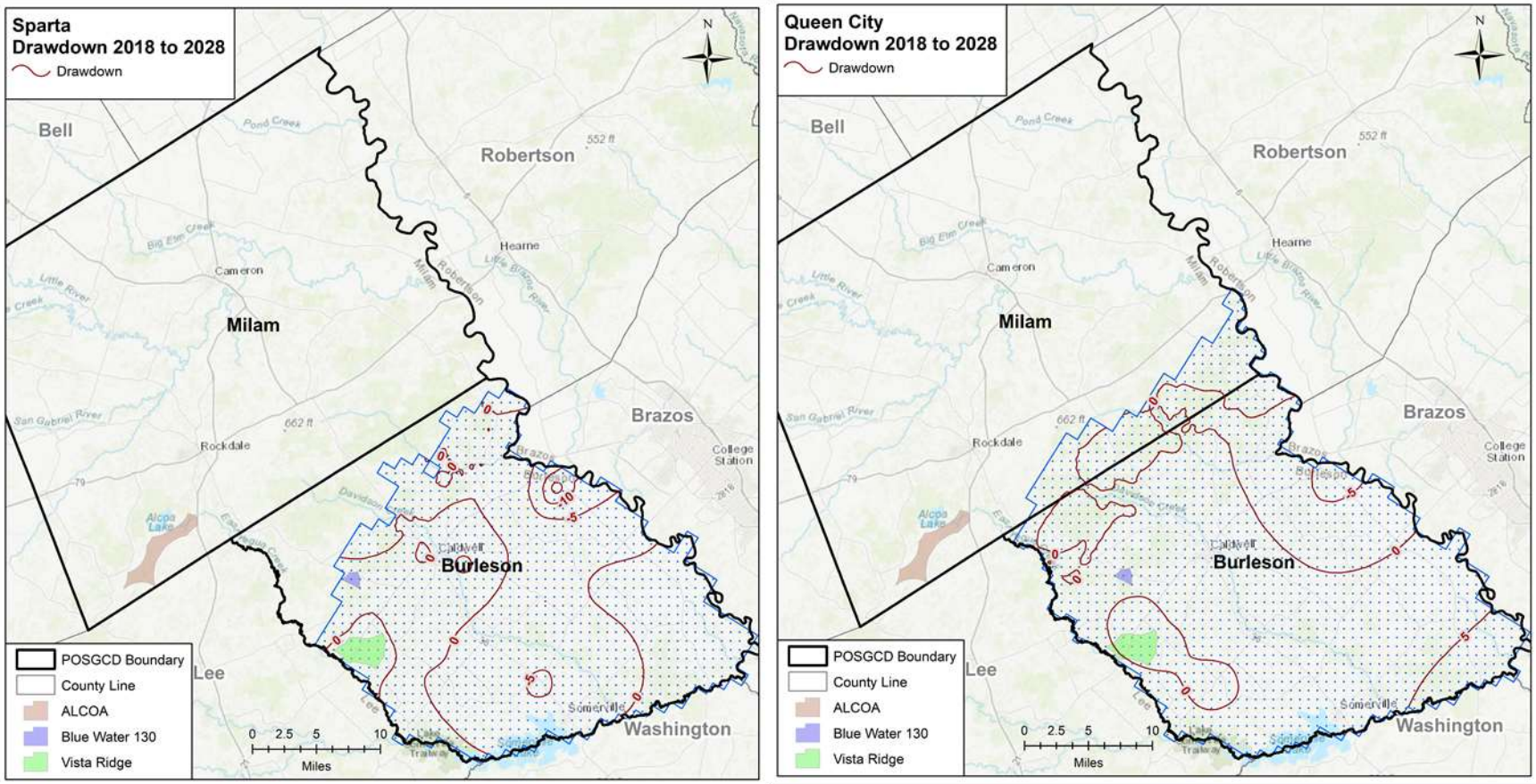

Figure 6 Contours of Simulated Drawdown from 2018 to 2028 in the Sparta and Queen City Aquifers

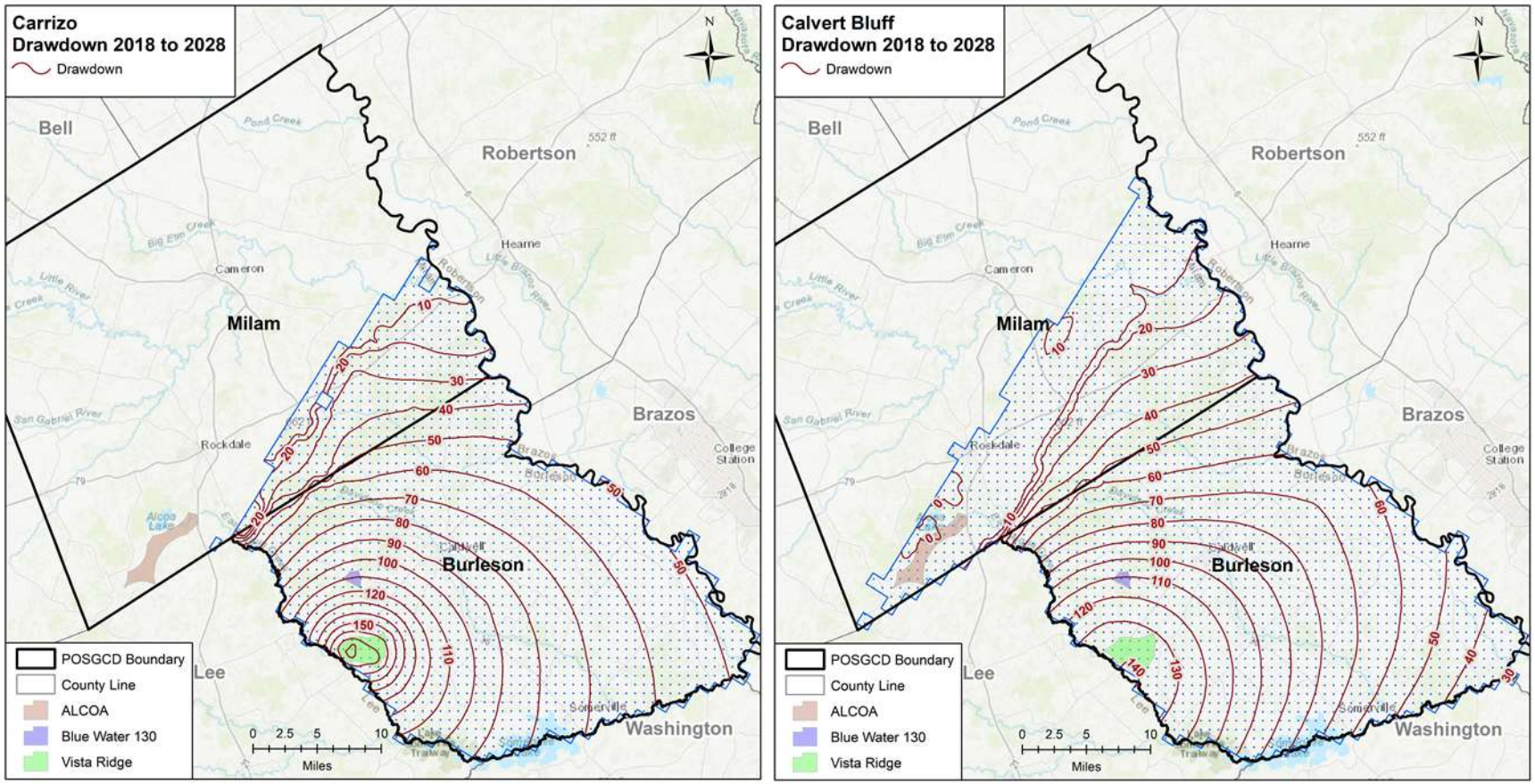

Figure 7 Contours of Simulated Drawdown from 2018 to 2028 in the Carrizo and Calvert Bluff Aquifers

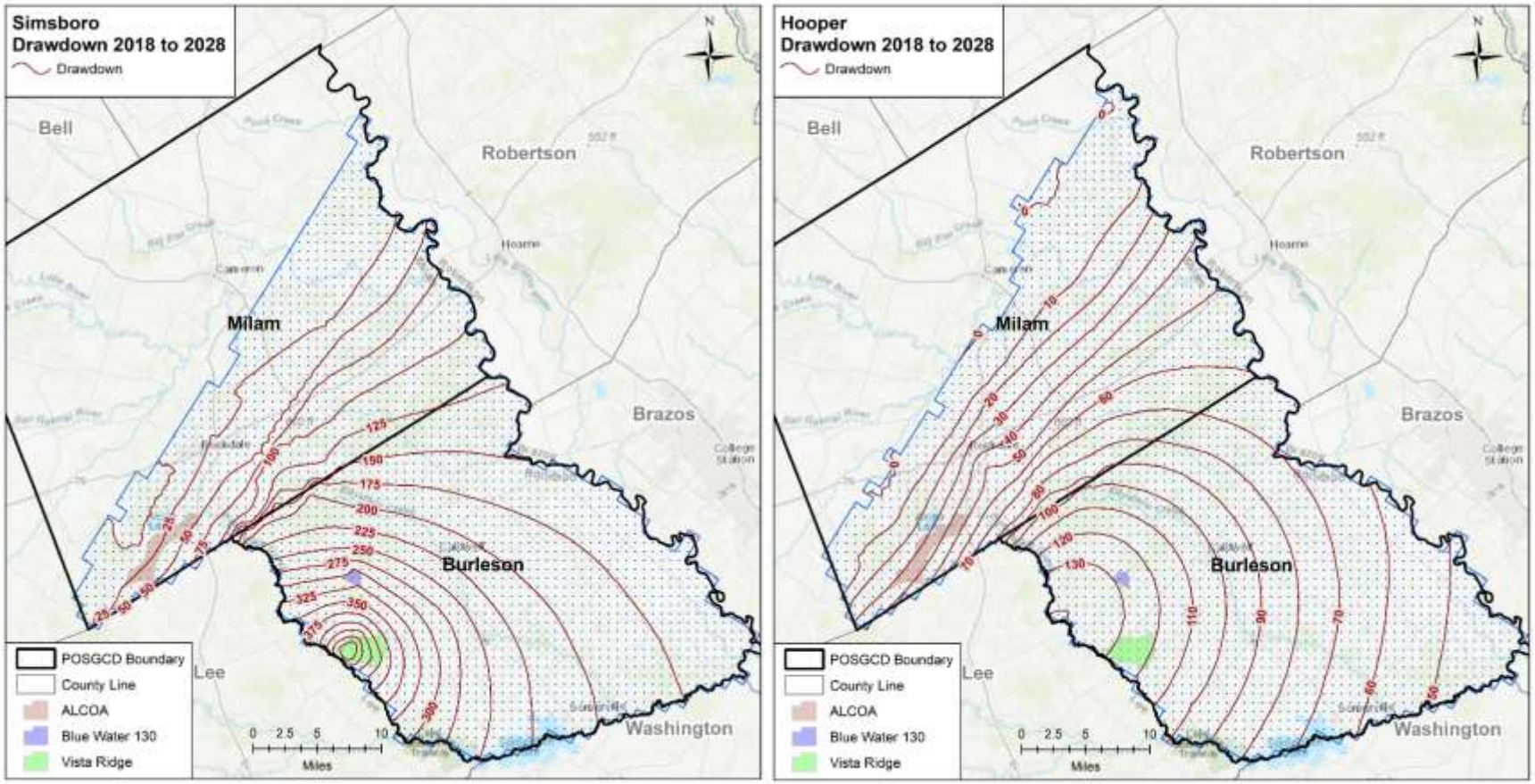

Figure 8 Contours of Simulated Drawdown from 2018 to 2028 in the Simsboro and Hooper aquifers.

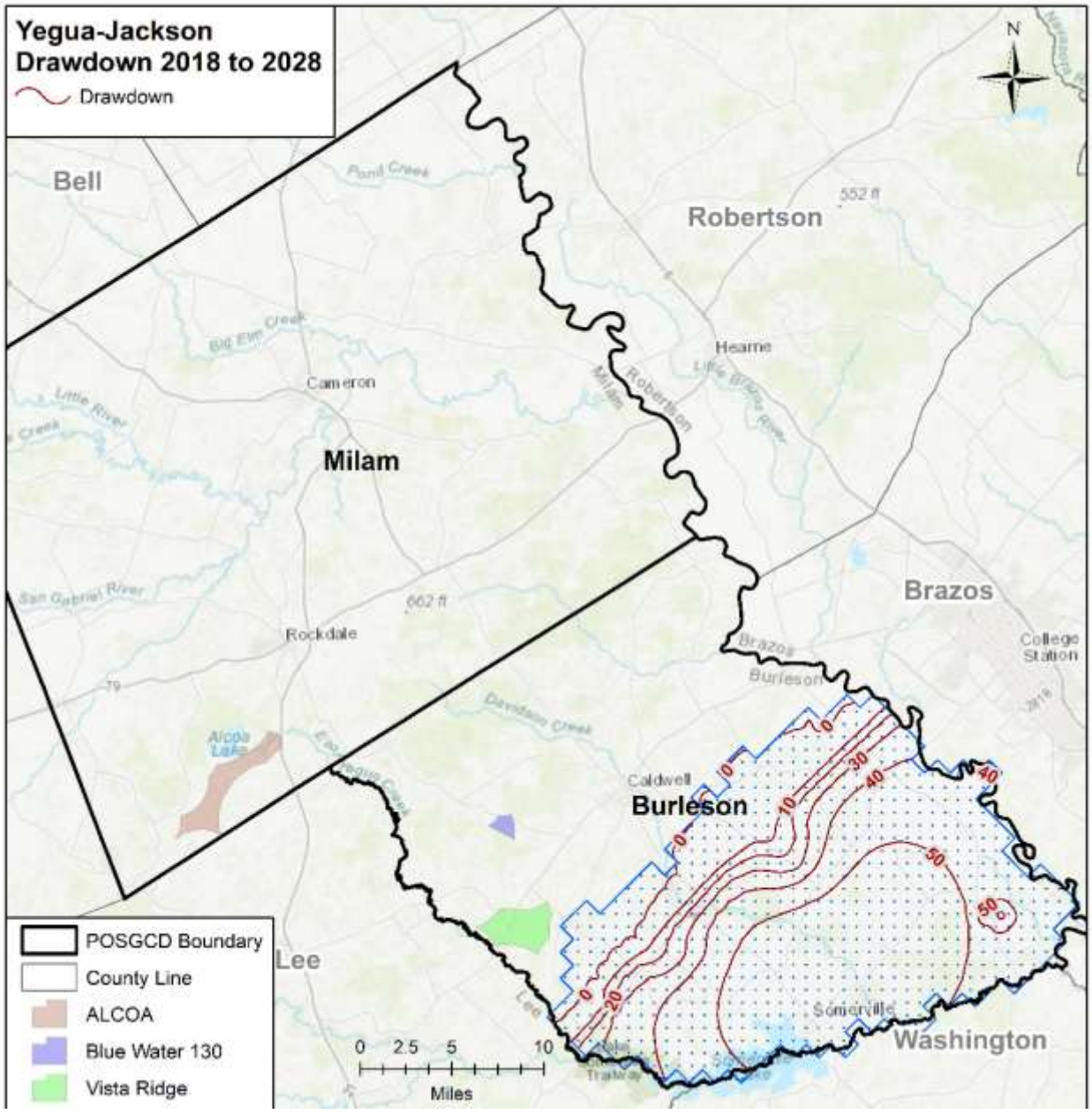

Figure 9 Contours of Simulated Drawdown from 2018 to 2028 in the Yegua-Jackson Aquifer.

4.0 DISCUSSION OF RESULTS

An examination of the hydrographs in Appendices C and D provides considerable evidence that the GWAP criteria and information used for determining whether a well is a priority requires additional vetting and perhaps a change in the criteria itself. The case for additional vetting and possible change in criteria is discussed in the following subsections.

4.1 Comparison of Measured Water Levels and Pump Settings

Figure 10 shows simulated and measured water levels for two Simsboro wells. These wells were selected for two reasons. One reason is that each well has multiple water levels between the year 2002 and 2019 that are below the elevation of the pump setting. The second reason is that the well owners have not reported problems with pumping water from these two wells. The combination of these two conditions indicates that the POSGCD likely contains incorrect information regarding the elevation of the pump settings. **Table 10** was generated for eight wells in Appendix C where pumping should either not be possible or would not be sustainable for any meaningful period if the POSGCD information regarding the pump setting are correct. Because of concerns with the pump elevation at these eight wells, additional reviews should be performed regarding the accuracy of well information in the POSGCD database before the next GWAP analysis is performed.

Table 10 Wells in the POSGCD Monitoring Network where measured water levels are below or less than 5 feet above the elevation of the pump setting

Well ID	Formation	Exempt/ Permitted	Number of Measured Water Levels			Lowest Water Level Minus Pump Level (ft)		
			1980 - 2000	2000 - 2010	2010 - 2019	1980 - 2000	2000 - 2010	2010 - 2019
PO-009769	Calvert Bluff	Exempt	52	42	23	-46	-60	-46
PO-007242	Calvert Bluff	Exempt	0	0	3	--	--	-42
PO-002014	Simsboro	Exempt	24	59	25	-16	-36	-18
PO-009753	Simsboro	Exempt	36	58	24	13	-23	-11
PO-001505	Simsboro	Exempt	33	60	25	15	6	0
PO-009754	Simsboro	Exempt	0	40	23	--	1	1
PO-002205	Simsboro	Exempt	1	0	2	45	--	3
PO-007363	Simsboro	Exempt	34	60	24	10	-2	3

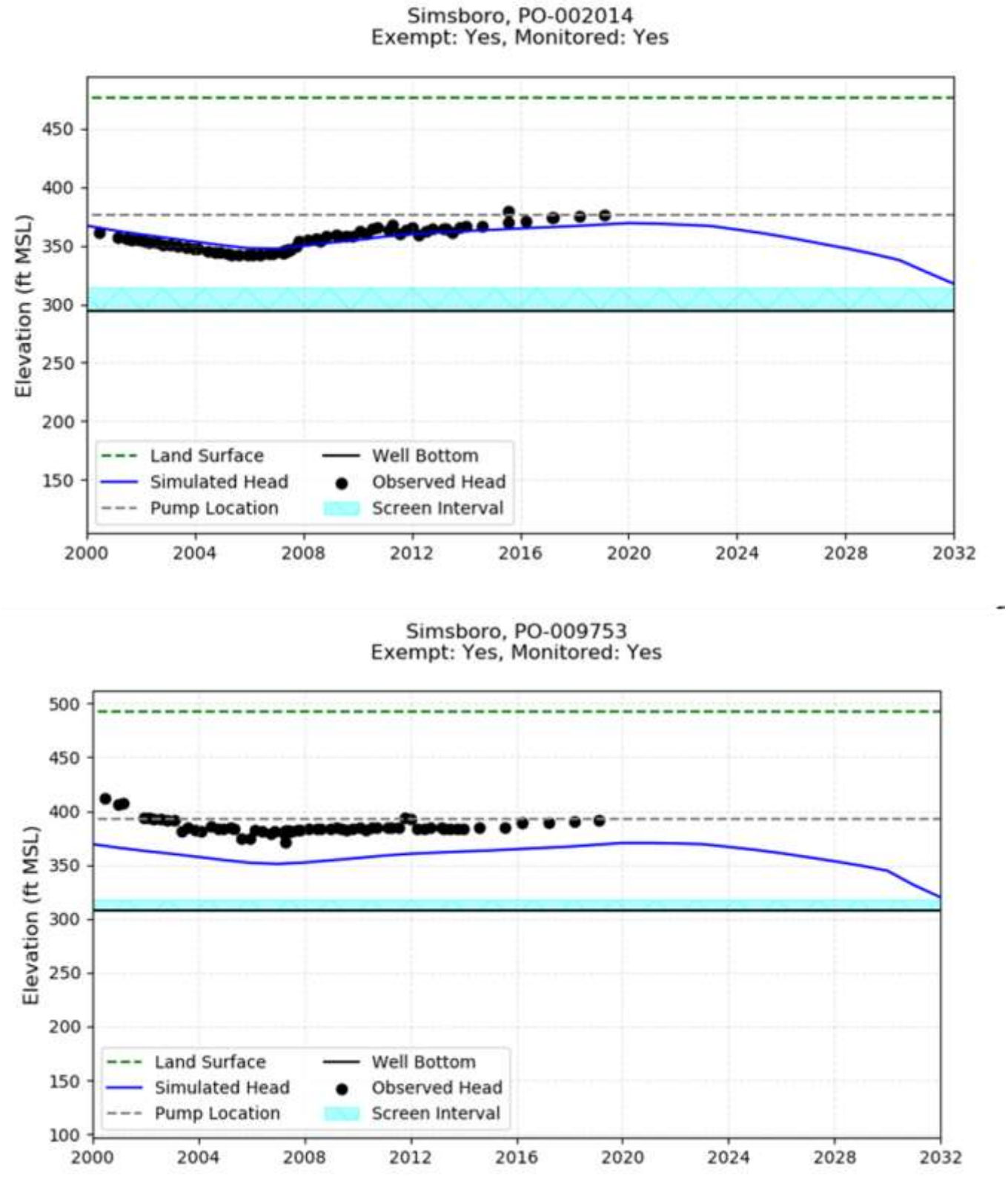

Figure 10 Simulated water levels from 2000 to 2032 for exempt wells PO-002014 and PO-009753 located in the Simsboro Aquifer

Possible causes for the incorrect information on the pump setting in the POSGCD database include mistakes with inputting the value into the POSGCD database, incorrect information provided to POSGCD by the well owner or driller, incorrect elevations for land surface, or changes in the pump elevation after the installation of the well. One of the reasons for pump elevations to change over time is if the well was mitigated by ALCOA during their mining operations in Milam and Lee counties. ALCOA mitigated approximately 500 wells but POSGCD has not yet obtained documents from ALCOA that describes the specific mitigation activities performed.

Because well drillers reports list the pump setting as a depth below ground surface, a possible cause for an inaccurate elevation for a pump location is error in the elevation used for the land surface. At monitoring and permitted wells, the POSGCD is continuously performing field surveys to establish accurate well locations and ground surface elevations. But because of the large number of exempt wells in the District, POSGCD has not yet surveyed all of the exempt wells. For this reason, the GWAP analysis has relied on land surface elevations estimated from DEM maps produced by the United States Geological Survey (USGS). This DEM has a spatial resolution of 10 meters. Evidence of potential problems with the presumed land surface elevations exists in Table 1. In Table 1, there are 45 wells where the difference between the land surface elevation provided by the owner/driller and the land surface from the DEM map is greater than 10 ft.

4.2 Comparison of Modeled Water Levels and Pump Settings

Table 11 lists the number of wells that have simulated water levels below the elevation of the pump setting for different times. “Pre-pumping” indicates the year before pumping has started in the GAM. For the Sparta/Queen City/Carrizo-Wilcox GAM, “pre-pumping” represents the year 1929. In the Yegua-Jackson GAM, “pre-pumping” represents the year 1900. The number of wells with simulated water levels below the elevation of the pump setting is also reported for the years 2010, 2018, and 2028. Table 11 was created from information in **Appendices F** and **G**. Appendix F compares the simulated water levels to the elevation of the pump setting for wells located in the Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro, and Hooper aquifers. Appendix G compares the simulated water levels to the elevation of the pump setting for wells located in the Yegua-Jackson Aquifer.

Of the 151 wells identified as a priority by the GWAP analysis, there are 98 (or 65%) where the simulated water level was already below the elevation of the pump setting by 2018. If the well completion data and the simulated water levels were accurate, then the POSGCD would likely have been notified of well problems with dry wells by many, if not the vast majority, of owners of these 98 wells by late November 2019, which is the time of the writing of this report. The fact that well problems were not reported to POSGCD in 2019 suggests that these 98 wells were not dry in 2019 and that the results from the GWAP analysis are biased toward over-predicting the number of priority wells.

Table 11 Comparison of Modeled Water Levels and Elevation of Pump Setting over Time for the 151 Wells Identified as a priority

Aquifer	Number of Well where Modeled Water Level is Below the Elevation of the Pump Setting				
	Pre-Pumping	2010	2018	2023	2028
Sparta	0	1	1	1	1
Queen City	1	1	1	2	3
Carrizo	2	4	4	11	17
Calvert Bluff	1	2	2	3	3
Simsboro	0	7	6	9	9
Hooper	2	2	2	2	2
Yegua-Jackson	7	8	82	108	116
Total	13 (9%)	25 (17%)	98 (65%)	136 (90%)	151 (100%)

The results in Table 11 indicate that vetting of both the simulated water levels and the elevation of the pump setting should be included as a part of the final evaluation of the eligibility of wells for GWAP funding and recommendations for appropriate action. For a initial estimate of the potential impacts of potential bias toward over-predicting the number of priority wells, Figure 11 shows only those priority wells where the simulated water table was above the elevation of the pump setting in 2018. This restriction reduces the priority wells from 151 to 53 wells.

4.3 Validity of Future Pumping Scenarios

A key assumption underlying the capability of GAMs to accurately simulate the water levels from 2018 to 2028 is that the distribution and pumping amounts used in the GAM is accurate. The Yegua-Jackson GAM was calibrated through the year 1997. Based on information from the TWDB website (http://www.twdb.texas.gov/waterplanning/waterusesurvey/historical-pumpage.asp), the pumping rate in POSGCD has remained relatively constant at approximately 600 acre-feet per year (AFY) from 2000 to 2017. As shown in Figure 3, the pumping amounts for POSGCD in the DFC run used for the GWAP analysis had an estimated pumping rate of approximately 600 AFY from 1990 to 2010 and approximately 14,000 AFY from 2010 to 2028. A comparison between these two sets of numbers indicates that the simulated pumping for the Yegua-Jackson is likely to be more than 20 times the actual pumping over the period of 2010 to 2018. Because the Yegua-Jackson GAM simulations used for the GWAP analysis has significantly higher pumping than what actually occurred from 2010 to 2018 and would likely occur from 2018 to 2028, the 116 Yegua-Jackson wells predicted to be a priority in 2018 is not credible.

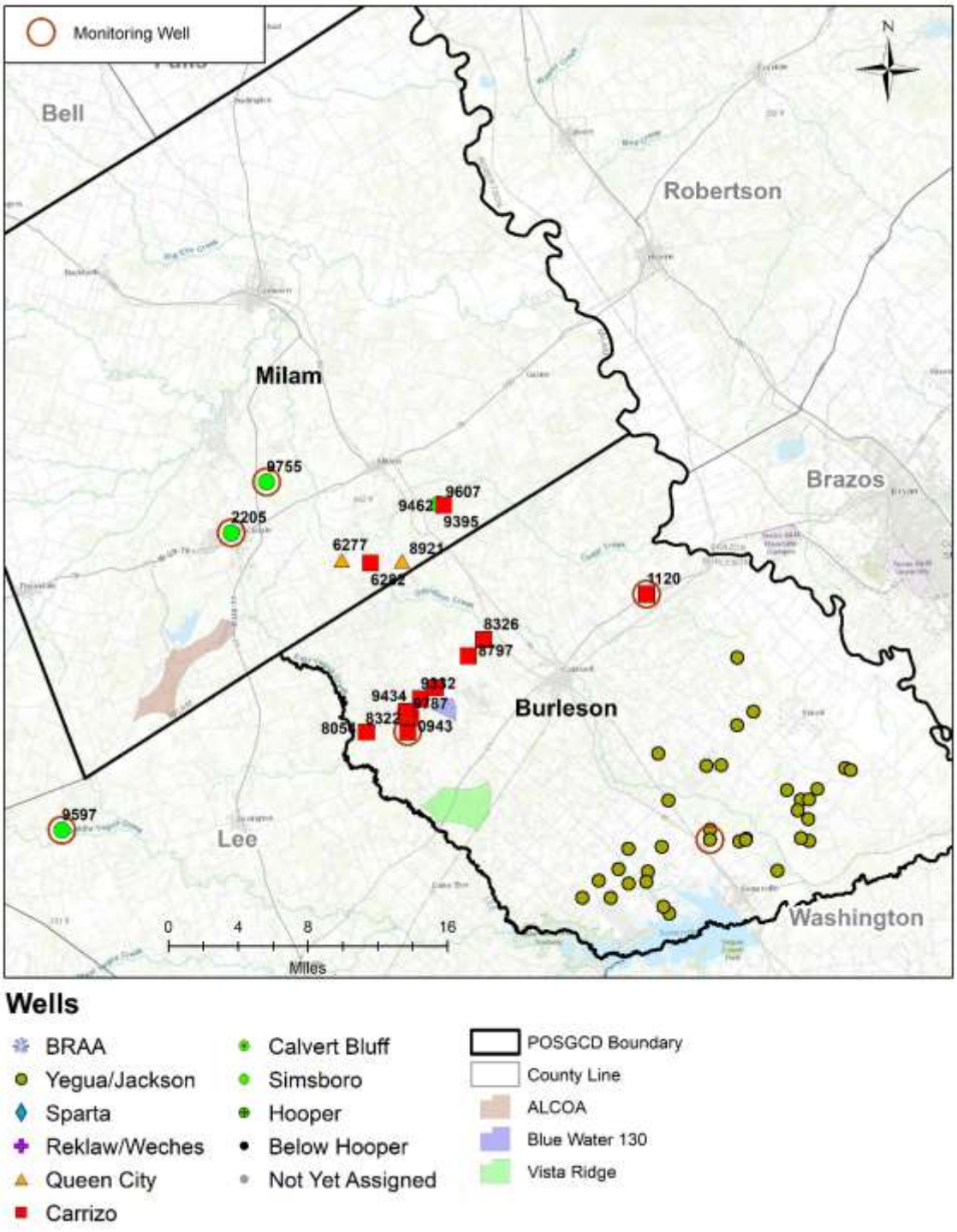

Figure 11 Fifty-three wells identified as a priority that do not have simulated 2018 water levels below the elevation of the pump setting

The measured water levels at the Yegua-Jackson wells support the conclusion that the Yegua-Jackson DFC run is not a credible simulation for the GWAP analysis because the pumping from 2010 to 2018 is too high. **Figure 12** shows water levels at well PO-009157. From 2013 to 2019, the measured water levels have remained relatively stable but the simulated water levels have decreased by over 100 ft from 2009 to 2018. The two recent measured water levels at well PO-000618 are also more than 100 ft higher than the simulated water levels for 2018 and 2019.

The Central Sparta\Queen City\Carrizo-Wilcox GAM was calibrated through the year 2010. The GMA 12 consultants developed pumping files to approximate historical pumping from 2010 to 2018. Despite not having as thorough documentation and quality control checks as the historical pumping used for the GAM calibration, the pumping file developed by the GMA 12 consultants is presumed to be sufficiently accurate to support a credible GWAP analysis. One concern with the GAM simulation is that PS-9 has significant increases in pumping for the Carrizo-Wilcox Aquifer from 2018 to 2028. **Table 12** shows the increases for the Simsboro Aquifer. The large increase in POSGCD from 5,000 to 42,000 AFY is likely to occur because Vista Ridge has contracted to supply more than 35,000 AFY of Simsboro groundwater to San Antonio for 30 years. However, the large increase in Lost Pines GCD is unlikely to occur. Currently, the water suppliers in Lost Pines GCD have no contracts for most of the 100,000 AFY of Simsboro water that is included in the model run. As a result, it is likely that the GAM PS-9 simulation over-predicts drawdown in 2028 for some areas of POSGCD.

Table 12 Simsboro Pumping in Pumping Scenario 9 for Lost Pines GCD, Post Oak Savannah GCD, and Brazos Valley GCD"

GAM Run	District	Pumping Rate (AFY)	
		2018	2028
PS -9 for the Central Sparta, Queen City, and Carrizo-Wilcox GAM	Lost Pines GCD	20,000	100,000
	Post Oak Savannah GCD	5,000	42,000
	Brazos Valley GCD	50,000	82,000
	Total	75,000	224,000

A known predictive bias in the Central Sparta/Queen City/Carrizo-Wilcox GAM is an over-prediction of drawdown in the vicinity of Vista Ridge well field caused by low modeled transmissivity values for the Simsboro Aquifer. In the vicinity of the Vista Ridge well field, the aquifer pumping tests from six aquifer tests at PW-10, PW-11, PW-13, PW-15, PW-16, and PW-17 measured an average Simsboro transmissivity of about 12,600 square feet per day (ft^2/day). However, the GAM simulates an average Simsboro transmissivity of about 7,200 ft^2/day for this region. This difference causes the GAM to over-predict drawdowns caused by pumping by about 75%. In the area near the Vista Ridge well field, the 75% over-prediction could result in an over-prediction of drawdown greater than 120 ft near each of Vista Ridge's Simsboro wells.

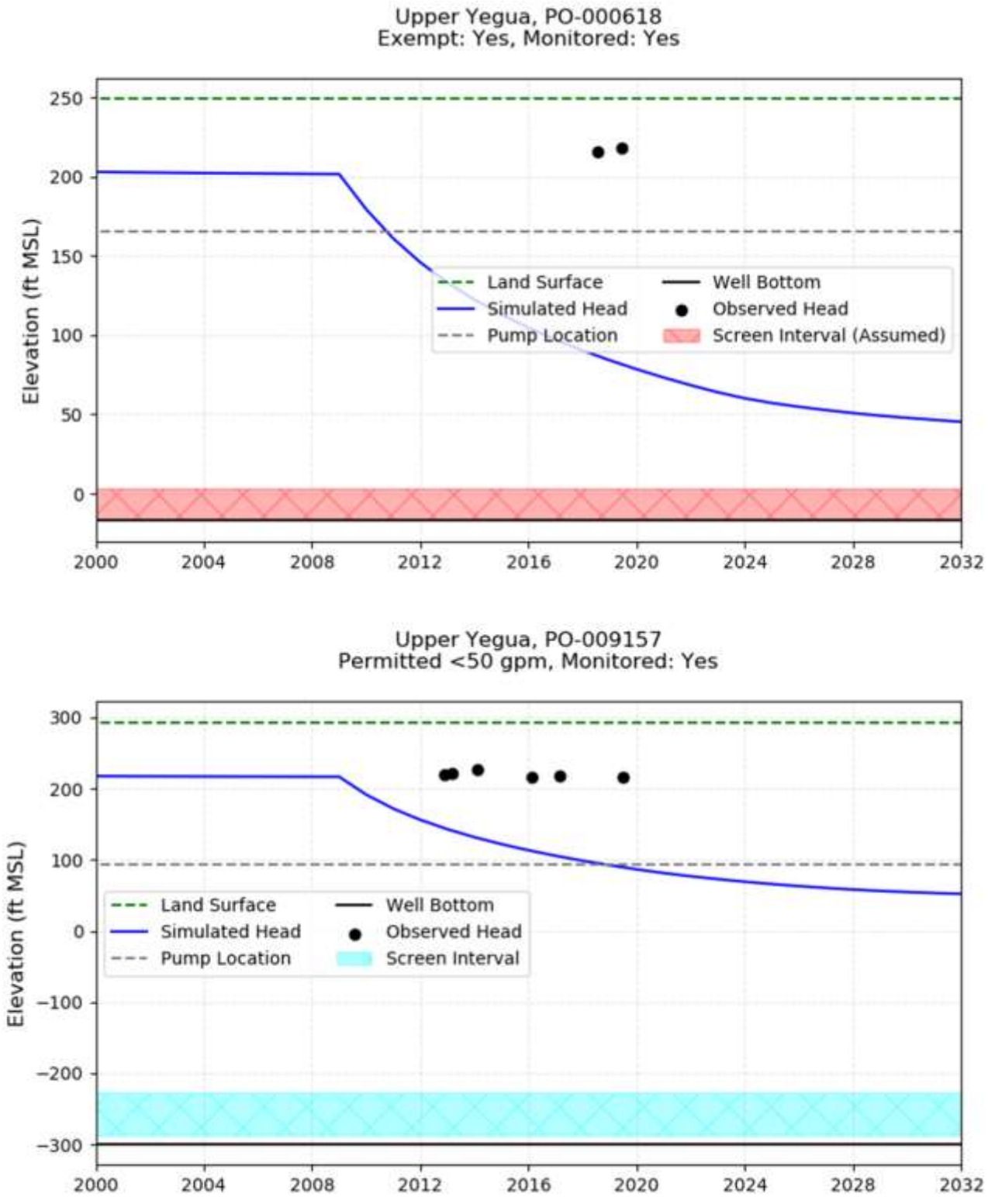

Figure 12 Simulated water levels from 2000 to 2032 for exempt wells PO-000618 and PO-009157 located in the Yegua-Jackson Aquifer.

Another known predictive bias in the Central Sparta/Queen City/Carrizo-Wilcox GAM is the tendency to over-predict drawdown near the Simsboro outcrop in Milam County. This bias is evident in the hydrographs for wells PO-009597, PO-009753, PO-009754, PO-009755, PO-007363, and PO-001883 in Appendix D. The cause for the bias is not known but because faulting in this region complicates the characterization of the Carrizo-Wilcox Aquifer, it is likely a result of inappropriate hydraulic properties assigned to faults and/or to aquifer formations.

The bias of over-prediction of drawdown across portions of the Simsboro outcrop could be partially corrected by using two different approaches that could be used in combination with each other. One approach is to perform a localized recalibration of the GAM in the area of interest. Another approach is to develop an interpolation option that adjusts the simulated water levels using algorithms based on a combination of nearby pumping rates and measured water levels.

5.0 SUMMARY OF ANALYSES AND IMPORTANT FINDINGS

The GWAP is meant to assist well-owners with low-capacity wells (typically domestic & livestock) whose water levels decline below the pump setting as a result of regional groundwater production in GMA 12. A well was designated as a priority well if its simulated well water level in 2028 is below the elevation of its pump setting recorded in the POSGCD database. The simulated water levels are generated from groundwater availability model (GAM) simulations. This initial filtering process relies on assumptions that well data is accurate, future pumping scenarios are credible, historical pumping values are accurate, and groundwater models have low predictive uncertainty. Since these assumptions may not always be valid, some wells that are designated priority wells may not require assistance within the next 10 years or may not actually require assistance at all. Therefore, to find the priority wells most likely to require assistance within the next 10 years, a second more in-depth analysis identified those wells where the key assumptions appear to be valid. Those wells where the assumptions appeared to be met were assigned the status of high priority wells.

5.1 Summary of Analyses

This section summarizes the key analysis performed and documented in this report.

- GAMs were used to predict the water levels from 2018 to 2028 at 981 wells that have values for pump depths in the POSGCD database. Out of the 981 wells, 151 wells were considered a priority because the simulated 2028 water level is lower than the elevation of the pump setting. The 981 wells and the 151 wells are comprised of the following:
  - 114 Sparta wells were modeled, 1 well is considered to be a priority
  - 121 Queen City wells were modeled, 3 wells are considered to be a priority
  - 75 Carrizo wells were modeled, 17 wells are considered to be a priority
  - 162 Calvert Bluff wells were modeled, 3 wells are considered to be a priority
  - 52 Simsboro wells were modeled, 9 wells are considered to be a priority
  - 134 Simsboro wells were modeled, 2 wells are considered to be a priority
  - 322 Yegua-Jackson wells were modeled, 116 wells are considered to be a priority
- The Yegua-Jackson GAM simulated 2028 water levels based on the DFC pumping file adopted by GMA 12 in the last joint planning cycle and presented as a valid simulation during the November 15, 2019 GMA 12 meeting. An investigation into the reasonableness of the predicted water levels for 2028 revealed the following:
  - The pumping rates from 2010 to 2018 in POSGCD and some adjacent counties was more than 20 times the historical rates
  - The pumping rates for 2018 to 2028 are likely to be significantly over-predicted
  - Comparison of measured to modeled water levels prior to 2019 confirm that the simulated water levels in 2028 were likely more than 100 ft too low for numerous wells
- The Central Sparta/Queen City/Carrizo-Wilcox GAM simulated 2028 water levels based on the Pumping Scenario 9 (PS-9), which was developed by the GMA 12 consultants. The PS-9 scenario likely provides reasonable historical pumping until 2018. From 2018 to 2028, PS-9 likely provides reasonable future pumping estimates for POSGCD but may provide high pumping rates for neighboring GCDs. Based on PS-9, the following general trends in drawdown were simulated for the period 2018 to 2028:

  - Across the vast majority of the Sparta and Queen City aquifers, the drawdown is less than 10 ft
  - In the Carrizo, Calvert Bluff, and Hooper aquifers, the drawdown values are the largest near the Vista Ridge well field (between values of 150 to 200 ft) and they decrease radially outward to less than 20 ft in the aquifer outcrops that exist in Milam county
  - In the Simsboro Aquifer, the drawdown values are the largest near the Vista Ridge well field (greater than 450 ft) and they decrease radially outward to less than 20 ft in the outcrops in Milam county

- Hydrographs of simulated water levels from 2000 to 2032 were created for all 151 wells identified as a priority well. Included in each figure are markers for the elevations associated with land surface, the pump elevation and the location of the well screen.

- For each aquifer, a cumulative distribution function (CDF) was generated to show the distribution of the differences between the simulated water level and the elevation of the pump setting for an assumed pre-development time, 1985, 2000, 2018, 2023, and 2028. The CDFs were generated based on the assumption that all wells existed in the aquifer since pre-development. The number of wells associated with each aquifer is as follows:
  - 109 Sparta wells
  - 117 Queen City wells
  - 72 Carrizo wells
  - 143 Calvert Bluff wells
  - 46 Simsboro wells
  - 129 Hooper wells
  - 311 Yegua-Jackson wells
- Ten wells that are a part of the POSGCD monitoring network and that are located in Carrizo-Wilcox Aquifer were considered a priority well. At those ten wells, the measured water levels were compared with the elevation of the pump setting. This comparison showed the following:
  - Three of the wells have measured water levels that were below the elevation assigned to the pump settings for at least the last 15 years
  - Two of the wells have measured water levels that were below the elevation assigned to the pump settings for at least the last 9 years
  - Four of the wells had measurements less than 3 ft above the pump depth, which is an insufficient height to support the pumping of a domestic well
- Wells that were identified as a priority well in 2028 were part of an analysis where the simulated water levels for pre-pumping, 2010, 2018, and 2023 were compared to the elevation of the pump setting. This analysis produced the following results:
  - For the 4 priority wells located in the Sparta or Queen City aquifer, 25% and 25% of the priority wells had simulated water levels below the pump elevation for the pre-development period and the year 2018, respectively
  - For the 15 priority wells located in the Carrizo-Wilcox Aquifer, 10% and 45% of the priority wells had simulated water levels below the pump elevation for the pre-development period and the year 2018, respectively
  - For the 116 priority wells located in the Yegua-Jackson Aquifer, 6% and 71% of the priority wells had simulated water levels below the pump elevation for the pre-development period and the year 2018, respectively

5.2 Important Findings

This section summarizes the important findings based on an integration all analysis presented in this report.

- There is insufficient evidence that indicates that any of the 116 Yegua-Jackson wells will become dry as a result of impacts from regional pumping. However, there are also insufficient data, at this time, to simulate the risk of the Yegua-Jackson wells going dry by 2028 because the GAM has not been updated with realistic values for historical and future pumping.
- The criterion of defining wells in the Sparta, Queen City, and Carrizo-Wilcox aquifer as a priority well based solely on the simulated 2028 water levels as determined by the PS-9 model simulation and the wells' pump settings is insufficient justification. Among the reasons for required additional justification are the following:
  - The POSGCD database contains some inaccurate depths for pump settings at wells
  - The elevation of the land surface associated with well locations in the POSGCD may be incorrect by more than 20 ft unless POSGCD has surveyed the well location
  - There is uncertainty with both the historical pumping rates and projected future pumping rates in the PS-9 pumping file
  - The Central Sparta/Queen City/Carrizo-Wilcox GAM contains inherent predictive bias that is site-specific and is known to exist because the GAM does not adequately represent measured transmissivity values near the Vista Ridge wellfield and there is a tendency to underpredict water levels across portions of the Simsboro outcrop in Milam County
- The initial GWAP assessment identified 35 priority wells in the Sparta, Queen City, and Carrizo-Wilcox aquifers. After additional review of the 35 evaluations, one or more of the following issues were discovered: (1) measured water levels were below the elevation of the pump; (2) measured water levels are higher above the simulated water levels than the simulated water levels are below the elevation of the pump setting; (3) the simulated 2028 water level is less than 10 ft below the elevation of the pump setting; and, (4) the simulated water level in 2010 was lower than the elevation of the pump. The inclusion of these four additional constraints reduced the count of priority wells from 35 to 7 wells. These seven wells are considered high priority wells. **Figure 13** shows the locations of the seven high priority wells are:
  - Carrizo well PO-00943, which is has a predicted drawdown of 115 ft from 2018 to 2028 and a predicted 2028 water level that is 72 ft lower than the elevation of the pump
  - Carrizo well PO-009787, which is has a predicted drawdown of 110 ft from 2018 to 2028 and a predicted 2028 water level that is 32 ft lower than the elevation of the pump
  - Carrizo well PO-008322, which is has a predicted drawdown of 110 ft from 2018 to 2028 and a predicted 2028 water level that is 23 ft lower than the elevation of the pump
  - Carrizo well PO-008923, which is has a predicted drawdown of 100 ft from 2018 to 2028 and a predicted 2028 water level that is 16 ft lower than the elevation of the pump
  - Carrizo well PO-008797, which is has a predicted drawdown of 89 ft from 2018 to 2028 and a predicted 2028 water level that is 83 ft lower than the elevation of the pump
  - Carrizo well PO-008326, which is has a predicted drawdown of 84 ft from 2018 to 2028 and a predicted 2028 water level that is 12 ft lower than the elevation of the pump
  - Carrizo well PO-001120, which is has a predicted drawdown of 63 ft from 2018 to 2028 and a predicted 2028 water level that is 18 ft lower than the elevation of the pump

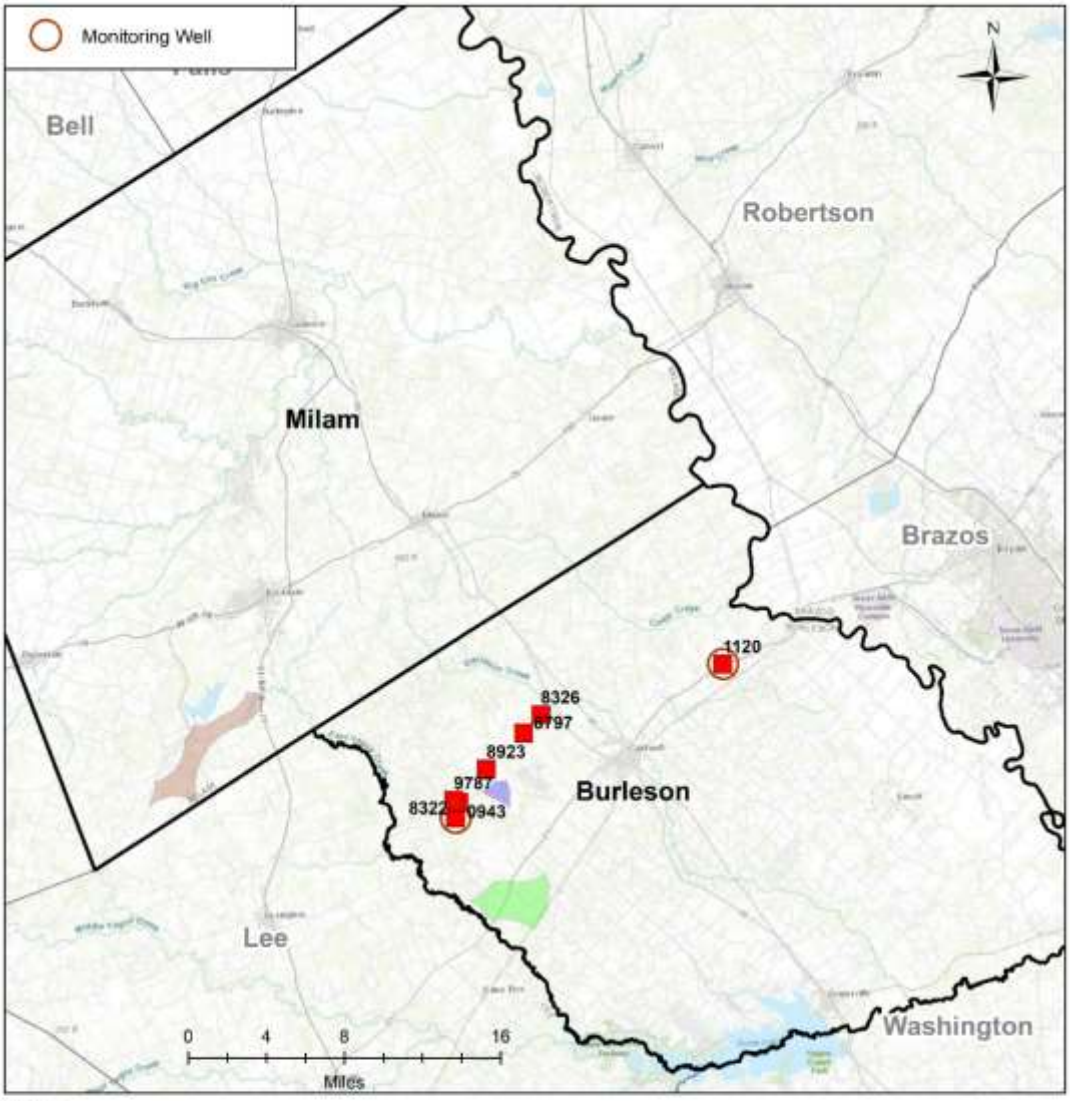

Figure 13 Seven wells that are designed as high priority wells based on a groundwater GAM simulations indicating simulated water levels in 2028 declining below the elevation of the pump setting and an evaluation of the reliability of the GAM simulated water levels and the elevation of the pump setting.

5.3 Recommendations

Based on the data, data analysis, and findings presented in the report, the following actions are recommended:

- POSGCD's Water Resource Specialist should verify the eligibility, review the analysis, and recommend appropriate action for the seven wells screened in the Carrizo Aquifer and designated as high priority wells.
- The actions that POSGCD undertakes for the high-priority, Carrizo wells should include measuring water levels at each well at least one every four months and verifying the elevation of the pump setting
- In early 2020, POSGCD should request that GMA 12 modify the DFC simulation for the Yegua-Jackson Aquifer because the current DFC simulation significantly over predicts historical pumping from 2010 to 2020 and appears to have unrealistic projections for future pumping after 2020.
- In early 2020, POSGCD should evaluate whether the large increases in Carrizo-Wilcox pumping used in the GAM simulation from 2018 to 2028 are probable. Specifically, the high pumping rate of 100 AFY in Lee and Bastrop counties in 2028 does not appear likely. If these high pumping rates are not probable , then addition GAM simulations should be undertaken to better assess the vulnerability of the seven Carrizo wells to drawdown caused by future pumping.
- POSGCD should improve the GAMs to better reflect aquifer conditions in POSGCD. The priority should be given to the Sparta/Queen City/Carrizo-Wilcox GAM so that it will be better suited for predicting the drawdown impacts that will be caused by the pumping of more than 45,000 AFY associated with the Vista Ridge Project, which is scheduled to being in 2020.
- POSGCD should develop a methodology for using measured water level data to help adjust for biases and error in the simulated water levels.

6.0 REFERENCES

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APPENDIX A

POSGCD Groundwater Monitoring Well Network

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screened Interval	Pump Depth	TWDB Aquifer	POSGCD Aquifer	Shallow
PO-000025	5917409	30.668478	-96.986864	504.4	505.61	1.21	391	226-290, 320-390	--	124HOOP - Hooper	Hooper	Shallow
PO-000026	5917103	30.723888	-96.982777	456.96	457.122	0.162	410	136-410	--	124HOOP - Hooper	Hooper	--
PO-000053	5909901	30.784166	-96.895555	434.22	434.228	0.008	169	109-169	--	124SMBR - Simsboro	Calvert Bluff	Shallow
PO-000059	5911402	30.796944	-96.734444	426.1	425.835	0.265	323	307-323	--	124CABF - Calvert Bluff	Carrizo	Shallow
PO-000073	5910907	30.780832	-96.784999	382.83	382.974	0.144	440	410-430	--	124CABF - Calvert Bluff	Calvert Bluff	--
PO-000077	5919103	30.740555	-96.720832	431.51	432.558	1.048	522	507-522	--	124CABF - Calvert Bluff	Calvert Bluff	--
PO-000084	5919302	30.728288	-96.632301	340.7	341.248	0.548	45	--	--	124QNCT - Queen City	Shallow Fill	Shallow
PO-000099	5925508	30.569443	-96.947777	409.6	409.165	0.435	520	480-520	--	124CABF - Calvert Bluff	Calvert Bluff	--
PO-000107	5925102	30.600833	-96.982499	412.08	411.94	0.14	860	767-782	--	124SMBR - Simsboro	Hooper	--
PO-000115	5917715	30.640833	-96.987777	441.31	441.437	0.127	337	316-337	--	124SMBR - Simsboro	Simsboro	Shallow
PO-000121	5917714	30.663611	-96.995833	474.09	475.06	0.97	390	238-370	--	124SMBR - Simsboro	Hooper	Shallow
PO-000138	5917713	30.666388	-96.995833	482.87	484.69	1.82	408	226-346, 356-408	--	124SMBR - Simsboro	Hooper	--
PO-000170	5824914	30.658333	-97.016666	494.65	495.891	1.241	295	153-233	189	124SMBR - Simsboro	Hooper	Shallow
PO-000221	5909605	30.824443	-96.889721	422.61	423.263	0.653	503	340-500	--	124HOOP - Hooper	Hooper	--
PO-000223	5902706	30.897499	-96.851944	359.12	358.874	0.246	315	235-250, 256-298	--	124WLCX - Wilcox	Hooper	Shallow
PO-000234	5902309	30.987777	-96.757777	296.72	296.725	0.005	417	185-417	--	124SMBR - Simsboro	Simsboro	--
PO-000236	5902307	30.964166	-96.790555	415.05	415.949	0.899	450	410-450	--	124WLCX - Wilcox	Simsboro	--
PO-000256	5902901	30.884999	-96.778332	370.88	370.624	0.256	318	284-308	--	124WLCX - Wilcox	Calvert Bluff	Shallow
PO-000268	5832101	30.623332	-97.088055	469.81	473.474	3.664	60	40-60	43	124HOOP - Hooper	Simsboro	Shallow
PO-000308	5927716	30.537221	-96.741666	451.13	451.132	0.002	400	--	--	124QNCT - Queen City	Queen City	Shallow
PO-000341	5927606	30.578054	-96.650555	393.77	394.424	0.654	600	558-600	--	124QNCT - Queen City	Queen City	--
PO-000433	5920410	30.695555	-96.614444	298.74	298.749	0.009	920	688-710, 794-815	--	124SMBR - Simsboro	Carrizo	--
PO-000434	5920409	30.689721	-96.611388	299.31	299.278	0.032	230	188-230	--	124QNCT - Queen City	Queen City	Shallow
PO-000457	5919502	30.679166	-96.67361	461.73	461.247	0.483	2018	1832-1958	--	124CZSB - Carrizo and Simsboro	Simsboro	--
PO-000518	5927204	30.618888	-96.686388	313.76	314.592	0.832	205	163-205	100	124QNCT - Queen City	Queen City	Shallow
PO-000579	5937611	30.432221	-96.397777	233.21	233.307	0.097	240	177-240	--	124JCKSL - Lower Jackson	Yegua-Jackson	Shallow
PO-000596	5937329	30.48861	-96.375554	214.69	214.695	0.005	58	--	--	111ABZR - Alluvium, Brazos River	Brazos River	Shallow
PO-000638	5937101	30.489166	-96.465	240.18	240.101	0.079	1600	--	--	124QNCT - Queen City	Sparta	--
PO-000661	5936802	30.386691	-96.564576	342.29	342.317	0.027	1609	1513-1573	--	124SPRT - Sparta	Sparta	--
PO-000698	5943608	30.310833	-96.646388	271.13	264.326	6.804	533	494-533	--	124YEGUL - Lower Yegua	Yegua-Jackson	--
PO-000787	5938701	30.411679	-96.357911	205.06	205.066	0.006	56	--	--	111ABZR - Alluvium, Brazos River	Brazos River	Shallow
PO-000791	5935208	30.496354	-96.691918	343.89	379.331	35.441	364	322-364	--	124SPRT - Sparta	Sparta	Shallow
PO-000859	5929456	30.543633	-96.493766	230.88	230.853	0.027	60	--	--	111ABZR - Alluvium, Brazos River	Brazos River	Shallow
PO-000860	5929457	30.544533	-96.492043	230.91	230.914	0.004	60	--	--	111ABZR - Alluvium, Brazos River	Brazos River	Shallow
PO-000877	5928619	30.545325	-96.525524	266.57	266.969	0.399	780	605-700, 719-765	--	124SPRT - Sparta	Cook Mountain	--
PO-000894	5928601	30.579166	-96.540555	240.11	240.112	0.002	58	--	--	111ABZR - Alluvium, Brazos River	Brazos River	Shallow
PO-000895	5928702	30.529166	-96.608333	346.39	346.569	0.179	498	456-498	--	124SPRT - Sparta	Sparta	--
PO-000943	5934106	30.48861	-96.84361	441.2	441.205	0.005	840	800-840	168	124CRRZ - Carrizo	Carrizo	--
PO-001023	5929537	30.549166	-96.436944	224.63	224.636	0.006	1090	1048-1090	--	124SPRT - Sparta	Sparta	--
PO-001061	5934608	30.456024	-96.783583	403.68	427.4	23.72	814	745-797	--	124QNCT - Queen City	Queen City	--

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screened Interval	Pump Depth	TWDB Aquifer	POSGCD Aquifer	Shallow
PO-001062	5918101	30.716233	-96.863433	565.38	566.174	0.794	790	689-790	--	124CABF - Calvert Bluff	Calvert Bluff	--
PO-001063	5918104	30.71278	-96.86889	547.96	547.966	0.006	800	650-780	--	124CABF - Calvert Bluff	Calvert Bluff	--
PO-001064	5918908	30.632283	-96.788067	519.49	519.745	0.255	1687	1490-1534, 1564-1620	--	124CZSB - Carrizo and Simsboro	Calvert Bluff	--
PO-001066	5918705	30.648217	-96.85465	580.51	580.51	0	813	540-645	--	124SMBR - Simsboro	Carrizo	--
PO-001082	5911703	30.787222	-96.716667	365.4	365.409	0.009	992	889-980	--	124SMBR - Simsboro	Simsboro	--
PO-001110	5824611	30.671275	-97.004033	498	492.393	5.607	485	190-283, 343-383, 403-	--	124HOOP - Hooper	Hooper	--
PO-001117	5917712	30.6312	-96.9901	460.34	459.774	0.566	475	270-450, 460-475	--	124SMBR - Simsboro	Simsboro	--
PO-001118	5917711	30.634814	-96.991073	462.4	462.402	0.002	463	250-300, 345-443, 453-	--	124SMBR - Simsboro	Simsboro	--
PO-001166	5929410	30.557917	-96.470083	225.32	225.262	0.058	71	--	--	111ABZR - Alluvium, Brazos River	Brazos River	Shallow
PO-001197	5934107	30.4811	-96.8721	440.38	440.719	0.339	370	150-170, 240-260, 340-	--	124QNCT - Queen City	Queen City	Shallow
PO-001573	5934601	30.432728	-96.757067	382.99	384.636	1.646	784	734-774	--	124QNCT - Queen City	Queen City	--
PO-001575	5927718	30.525554	-96.72666	446.29	447.004	0.714	1300	1252-1277	--	124CZCB - Carrizo and Calvert Bluff	Carrizo	--
PO-001789	5911403	30.798454	-96.748917	437.01	437.012	0.002	515	487-507	--	--	Calvert Bluff	--
PO-001883	5832704	30.5065	-97.118558	482.35	481.927	0.423	180	160-180	100	124SMBR - Simsboro	Simsboro	Shallow
PO-002152	5925409	30.56096	-96.99514	467.99	467.125	0.865	480	450-470	--	124CABF - Calvert Bluff	Calvert Bluff	--
PO-002191	5917716	30.644744	-96.989442	465.44	464.048	1.392	520	470-490	--	124HOOP - Hooper	Hooper	--
PO-002423	5902904	30.905951	-96.778042	329.65	400.524	70.874	240	180-220	180	124SMBR - Simsboro	Simsboro	Shallow
PO-006145	5927611	30.545711	-96.637995	397.32	397.501	0.181	770	650-750	240	Queen City	Queen City	--
PO-006243	5925502	30.563759	-96.940989	430.38	430.545	0.165	614	593-614	--	124CZCB - Carrizo and Calvert Bluff	Calvert Bluff	--
PO-006305	5832908	30.531256	-97.026756	438.04	438.864	0.824	344	--	--	124CABF - Calvert Bluff	Calvert Bluff	Shallow
PO-006586	5927309	30.613416	-96.660202	379.83	382.172	2.342	260	240-260	--	Queen City	Queen City	Shallow
PO-006621	5926402	30.552653	-96.860563	487.19	487.374	0.184	2020	1580-1780	--	124SMBR - Simsboro	Simsboro	--
PO-006910	5926403	30.56487	-96.83466	511.43	496.292	15.138	2200	1750-1950, 2060-2090	--	124SMBR - Simsboro	Simsboro	--
PO-007364	5824612	30.684551	-97.040073	431.72	432.264	0.544	180	160-180	160	124HOOP - Hooper	Hooper	Shallow
PO-007506	5824610	30.671558	-97.003974	491.77	491.382	0.388	392	165-193, 196-259, 339-	--	124HOOP - Hooper	Hooper	Shallow
PO-007774	5910705	30.78	-96.8623	440.97	441.592	0.622	560	535-555	240	124CABF - Calvert Bluff	Simsboro	--
PO-007793	5925103	30.60088	-96.98249	412.08	412.085	0.005	420	400-420	--	124WLCX - Wilcox	Calvert Bluff	--
PO-007965	5929408	30.5638	-96.4796	230.89	230.676	0.214	1260	--	--	--	Queen City	--
PO-007998	5910908	30.789912	-96.763097	492.42	494.196	1.776	460	435-455	360	124CABF - Calvert Bluff Formation	Calvert Bluff	--
PO-008172	5831904	30.51382	-97.164501	579.21	579.212	0.002	370	330-370	140	--	Hooper	Shallow
PO-008239	5928804	30.536702	-96.578293	304.97	301.686	3.284	460	418-460	--	124SPRT - Sparta	Cook Mountain	--
PO-008388	5943104	30.3552	-96.7173	326.33	324.698	1.632	3988	3600-3800	--	124SMBR - Simsboro	Hooper	--
PO-008415	5929433	30.544721	-96.49861	232.98	233.339	0.359	59	--	--	111ABZR - Alluvium, Brazos River	Brazos River	Shallow
PO-008451	5925408	30.563228	-96.962233	381.88	381.886	0.006	690	300-380, 620-680	273	124CABF - Calvert Bluff	Calvert Bluff	--
PO-008658	5910706	30.77323	-96.842921	421.77	450.809	29.039	528	508-528	--	124SMBR - Simsboro	Calvert Bluff	--
PO-008767	5934108	30.483545	-96.86044	410.84	409.332	1.508	2230	1800-2100	--	124SMBR - Simsboro	Simsboro	--
PO-008935	5901904	30.91316	-96.8863	390.11	390.113	0.003	80	64-74	--	124HOOP - Hooper	Hooper	Shallow
PO-008959	5918602	30.681466	-96.786821	441.48	441.481	0.001	810	790-810	260	--	Calvert Bluff	--
PO-009064	5928343	30.60324	-96.53625	241.4	241.419	0.019	3255	2400-2410, 2750-2760	--	--	Calvert Bluff	--
PO-009095	5910707	30.771301	-96.846388	421.77	421.773	0.003	580	550-570	--	124SMBR - Simsboro	Simsboro	--

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screened Interval	Pump Depth	TWDB Aquifer	POSGCD Aquifer	Shallow
PO-009104	5928342	30.606638	-96.534382	242.81	242.845	0.035	380	340-380	260	124SPRT - Sparta	Sparta	Shallow
PO-009157	5936809	30.39167	-96.55611	294.89	292.926	1.964	592	520-580	200	124JKYG - Jackson and Yegua	Yegua-Jackson	--
PO-009166	5918108	30.711389	-96.8625	504.56	504.566	0.006	1240	1178-1220	--	124SMBR - Simsboro	Simsboro	--
PO-009167	5918109	30.711389	-96.8625	504.56	504.566	0.006	140	90-130	--	124CRRZ - Carrizo	Carrizo	Shallow
PO-009215	5925904	30.511139	-96.897167	389.75	387.657	2.093	2724	1560-1570, 2100-2110,	--	--	Hooper	--
PO-009230	5925302	30.596886	-96.878937	526.17	526.178	0.008	1720	1590-1600, 1710-1720	--	--	Simsboro	--
PO-009327	5901905	30.90666	-96.88888	367.68	367.43	0.25	140	120-140	--	--	Below Hooper	Shallow
PO-009346	5925905	30.540352	-96.907067	397.11	393.922	3.188	80	50-70	60	--	Queen City	Shallow
PO-009372	5925906	30.541111	-96.90485	422.48	422.425	0.055	120	80-100	65	--	Queen City	Shallow
PO-002538	5824915	30.634106	-97.008382	415.59	463.724	48.134	188	163-183	180	--	Simsboro	Shallow
PO-009745	5824916	30.633943	-97.037523	477.1	500.191	23.091	157	--	--	--	Simsboro	Shallow
PO-001505	5831905	30.507962	-97.158012	551.8	544.534	7.266	120	110-120	115	--	Simsboro	Shallow
PO-009480	5831906	30.519604	-97.128551	547	552.122	5.122	235	205-235	--	--	Simsboro	Shallow
PO-001450	5832304	30.608502	-97.007428	436.11	434.432	1.678	271	250-270	200	--	Simsboro	Shallow
PO-007363	5832404	30.556658	-97.088541	547.6	494.75	52.85	174	154-174	108	--	Simsboro	Shallow
PO-009753	5832705	30.509591	-97.120047	493.8	492.601	1.199	185	175-185	100	--	Simsboro	Shallow
PO-009754	5832706	30.518622	-97.108222	632.7	476.821	155.879	123	103-123	100	--	Simsboro	Shallow
PO-002014	5839303	30.482923	-97.125952	369.6	476.626	107.026	182	162-182	100	--	Simsboro	Shallow
PO-009716	5917510	30.69609	-96.918013	449.6	450.594	0.994	418	378-418	--	--	Calvert Bluff	--
PO-009755	5917411	30.698952	-96.972804	437.4	430.25	7.15	113	93-113	100	--	Simsboro	Shallow
PO-000020	5917505	30.681129	-96.948016	390.5	431.832	41.332	540	498-540	--	124SMBR - Simsboro Sand Member of Rockdale	Simsboro	--
PO-000118	5917705	30.651517	-96.978183	495.8	490.396	5.404	326	286-326	--	124SMBR - Simsboro Sand Member of Rockdale	Simsboro	Shallow
PO-002204	5917717	30.660954	-96.980579	498	491.698	6.302	750	720-750	--	--	Hooper	--
PO-008151	5917804	30.643505	-96.943028	477	477.033	0.033	385	--	--	--	Calvert Bluff	Shallow
PO-002153	5925410	30.543611	-96.995078	493.2	443.273	49.927	690	545-690	--	--	Calvert Bluff	--
PO-009769	5925512	30.569386	-96.949069	383.2	400.175	16.975	734	694-734	100	--	Calvert Bluff	--
PO-009445	5934609	30.427742	-96.762821	361.17	361.173	0.003	400	280-320, 365-395	--	--	Sparta	Shallow
PO-009446	5925511	30.572378	-96.920656	423.3	422.454	0.846	2350	1620-1630, 1706-1716,	--	--	Simsboro	--
PO-009770	5839510	30.458023	-97.183169	553.9	532.334	21.566	138	--	120	--	Simsboro	Shallow
PO-007773	5910910	30.787509	-96.765013	430.75	431.83	1.08	430	405-424	280	--	Calvert Bluff	--
PO-008274	5902311	30.967459	-96.777302	372.74	372.914	0.174	445	424-444	220	--	Simsboro	--
PO-009749	5840704	30.412727	-97.098625	462.3	401.903	60.397	462.3	433-454	--	124CABF - Calvert Bluff Formation	Calvert Bluff	--
PO-000186	5909701	30.759166	-96.984999	420.61	420.612	0.002	218	--	--	124HOOP - Hooper Formation	Hooper	Shallow
PO-009751	0	30.532276	-96.995225	440.5	420.328	20.172	440.5	--	--	--	Calvert Bluff	--
PO-009597	0	30.414799	-97.178676	513.7	442.489	71.211	513.7	104-134	80	--	Simsboro	--
PO-009602	0	30.448608	-97.119628	438	447.191	9.191	438	--	--	--	Simsboro	--
PO-009588	0	30.333743	-97.230485	499	554.852	55.852	584.7	459-479	--	--	Calvert Bluff	--
PO-009748	0	30.378317	-97.21891	453	438.835	14.165	402.5	280-300	--	--	Simsboro	--
PO-009545	0	30.813694	-96.915694	445.7	443.212	2.488	160	140-160	--	--	Simsboro	Shallow
PO-009551	0	30.742194	-96.922139	408	411.571	3.571	180	160-180	--	--	Calvert Bluff	Shallow

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screened Interval	Pump Depth	TWDB Aquifer	POSGCD Aquifer	Shallow
PO-009553	0	30.749722	-96.974028	401	438.334	37.334	110	198-218	--	--	Hooper	Shallow
PO-009555	0	30.749691	-96.974028	441	438.334	2.666	218	90-110	--	--	Hooper	Shallow
PO-005486	0	30.587439	-96.764618	431.22	430.903	0.317	199	--	--	--	Queen City	Shallow
PO-001390	0	30.571474	-96.829318	496.99	519.126	22.136	1120	980-1110	--	--	Calvert Bluff	--
PO-006153	0	30.547681	-96.650418	422.74	422.478	0.262	620	580-620	231	--	Queen City	--
PO-005109	0	30.547426	-96.647939	386.16	421.727	35.567	1235	1151-1235	--	--	Carrizo	--
PO-009774	0	30.433628	-96.82495	376.3	381.585	5.285	347	274-314	--	--	Queen City	Shallow
PO-010921	0	30.376351	-96.682702	337	336.756	0.244	400	--	--	--	Cook Mountain	Shallow
PO-010924	0	30.329753	-96.663316	303	302.311	0.689	348	--	--	--	Yegua-Jackson	Shallow
PO-007183	0	30.486532	-96.714581	341.03	340.676	0.354	570	--	200	--	Queen City	--
PO-009477	0	30.400751	-96.760518	360.54	360.358	0.182	516	424-520	--	--	Sparta	--
PO-007587	0	30.4332	-96.7023	333.5	333.502	0.002	532	450-530	--	--	Sparta	--
PO-010881	0	30.466504	-96.666701	297	299.104	2.104	228	--	--	--	Cook Mountain	Shallow
PO-009404	0	30.465073	-96.667994	316.1	315.712	0.388	520	480-520	--	--	Sparta	--
PO-009812	0	30.432572	-96.531891	296.07	295.795	0.275	260	200-240	--	--	Yegua-Jackson	Shallow
PO-009162	0	30.934915	-96.84479	401.17	401.277	0.107	265	--	168	--	Hooper	Shallow
PO-009806	0	30.936667	-96.843889	0	371.977	371.977	108	48-108	96.5	--	Hooper	Shallow
PO-009094	0	30.939344	-96.841284	376.29	377.653	1.363	300	200-300	189	--	Hooper	Shallow
PO-008772	0	30.936859	-96.840603	349.59	362.487	12.897	120	--	112	--	Hooper	Shallow
PO-008153	0	30.788111	-96.761941	495.69	495.866	0.176	454	429-449	320	--	Calvert Bluff	--
PO-001786	0	30.798699	-96.746354	420.19	414.733	5.457	436	406-426	260	--	Calvert Bluff	--
PO-009604	0	30.681111	-96.822778	446	450.76	4.76	700	657-677	240	--	Calvert Bluff	--
PO-009559	0	30.679167	-96.822778	464	465.139	1.139	680	670-690	280	--	Calvert Bluff	--
PO-005899	0	30.423292	-96.792778	375.74	370.467	5.273	300	260-300	--	--	Sparta	Shallow
PO-002355	0	30.74253	-96.72346	368.21	385.889	17.679	514	--	160	--	Calvert Bluff	--
PO-007197	0	30.473	-96.7359	369.77	369.453	0.317	740	--	--	--	Queen City	--
PO-007614	0	30.799303	-96.751891	423.74	423.355	0.385	460	435-455	240	--	Calvert Bluff	--
PO-006330	0	30.798579	-96.754708	279.55	442.338	162.788	410	384-404	260	--	Calvert Bluff	--
PO-008865	0	30.6521	-97.0617	409.52	409.052	0.468	160	--	--	--	Hooper	Shallow
PO-008149	0	30.665063	-96.828048	504.29	504.565	0.275	770	739-759	260	--	Calvert Bluff	--
PO-001343	0	30.801732	-96.758603	441.43	422.34	19.09	455	430-450	--	--	Calvert Bluff	--
PO-009467	0	30.801706	-96.754845	447	435.43	11.57	290	180-260	--	--	Carrizo	Shallow
PO-009468	0	30.760278	-96.651389	350	329.187	20.813	440	360-440	--	--	Carrizo	--
PO-009475	0	30.606947	-96.871244	509	505.375	3.625	685	550-560, 600-610	--	--	Calvert Bluff	--
PO-009707	0	30.605093	-96.545488	235.43	235.527	0.097	870	438-522, 549-590, 632-	336	--	Queen City	--
PO-008845	0	30.576783	-96.657704	428.5	428.79	0.29	700	660-700	240	--	Queen City	--
PO-008802	0	30.574574	-96.654178	417.96	415.799	2.161	700	660-700	240	--	Queen City	--
PO-008038	0	30.4447	-96.6559	294.08	294.09	0.01	145	124-145	--	--	Cook Mountain	Shallow
PO-010970	0	30.550286	-96.71384	382	382.074	0.074	990	--	--	--	Carrizo	--
PO-009808	0	30.849352	-96.921661	368	368.436	0.436	144	131-156	--	--	Hooper	Shallow

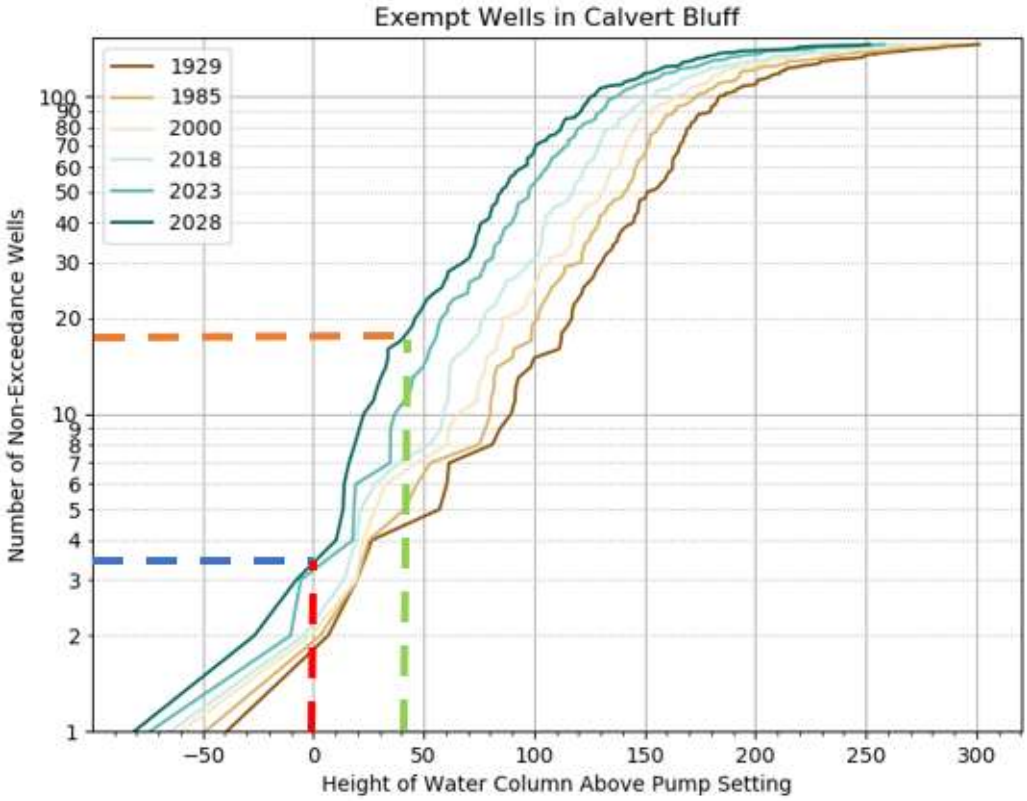
POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screened Interval	Pump Depth	TWDB Aquifer	POSGCD Aquifer	Shallow
PO-006483	0	30.444215	-96.709546	336.36	335.418	0.942	484	426-464	160	--	Sparta	--
PO-009768	0	30.946924	-96.794203	372.12	371.929	0.191	314	--	168	--	Hooper	Shallow
PO-009781	0	30.950367	-96.835099	451	446.393	4.607	148	120-140	--	--	Hooper	Shallow
PO-002061	0	30.91053	-96.83045	376.87	355.801	21.069	360	--	140	--	Hooper	Shallow
PO-009497	0	30.917406	-96.830408	382	378.963	3.037	142	115-135	128	--	Simsboro	Shallow
PO-007283	0	30.960985	-96.842635	410.93	410.309	0.621	239	196-235	180	--	Hooper	Shallow
PO-009556	0	30.96154	-96.843794	405	405.029	0.029	128	81-120	80	--	Hooper	Shallow
PO-002038	0	30.87949	-96.82478	345.64	345.648	0.008	80	--	--	--	Simsboro	Shallow
PO-009453	0	30.624123	-97.048891	505	493.507	11.493	440	--	260	--	Hooper	--
PO-002537	0	30.637123	-97.04747	531.12	532.372	1.252	510	--	260	--	Hooper	--
PO-002556	0	30.631437	-97.048043	526	522.347	3.653	431	--	300	--	Hooper	--
PO-001947	0	30.662027	-97.039107	496	497.586	1.586	360	360-380	240	--	Hooper	Shallow
PO-008096	0	30.519263	-97.128554	509.23	548.444	39.214	547	--	240	--	Hooper	--
PO-007838	0	30.583102	-97.119694	370.66	553.678	183.018	194	144-184	135	--	Hooper	Shallow
PO-007117	0	30.607372	-97.090487	540	554.994	14.994	412	372-392	200	--	Hooper	--
PO-010937	59-11-607	30.823773	-96.654986	299	302.02	3.02	276	--	--	--	Carrizo	Shallow
PO-009493	0	30.82527	-96.652193	0	299.746	299.746	230	180-260	165	--	Carrizo	Shallow
PO-009101	0	30.453068	-96.703883	363.45	361.653	1.797	440	--	--	--	Sparta	--
PO-007585	0	30.4553	-96.69665	394.85	396.3	1.45	553	--	--	--	Sparta	--
PO-009495	0	30.649376	-96.979036	482	476.504	5.496	320	280-320	200	--	Simsboro	Shallow
PO-009517	0	30.689759	-96.972942	454	453.991	0.009	447	--	360	--	Hooper	--
PO-009124	0	30.5278	-97.1089	525.05	525.654	0.604	500	--	260	--	Hooper	--
PO-007242	0	30.653758	-96.93644	509.93	512.115	2.185	562	542-562	160	--	Calvert Bluff	--
PO-008213	0	30.354709	-96.717382	335.95	325.624	10.326	530	180-200, 340-360, 420-	--	--	Yegua-Jackson	--
PO-009486	0	30.523019	-96.604314	363.34	363.338	0.002	630	610-630	300	--	Sparta	--
PO-007603	5928701	30.522911	-96.603313	370.84	360.463	10.377	570	--	126	--	Cook Mountain	--
PO-007601	0	30.524112	-96.601926	370.84	368.909	1.931	895	855-895	200	--	Sparta	--
PO-009767	0	30.888734	-96.726851	353.54	353.755	0.215	685	--	270	--	Calvert Bluff	--
PO-009709	0	30.435756	-96.804114	366.3	365.571	0.729	455	433-453	--	--	Queen City	--
PO-009710	0	30.414693	-96.816854	316.85	313.027	3.823	499	477-497	--	--	Queen City	--
PO-009708	0	30.428974	-96.806934	345.11	361.908	16.798	504	482-502	--	--	Queen City	--
PO-010971	0	30.432227	-96.815855	348.05	349.041	0.991	461	--	--	--	Queen City	--
PO-009601	0	30.436259	-97.08414	402.1	461.066	58.966	544	474-534	--	--	Calvert Bluff	--
PO-000691	5938709	30.395055	-96.345563	268.52	270.12	1.6	513	468-502	--	--	Yegua-Jackson	--
PO-001120	5928105	30.59691	-96.609768	344.63	351.665	7.035	1252	1104-1252	124	--	Carrizo	--
PO-002173	0	30.600906	-96.982564	430.1	411.718	18.382	420	--	140	--	Calvert Bluff	--
PO-008037	0	30.800017	-96.745035	338.61	401.657	63.047	430	405-425	260	--	Calvert Bluff	--
PO-008420	0	30.339553	-96.536804	251	252.521	1.521	197	157-197	147	--	Yegua-Jackson	Shallow
PO-008795	0	30.934858	-96.842781	380.84	377.945	2.895	279	--	200	--	Hooper	Shallow
PO-008840	0	30.7813	-96.7608	485.14	484.967	0.173	420	400-420	340	--	Calvert Bluff	--

POSGCD Well ID	SWN	Latitude	Longitude	Surface Elevation	Surface Elevation	Difference in Surface	Depth	Screened Interval	Pump Depth	TWDB Aquifer	POSGCD Aquifer	Shallow
PO-008945	0	30.787564	-96.754677	461.17	461.553	0.383	465	440-460	300	--	Calvert Bluff	--
PO-009431	0	30.569431	-96.737671	372	382.364	10.364	820	790-810	200	--	Carrizo	--
PO-009487	0	30.681163	-97.035405	475	471.946	3.054	151	135-151	--	--	Hooper	Shallow
PO-009552	0	30.790581	-96.755083	467	453.579	13.421	460	435-455	380	--	Calvert Bluff	--
PO-009606	0	30.448608	-97.119628	438	447.191	9.191	255	235-255	100	--	Calvert Bluff	Shallow
PO-009651	0	30.34349	-96.53797	249	249.987	0.987	770	--	357	--	Yegua-Jackson	--
PO-009747	0	30.333743	-97.230485	558	554.852	3.148	499	459-479	--	--	Calvert Bluff	--
PO-009752	0	30.797246	-96.752259	0	431.262	431.262	435	405-425	300	--	Calvert Bluff	--
PO-009790	5928702	30.529199	-96.60862	347	341.921	5.079	498	--	--	--	Sparta	--
PO-009824	0	30.96901	-96.780477	0	379.495	379.495	460	430-450	240	--	Simsboro	--
PO-010899	5920409	30.688523	-96.613987	304.16	304.005	0.155	230	--	105	--	Queen City	Shallow
PO-000618	5937109	30.459722	-96.469721	248.95	249.12	0.17	266	--	84	--	Yegua-Jackson	Shallow
PO-001486	0	30.66073	-97.00259	459	456.913	2.087	182	162-182	--	--	Simsboro	Shallow
PO-001983	0	30.610527	-97.087107	533.98	534.099	0.119	490	--	252	--	Below Hooper	--
PO-002205	0	30.65772	-97.00826	459	455.527	3.473	130	110-130	100	--	Simsboro	Shallow
PO-002217	0	30.667172	-96.930805	460	470.923	10.923	938	918-938	--	--	Hooper	--
PO-007085	0	30.792119	-96.749824	0	452.566	452.566	520	490-510	320	--	Calvert Bluff	--
PO-007586	0	30.456083	-96.69485	375.81	375.813	0.003	415	--	147	--	Cook Mountain	--
PO-008073	0	30.545408	-96.729017	401.75	391.048	10.702	1001	--	220	--	Carrizo	--
PO-008245	0	30.802735	-96.746258	415.19	417.108	1.918	397	370-390	260	--	Calvert Bluff	Shallow
PO-008281	0	30.78649	-96.757219	464.93	462.75	2.18	420	395-415	360	--	Calvert Bluff	--
PO-009448	0	30.433528	-96.739328	0	431.142	431.142	--	--	--	--	No Assignment	--
PO-009478	0	30.523029	-96.604352	365	363.351	1.649	--	--	--	--	No Assignment	--
PO-009540	0	30.795833	-96.755556	481	459.255	21.745	440	415-435	360	--	Calvert Bluff	--
PO-009599	0	30.436259	-97.08414	402.1	461.066	58.966	--	--	--	--	No Assignment	--
PO-009706	0	30.634877	-96.990972	0	462.619	462.619	420	265-305, 365-420	--	--	Simsboro	--
PO-010909	0	30.643022	-96.948829	0	469.258	469.258	--	--	--	--	No Assignment	--
PO-011001	0	30.440214	-96.578487	0	300.938	300.938	--	--	160	--	No Assignment	--
PO-003430	0	30.50064	-96.40968	357.72	358.792	1.072	360	--	--	--	Yegua - Jackson	Shallow
PO-007285	0	30.534924	-96.913489	357.24	362.245	5.005	460	400-440	160	--	No Assignment	--
PO-007390	0	30.468317	-96.672191	341.45	360.85	19.4	0	--	100	--	No Assignment	--
PO-008095	0	30.885833	-97.019722	486.42	498.371	11.951	433	408-428	220	--	No Assignment	--
PO-008907	0	30.467392	-96.670604	342.56	361.909	19.349	900	--	400	--	Queen City	--
PO-008971	0	30.535	-96.913611	349.6	363.245	13.645	840	820-840	200	--	Calvert Bluff	--
PO-011032	0	30.648145	-96.854683	575	0	575	1744	1462-1546,1588-1715	486	--	Simsboro	--

APPENDIX B

CUMULATIVE DISTRIBUTION FUNCTIONS (CDFS) FOR WATER COLUMN HEIGHTS ABOVE THE PUMP SETTING IN EXEMPT WELLS BY AQUIFER

(description of how to interpret a CDF Plot is below)



In this example, to determine the number of exempt wells in the Calvert Bluff where the water level is below the pump elevation, a line (red) is drawn at x = 0, a second line (blue) is aligned where the year 2028 crosses the x = 0 line. The blue line lies between 3 and 4, therefore there are 3 wells in the year 2028 where the water level in the Calvert Bluff is below the pump elevation. Similarly, one could have stopped where the red line intercepts the year 1929 and determine that in 1929 there were two wells where water level is below the pump elevation.

If the number of wells where the water level is less than or equal to 40 feet above the height of the water column is desired for the year 2028, a line (green) is drawn where x = 40 and a line (orange) is drawn where the 2028 line intersects the x = 40 line. The orange line lies between 17 and 18, therefore 17 wells have water levels less than or equal to 40 feet above the pump elevation. Similarly, one could have stopped where the green line intercepts the year 1929 and determine that in 1929 there were four wells where water level 40 feet or less above the pump elevation.

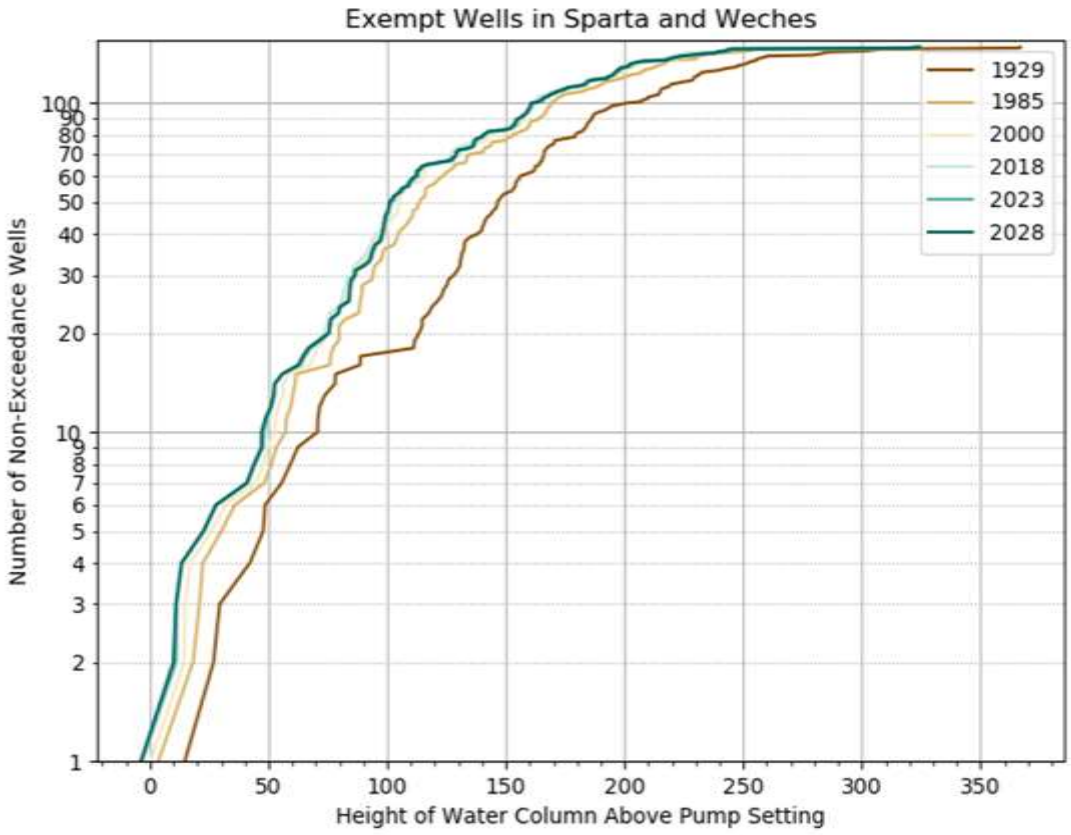


Figure B-1 Cumulative Distribution Function for Exempt Wells in the Sparta Aquifer or Weches Formation for Height of Water Column above the Pump Setting

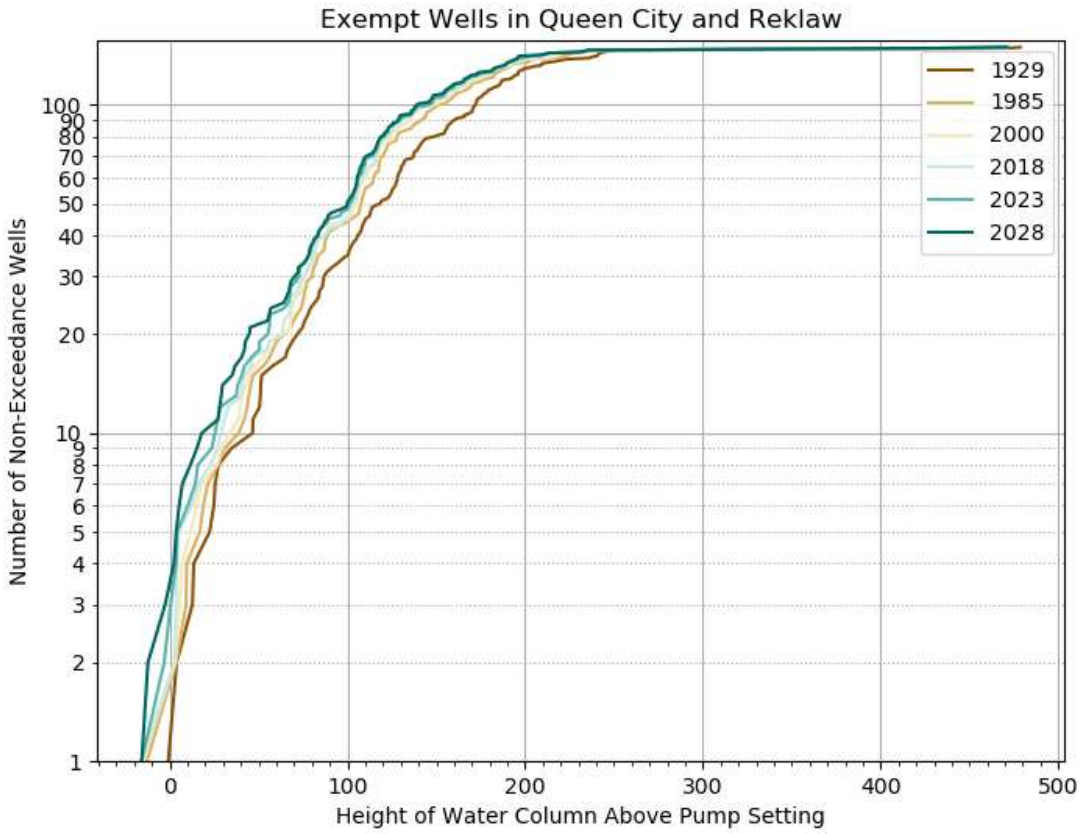


Figure B-2 Cumulative Distribution Function for Exempt Wells in Queen City Aquifer or Reklaw Formation for Height of Water Column above the Pump Setting

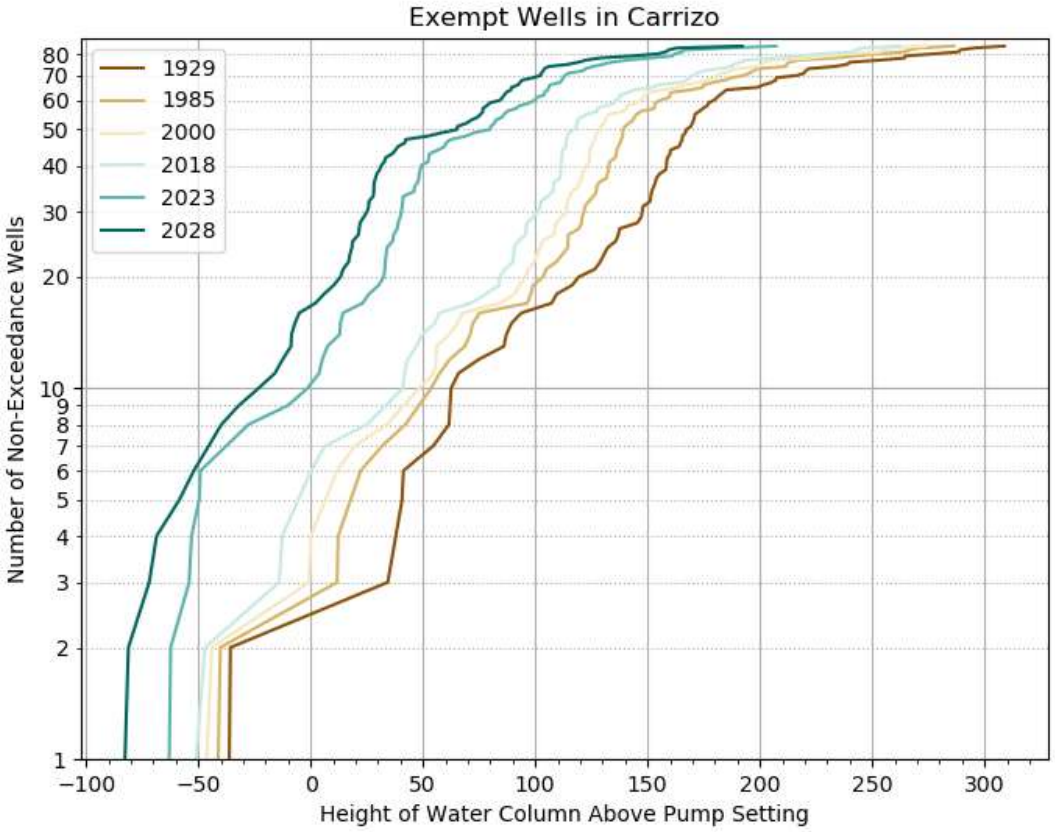


Figure B-3 Cumulative Distribution Function for Exempt Wells in Carrizo Aquifer for Height of Water Column above the Pump Setting

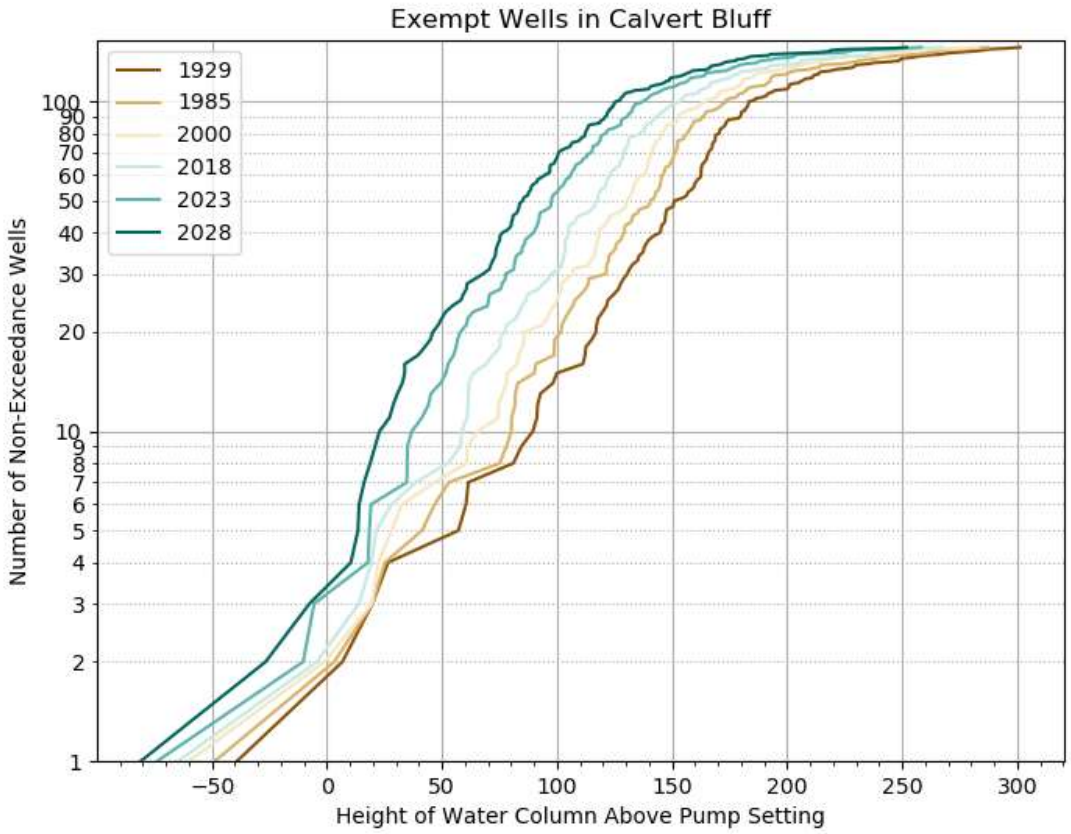


Figure B-4 Cumulative Distribution Function for Exempt Wells in Calvert Bluff Aquifer for Height of Water Column above the Pump Setting

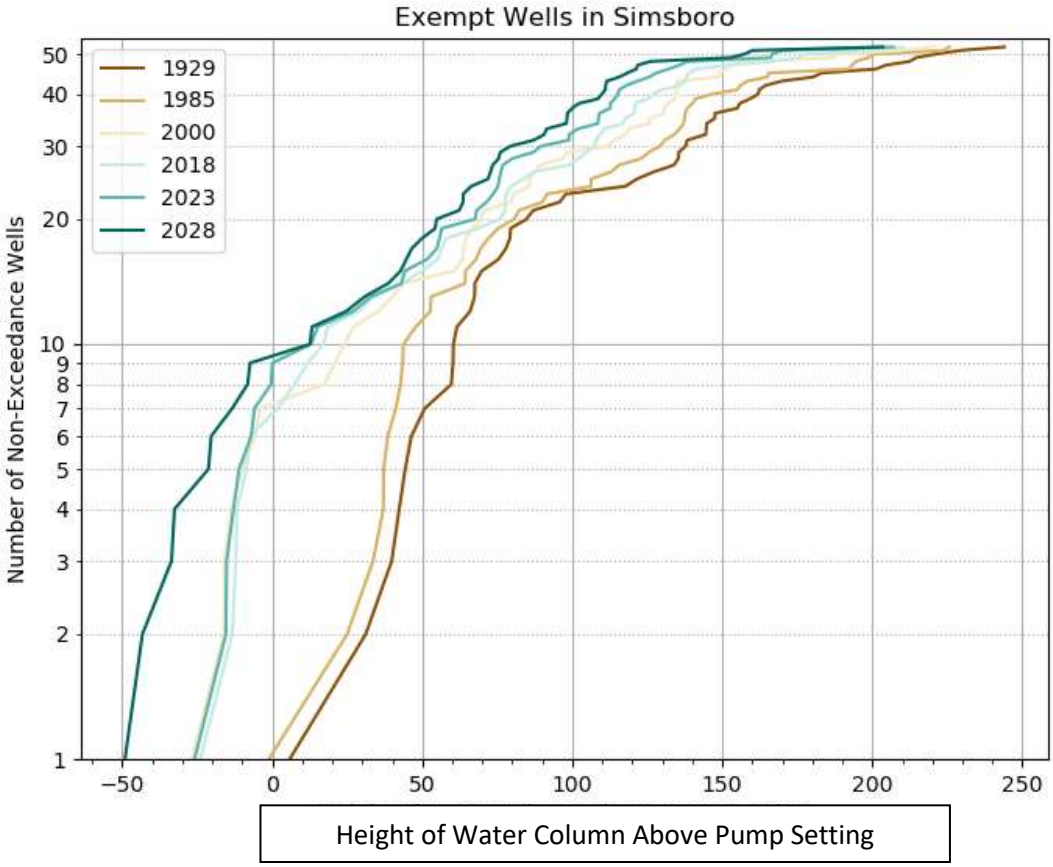


Figure B-5 Cumulative Distribution Function for Exempt Wells in Simsboro Aquifer for Height of Water Column above the Pump Setting

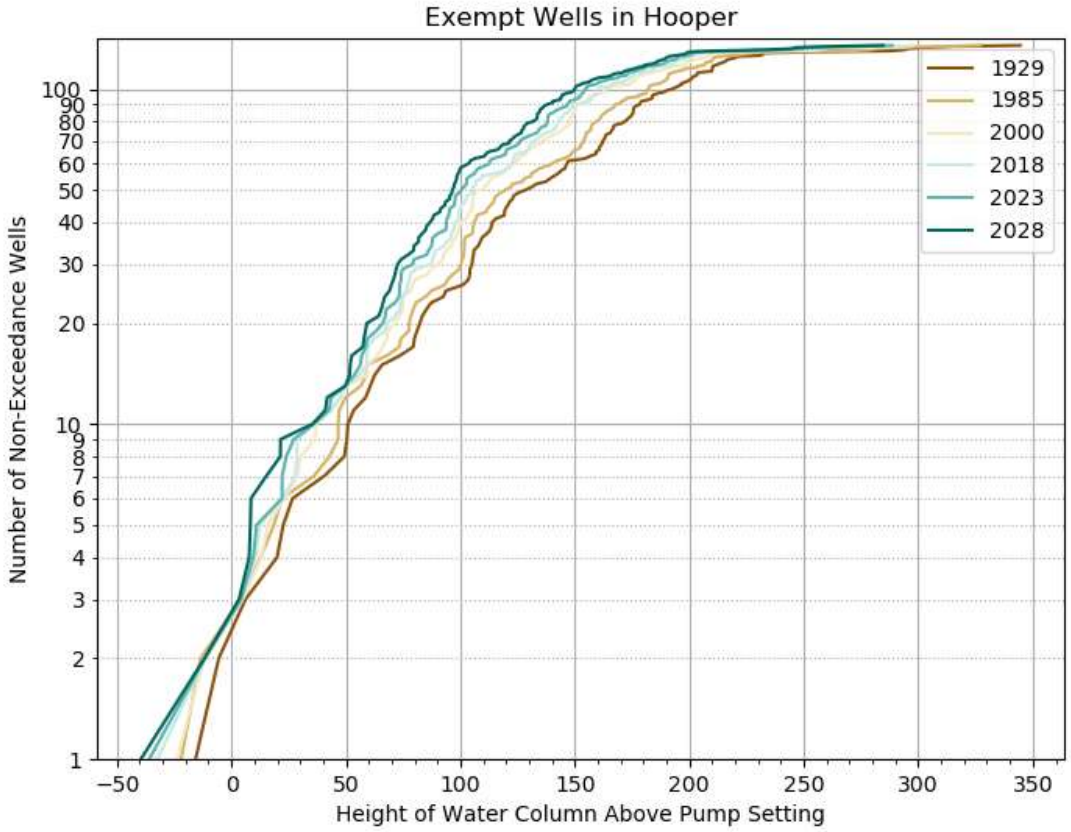


Figure B-6 Cumulative Distribution Function for Exempt Wells in Hooper Aquifer for Height of Water Column above the Pump Setting

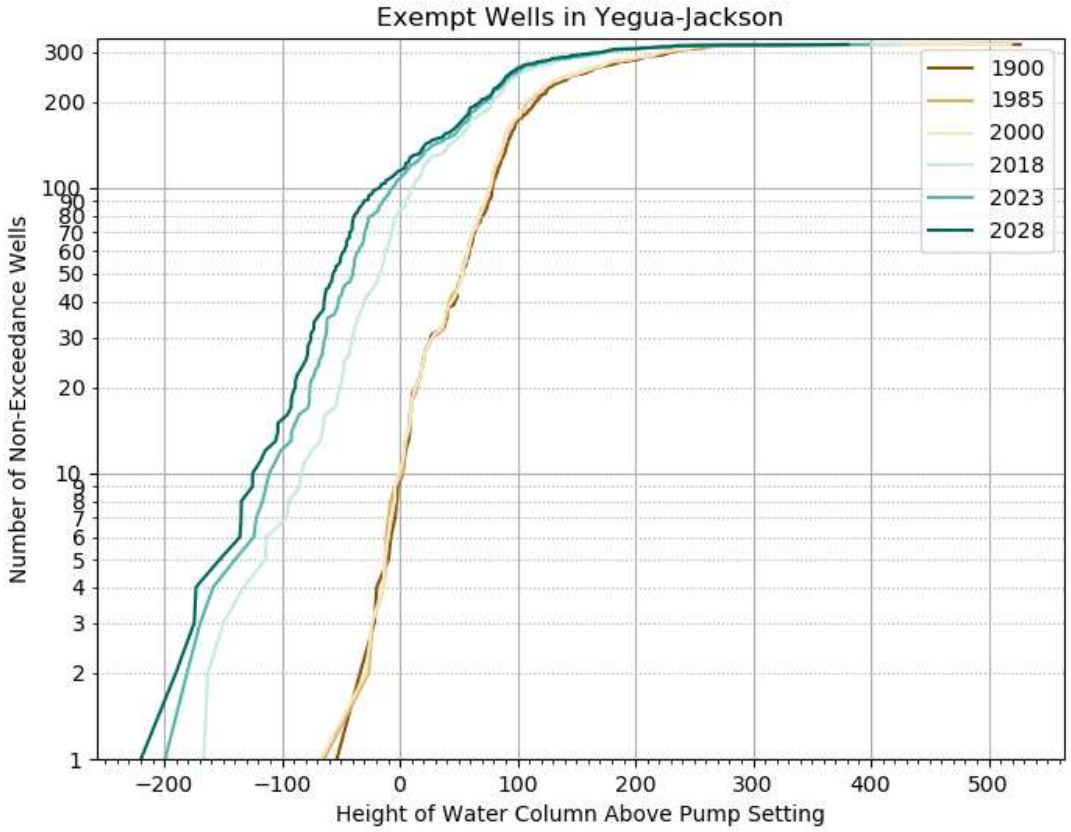
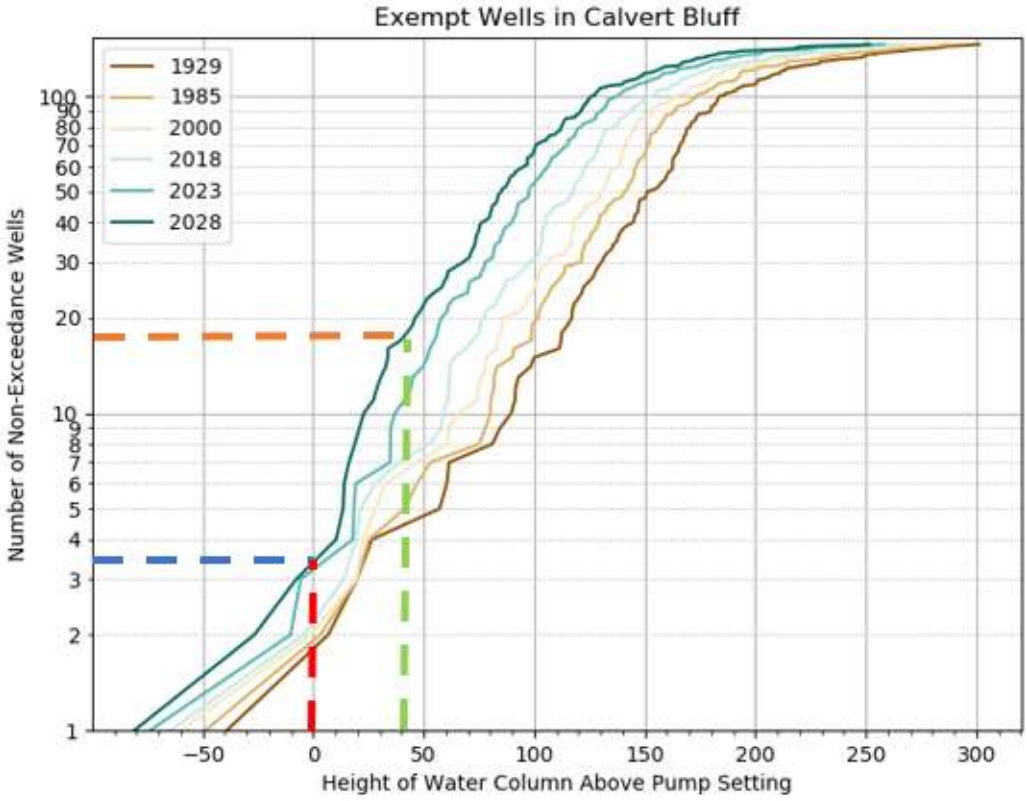


Figure B-7 Cumulative Distribution Function for Exempt Wells in Yegua-Jackson Aquifer for Height of Water Column above the Pump Setting

APPENDIX C

CUMULATIVE DISTRIBUTION FUNCTIONS (CDFS) FOR WATER COLUMN HEIGHTS ABOVE THE PUMP SETTING IN LOW-CAPACITY PERMITTED WELLS BY AQUIFER

(description of how to interpret a CDF Plot is below)



In this example, to determine the number of exempt wells in the Calvert Bluff where the water level is below the pump elevation, a line (red) is drawn at x = 0, a second line (blue) is aligned where the year 2028 crosses the x = 0 line. The blue line lies between 3 and 4, therefore there are 3 wells in the year 2028 where the water level in the Calvert Bluff is below the pump elevation. Similarly, one could have stopped where the red line intercepts the year 1929 and determine that in 1929 there were two wells where water level is below the pump elevation.

If the number of wells where the water level is less than or equal to 40 feet above the height of the water column is desired for the year 2028, a line (green) is drawn where x = 40 and a line (orange) is drawn where the 2028 line intersects the x = 40 line. The orange line lies between 17 and 18, therefore 17 wells have water levels less than or equal to 40 feet above the pump elevation. Similarly, one could have stopped where the green line intercepts the year 1929 and determine that in 1929 there were four wells where water level 40 feet or less above the pump elevation.

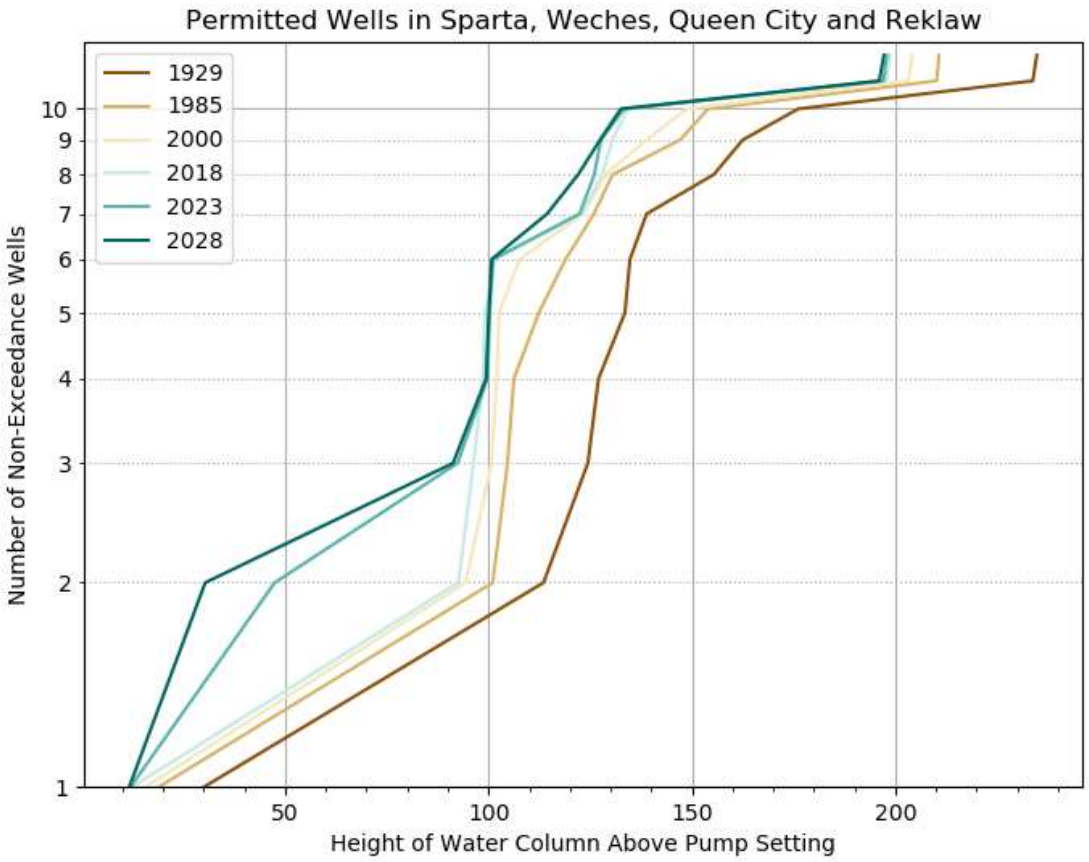


Figure C-1 Cumulative Distribution Function for Low-Capacity Permitted Wells in the Sparta Aquifer , Weches Formation, Queen City Aquifer, and Reklaw Formation for Height of Water Column above the Pump Setting

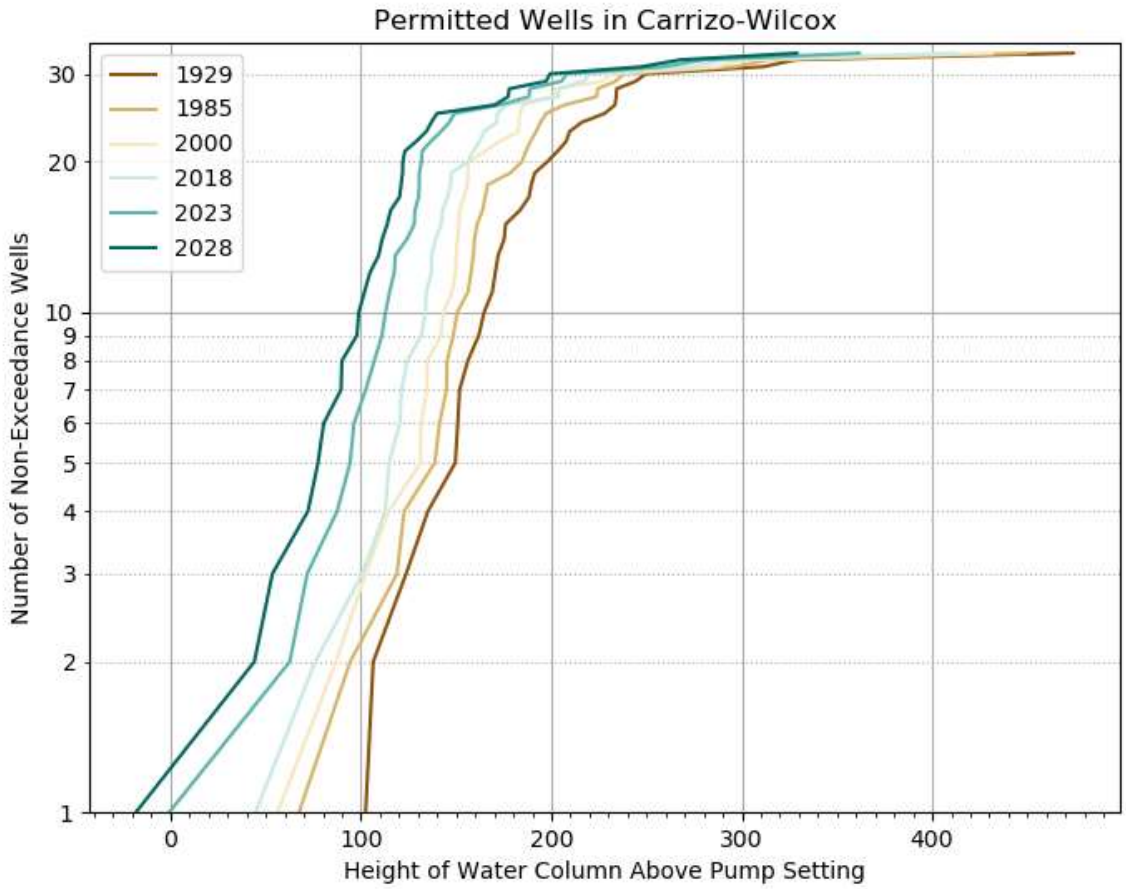


Figure C-2 Cumulative Distribution Function for Low-Capacity Permitted Wells in the Carrizo, Calvert Bluff, Simsboro, and Hooper Aquifers Height of Water Column above the Pump Setting

APPENDIX D

Hydrographs of Wells where Modeled 2028 water levels are lower than the pump setting in Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro, and Hooper Aquifers

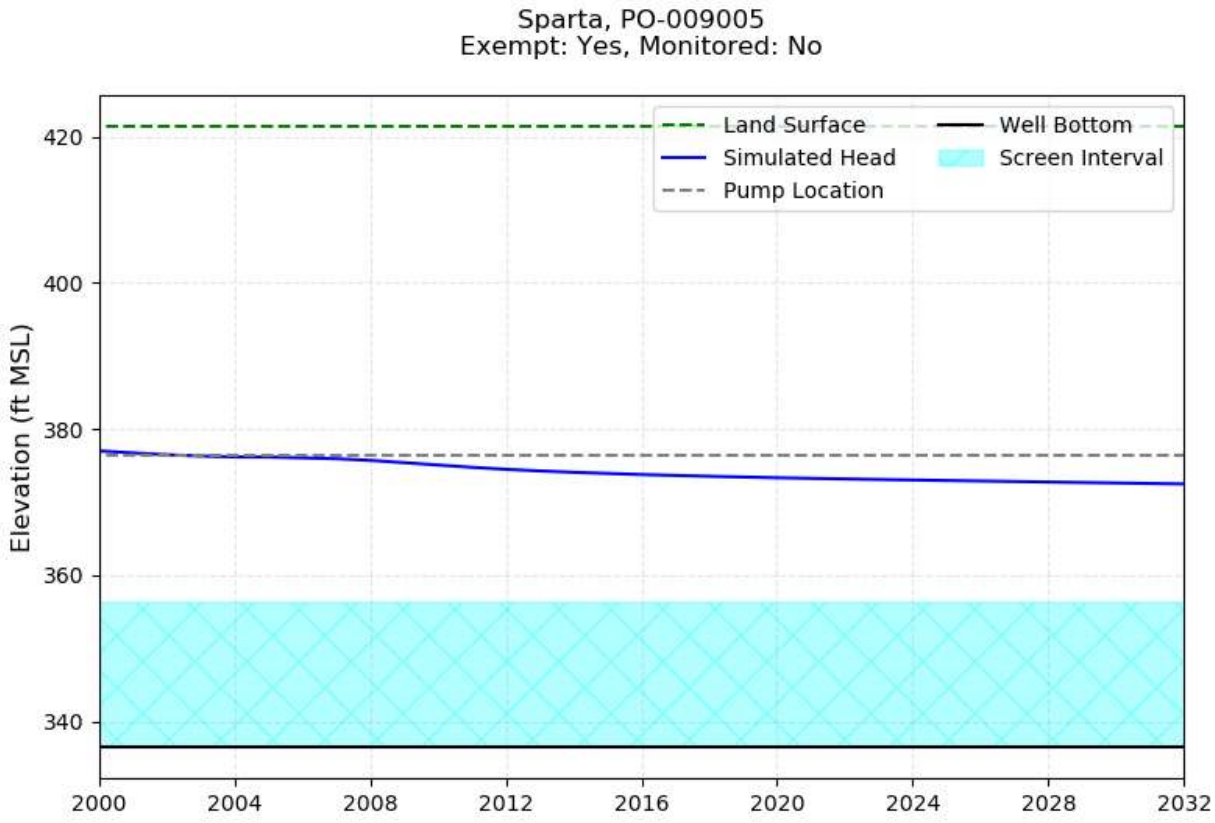


Figure D-1 Simulated water levels for exempt wells PO-009005 located in the Sparta Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

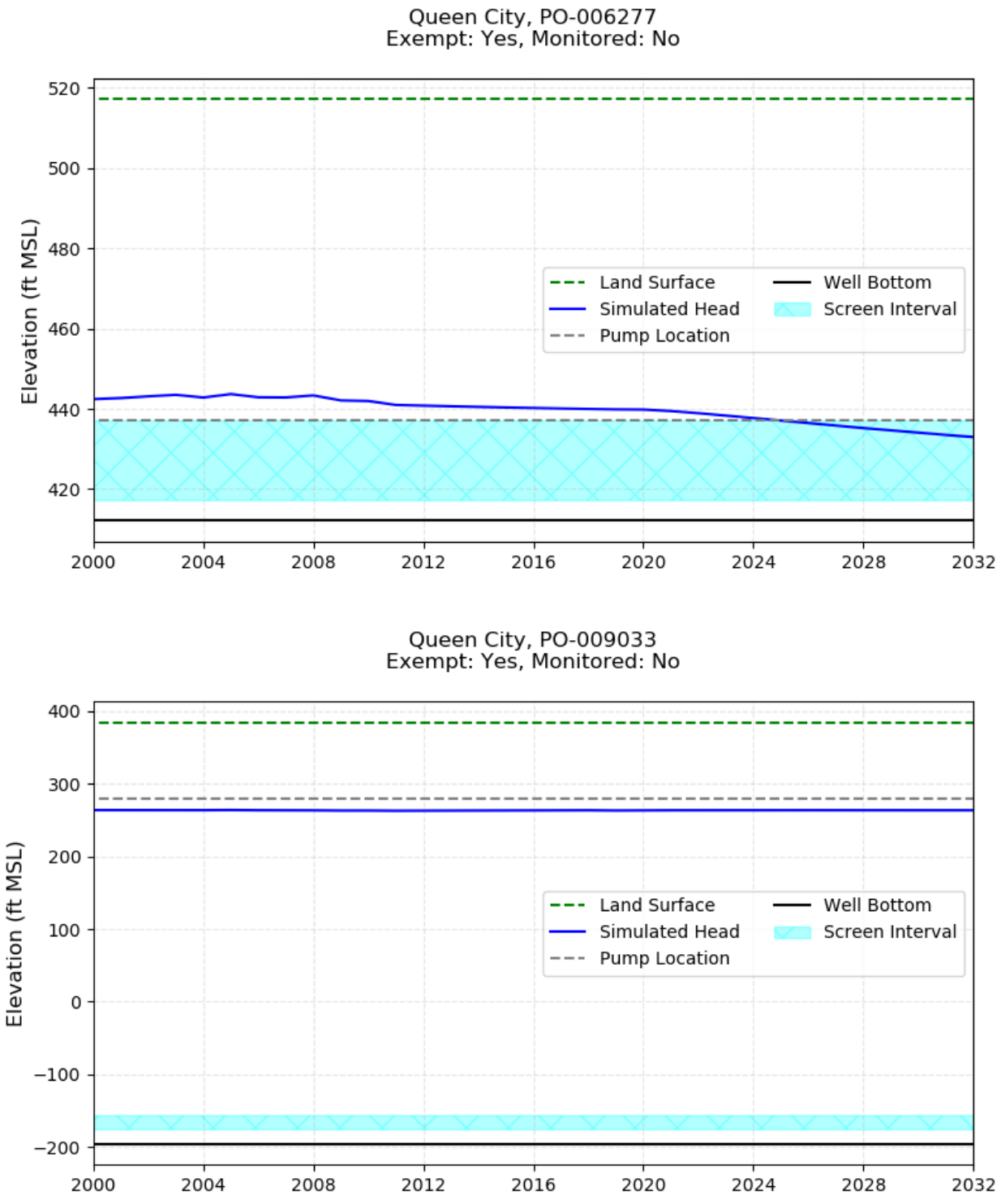


Figure D-2 Simulated water levels for exempt wells PO-006277 and PO-009033 located in the Queen City Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

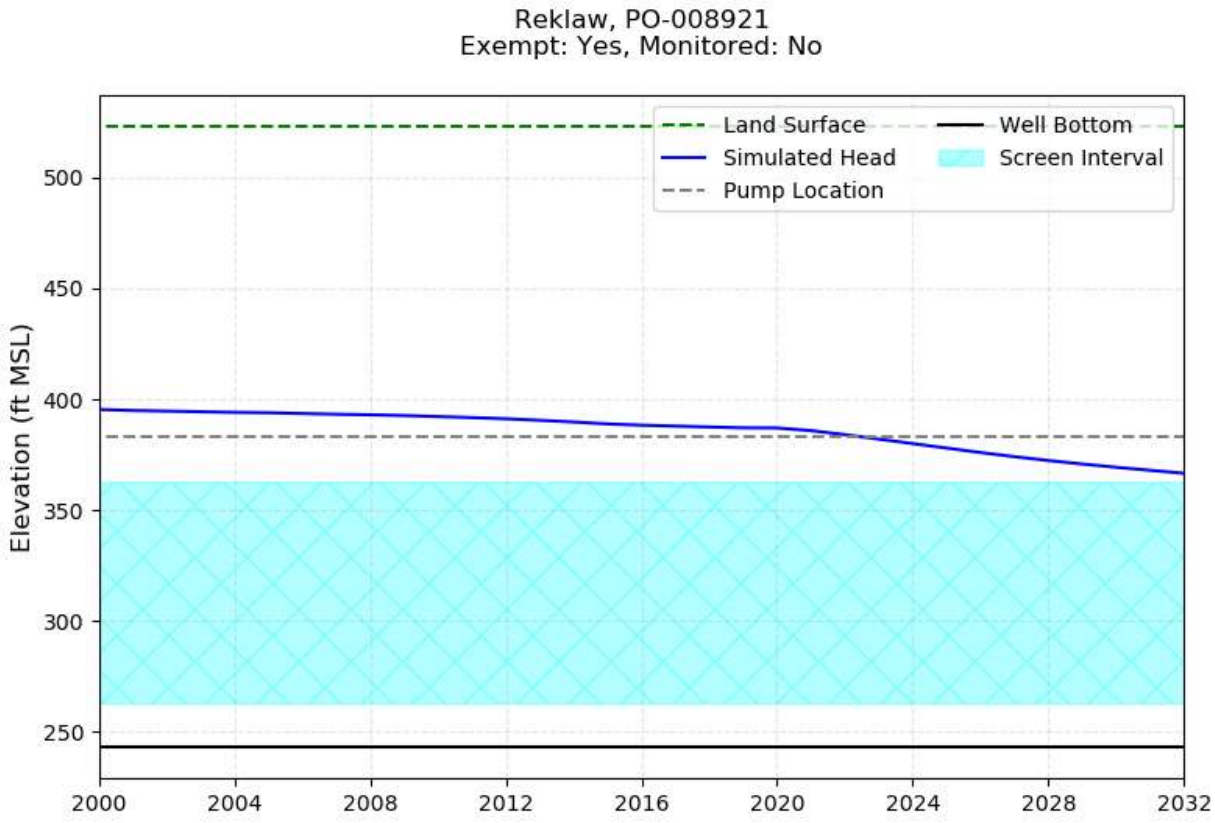


Figure D-3 Simulated water levels for exempt wells PO-008921 located in the Sparta Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

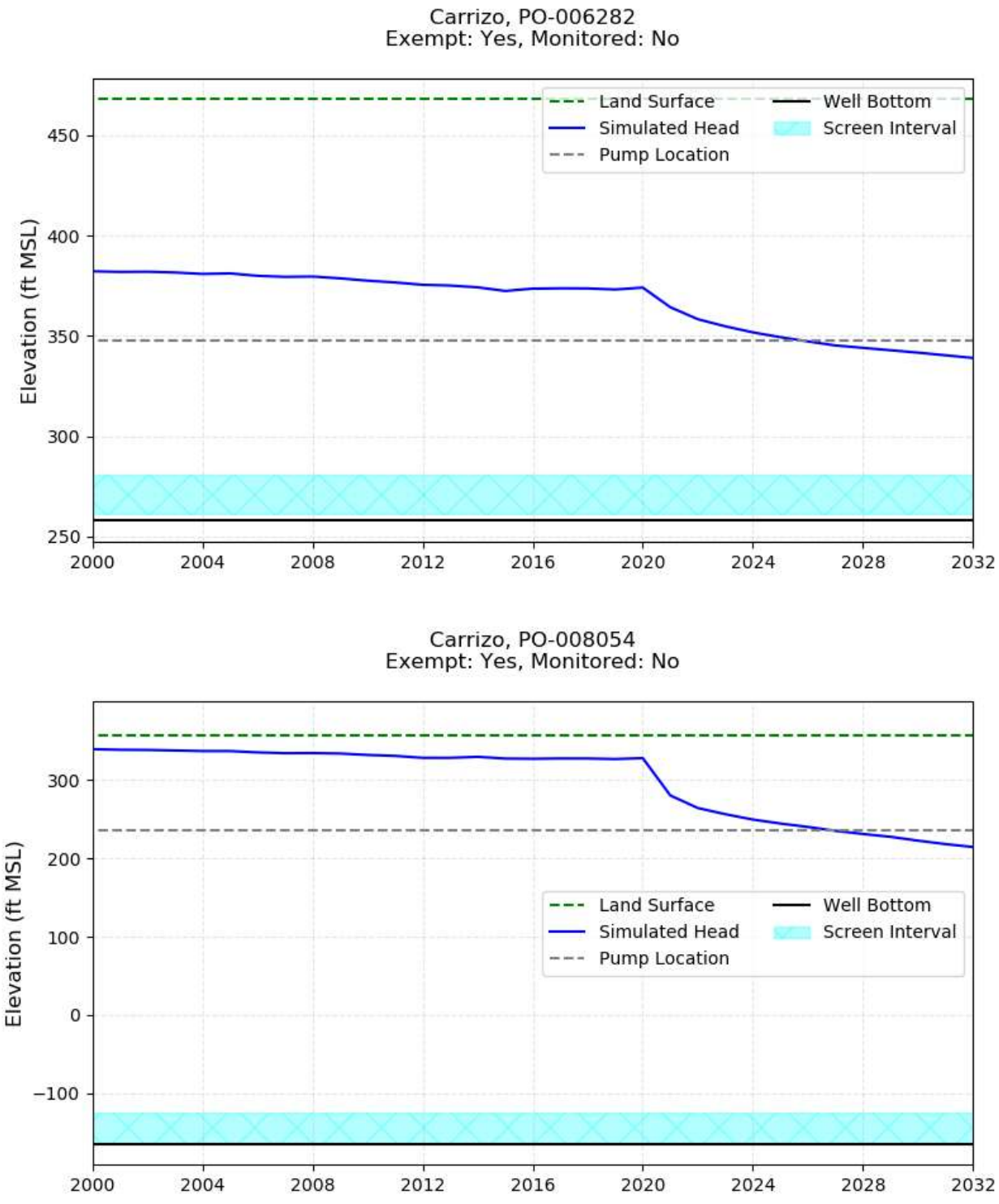


Figure D-4 Simulated water levels for exempt wells PO-006282 and PO-008054 located in the Carrizo Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

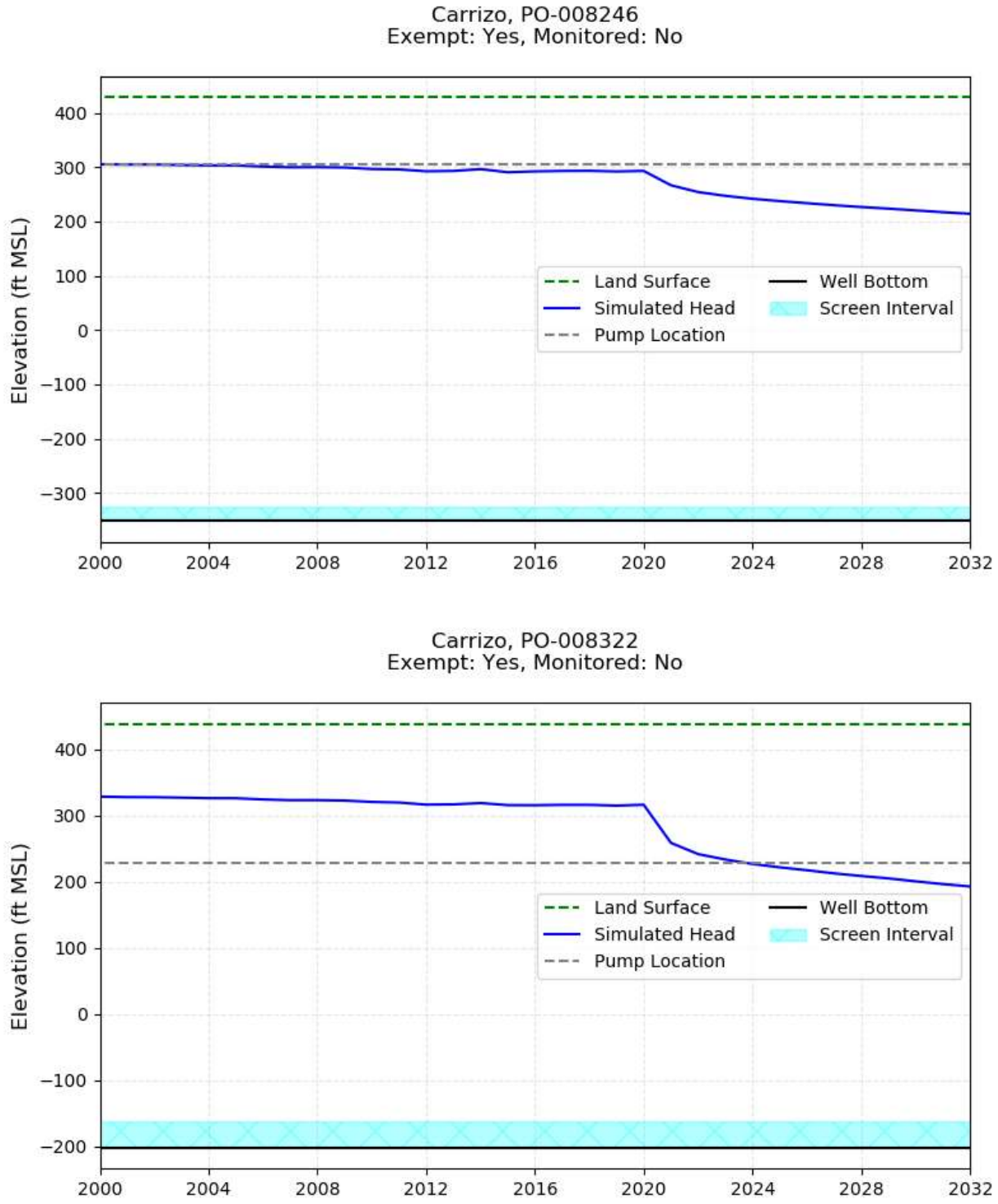


Figure D-5 Simulated water levels for exempt wells PO-008246 and PO-008322 located in the Carrizo Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

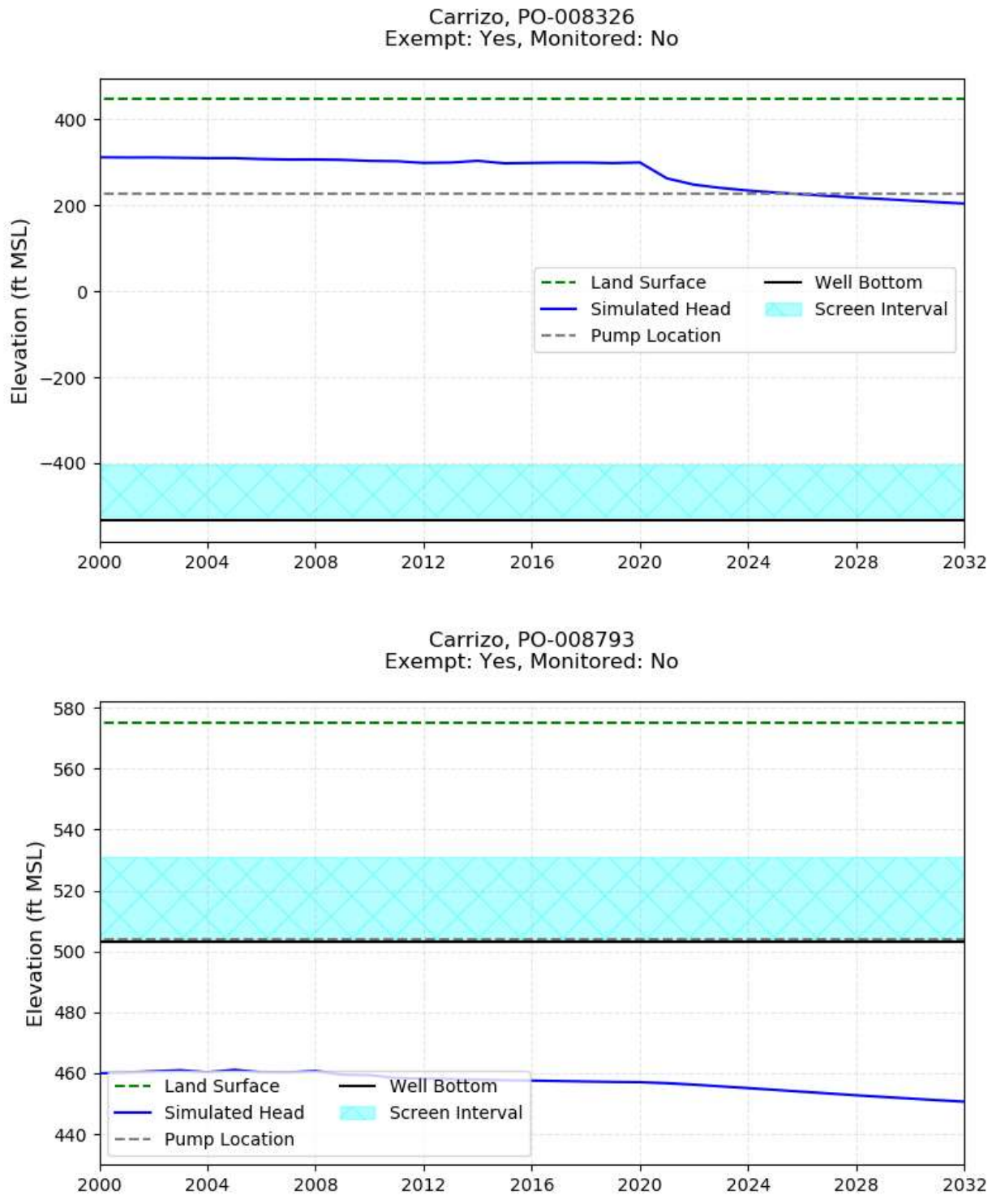


Figure D-6 Simulated water levels for exempt wells PO-008326 and PO-008793 located in the Carrizo Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

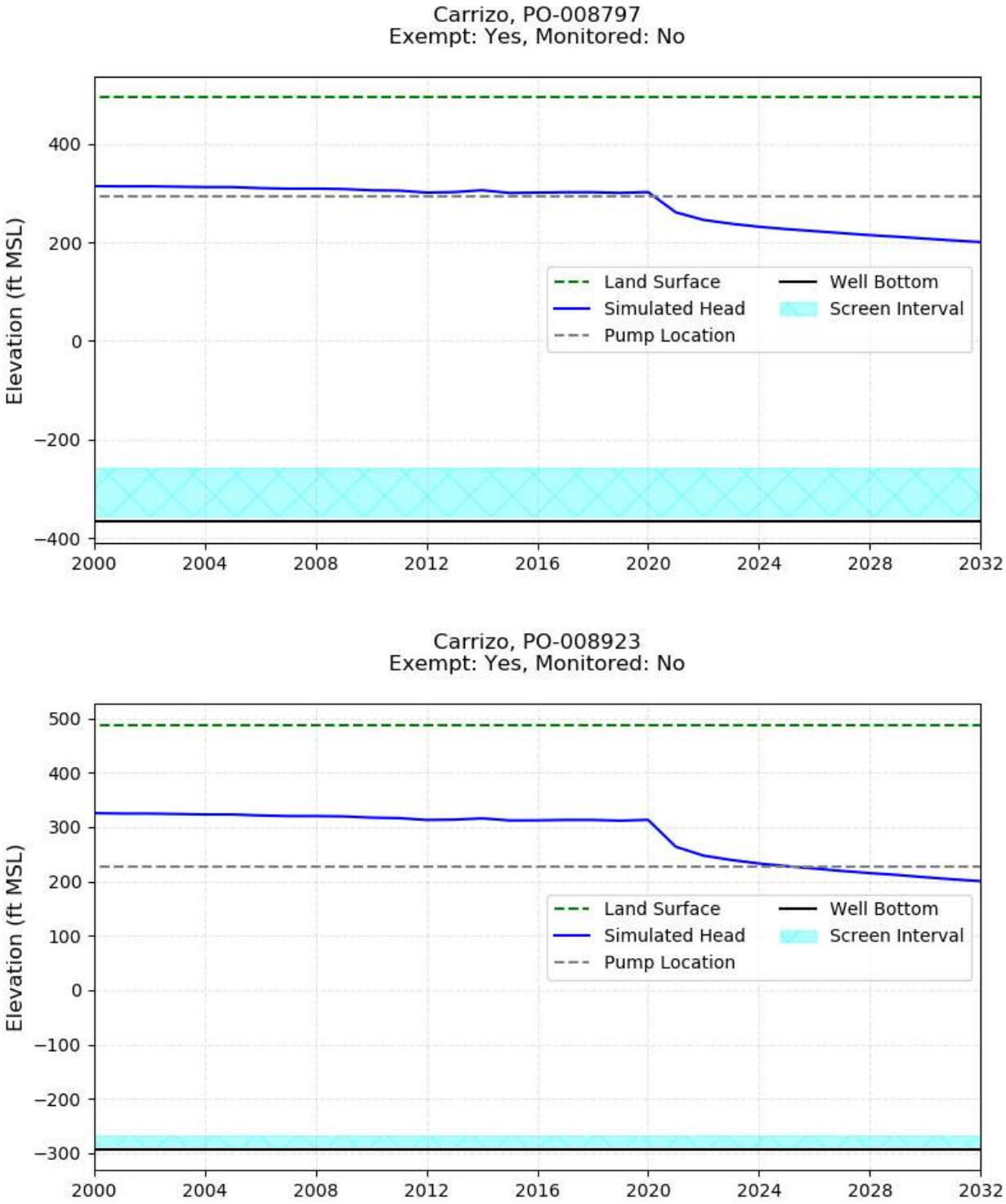


Figure D-7 Simulated water levels for exempt wells PO-008797 and PO-008923 located in the Carrizo Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

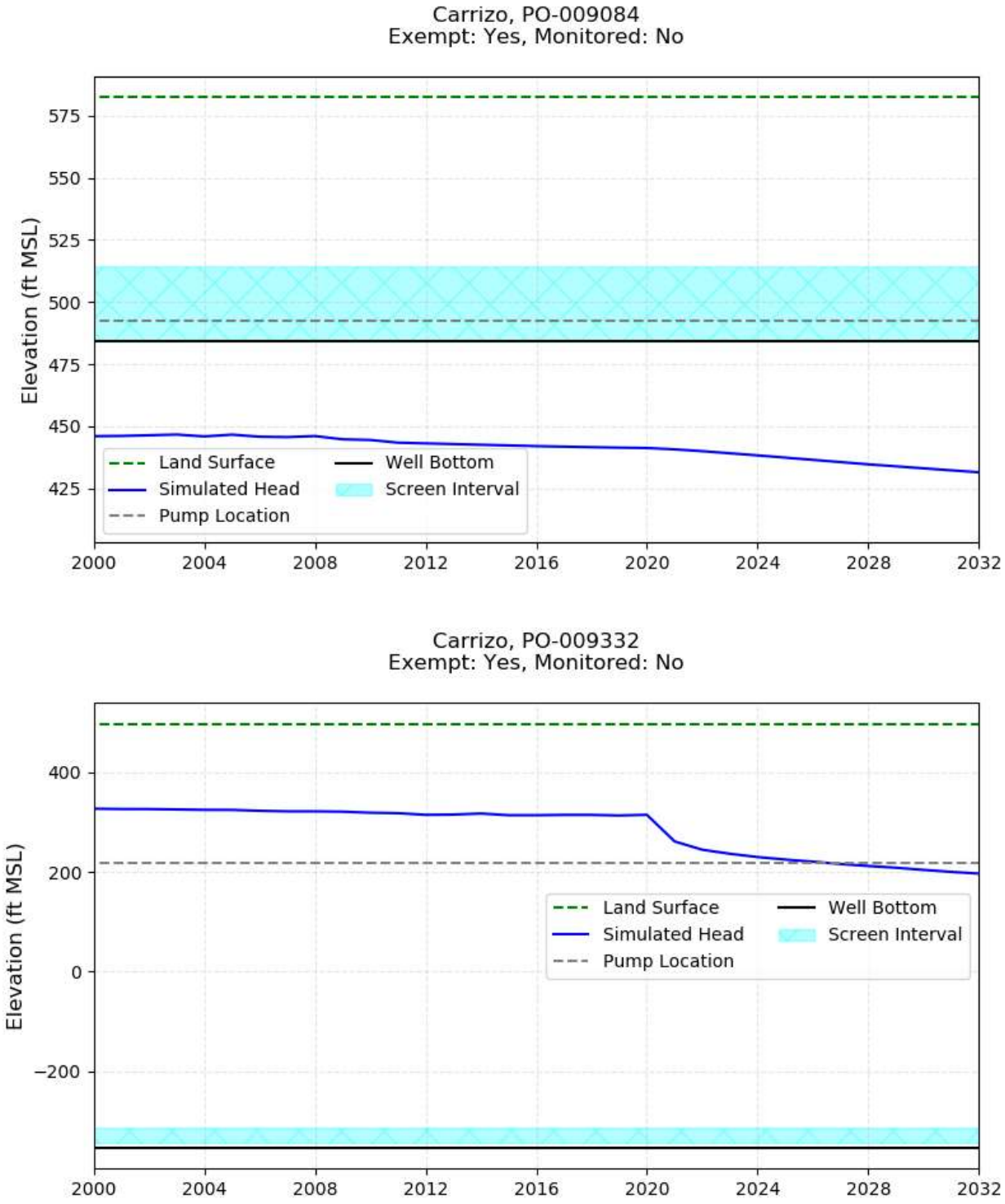


Figure D-8 Simulated water levels for exempt wells PO-09084 and PO-009332 located in the Carrizo Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

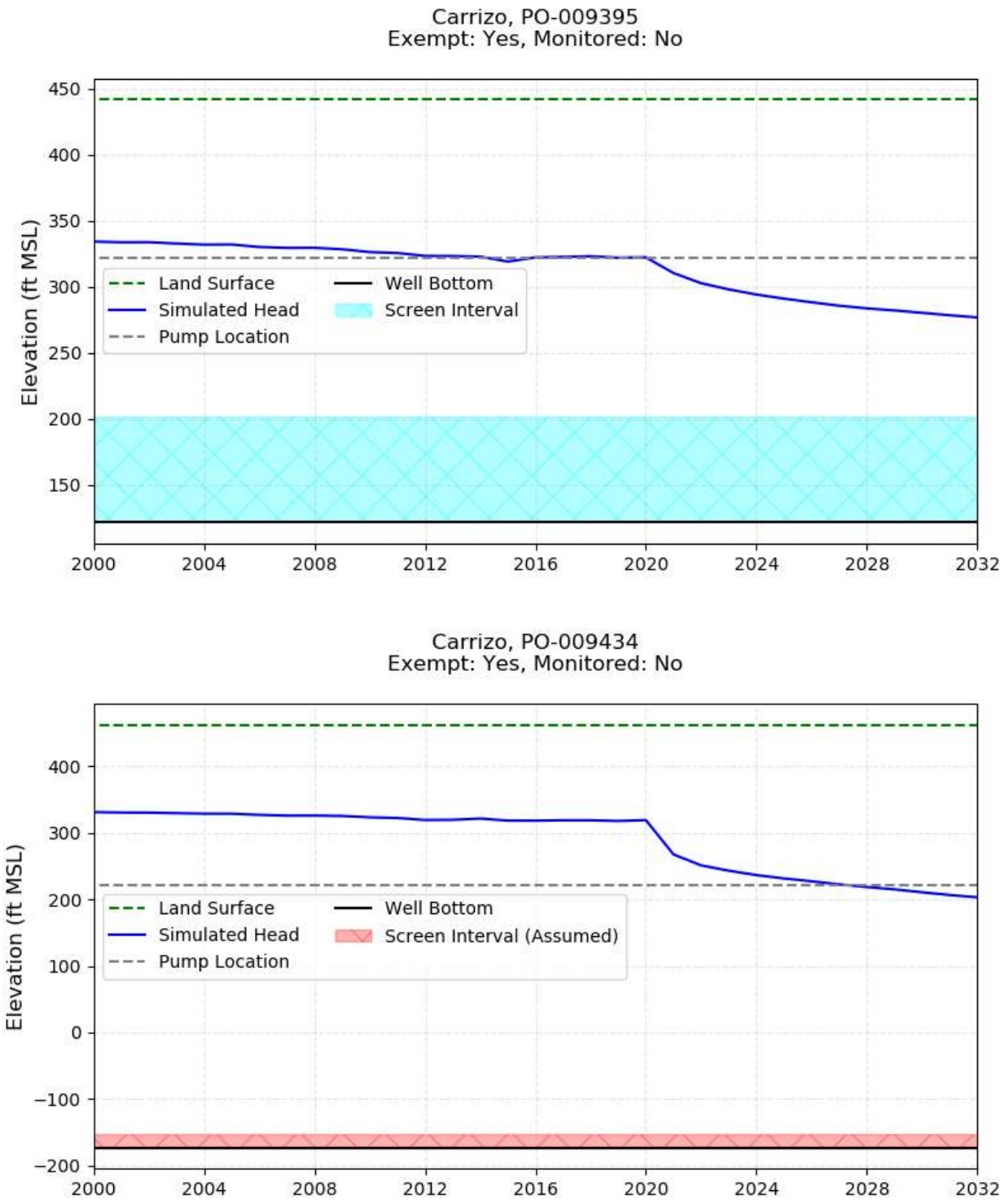


Figure D-9 Simulated water levels for exempt wells PO-009395 and PO-009434 located in the Carrizo Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

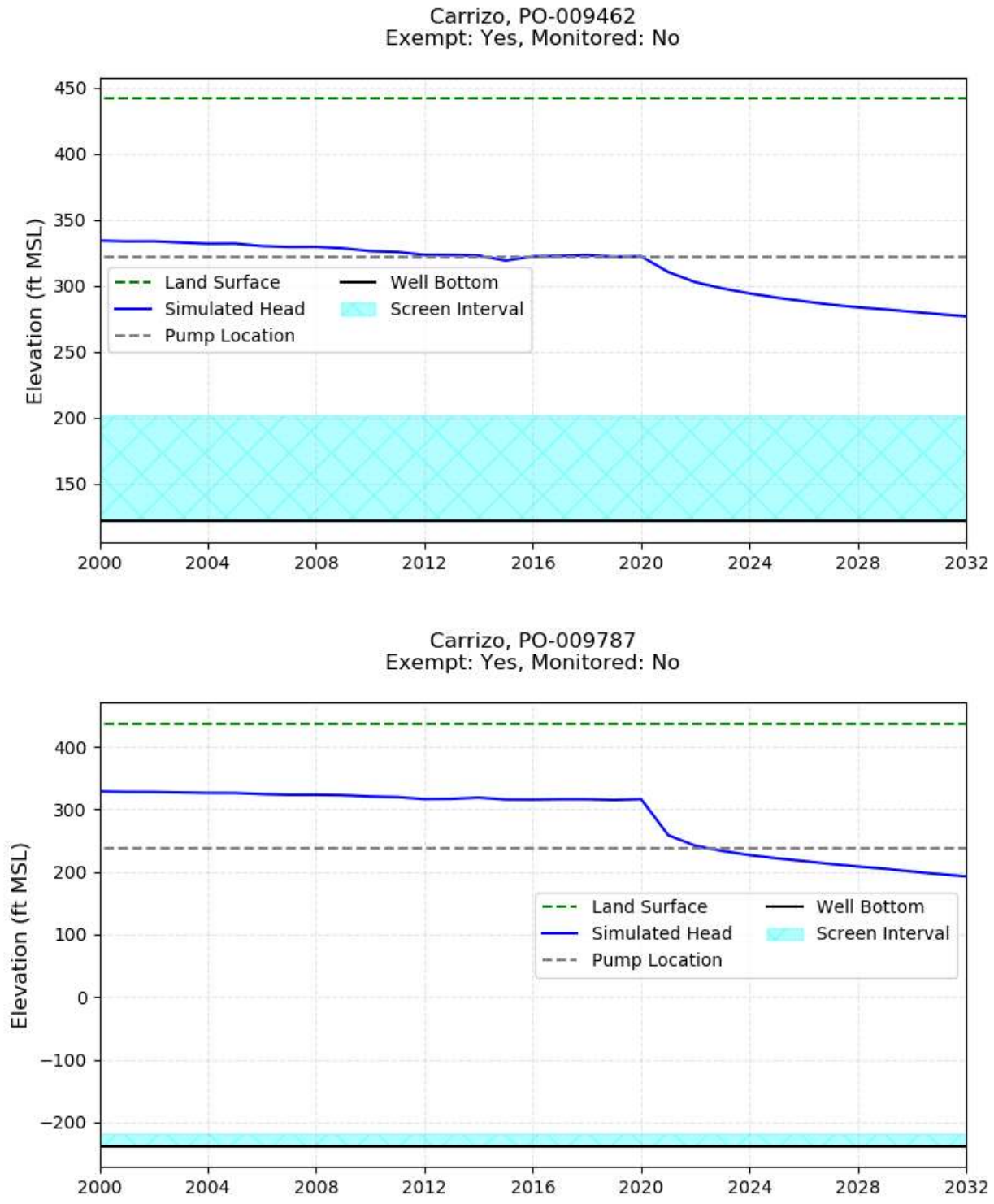


Figure D-10 Simulated water levels for exempt wells PO-009462 and PO-009787 located in the Carrizo Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

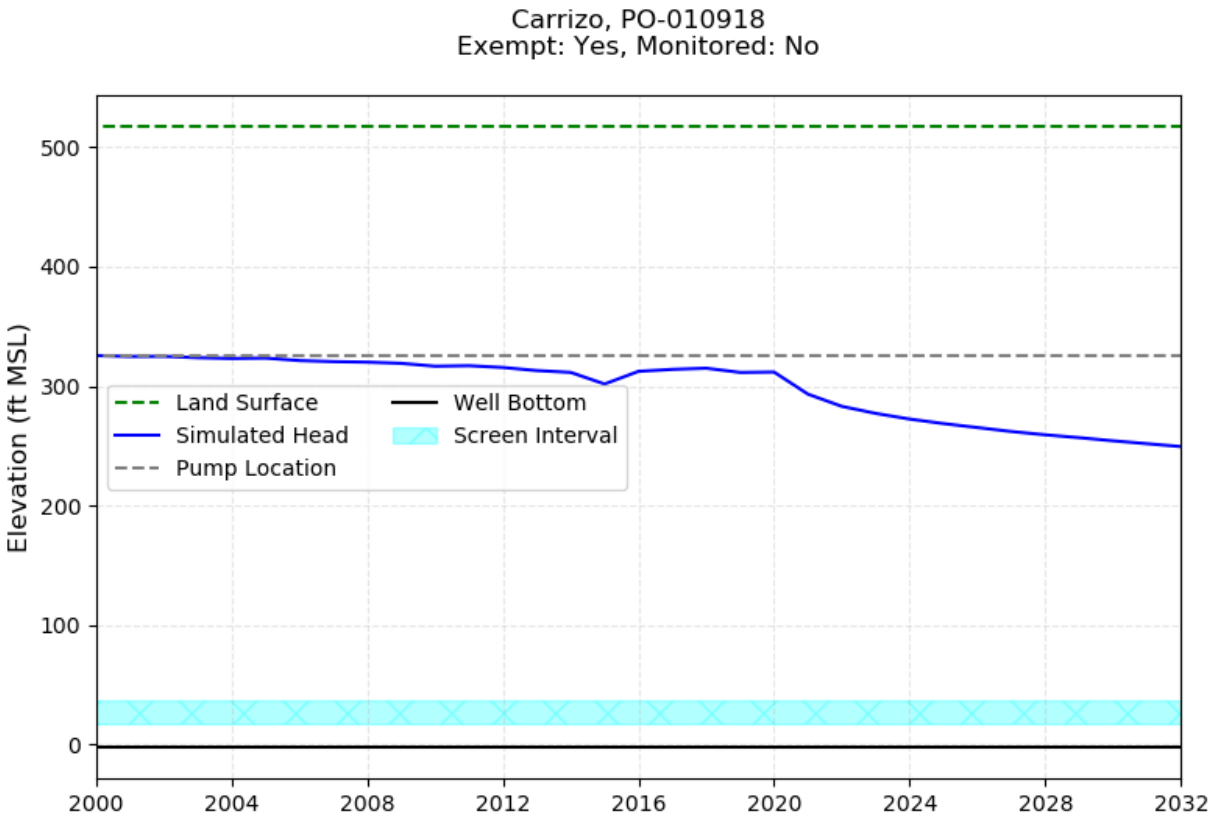


Figure D-11 Simulated water levels for exempt wells PO-010918 located in the Carrizo Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

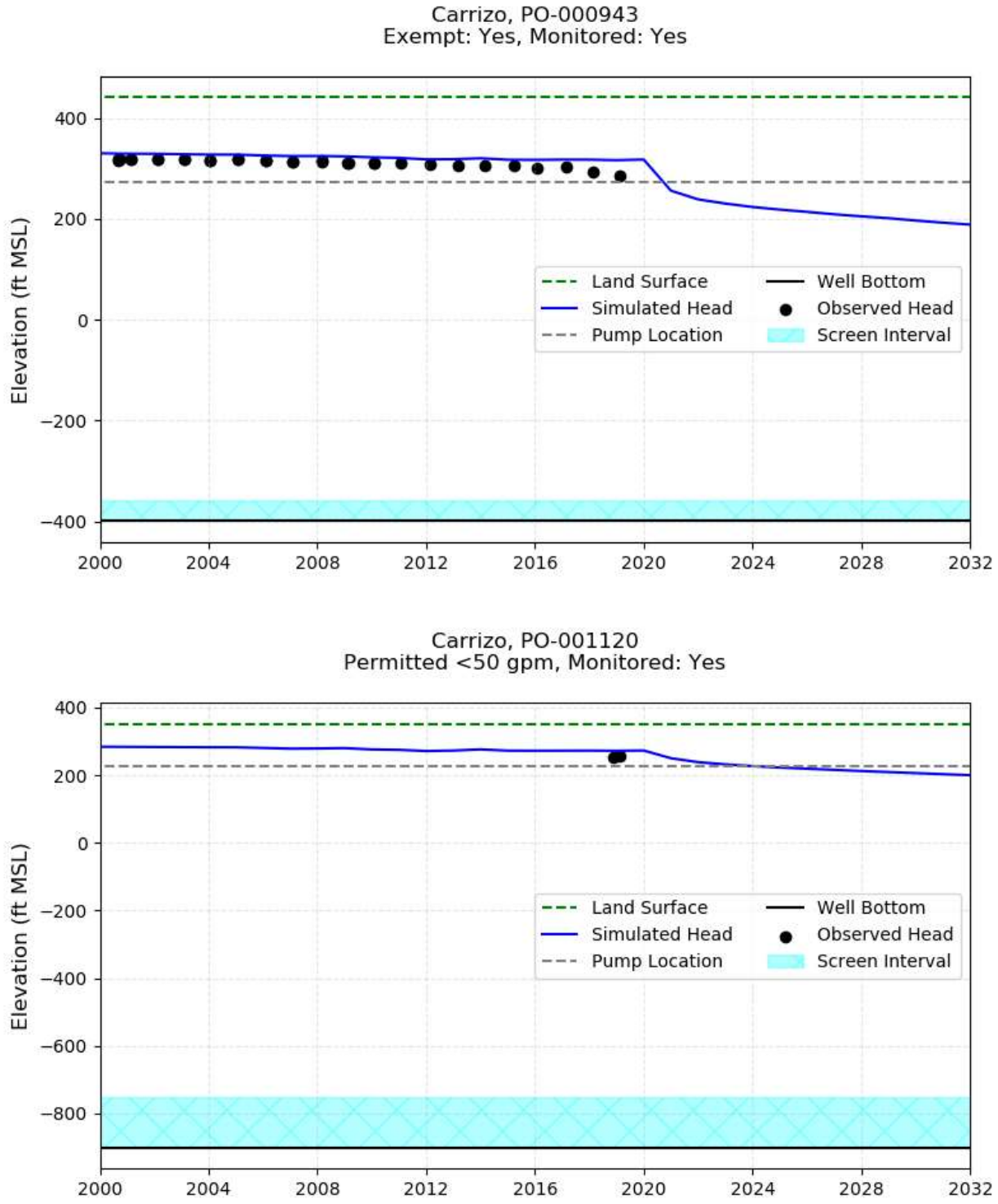


Figure D-12 Simulated water levels for exempt wells PO-000943 and PO-001120 located in the Carrizo Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

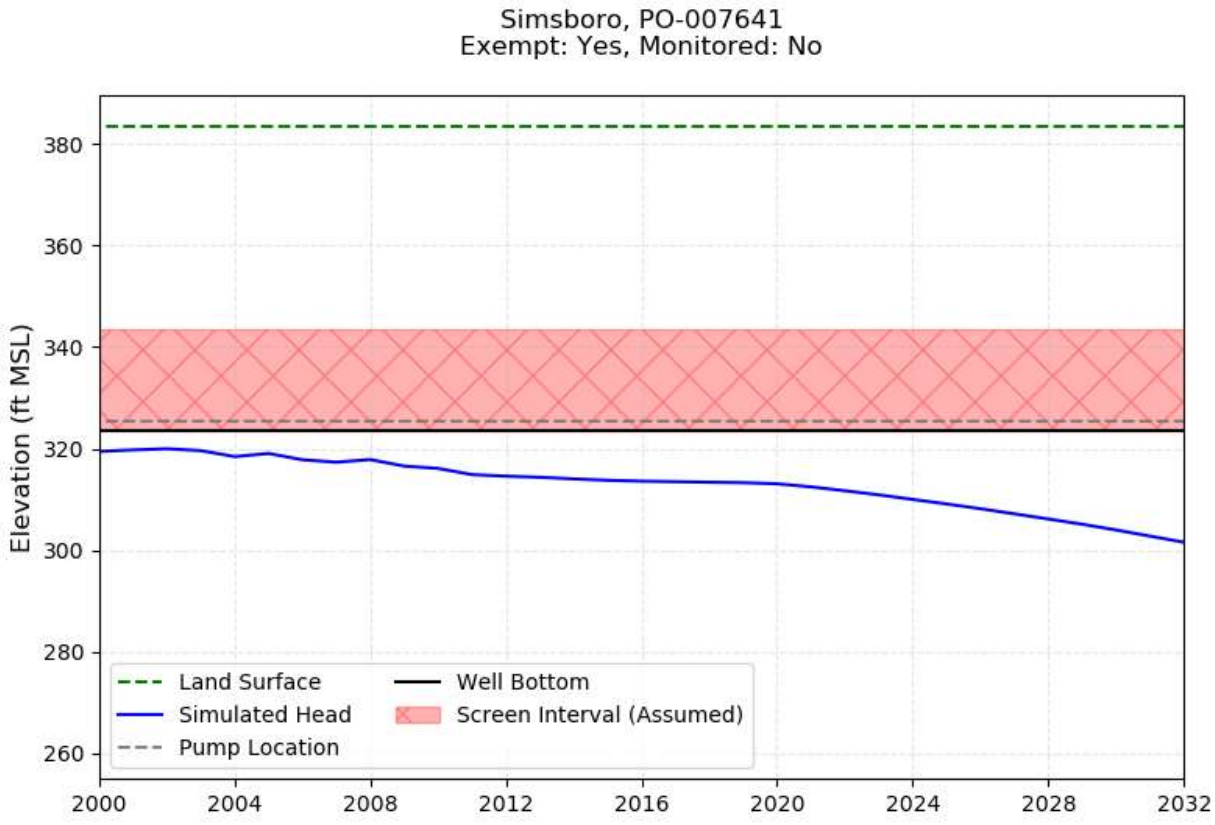


Figure D-13 Simulated water levels for exempt well PO-007641 located in the Simsboro Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

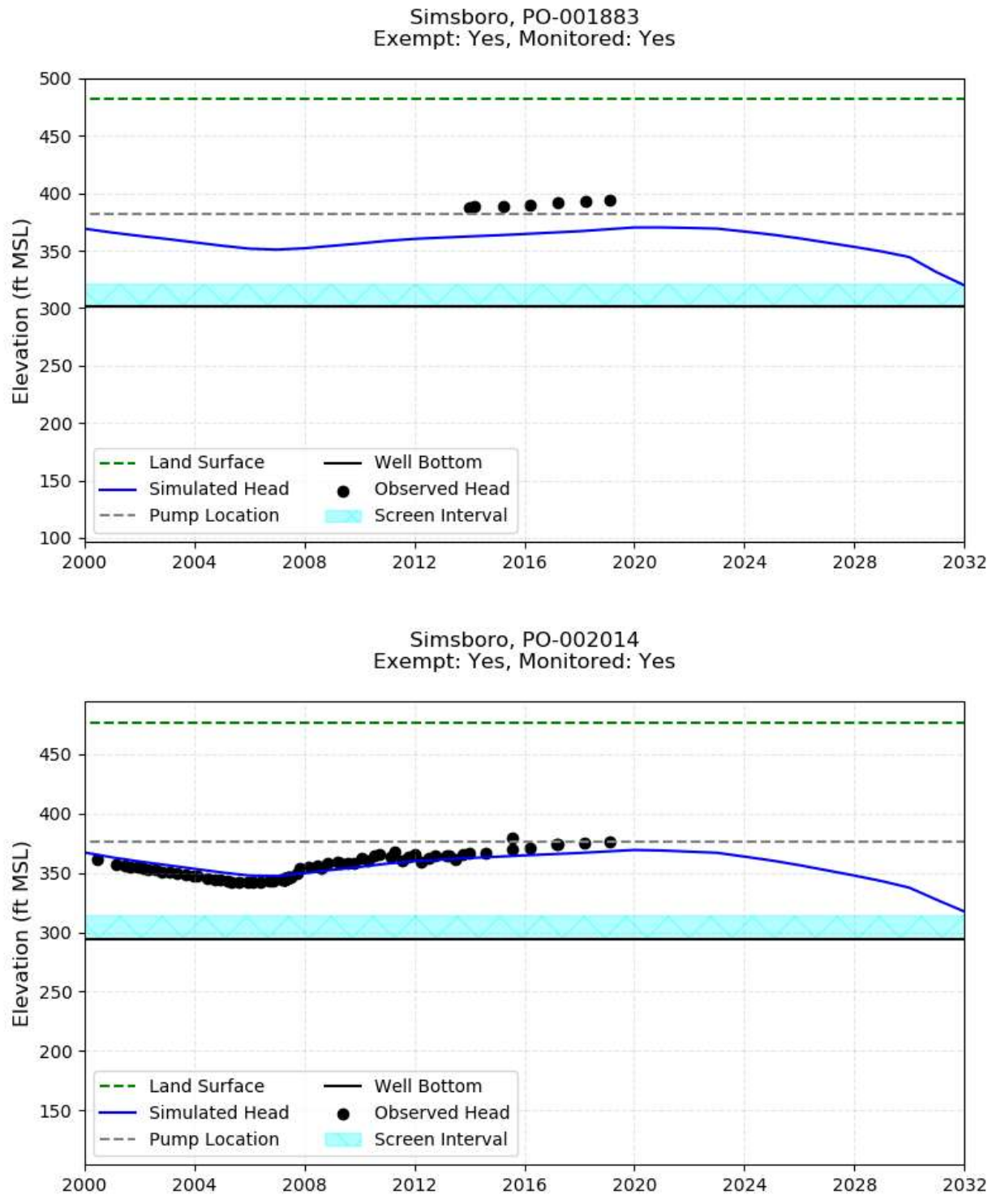


Figure D-14 Simulated water levels for exempt wells PO-001883 and PO-002014 located in the Simsboro Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

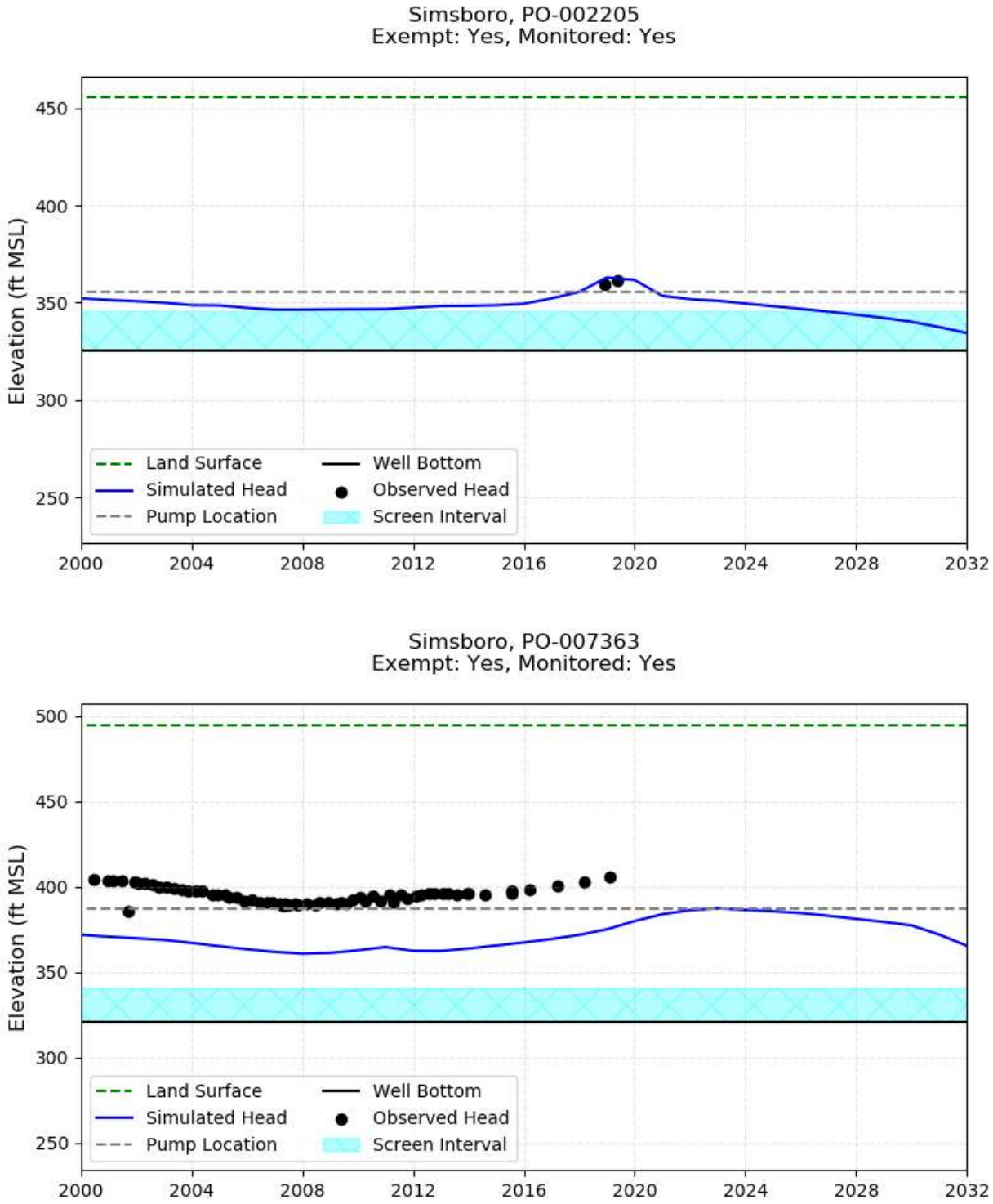


Figure D-16 Simulated water levels for exempt wells PO-002205 and PO-007363 located in the Simsboro Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

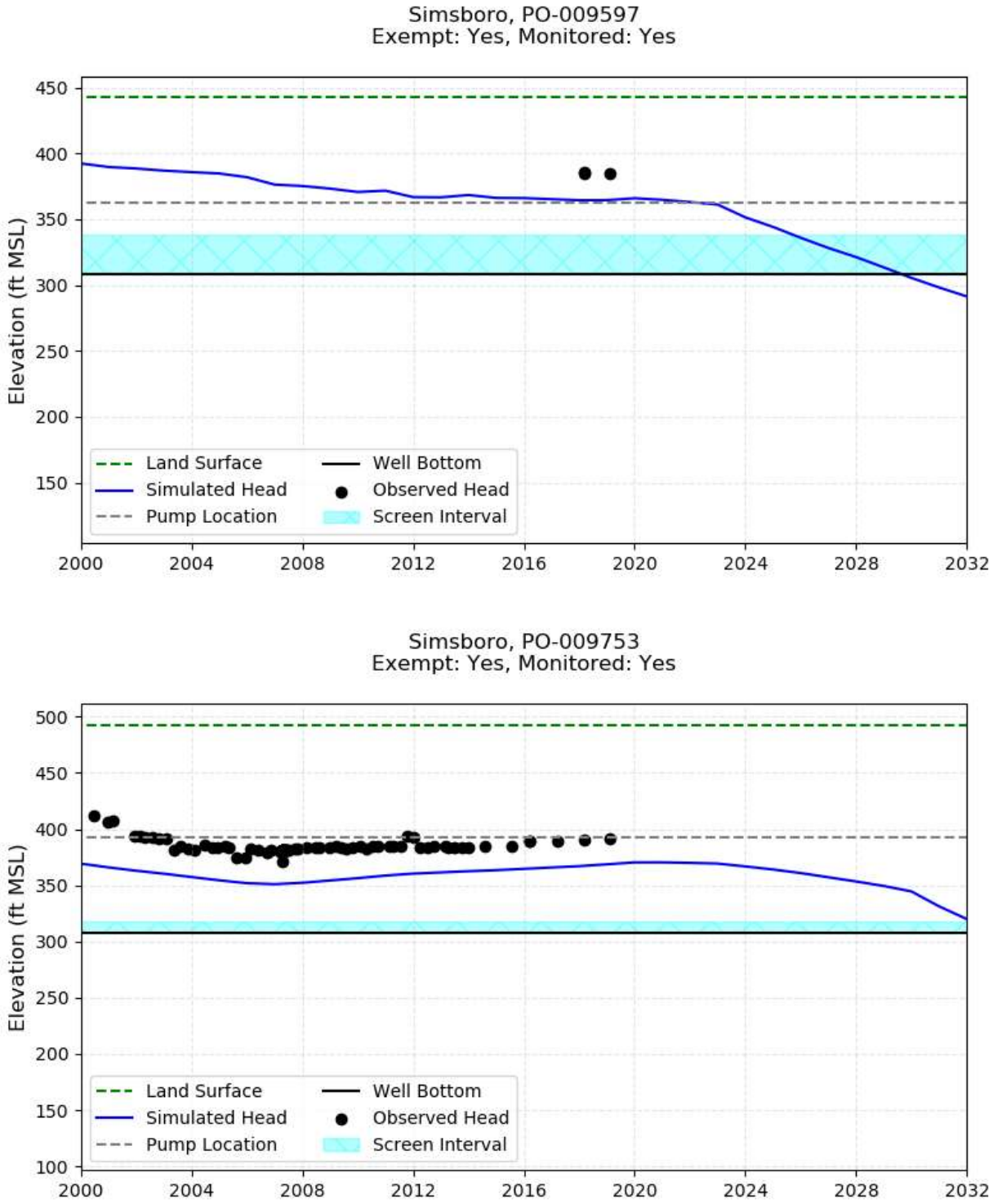


Figure D-17 Simulated water levels for exempt wells PO-009597 and PO-009753 located in the Simsboro Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

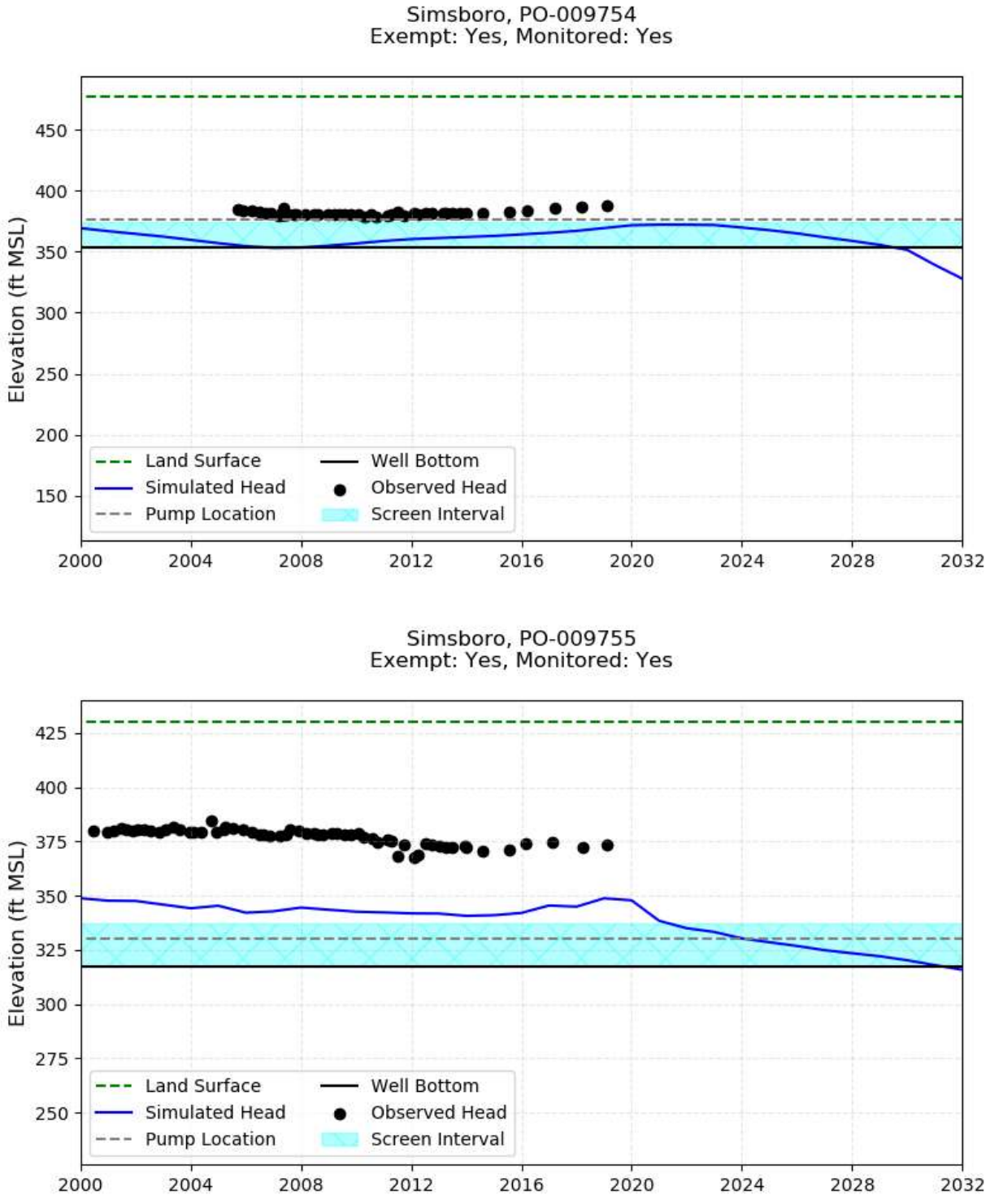


Figure D-18 Simulated water levels for exempt wells PO-009754 and PO-009755 located in the Simsboro Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

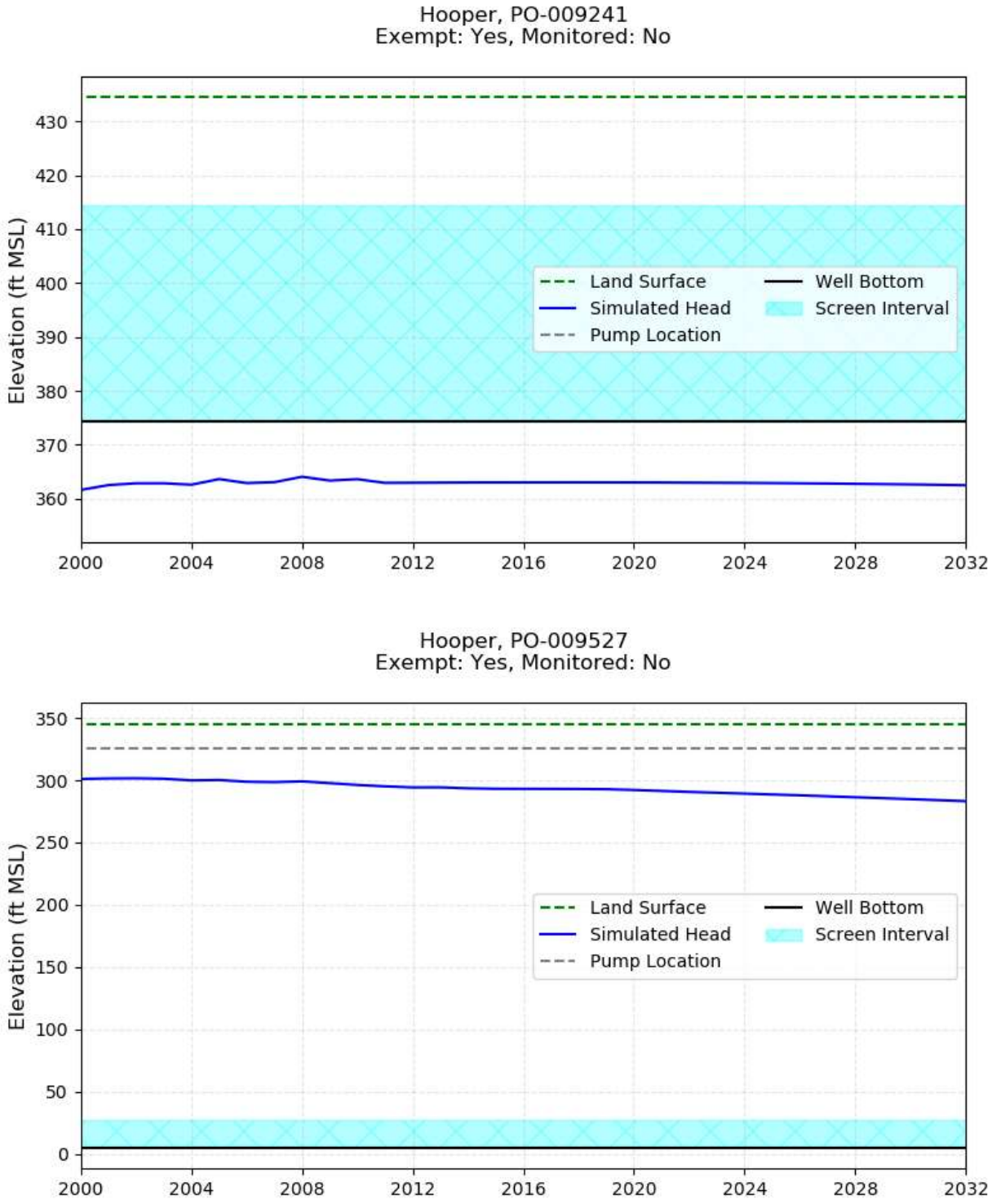


Figure D-19 Simulated water levels for exempt wells PO-009241 and PO-009527 located in the Hooper Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

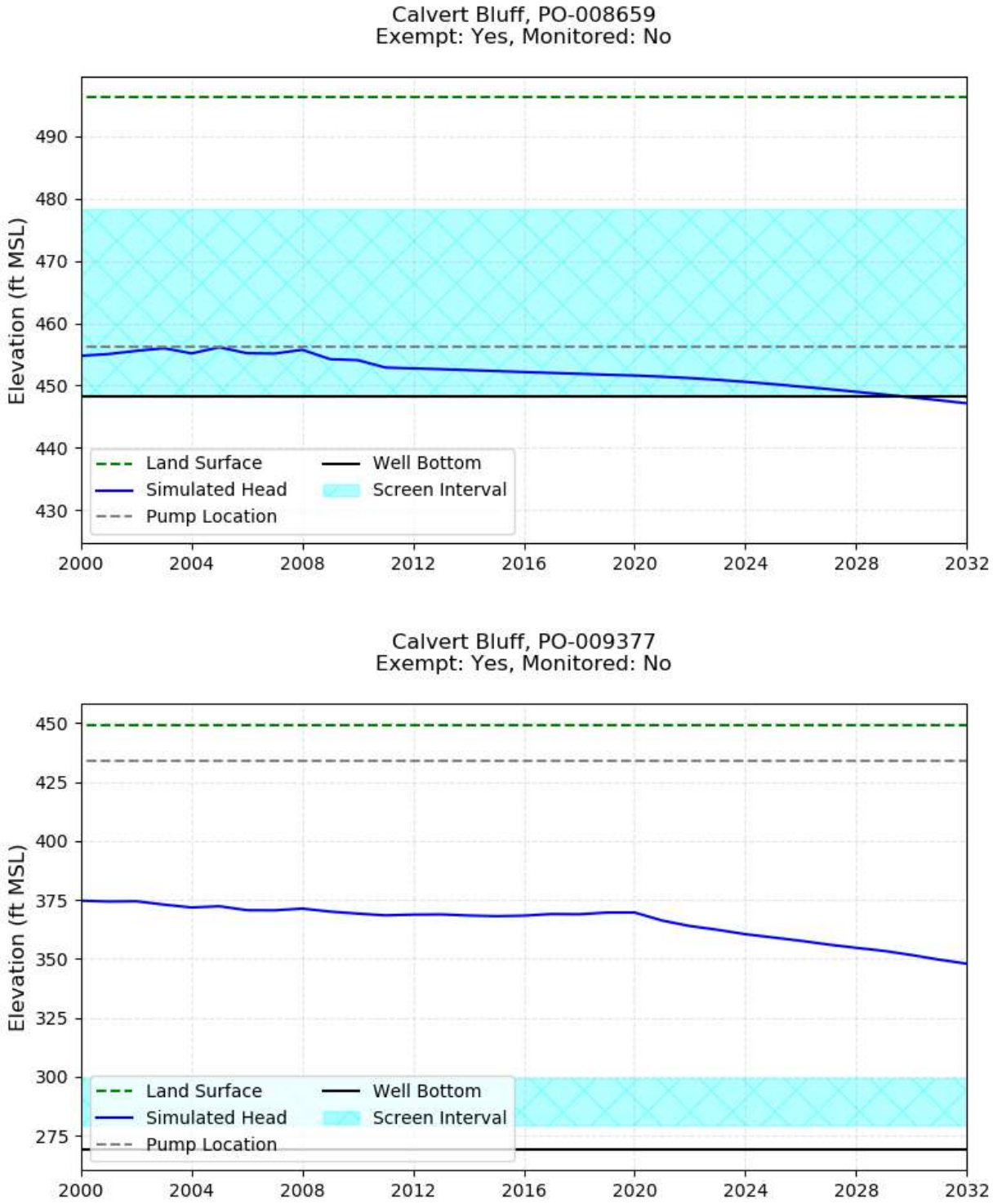


Figure D-20 Simulated water levels for exempt wells PO-008659 and PO-009377 located in the Calvert Bluff Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

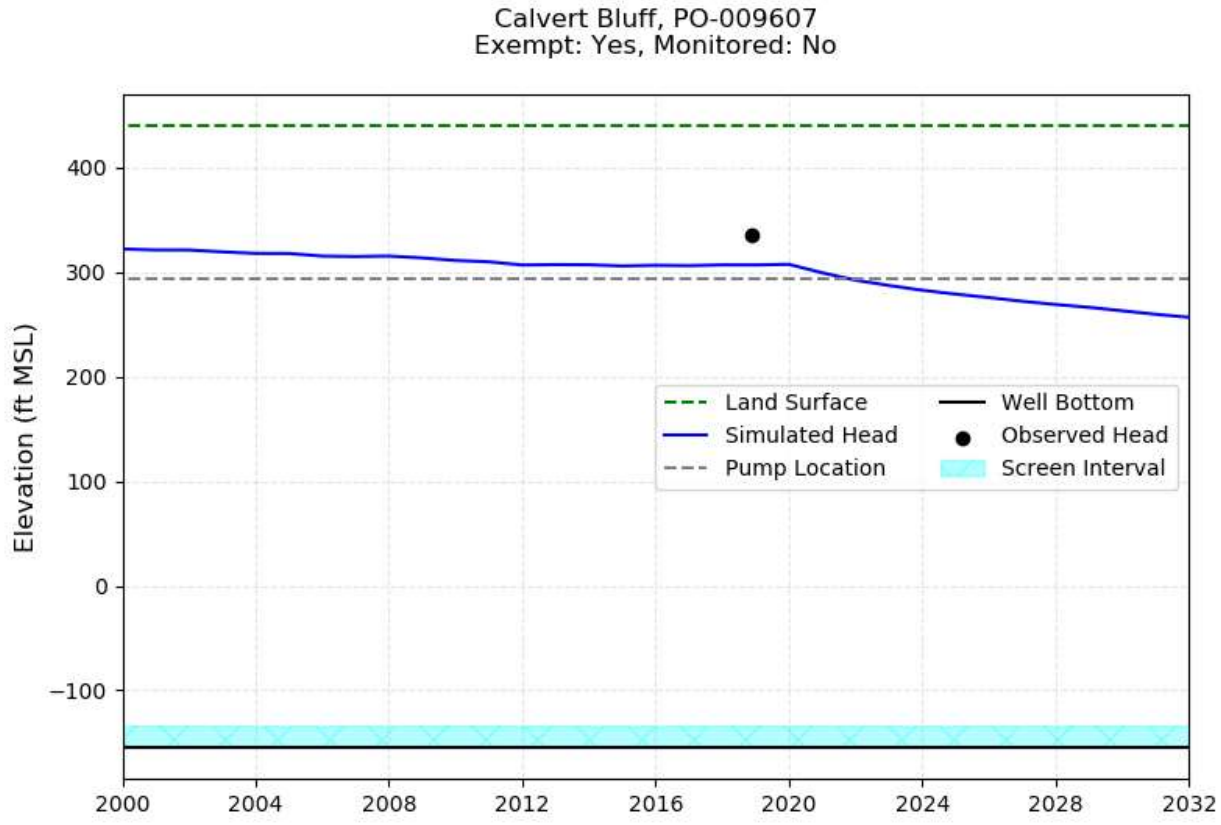


Figure D-21 Simulated water levels for exempt well PO-009607 located in the Calvert Bluff Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

APPENDIX E

Hydrographs of Wells where Modeled 2028 water levels are lower than the pump setting in Yegua Jackson Aquifer

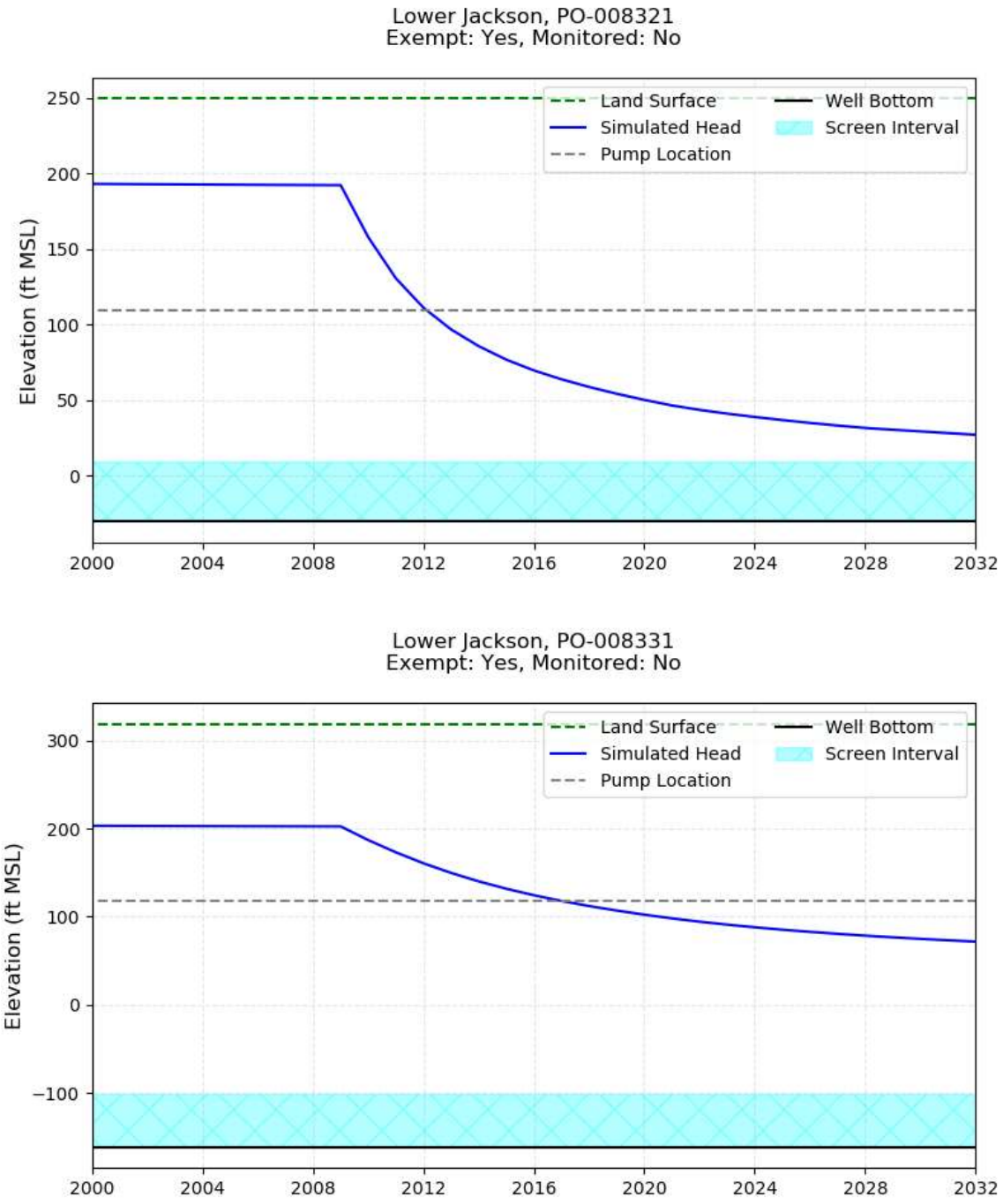


Figure E-1 Simulated water levels for exempt wells PO-008321 and PO-008331 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

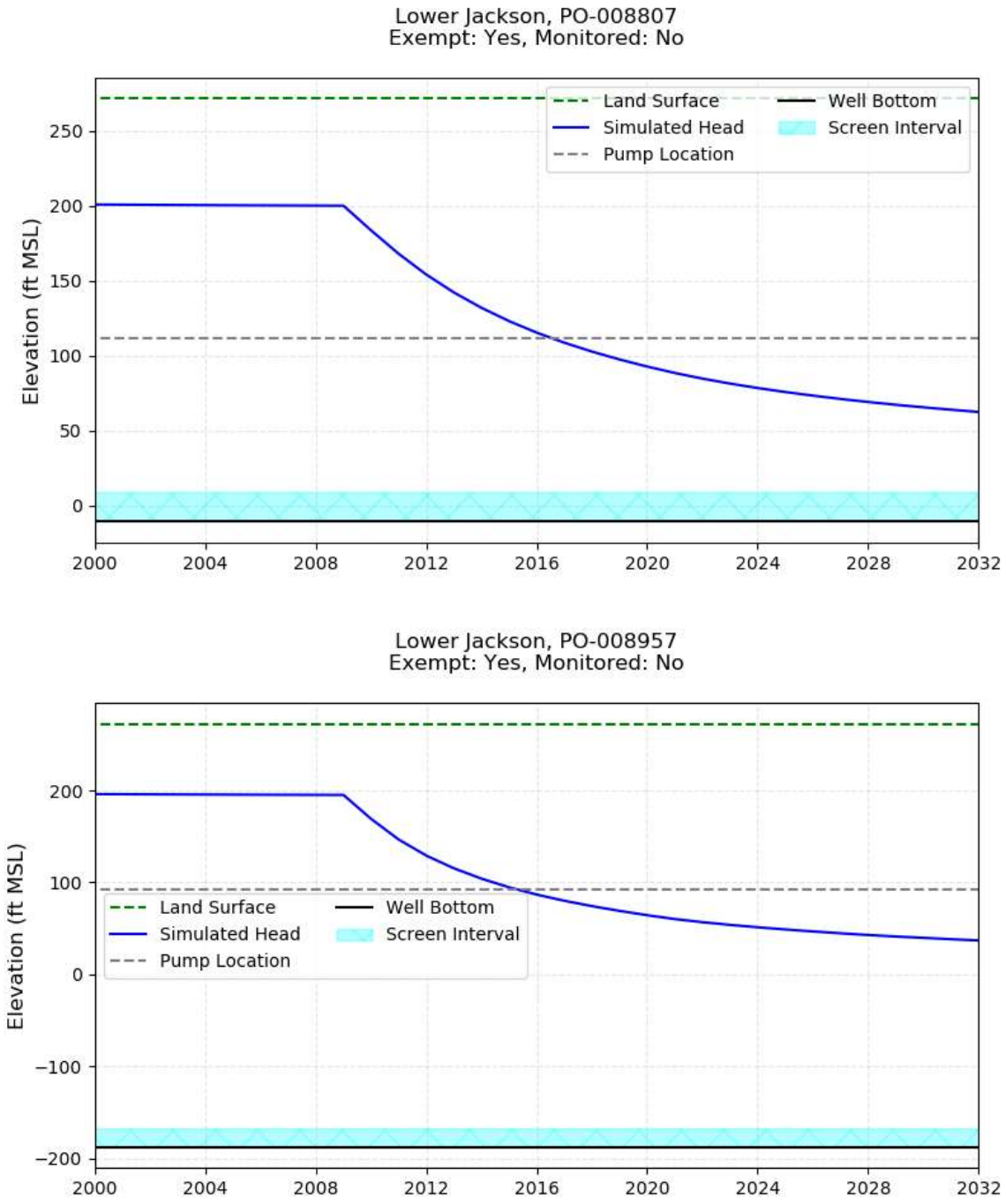


Figure E-2 Simulated water levels for exempt wells PO-008807 and PO-008957 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

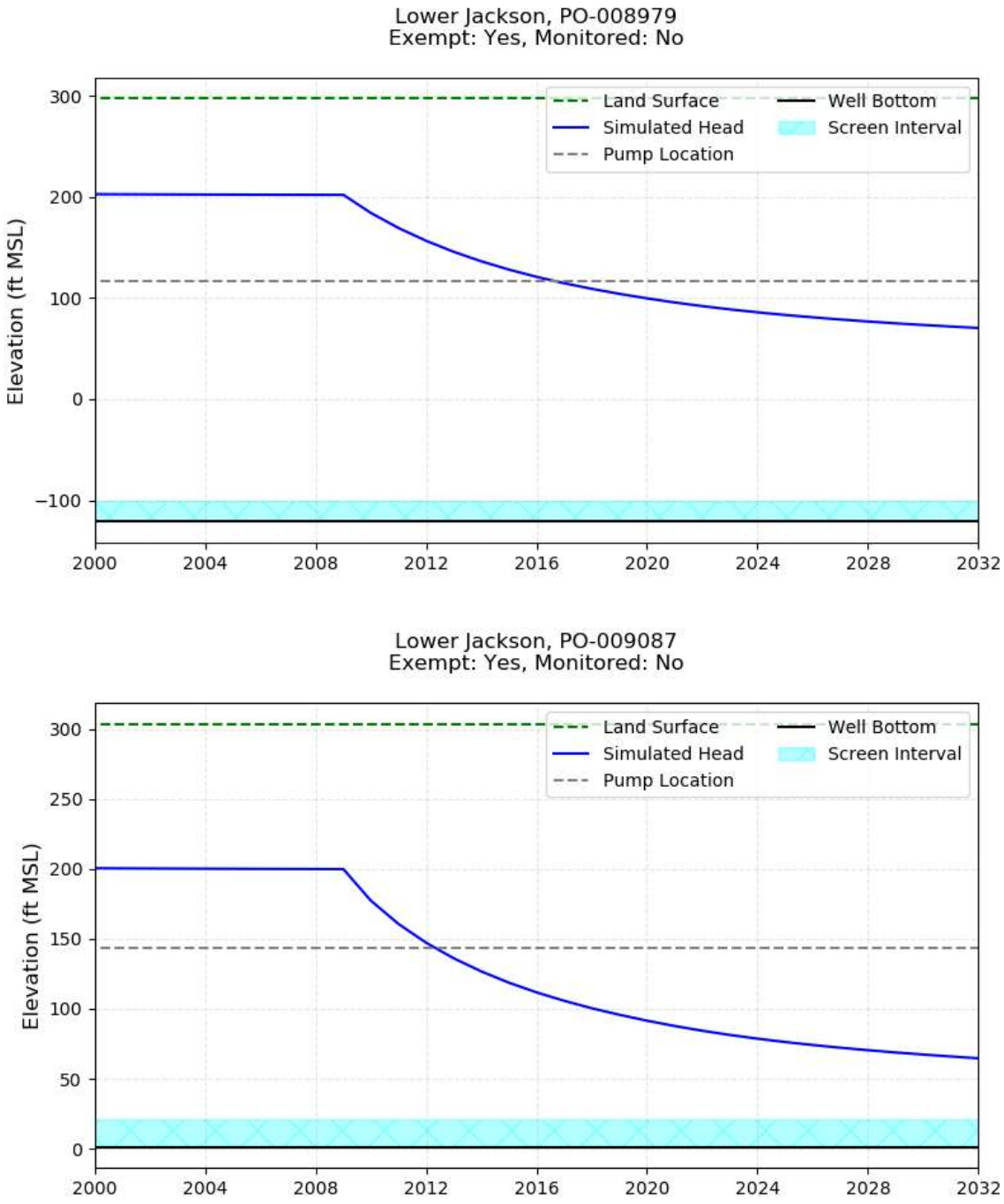


Figure E-3 Simulated water levels for exempt wells PO-008979 and PO-009087 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

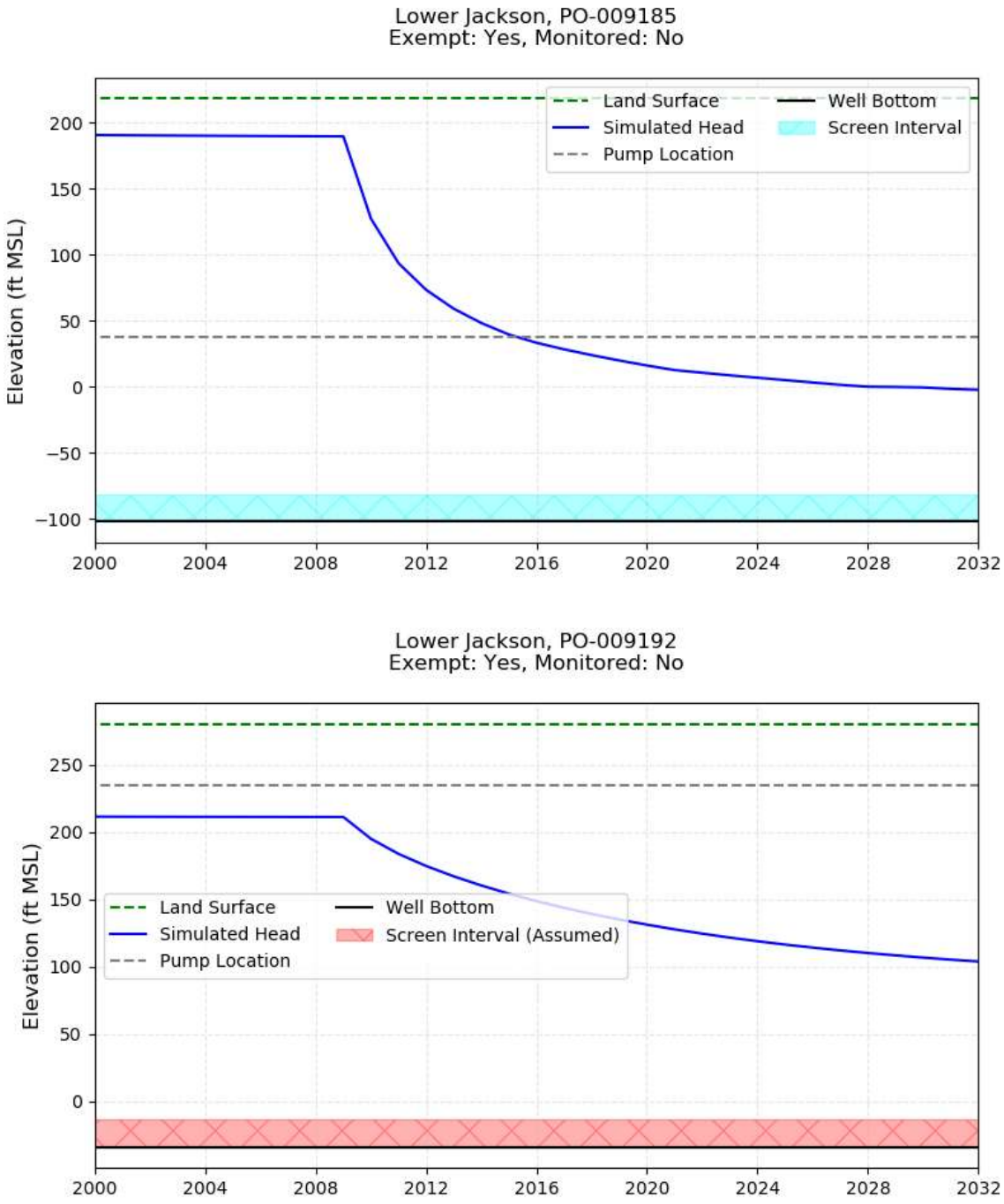


Figure E-4 Simulated water levels for exempt wells PO-009185 and PO-009192 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

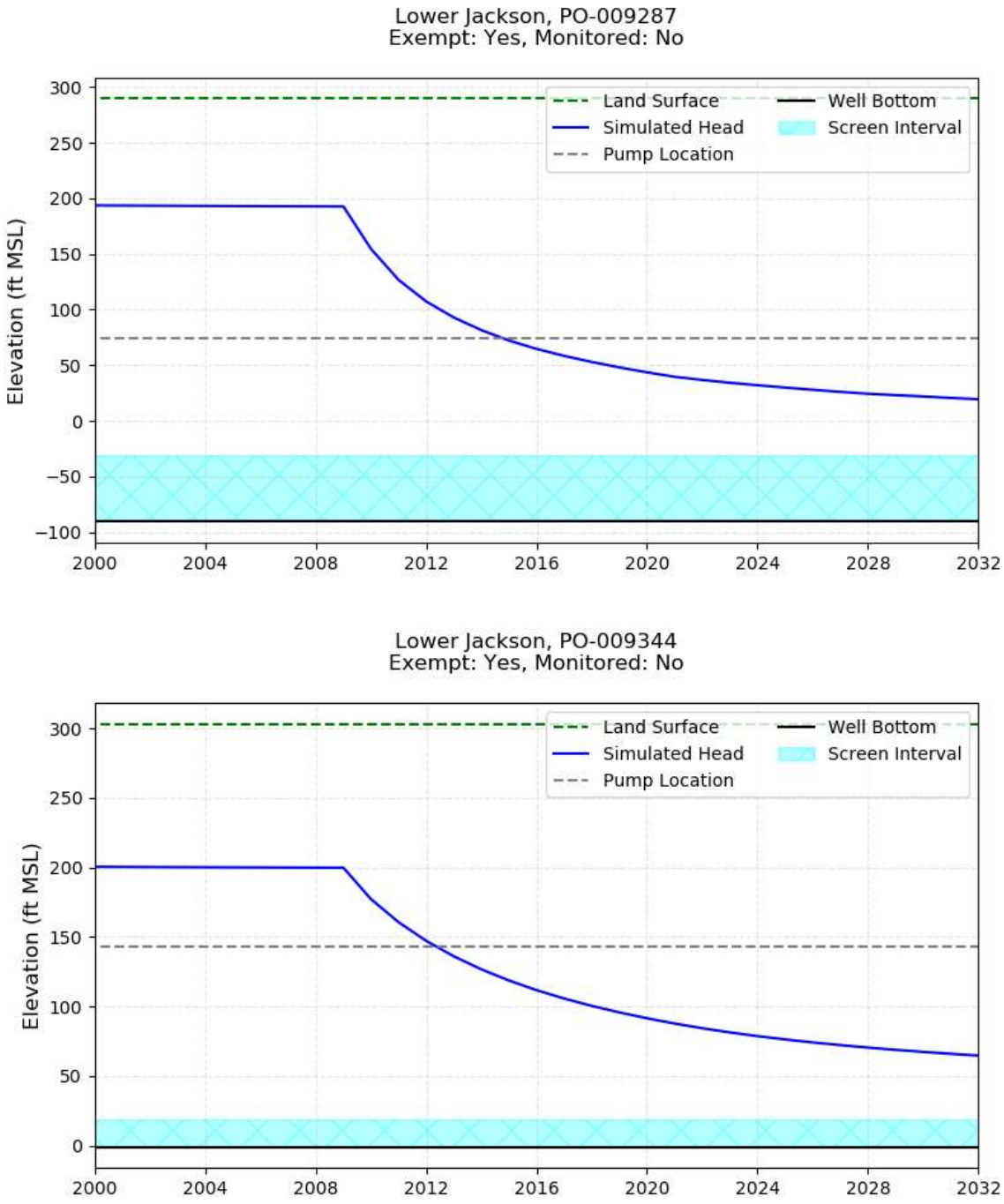


Figure E-5 Simulated water levels for exempt wells PO-009287 and PO-009344 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

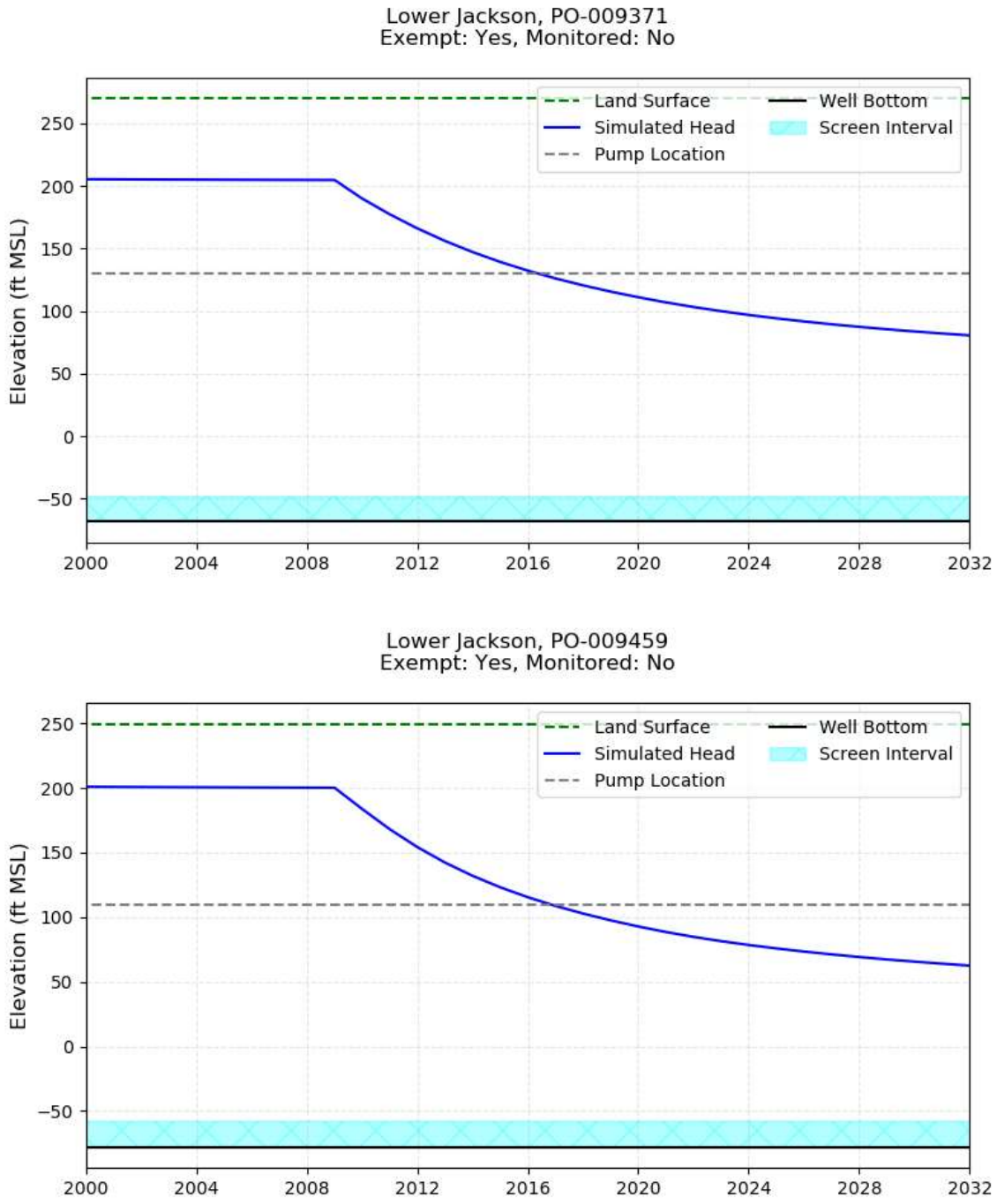


Figure E-6 Simulated water levels for exempt wells PO-009371 and PO-009459 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

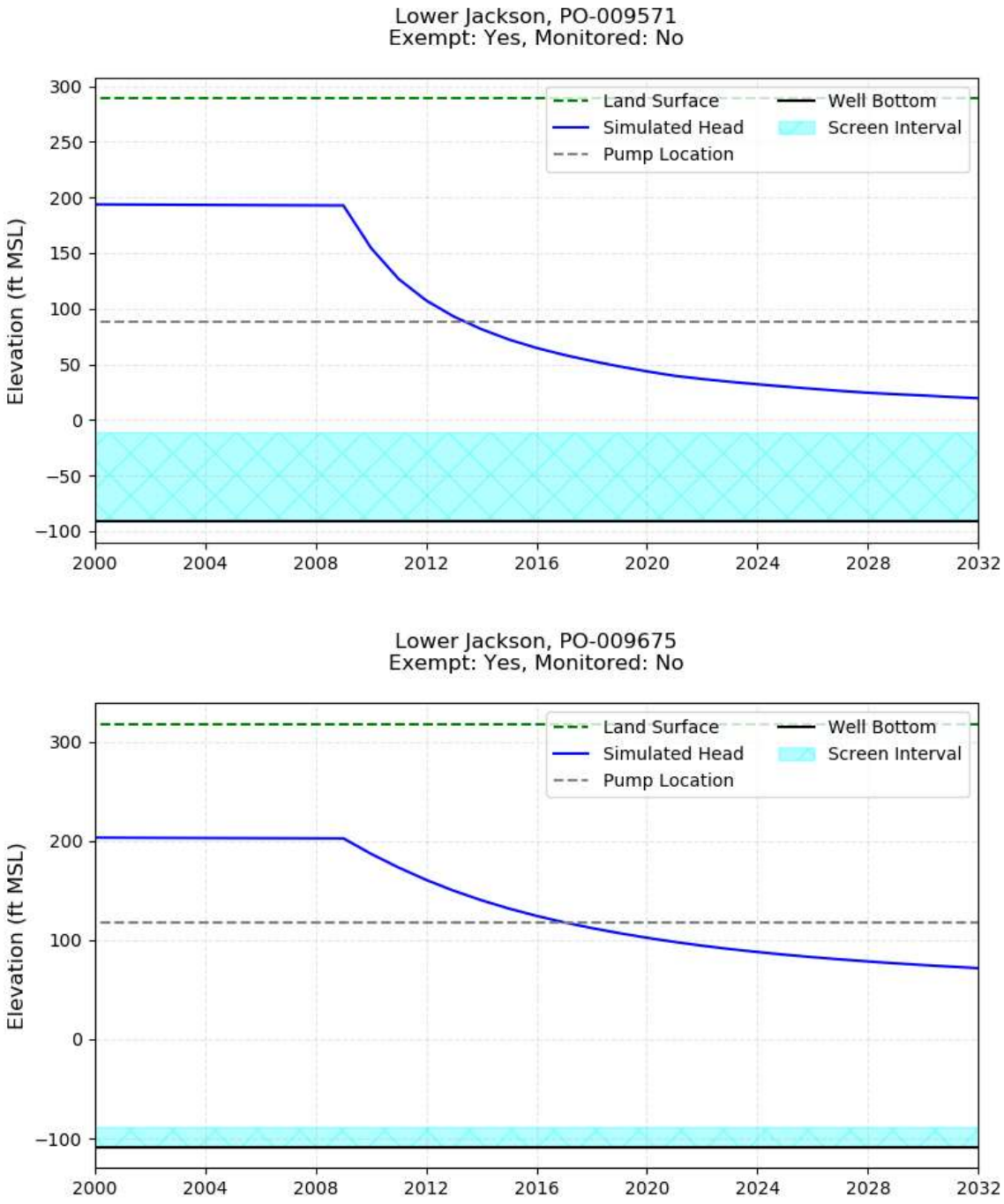


Figure E-7 Simulated water levels for exempt wells PO-009571 and PO-009675 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

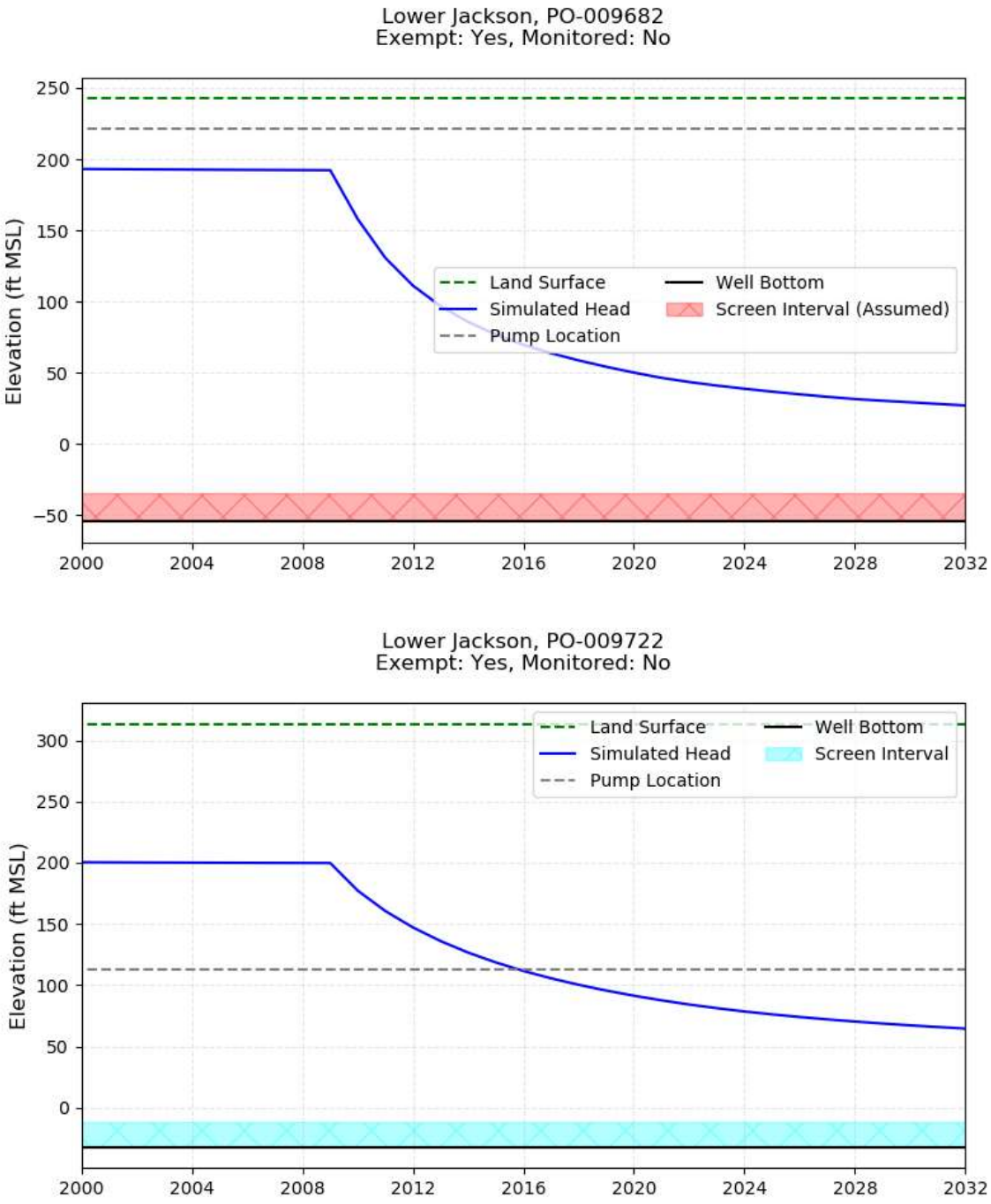


Figure E-8 Simulated water levels for exempt wells PO-009682 and PO-009722 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

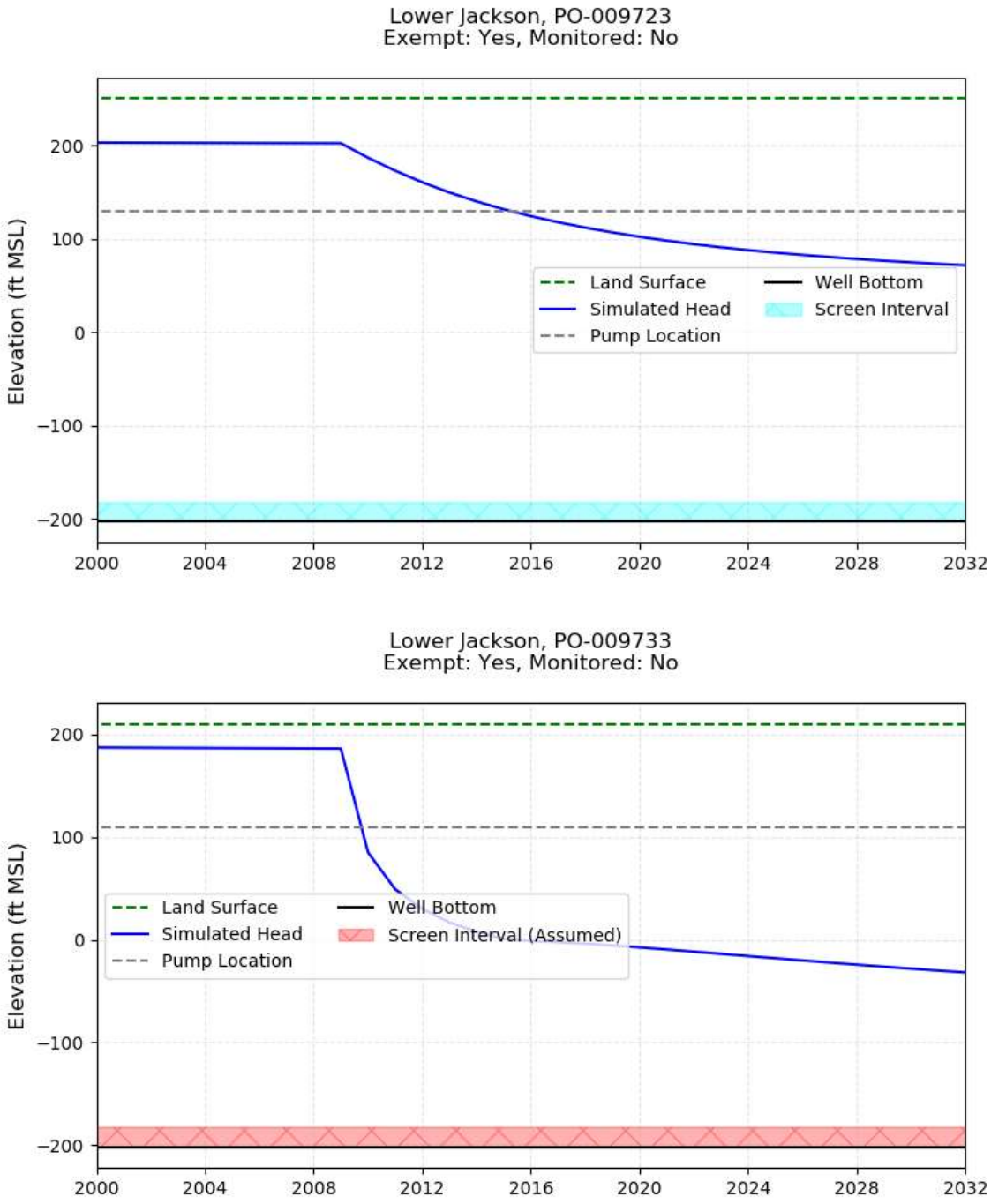


Figure E-9 Simulated water levels for exempt wells PO-009723 and PO-009733 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

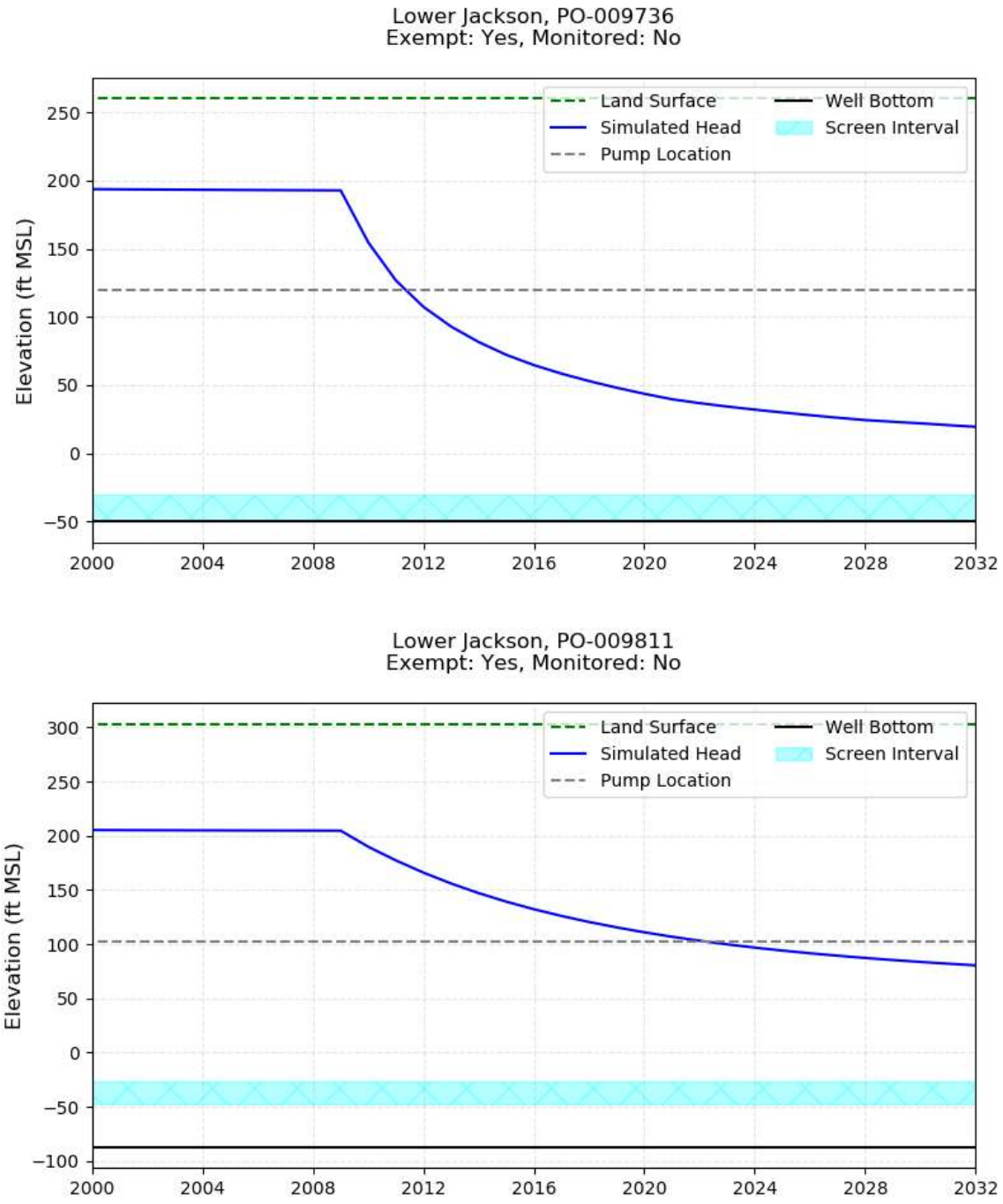


Figure E-10 Simulated water levels for exempt wells PO-009736 and PO-009811 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

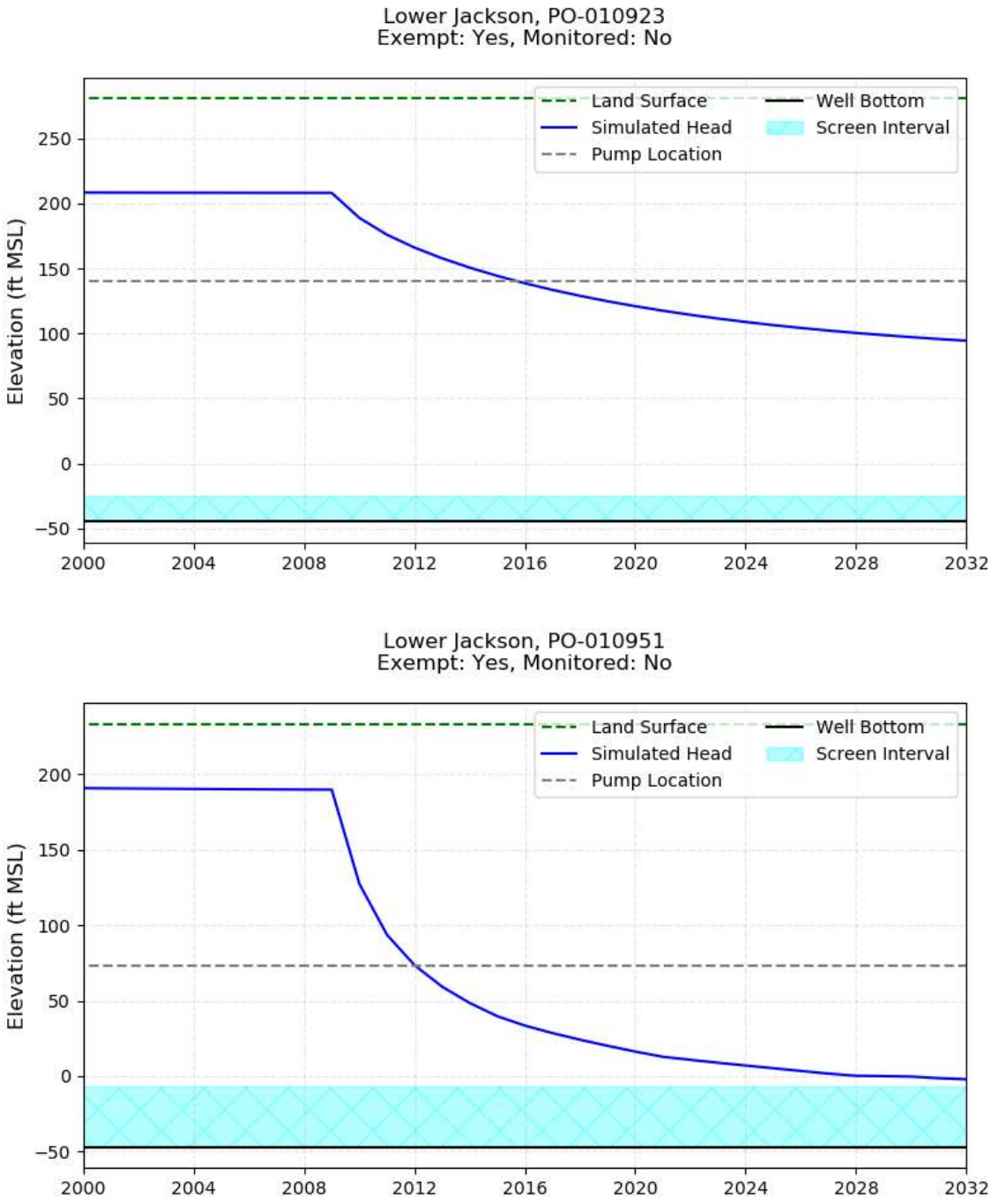


Figure E-11 Simulated water levels for exempt wells PO-010923 and PO-010951 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

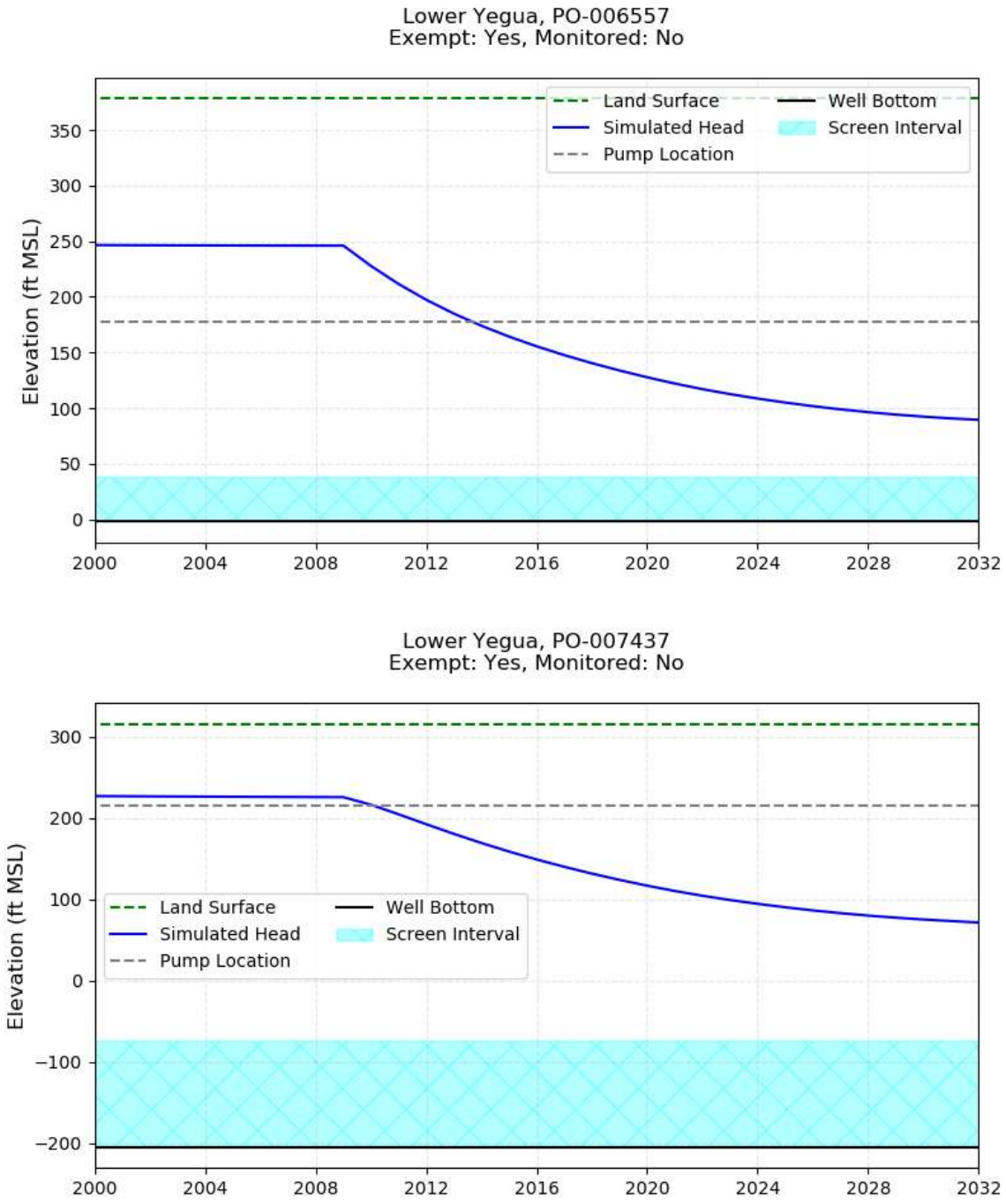


Figure E-12 Simulated water levels for exempt wells PO-006557 and PO-007437 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

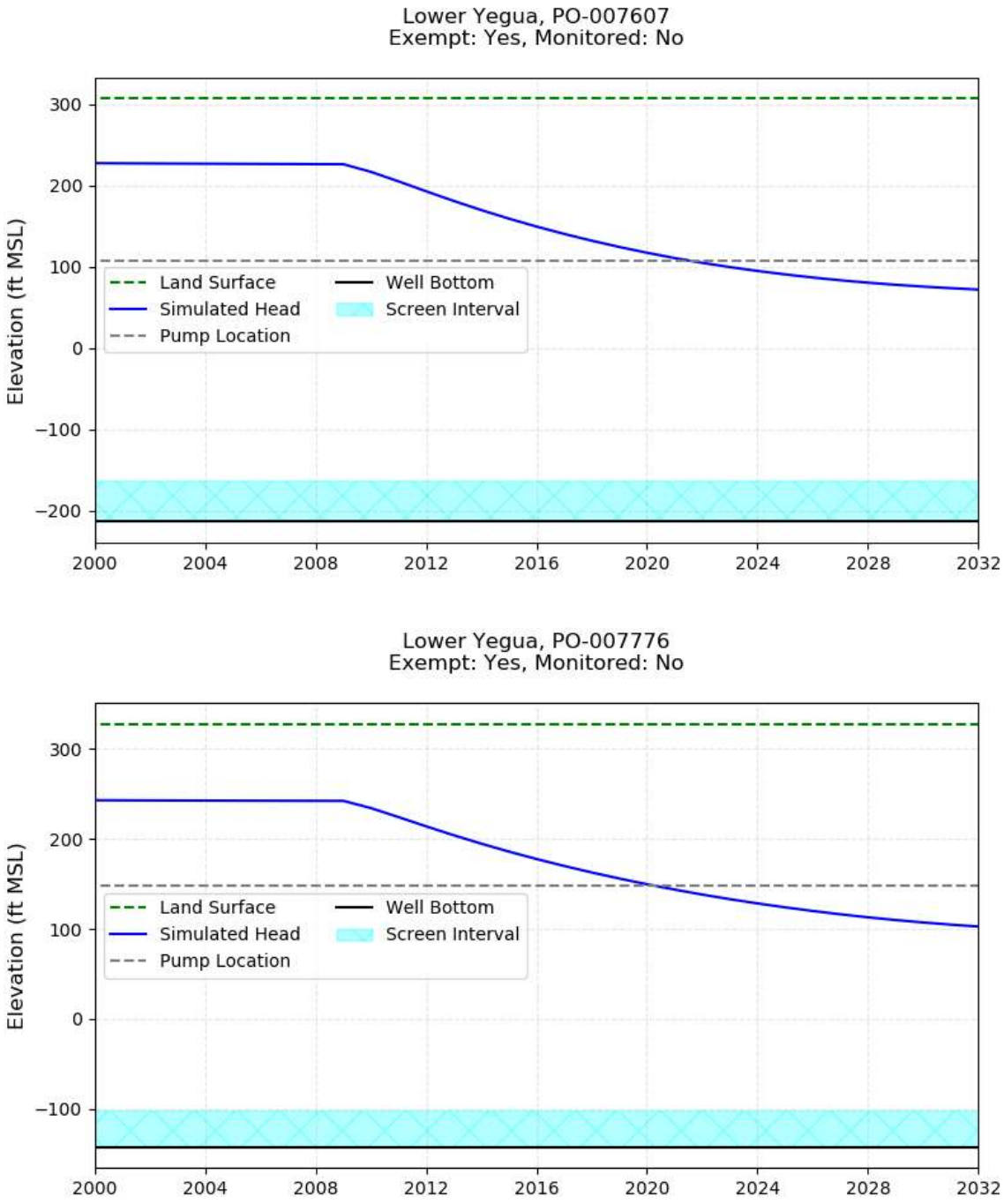


Figure E-13 Simulated water levels for exempt wells PO-007607 and PO-007776 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

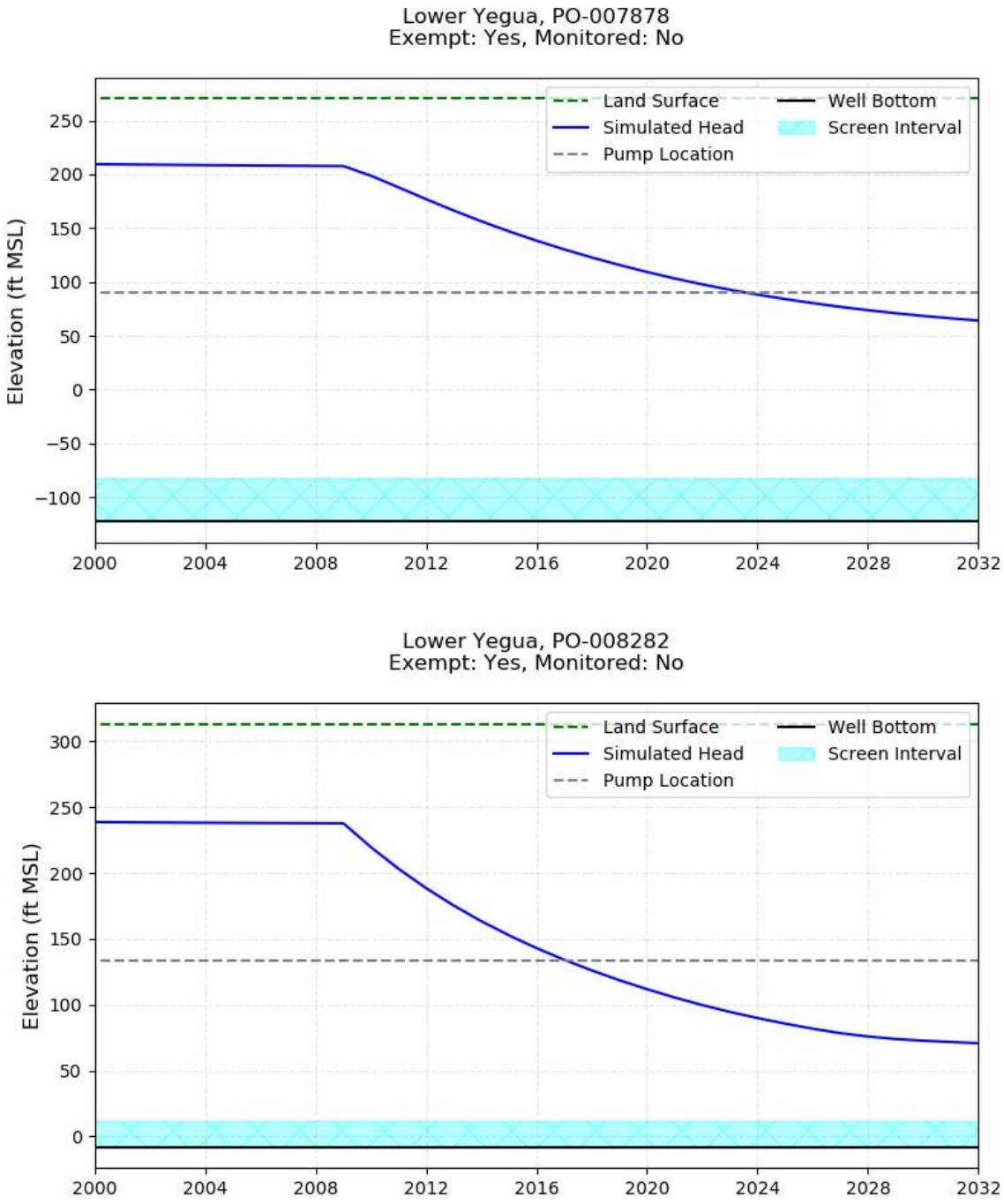


Figure E-14 Simulated water levels for exempt wells PO-007878 and PO-008282 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

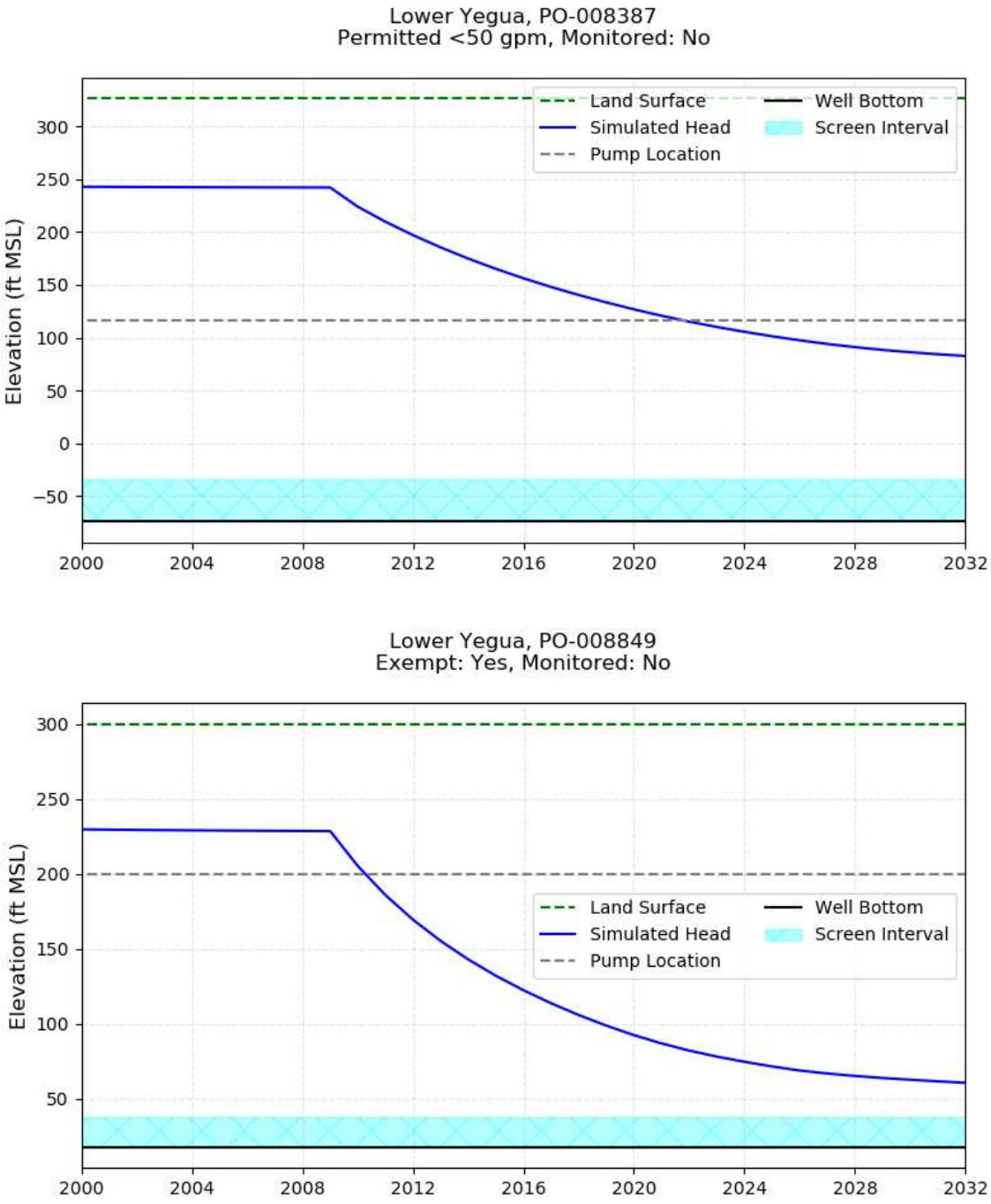


Figure E-15 Simulated water levels for exempt wells PO-008387 and PO-008849 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

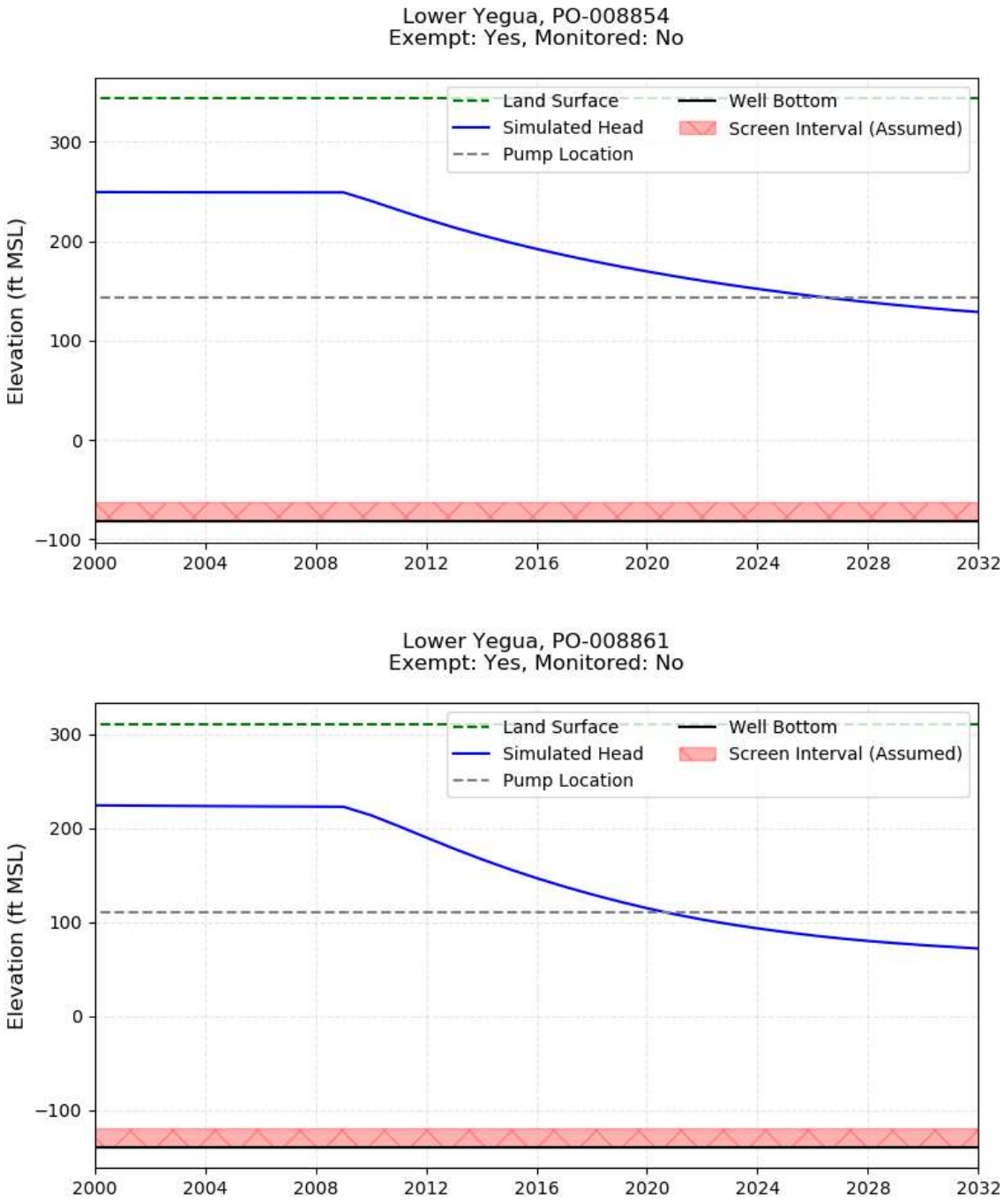


Figure E-16 Simulated water levels for exempt wells PO-008854 and PO-008861 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

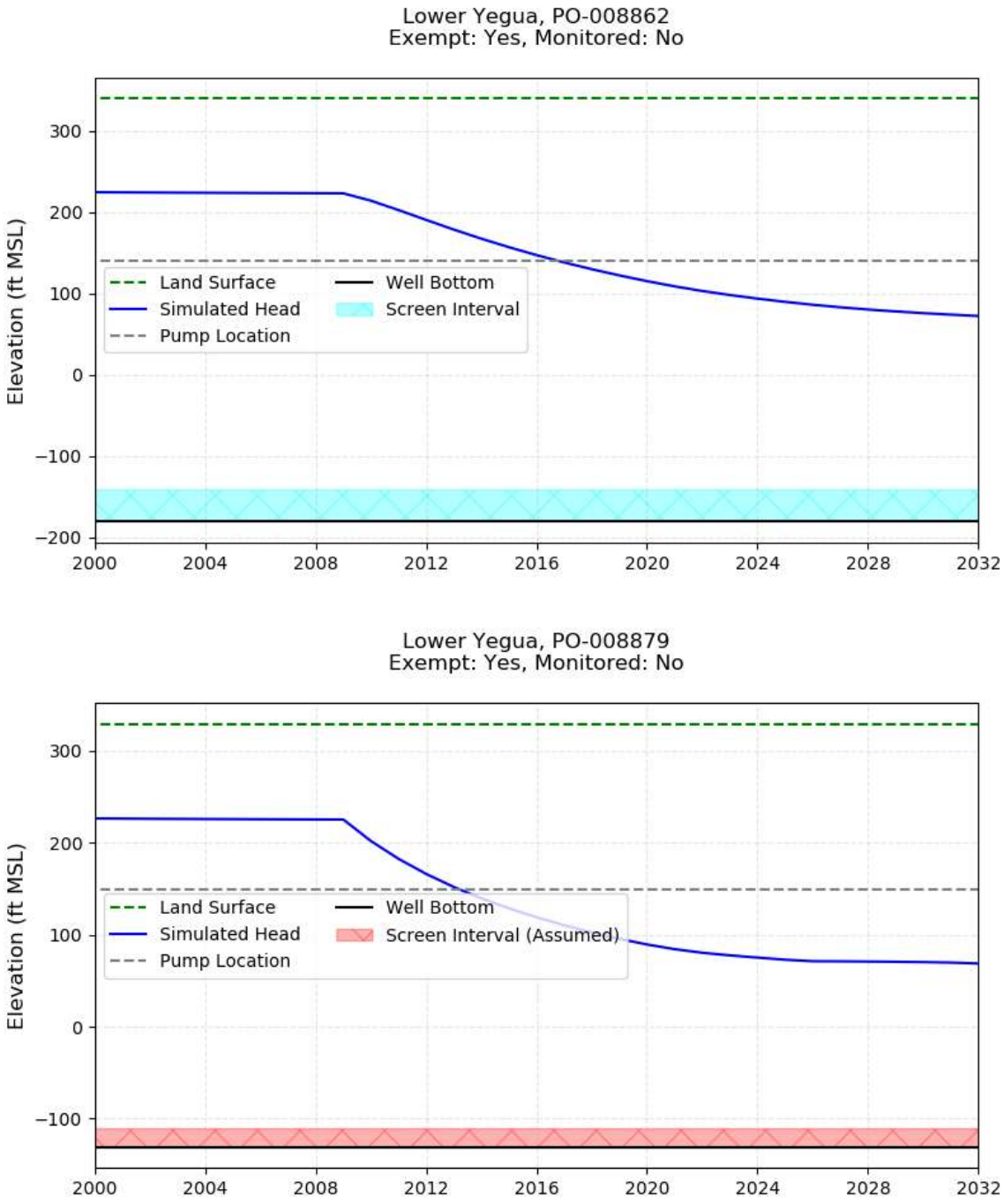


Figure E-17 Simulated water levels for exempt wells PO-008862 and PO-008879 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

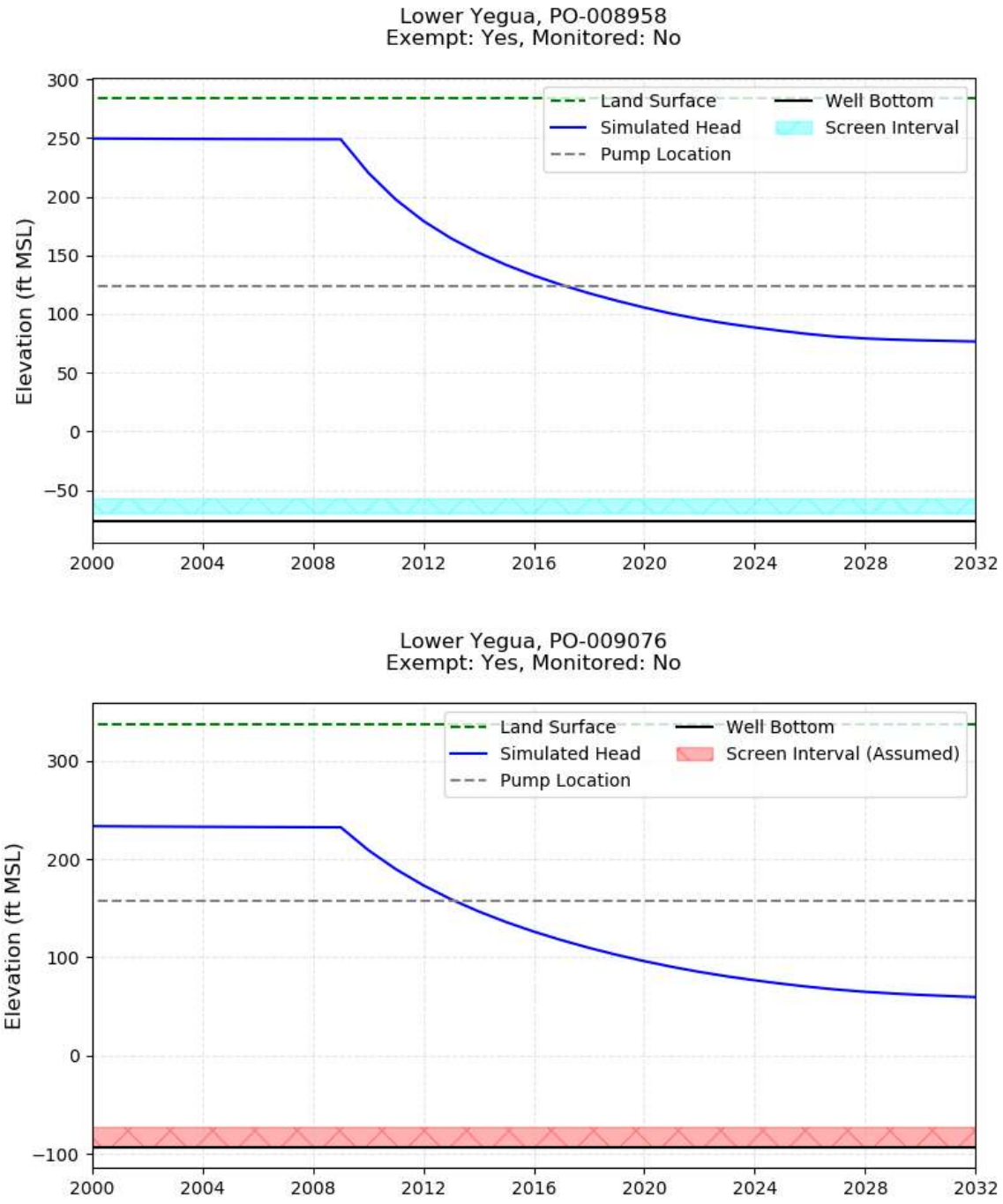


Figure E-18 Simulated water levels for exempt wells PO-008958 and PO-009076 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

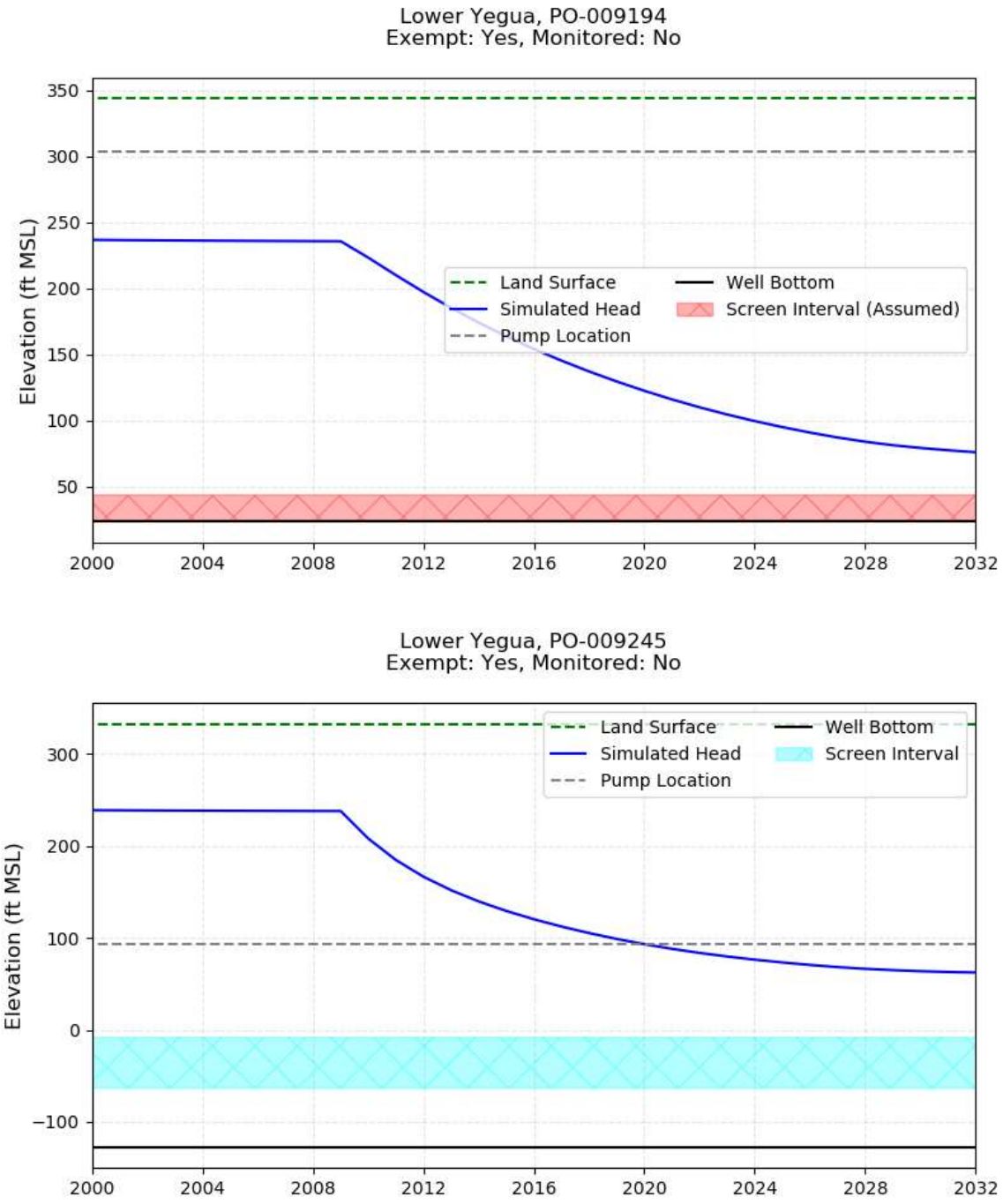


Figure E-19 Simulated water levels for exempt wells PO-009194 and PO-009245 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

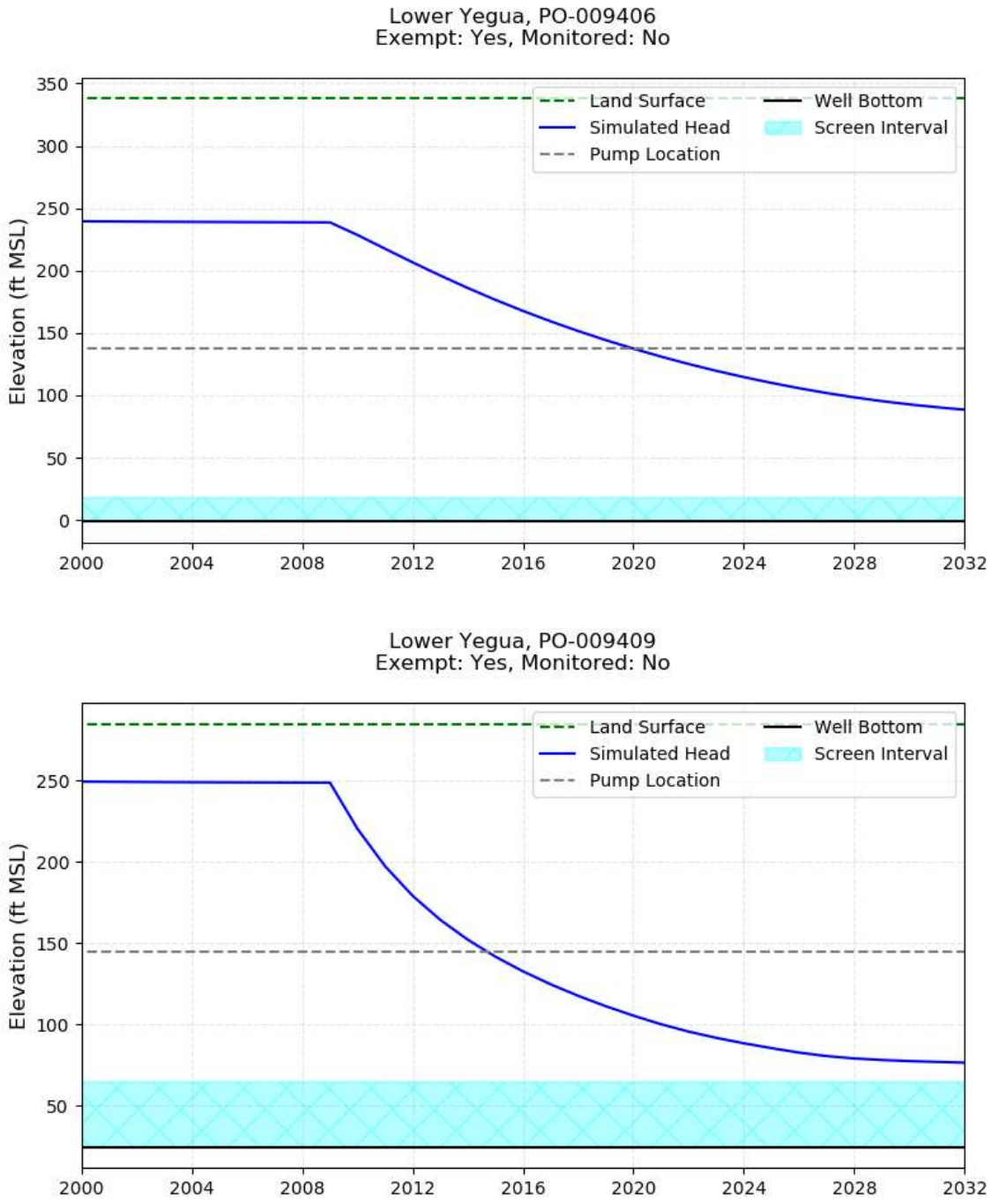


Figure E-20 Simulated water levels for exempt wells PO-009406 and PO-009409 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

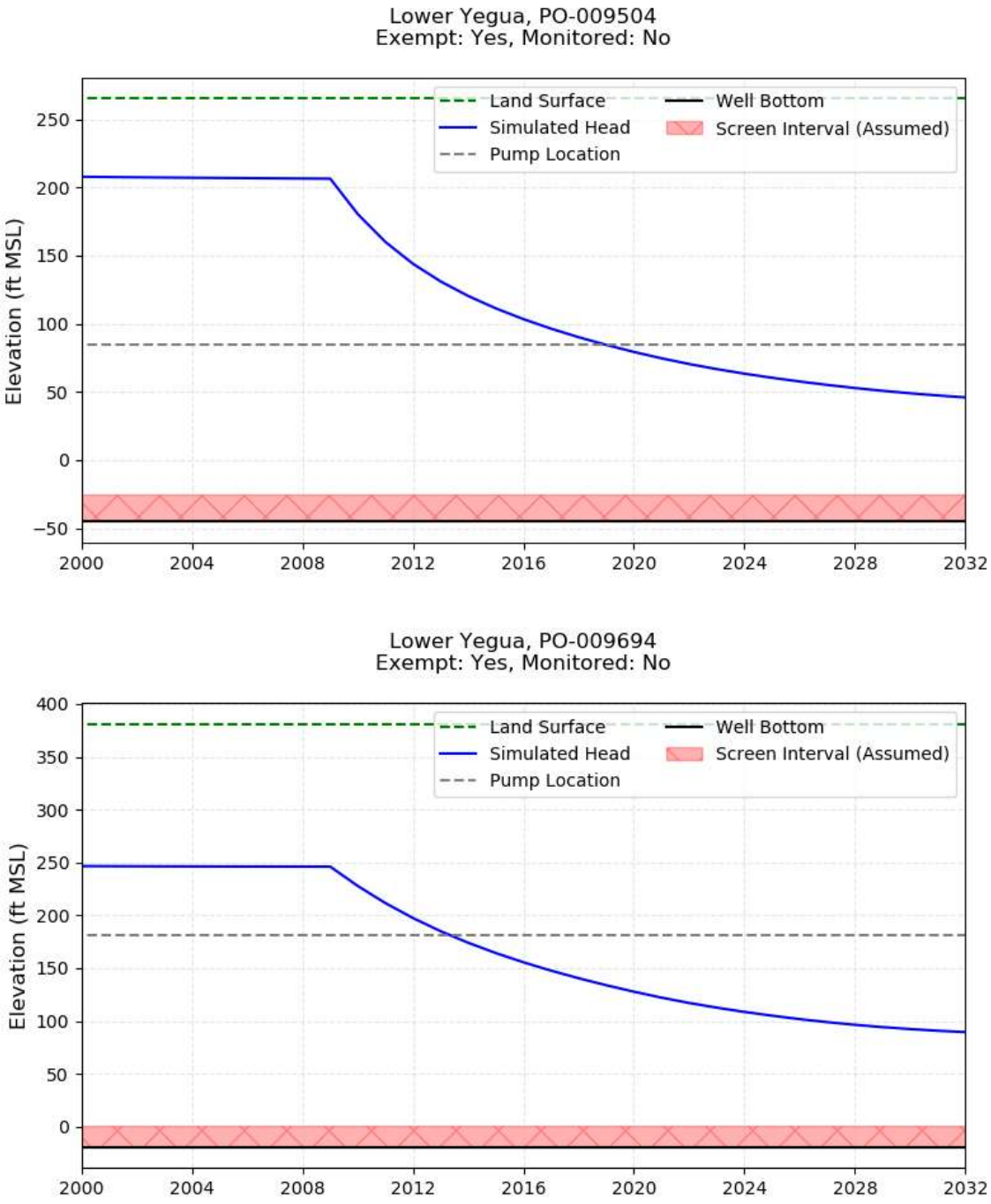


Figure E-21 Simulated water levels for exempt wells PO-009504 and PO-009694 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

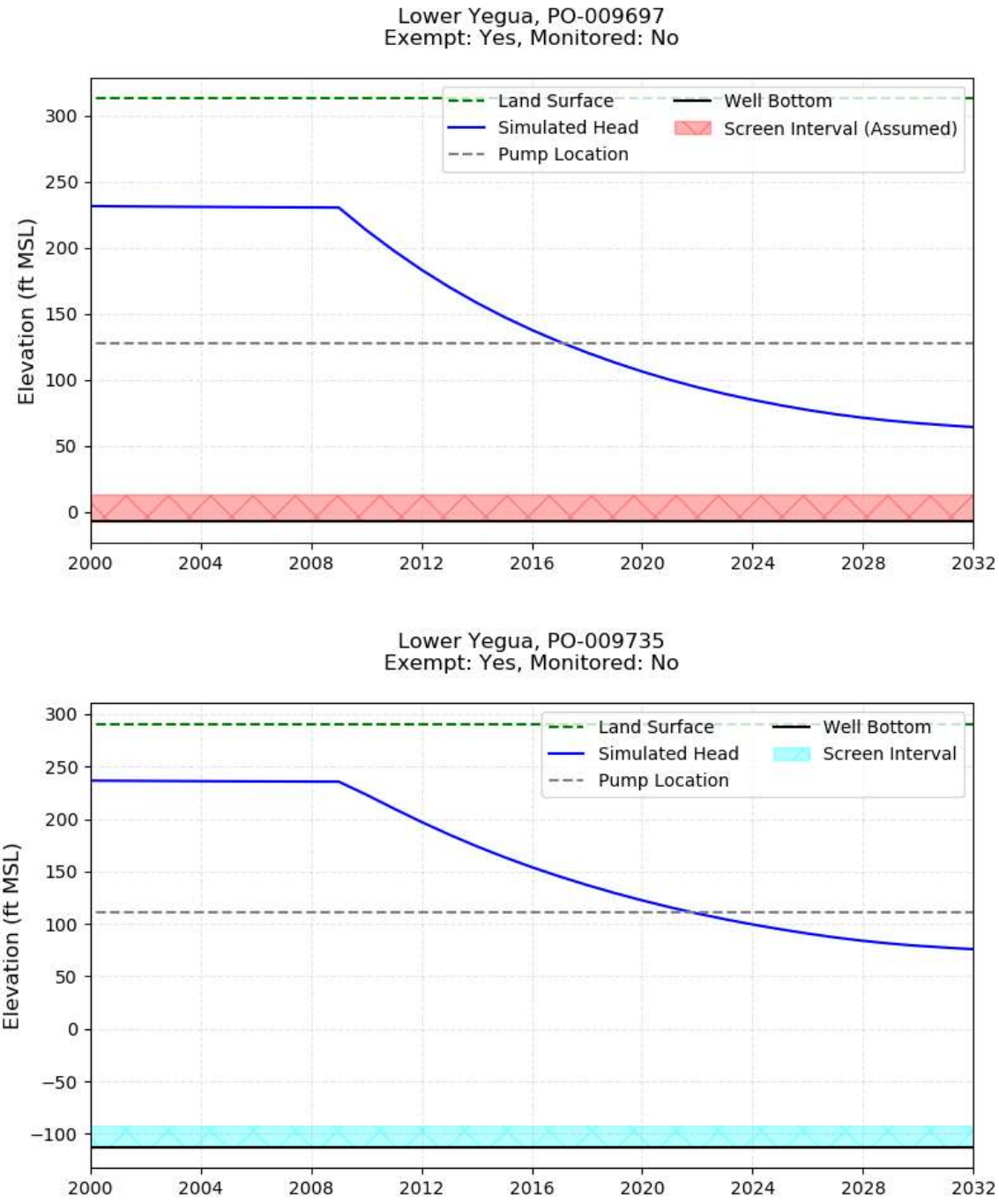


Figure E-22 Simulated water levels for exempt wells PO-009697 and PO-009765 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

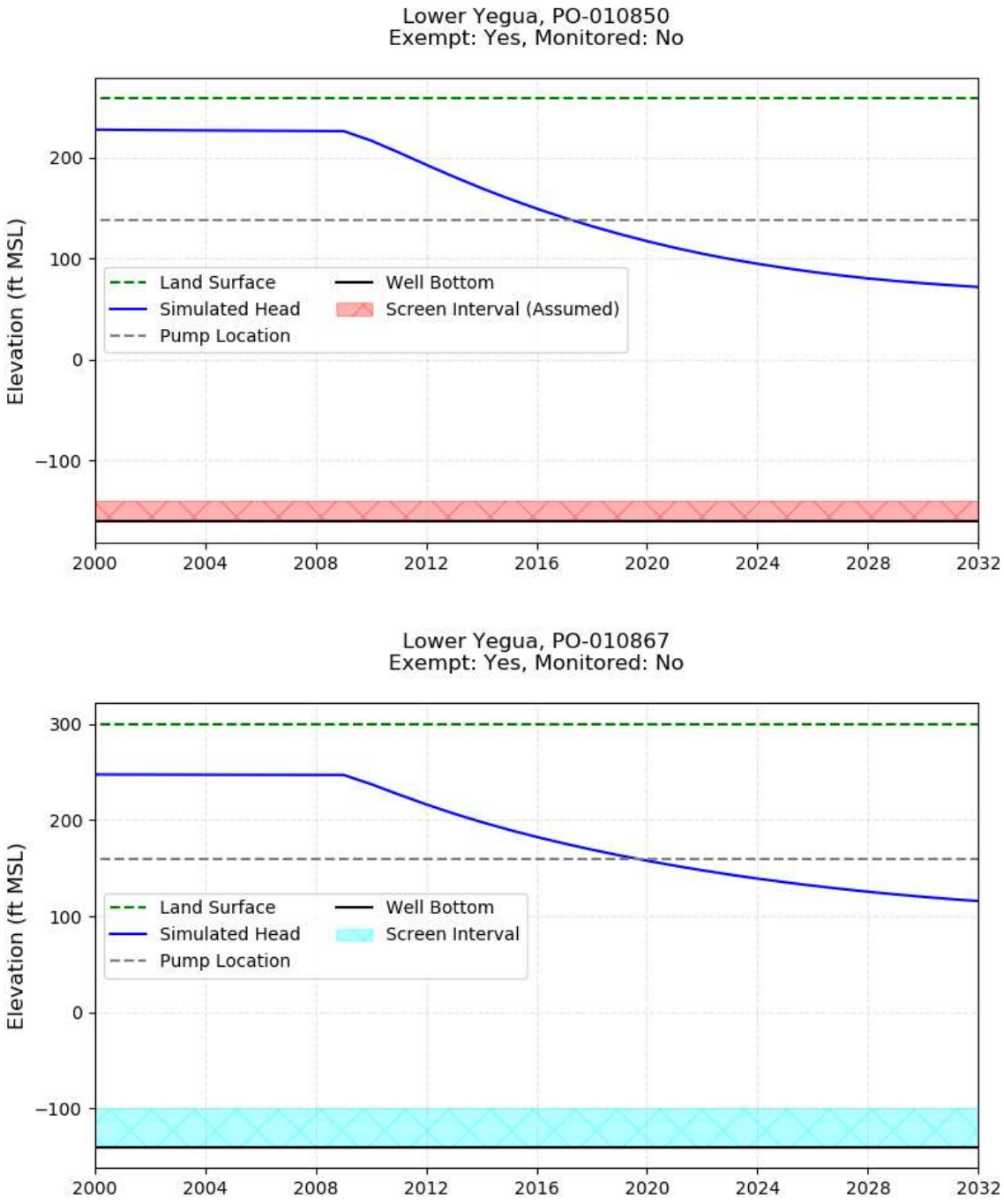


Figure E-23 Simulated water levels for exempt wells PO-010850 and PO-010867 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

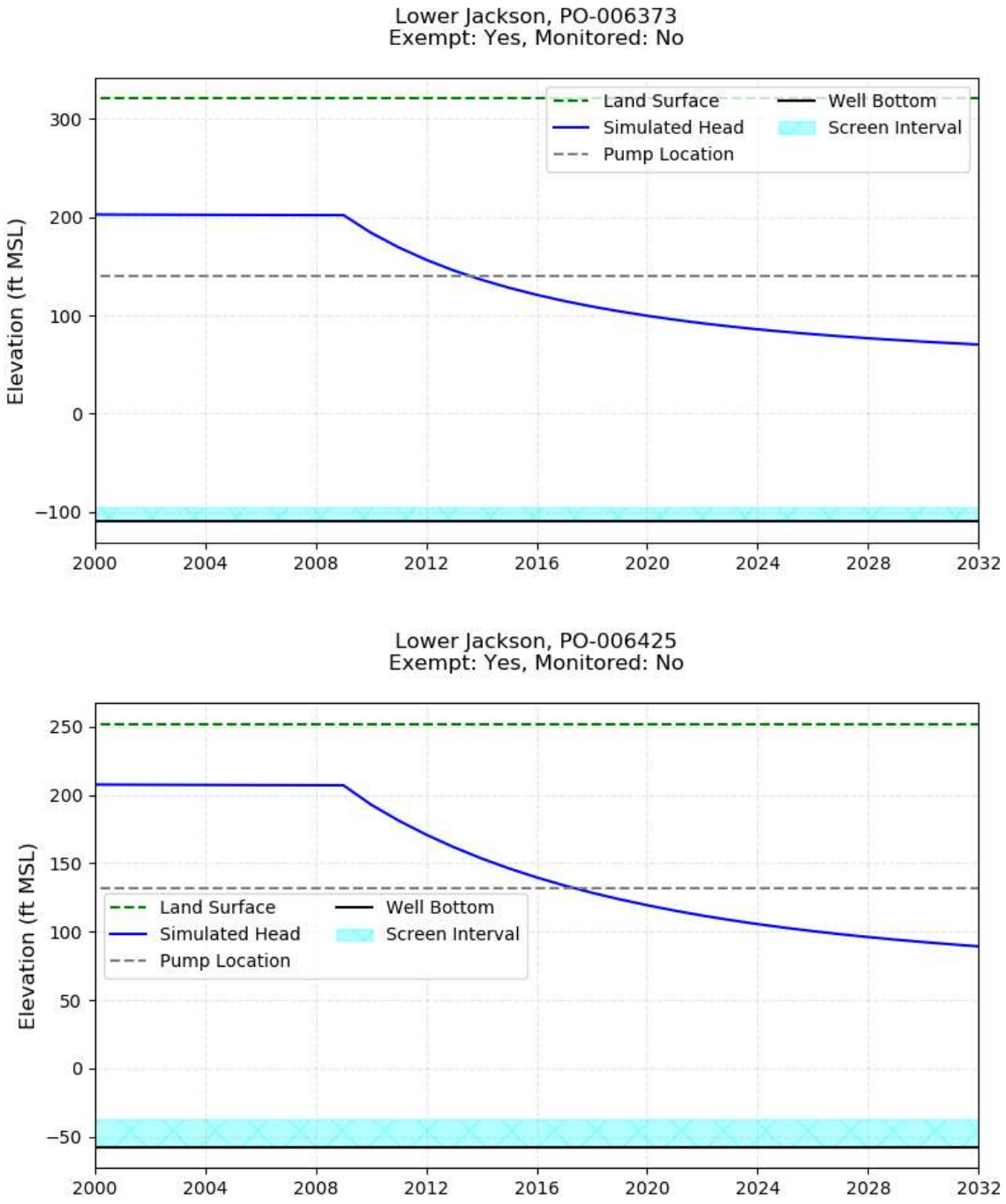


Figure E-24 Simulated water levels for exempt wells PO-006373 and PO-006425 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

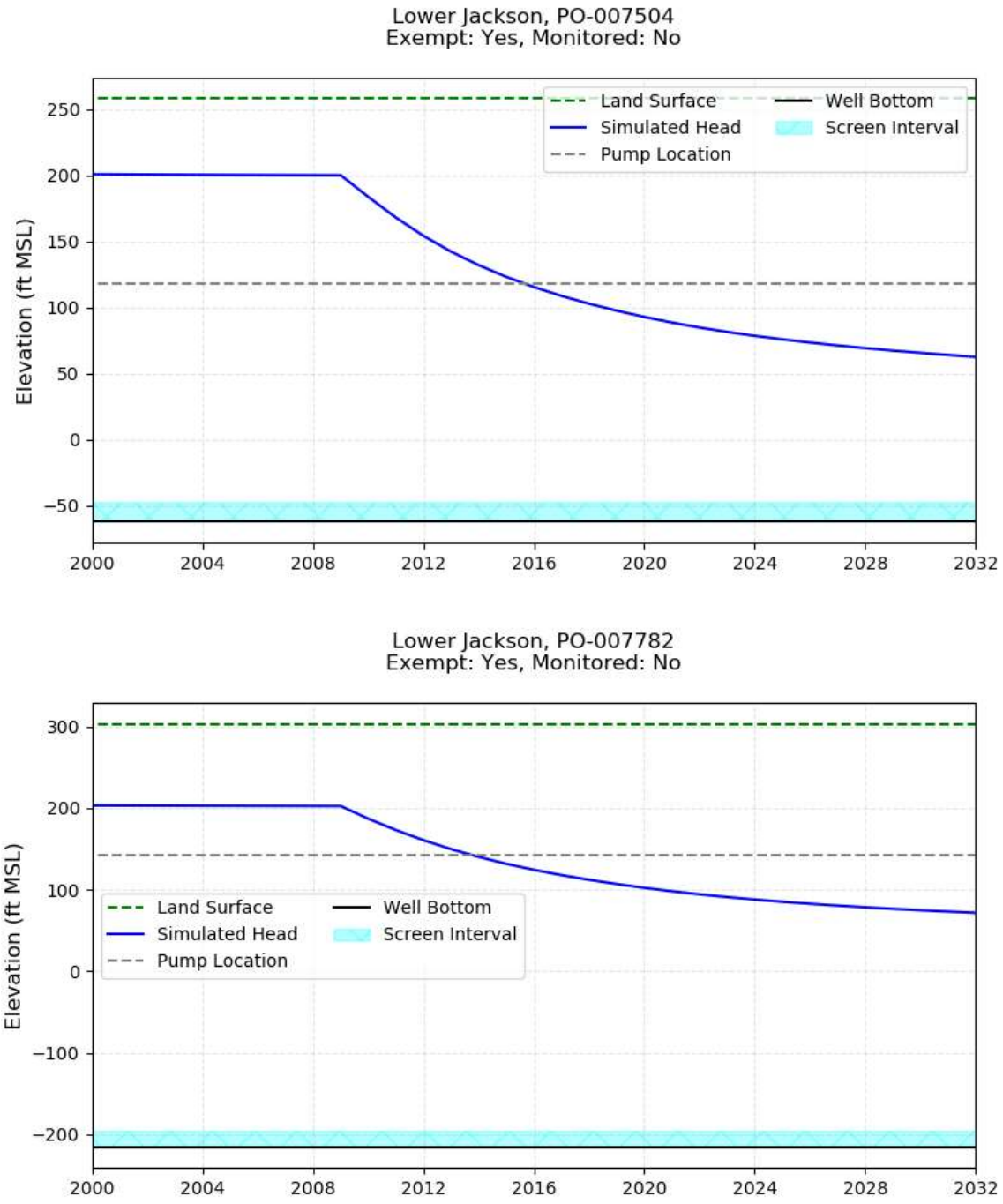


Figure E-25 Simulated water levels for exempt wells PO-007504 and PO-007782 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

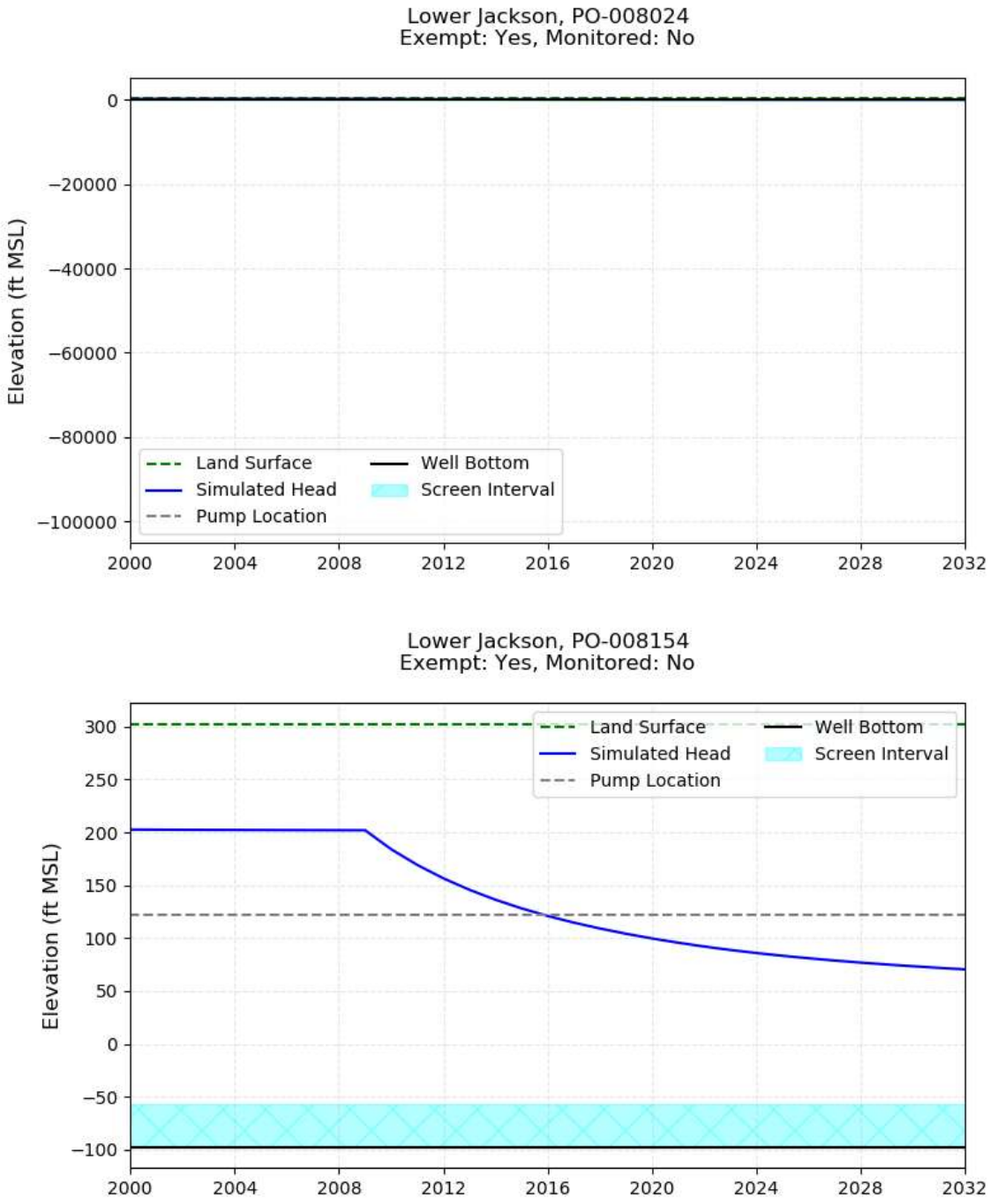


Figure E-26 Simulated water levels for exempt wells PO-008024 and PO-008154 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

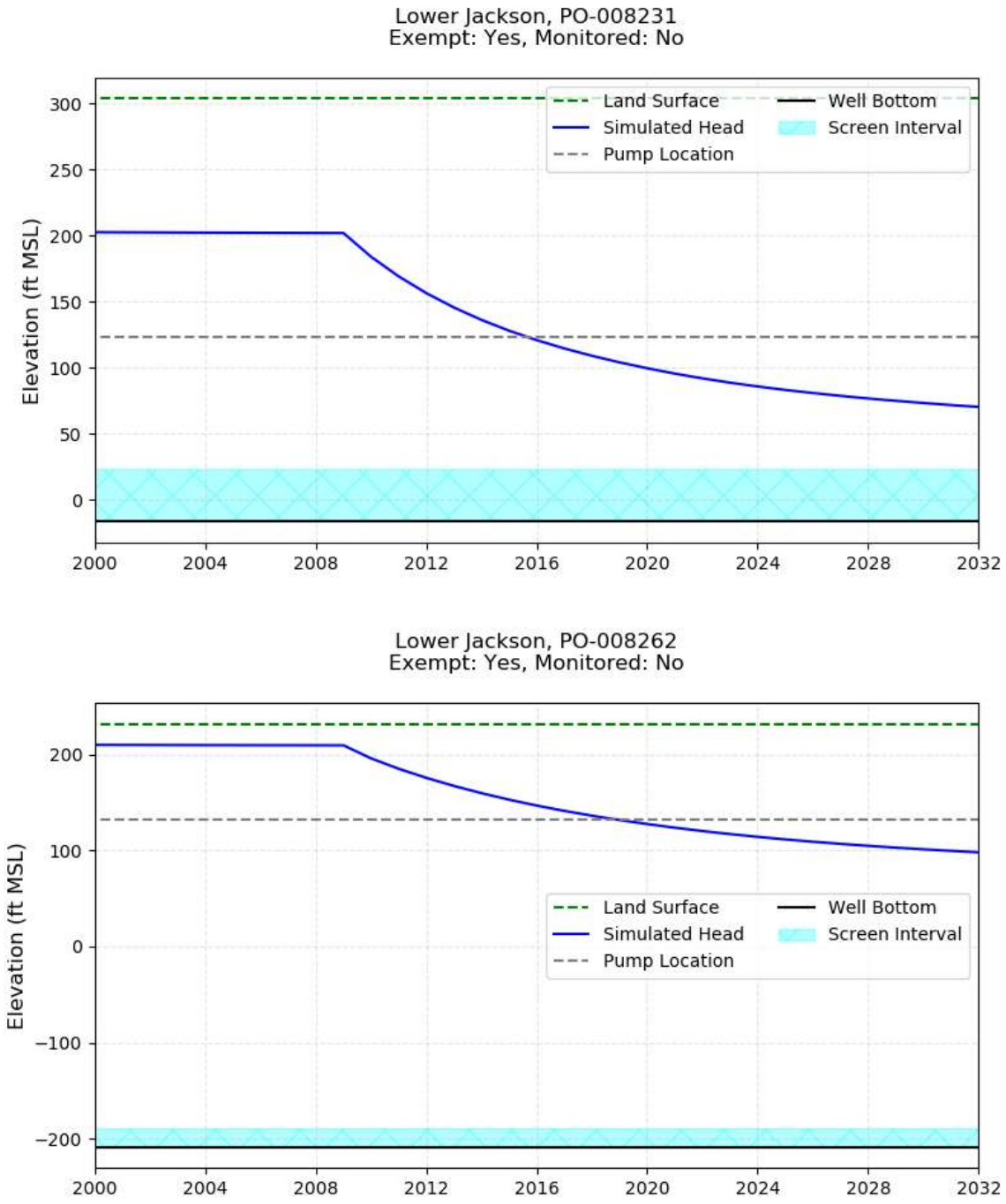


Figure E-27 Simulated water levels for exempt wells PO-008231 and PO-008262 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

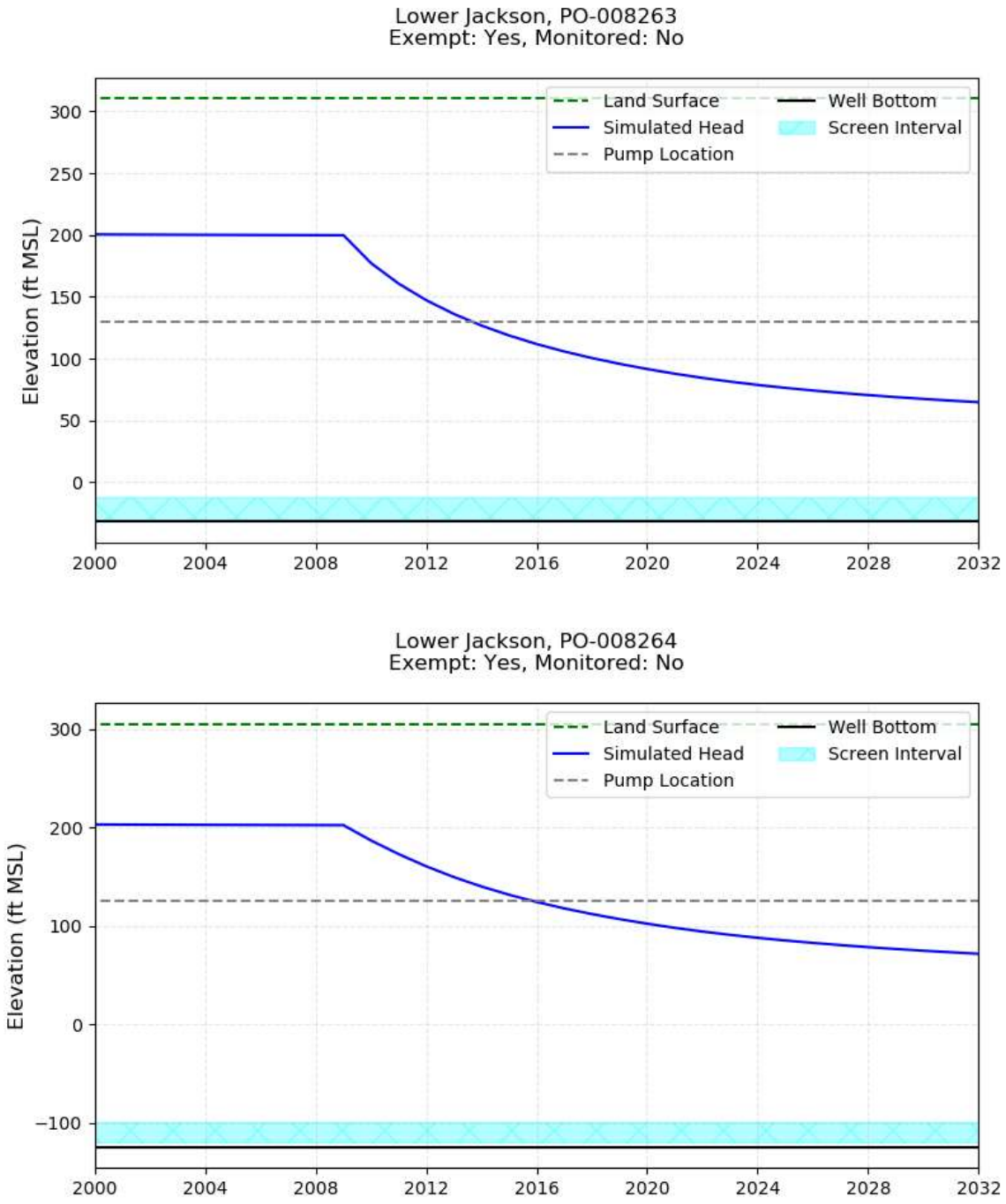


Figure E-28 Simulated water levels for exempt wells PO-008263 and PO-008264 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

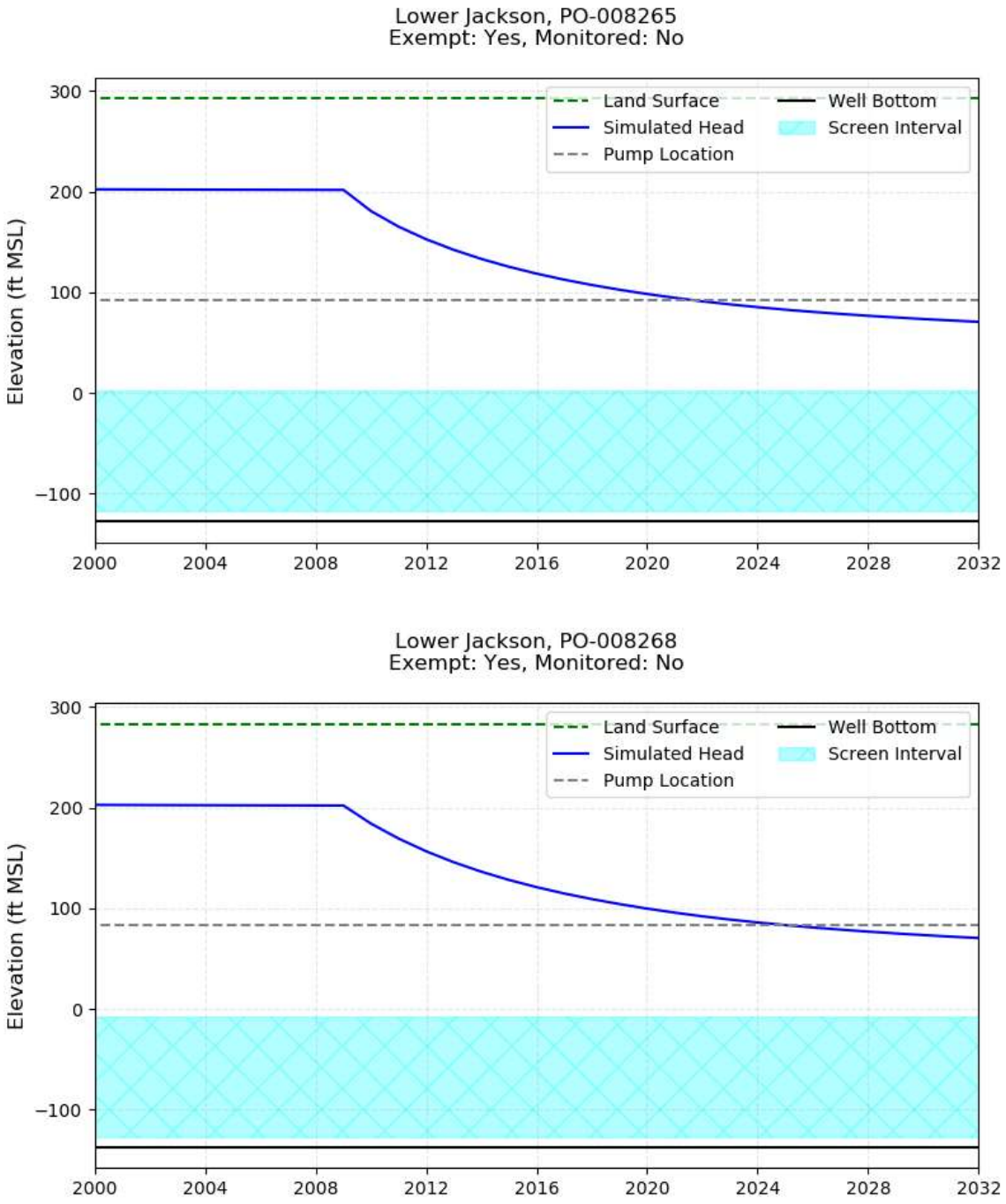


Figure E-29 Simulated water levels for exempt wells PO-008265 and PO-008268 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

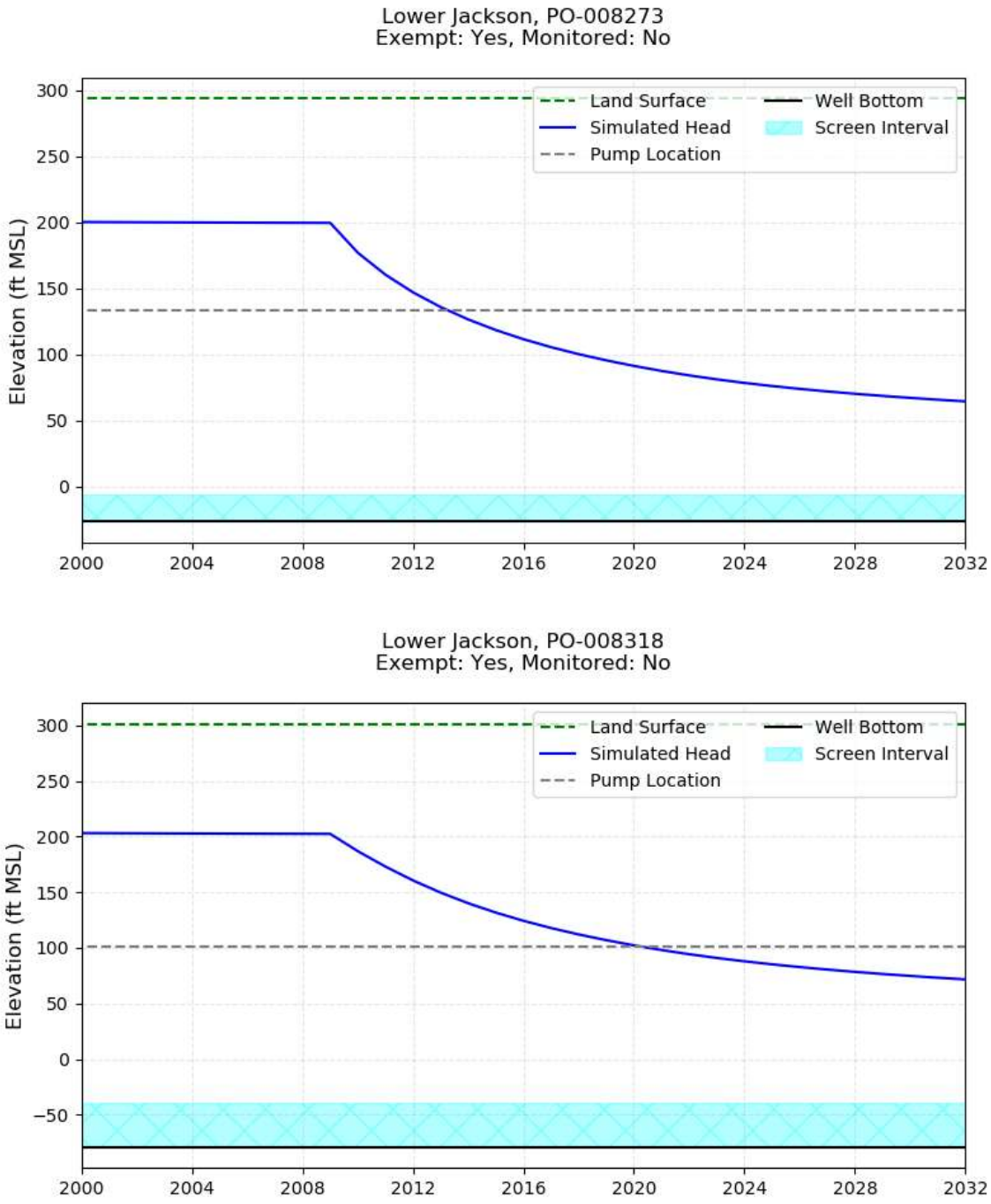


Figure E-30 Simulated water levels for exempt wells PO-008273 and PO-008318 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

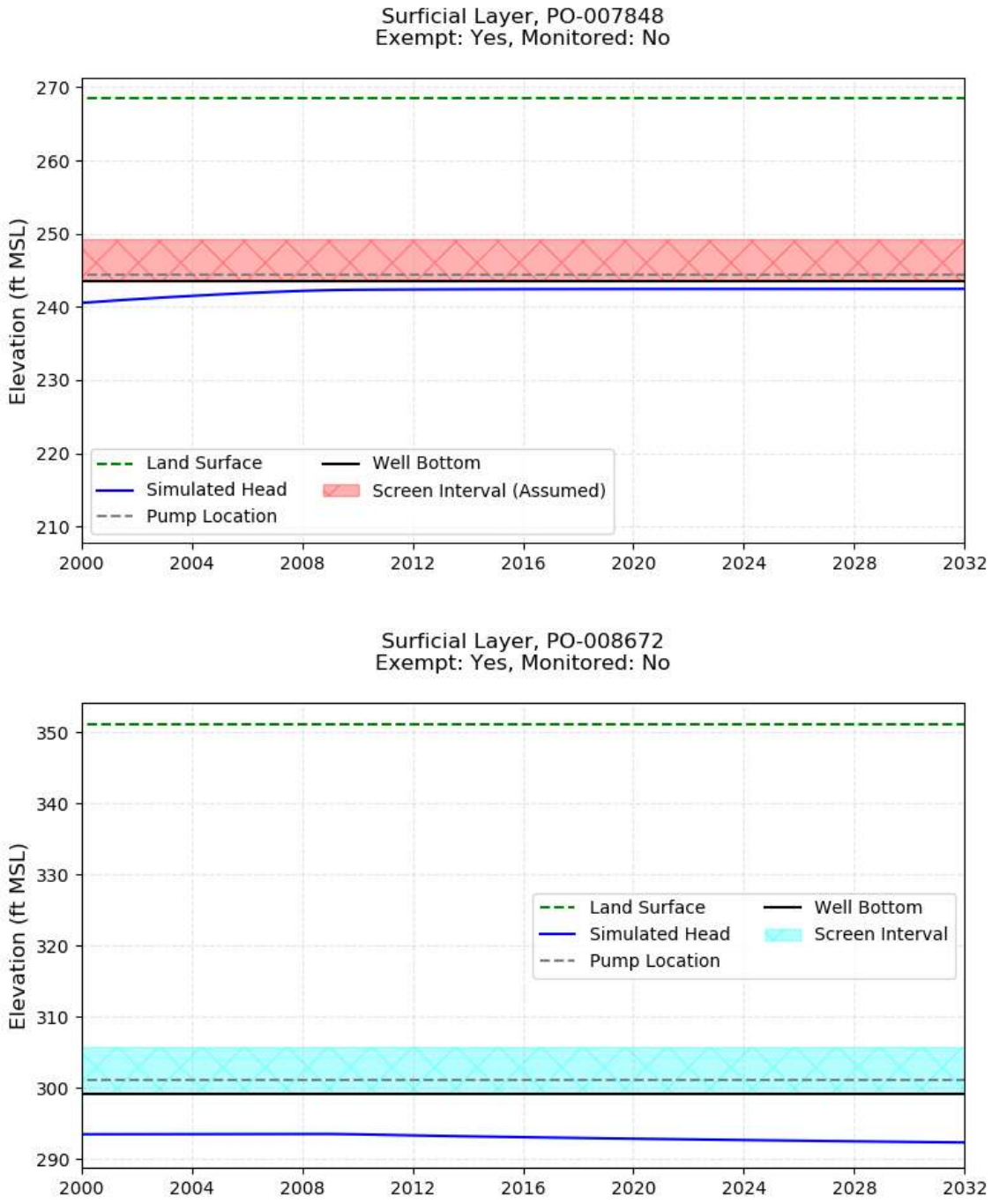


Figure E-31 Simulated water levels for exempt wells PO-007848 and PO-008672 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

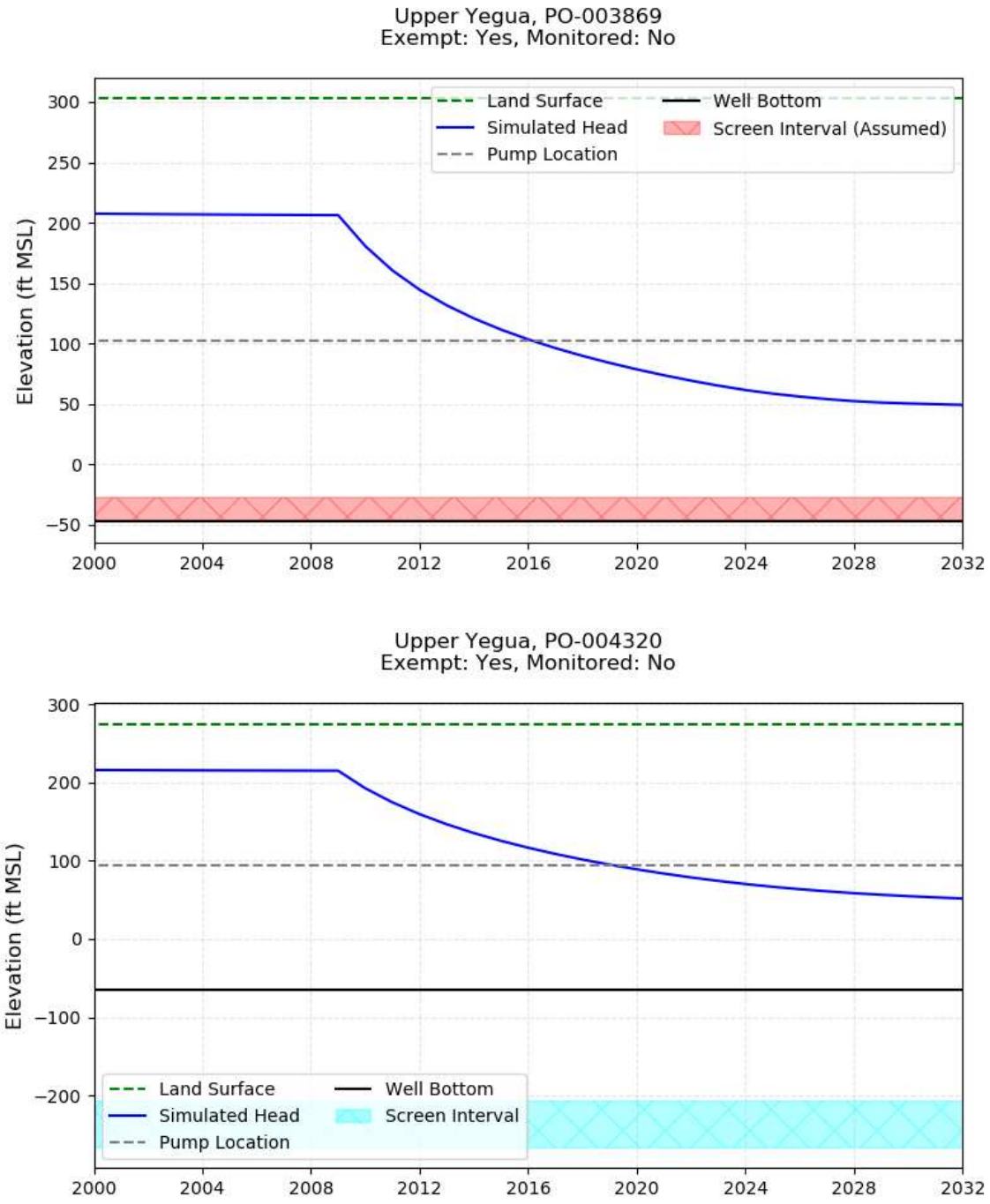


Figure E-32 Simulated water levels for exempt wells PO-003869 and PO-004320 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

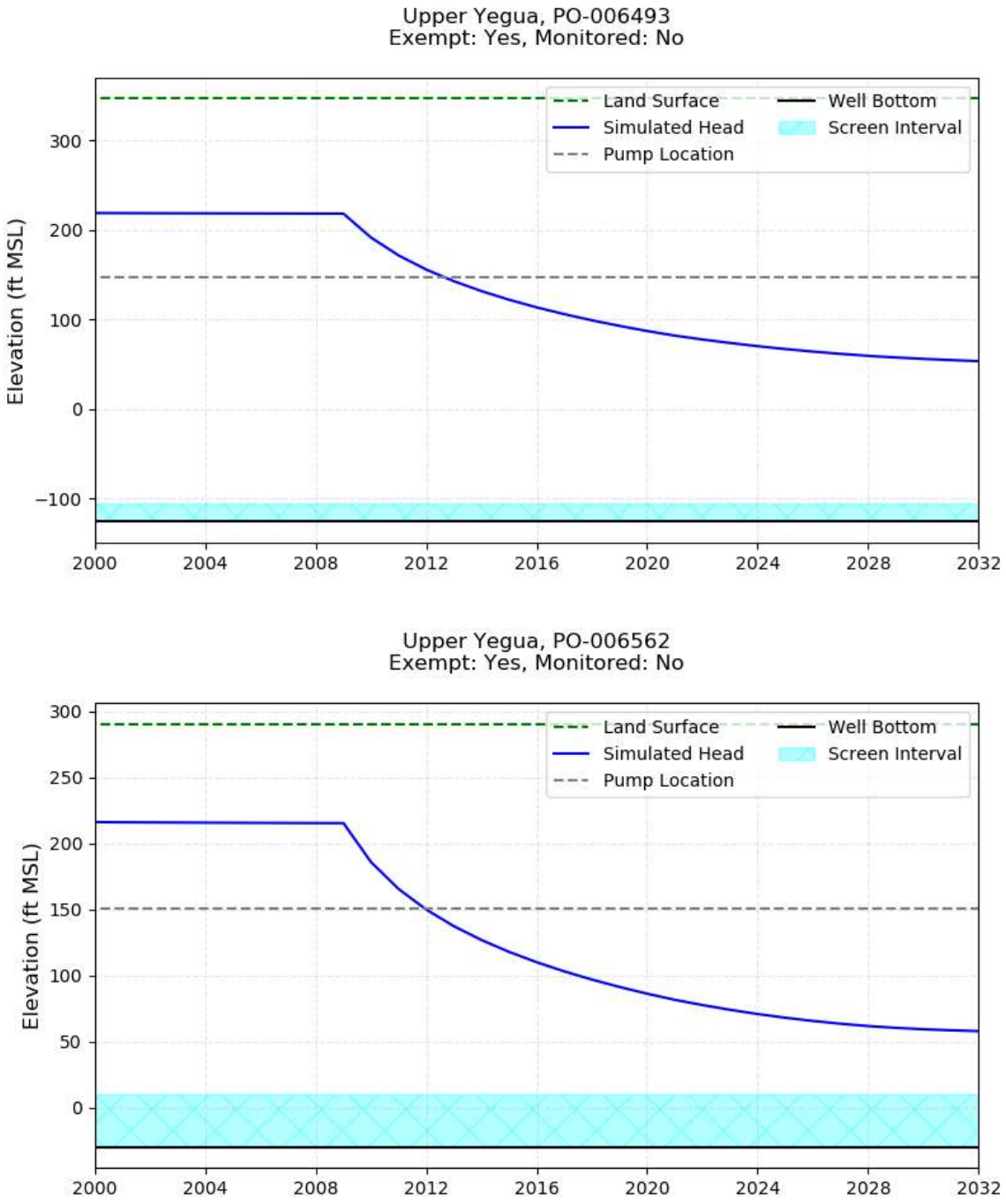


Figure E-33 Simulated water levels for exempt wells PO-006493 and PO-006562 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

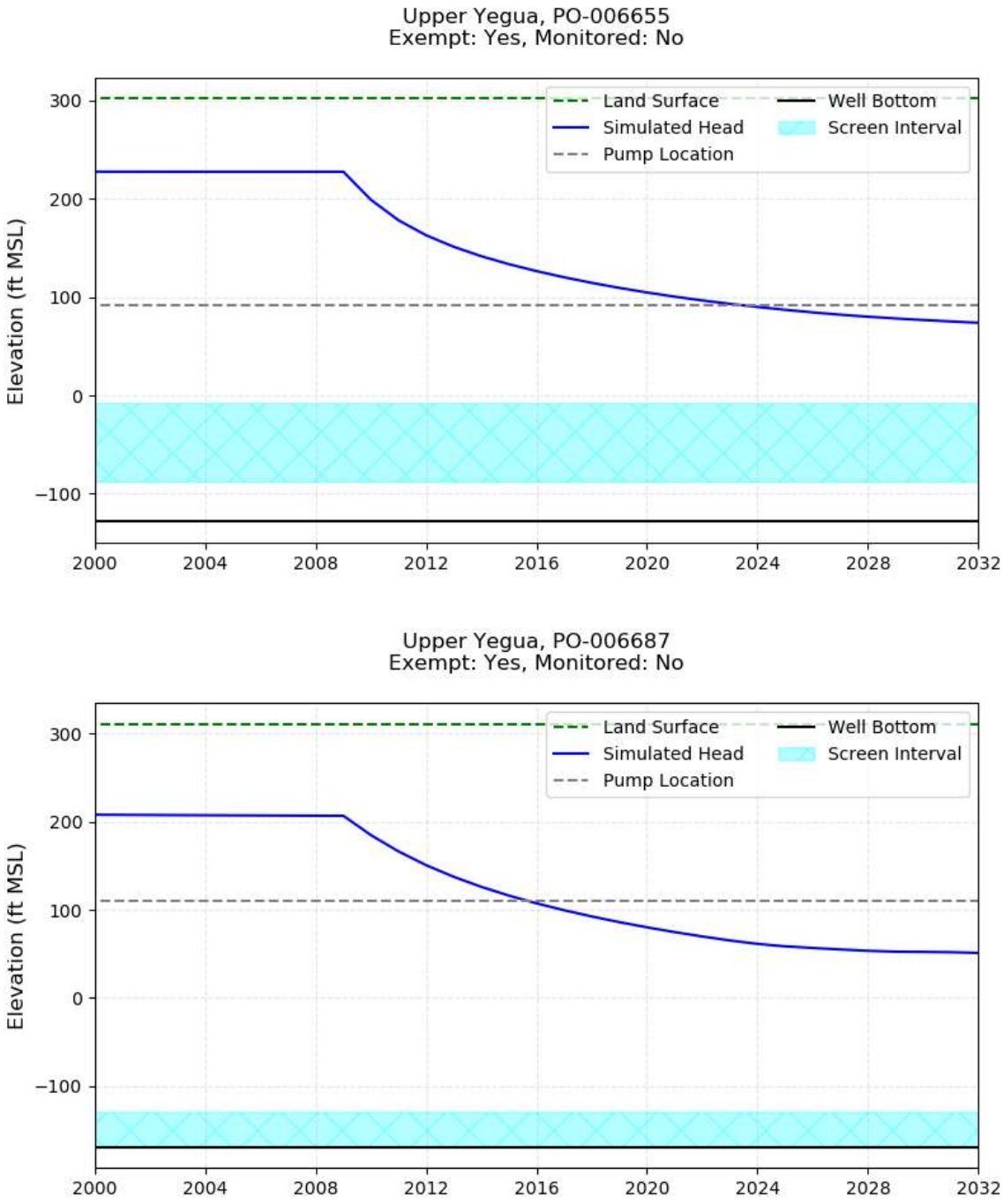


Figure E-34 Simulated water levels for exempt wells PO-006655 and PO-006687 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

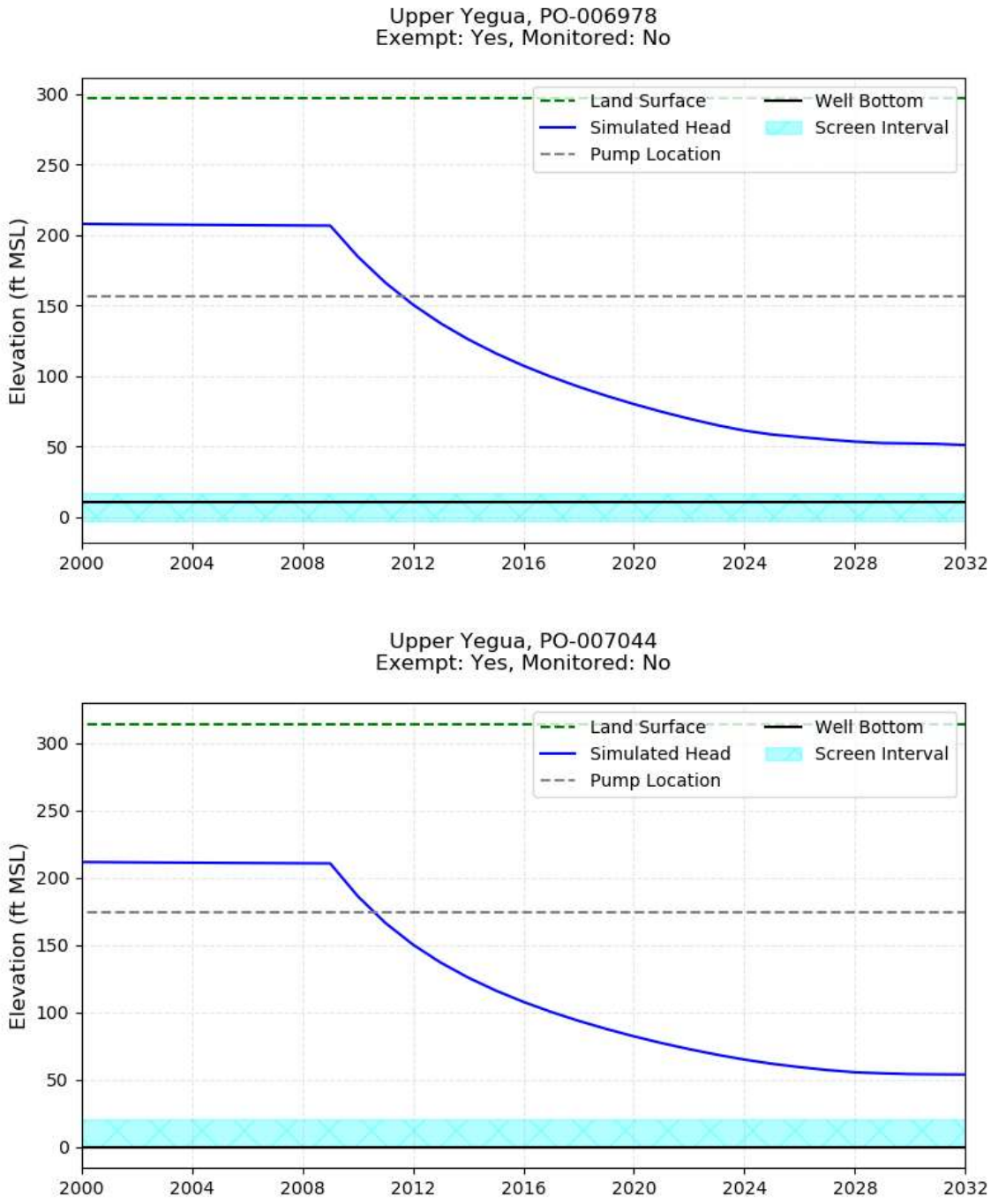


Figure E-35 Simulated water levels for exempt wells PO-006978 and PO-007044 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

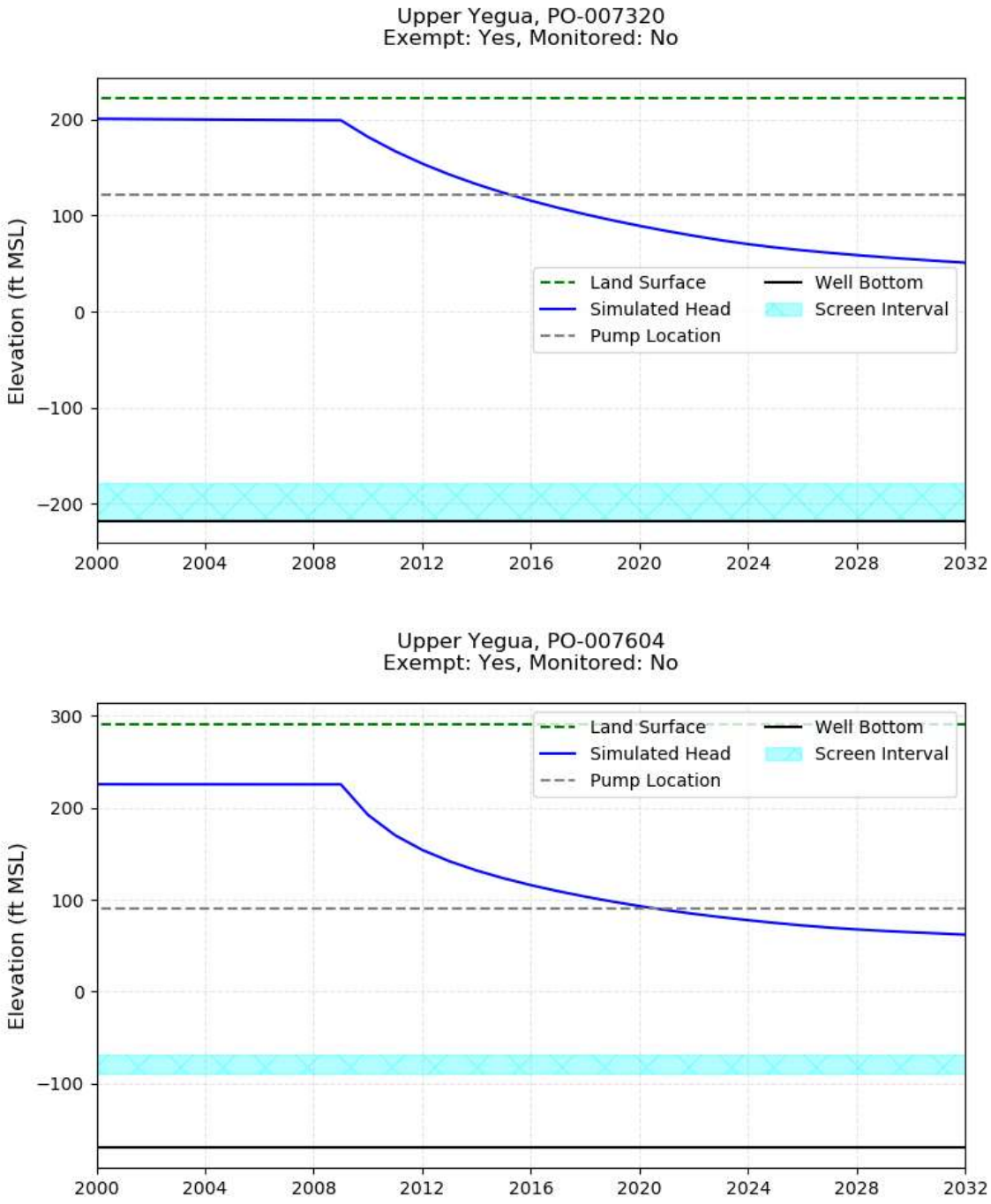


Figure E-36 Simulated water levels for exempt wells PO-007320 and PO-007604 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

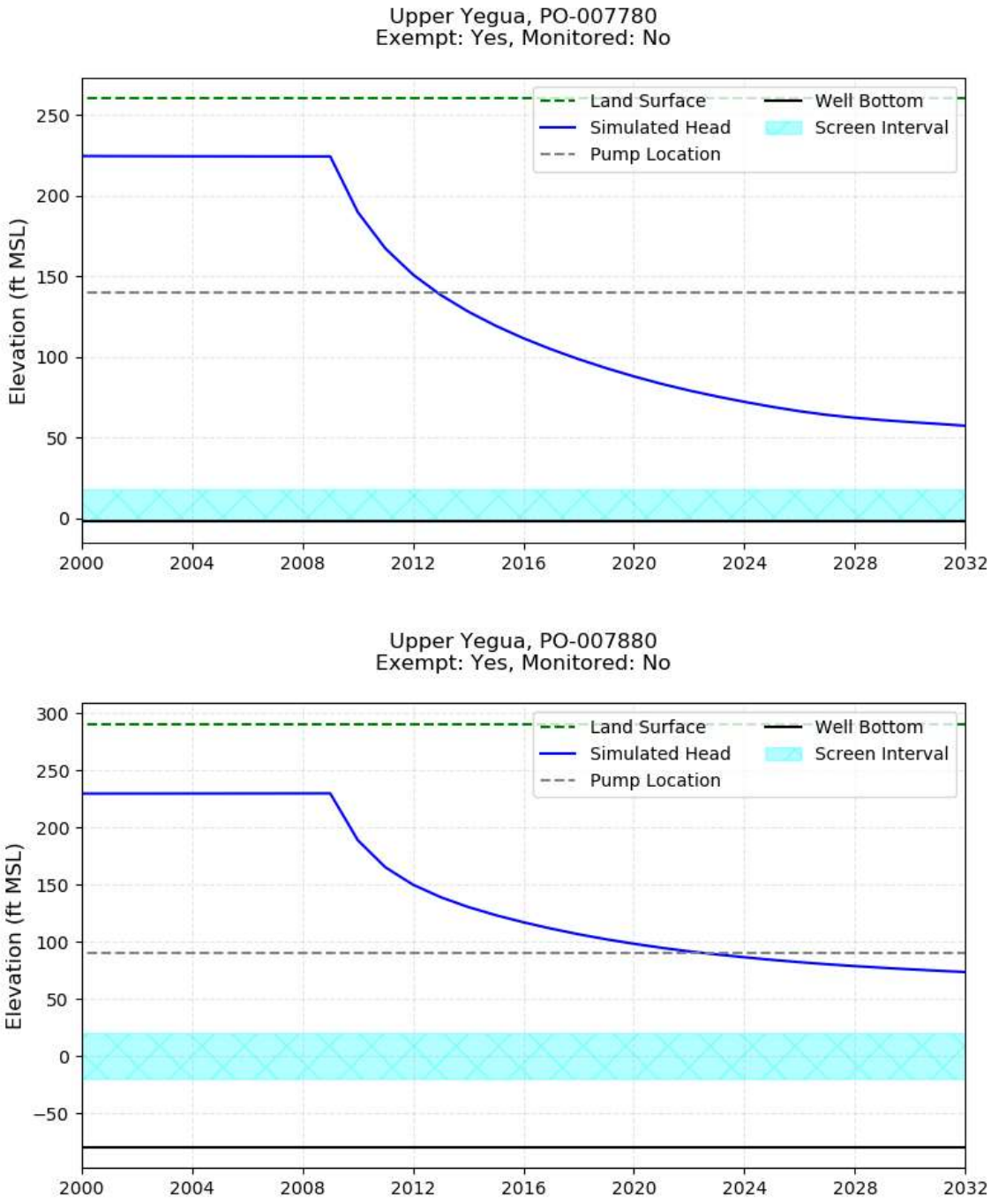


Figure E-37 Simulated water levels for exempt wells PO-007780 and PO-007780 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

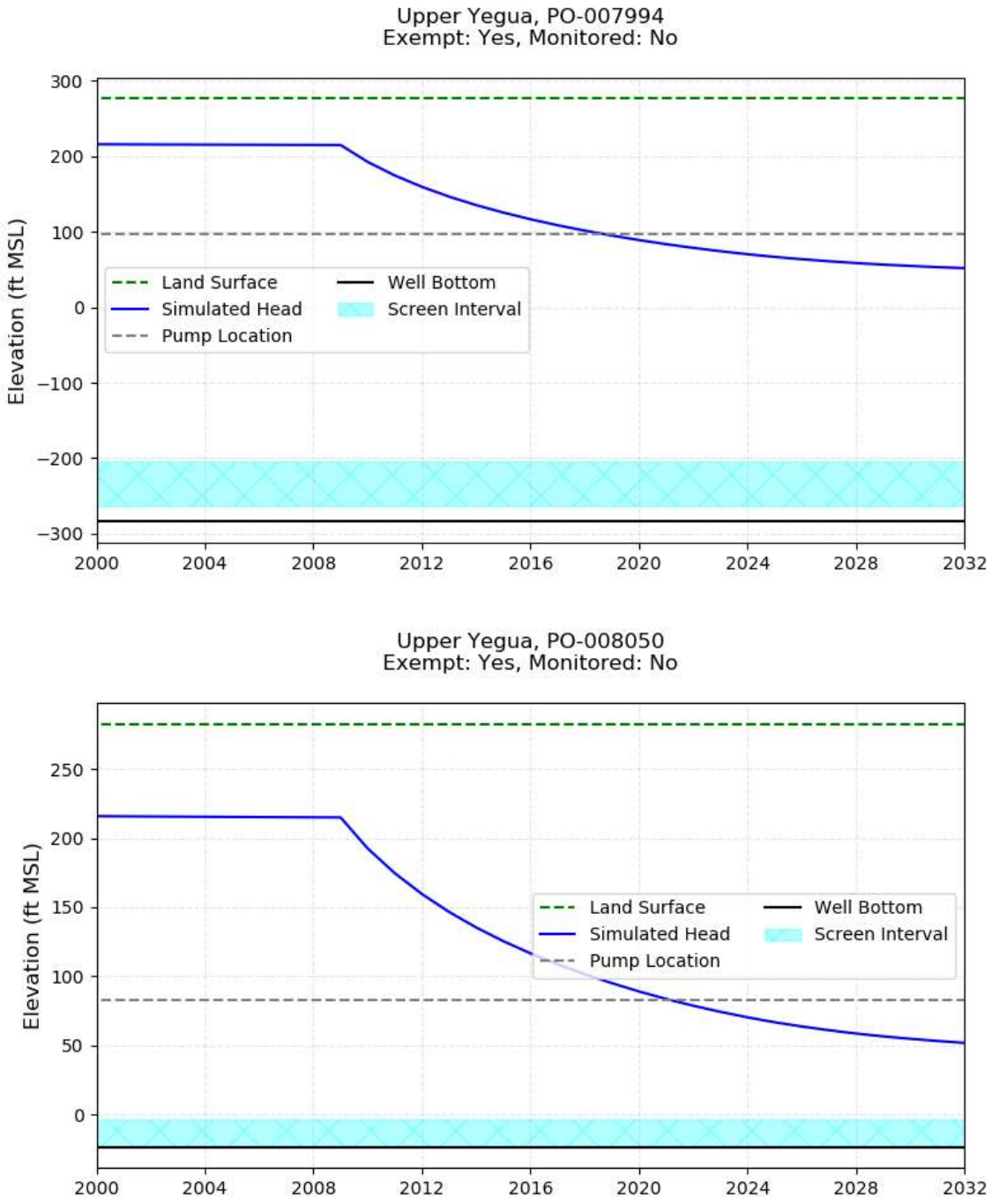


Figure E-38 Simulated water levels for exempt wells PO-007994 and PO-008050 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

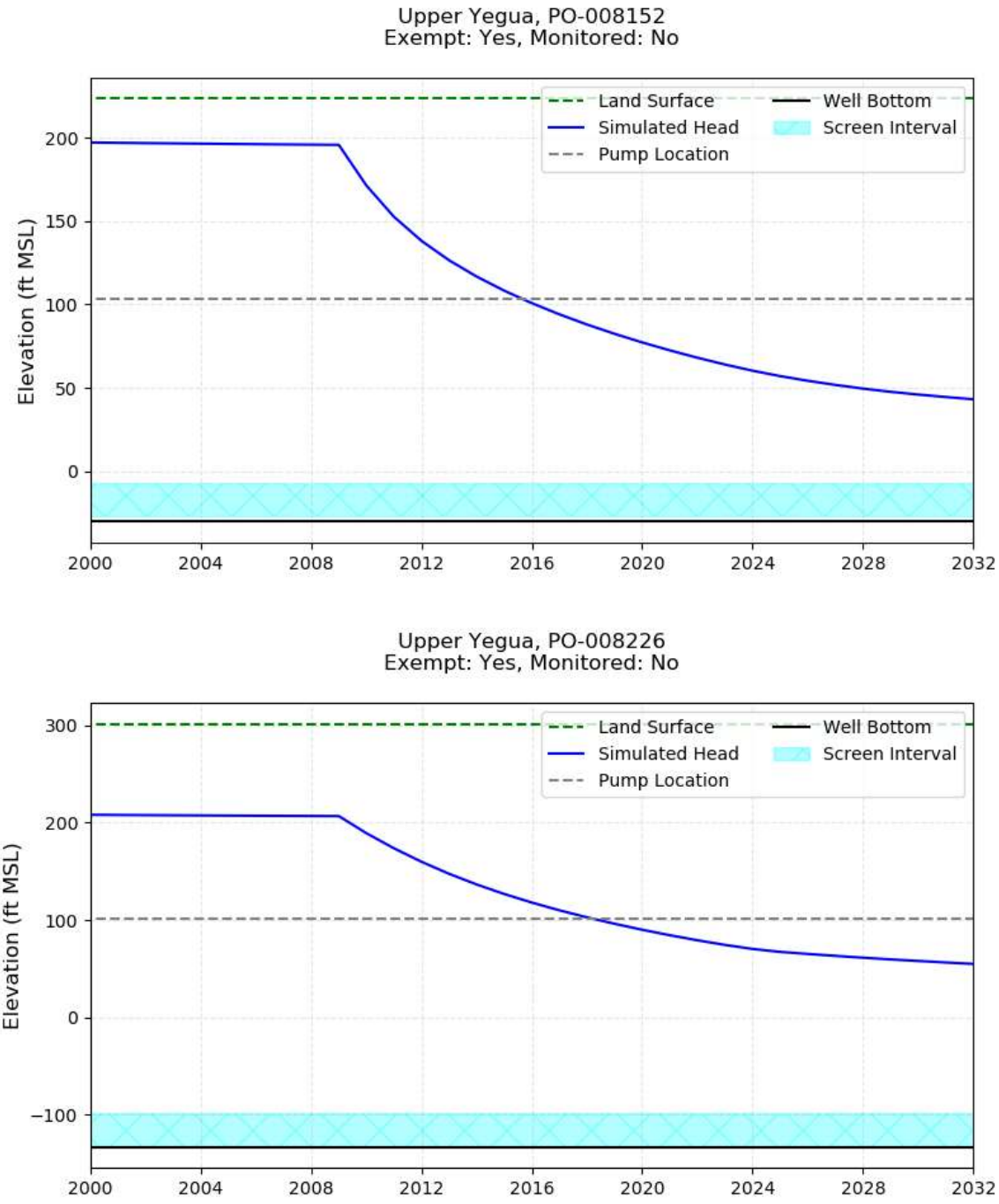


Figure E-39 Simulated water levels for exempt wells PO-008152 and PO-008226 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

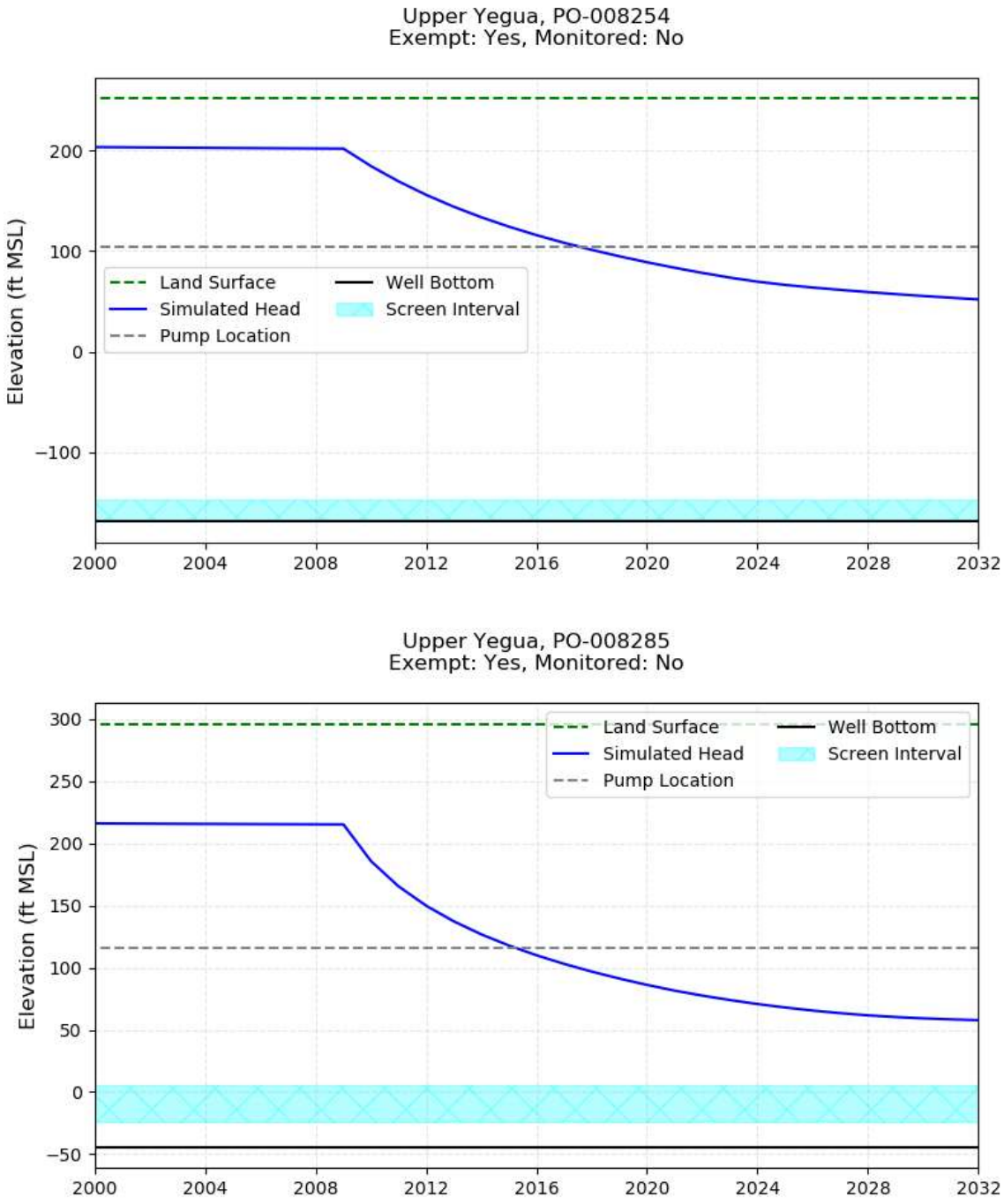


Figure E-40 Simulated water levels for exempt wells PO-008254 and PO-008285 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

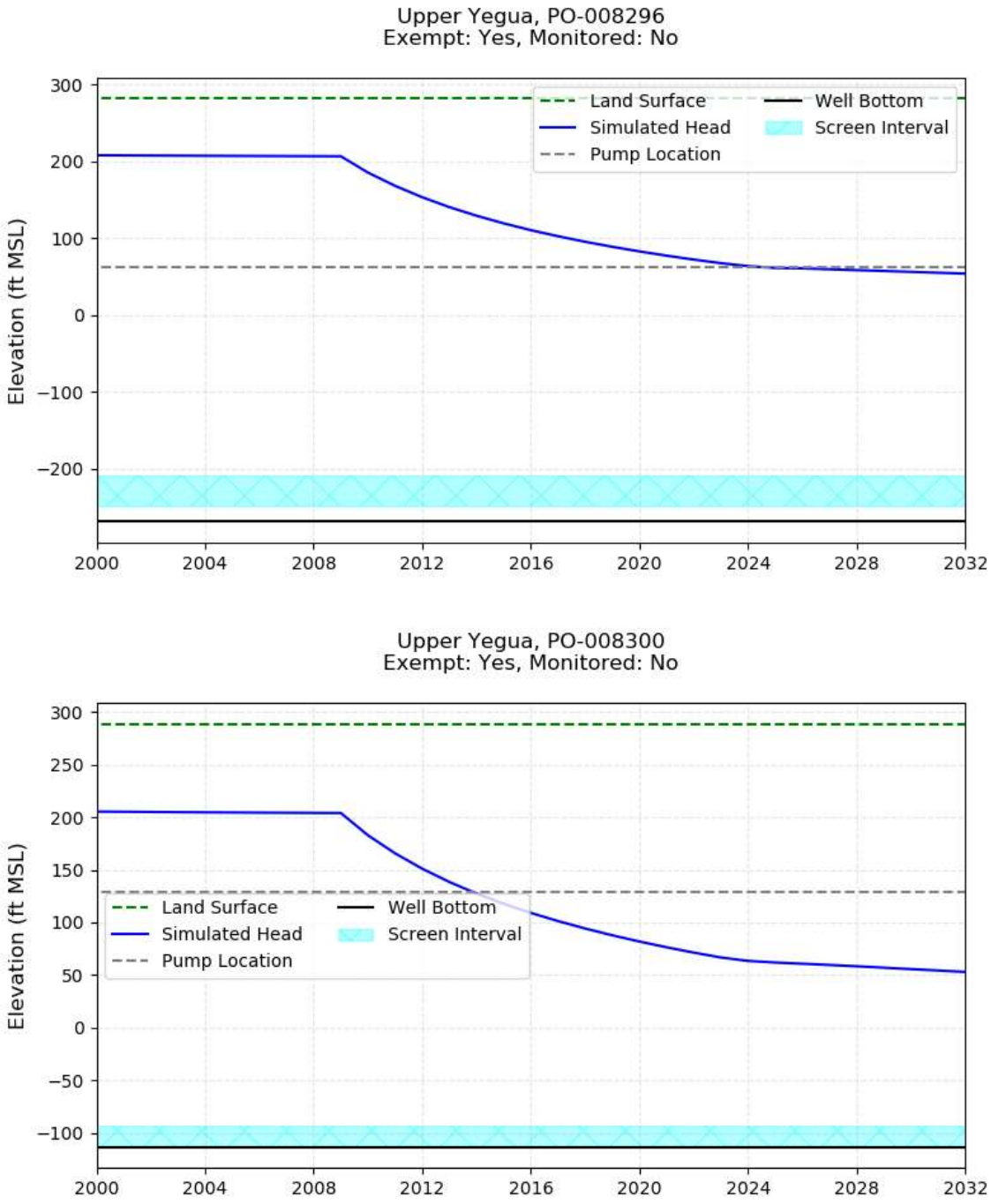


Figure E-41 Simulated water levels for exempt wells PO-008296 and PO-008300 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

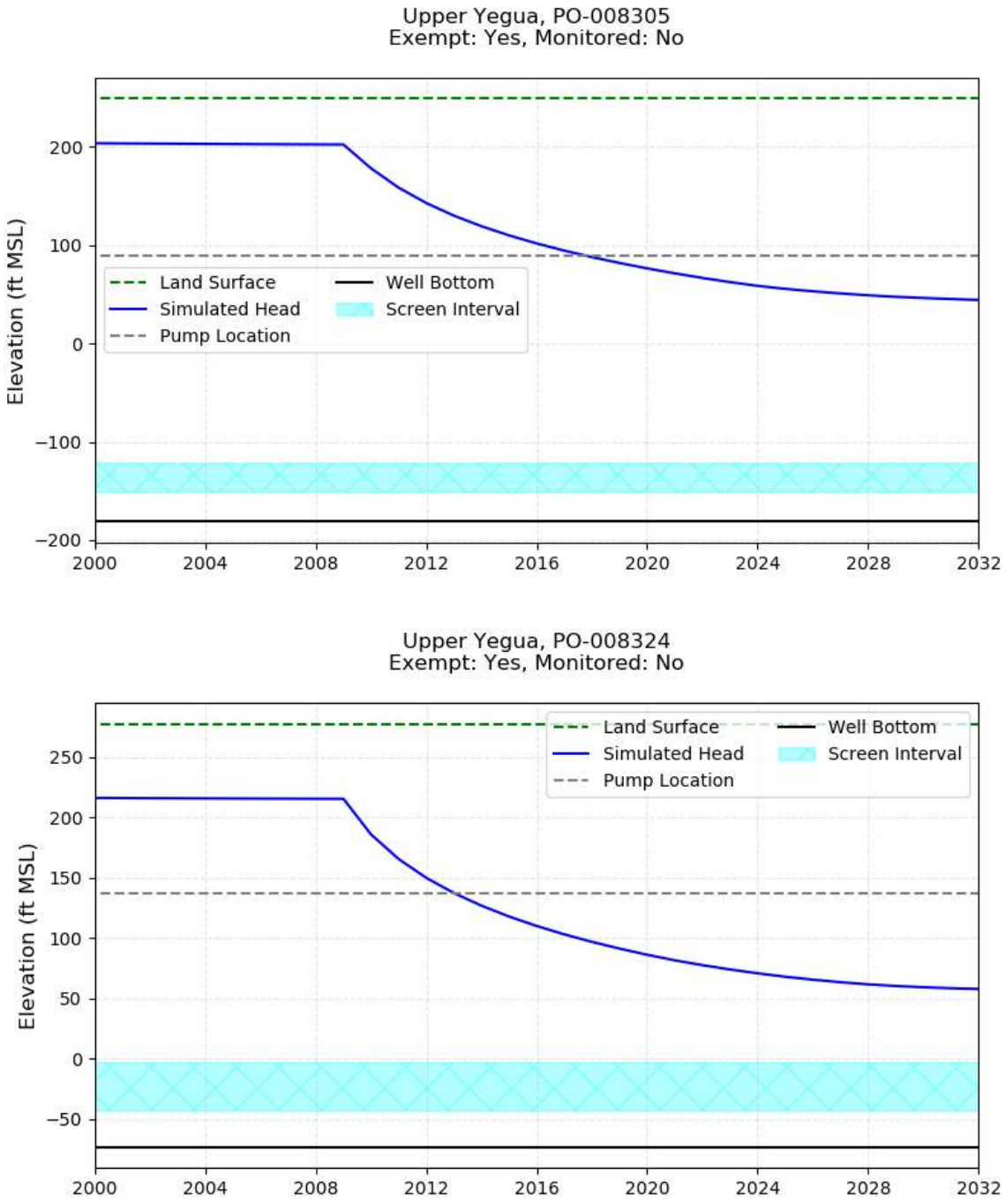


Figure E-42 Simulated water levels for exempt wells PO-008305 and PO-008324 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

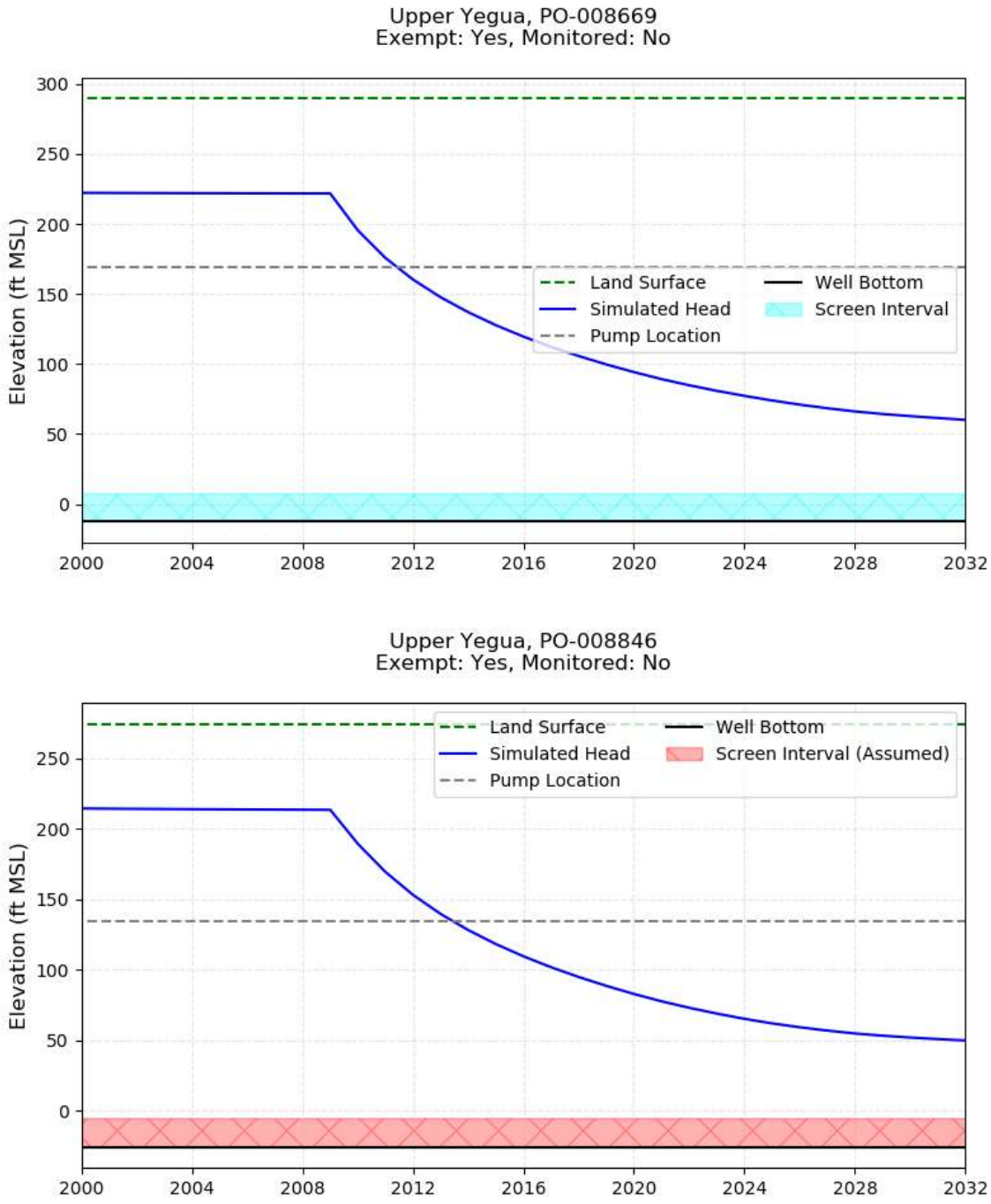


Figure E-43 Simulated water levels for exempt wells PO-008669 and PO-008846 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

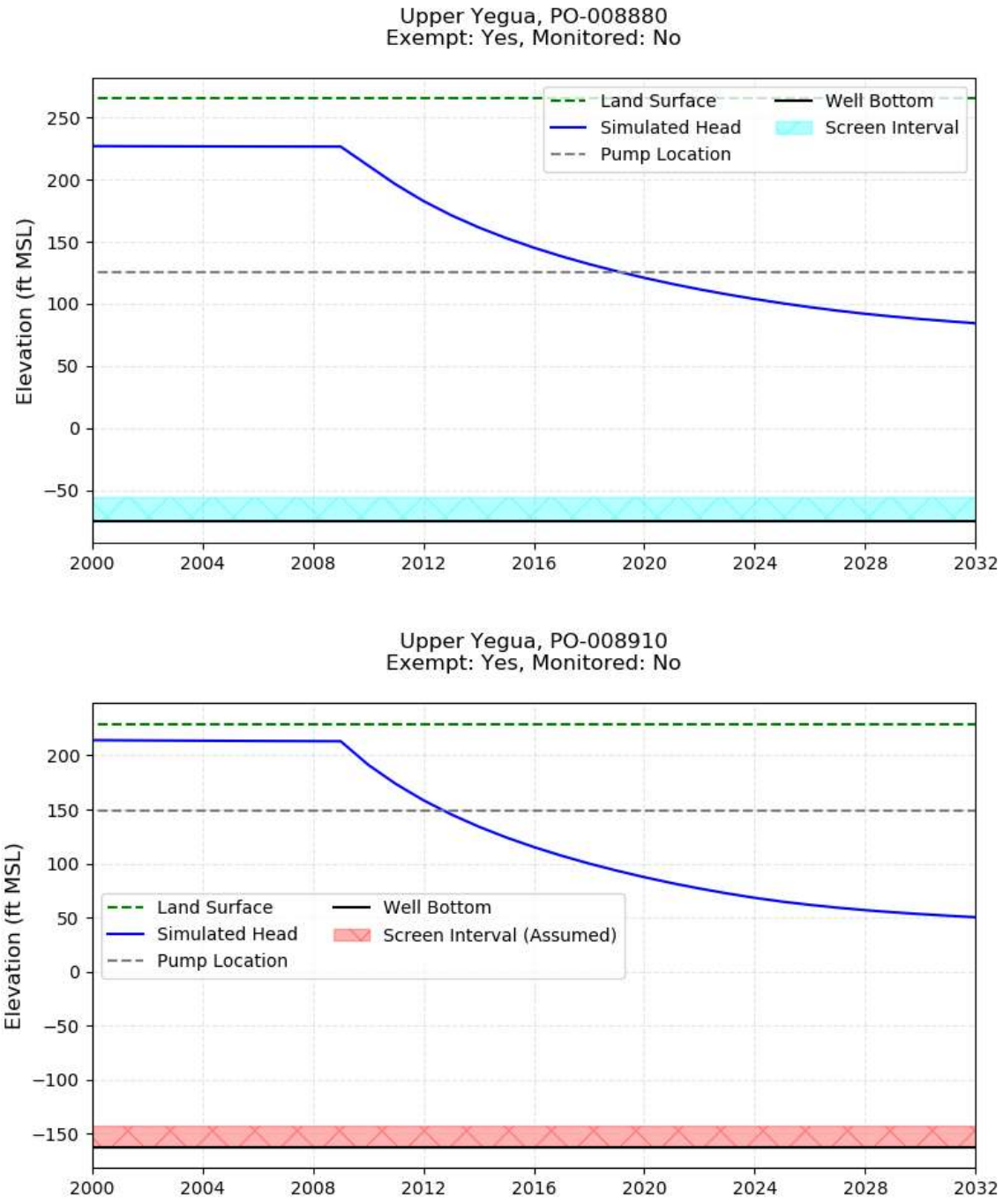


Figure E-44 Simulated water levels for exempt wells PO-008880 and PO-008910 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

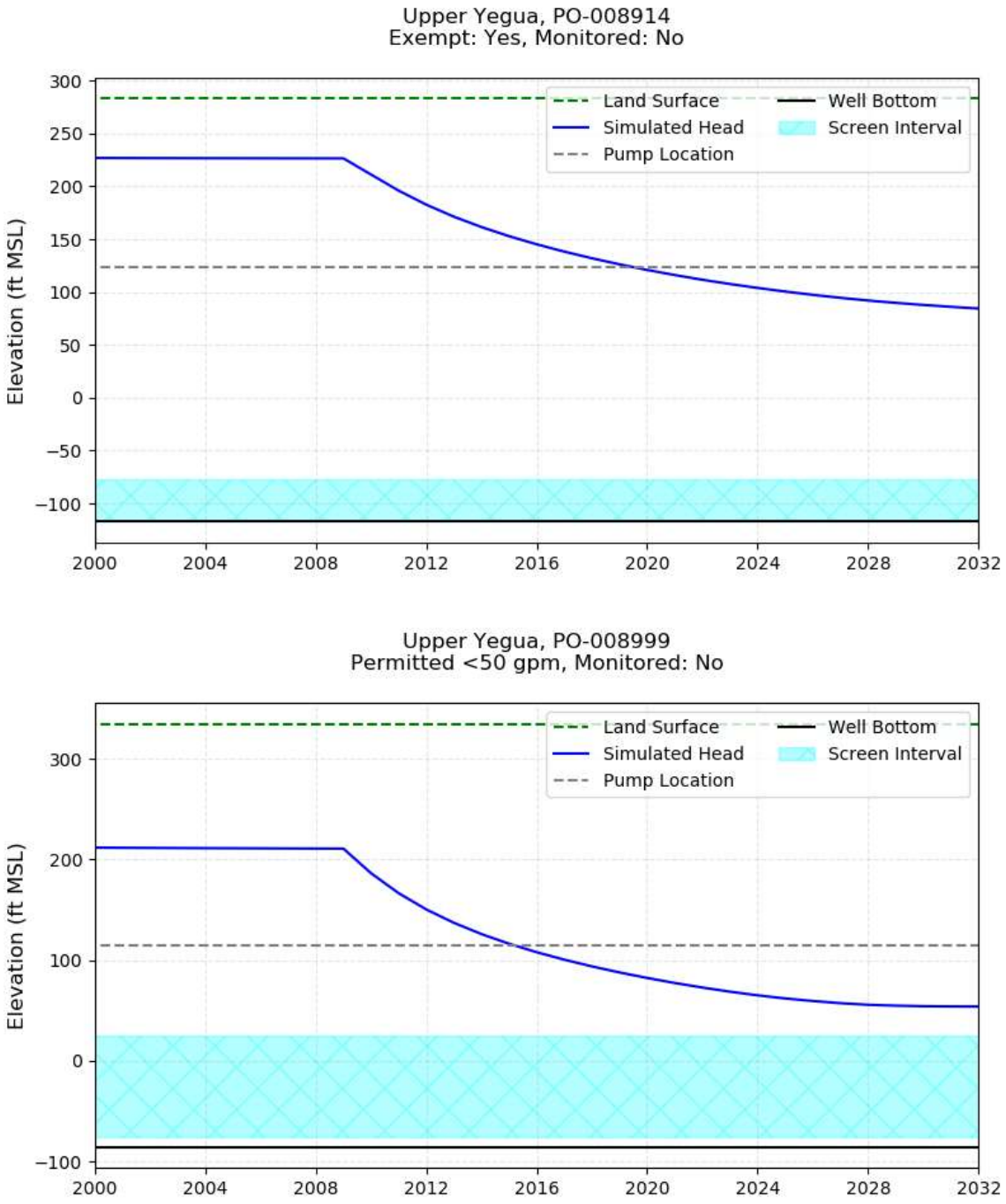


Figure E-45 Simulated water levels for exempt wells PO-008914 and PO-008999 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

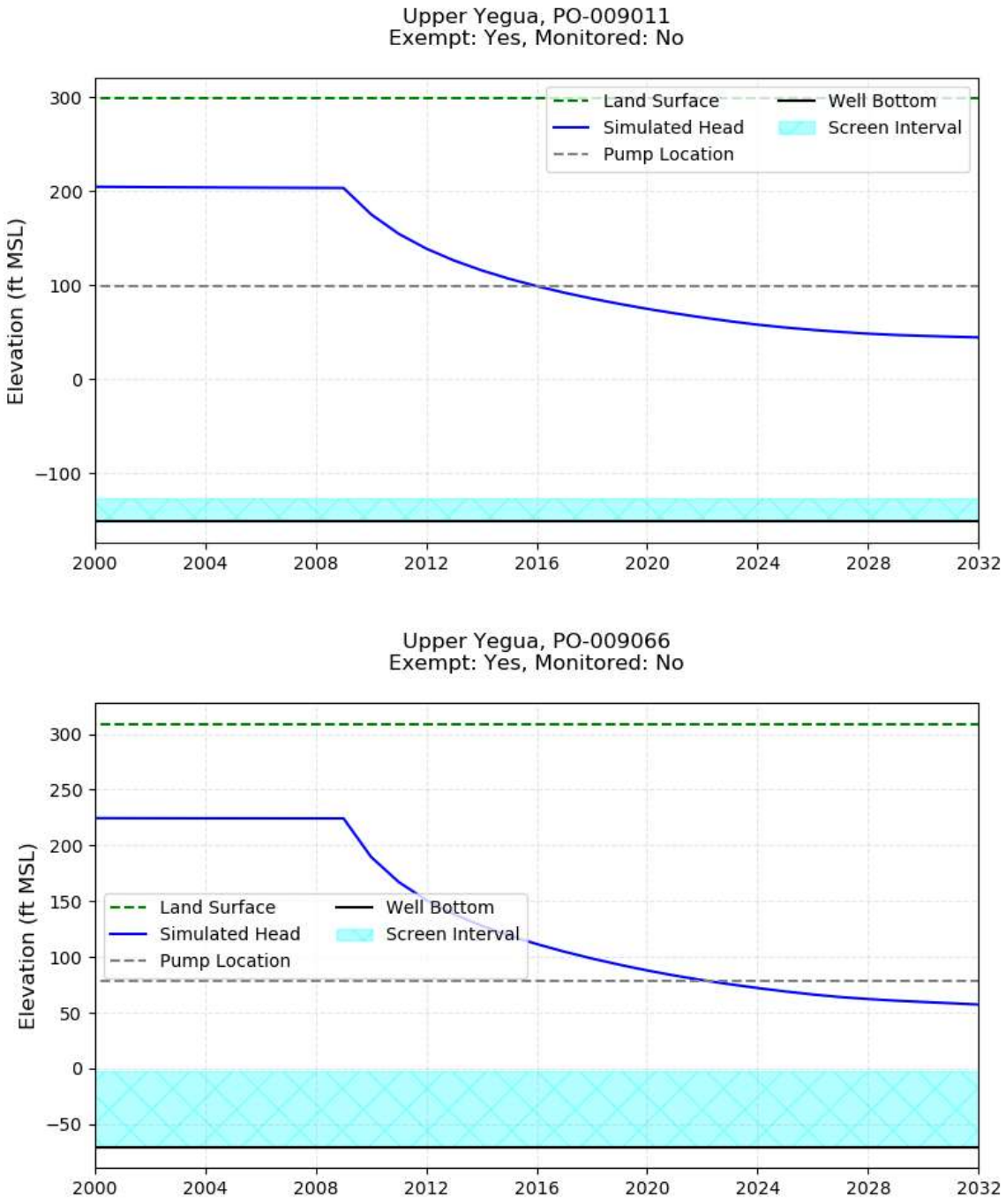


Figure E-46 Simulated water levels for exempt wells PO-009011 and PO-009066 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

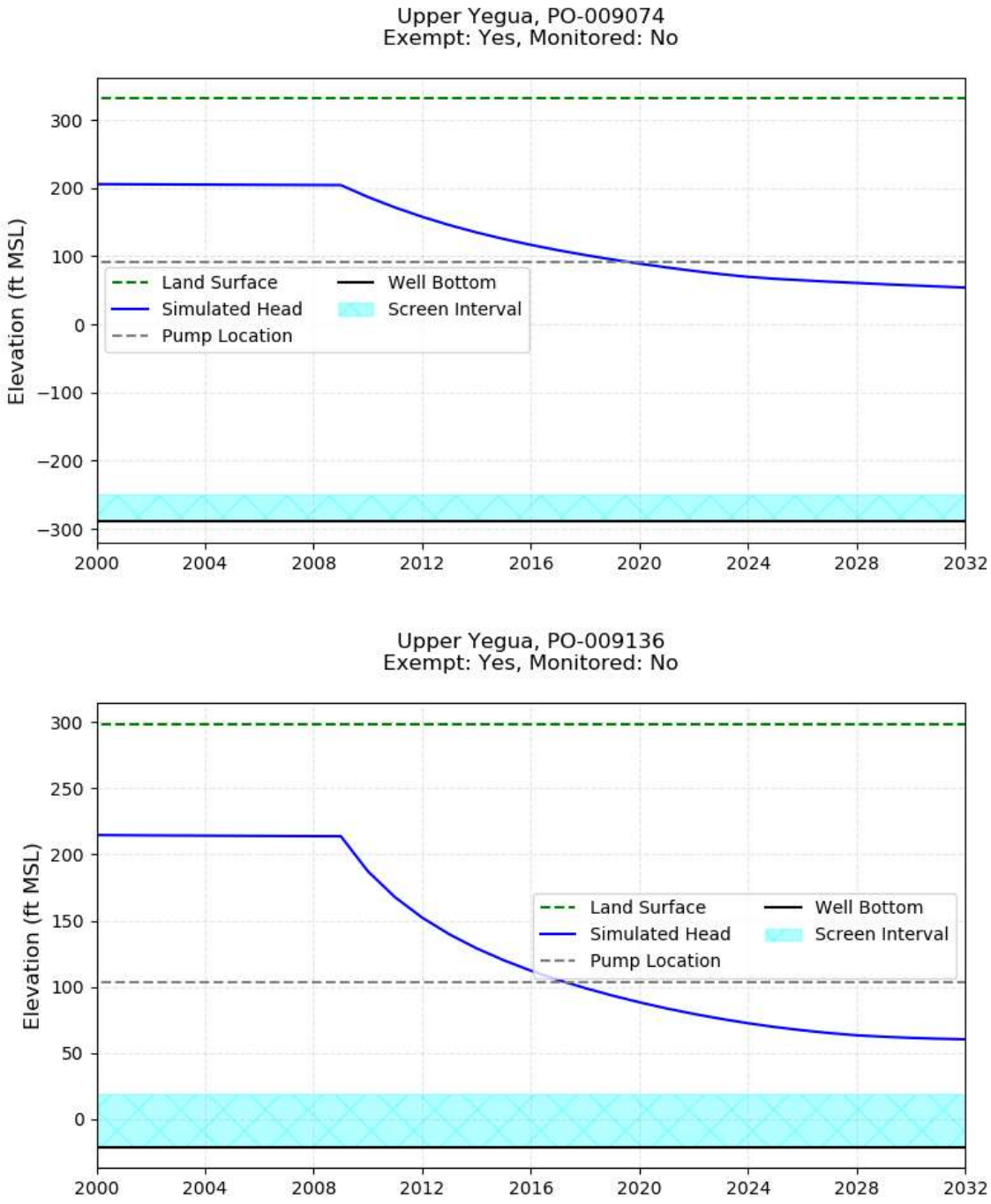


Figure E-47 Simulated water levels for exempt wells PO-009074 and PO-009136 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

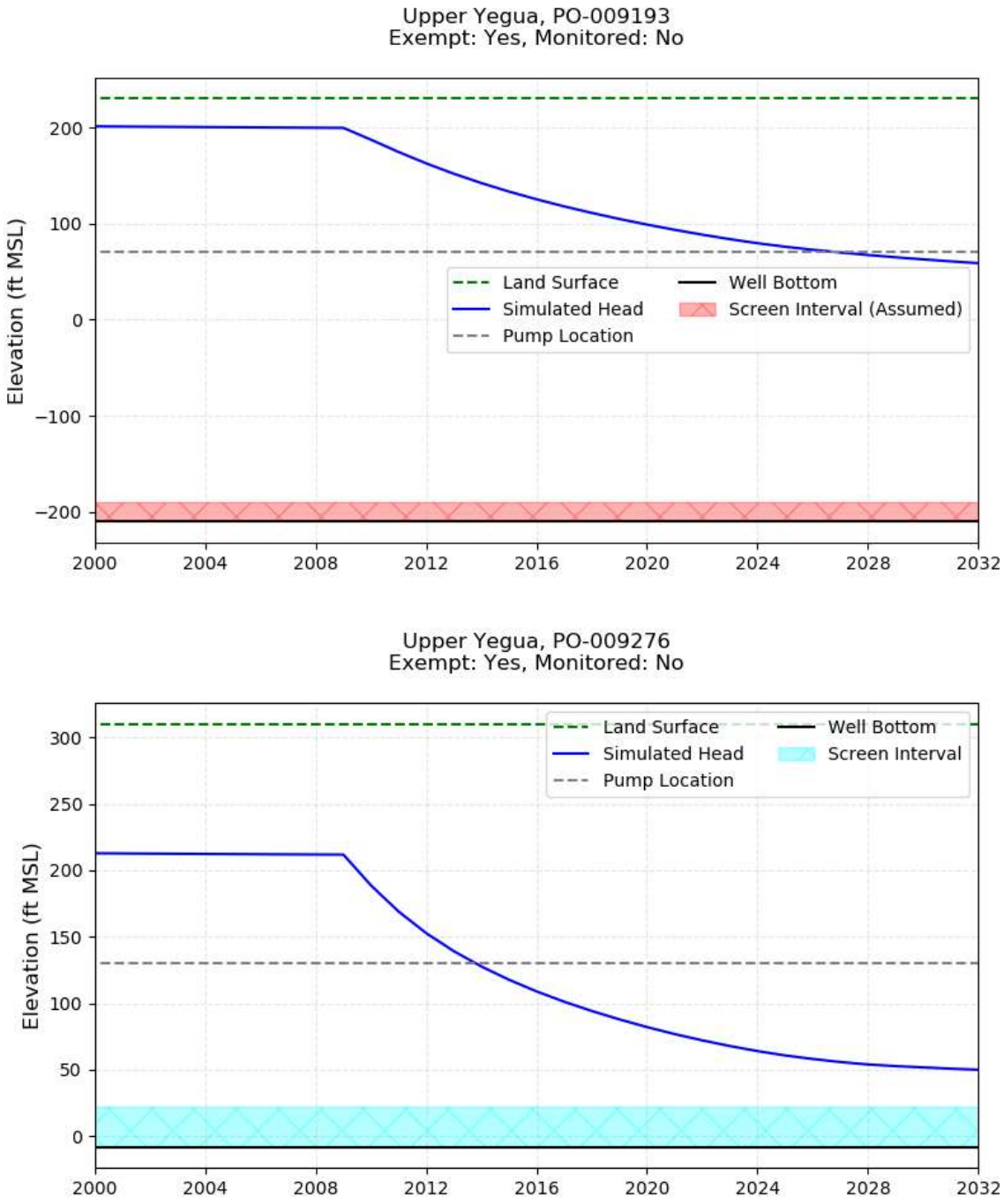


Figure E-48 Simulated water levels for exempt wells PO-009193 and PO-009276 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

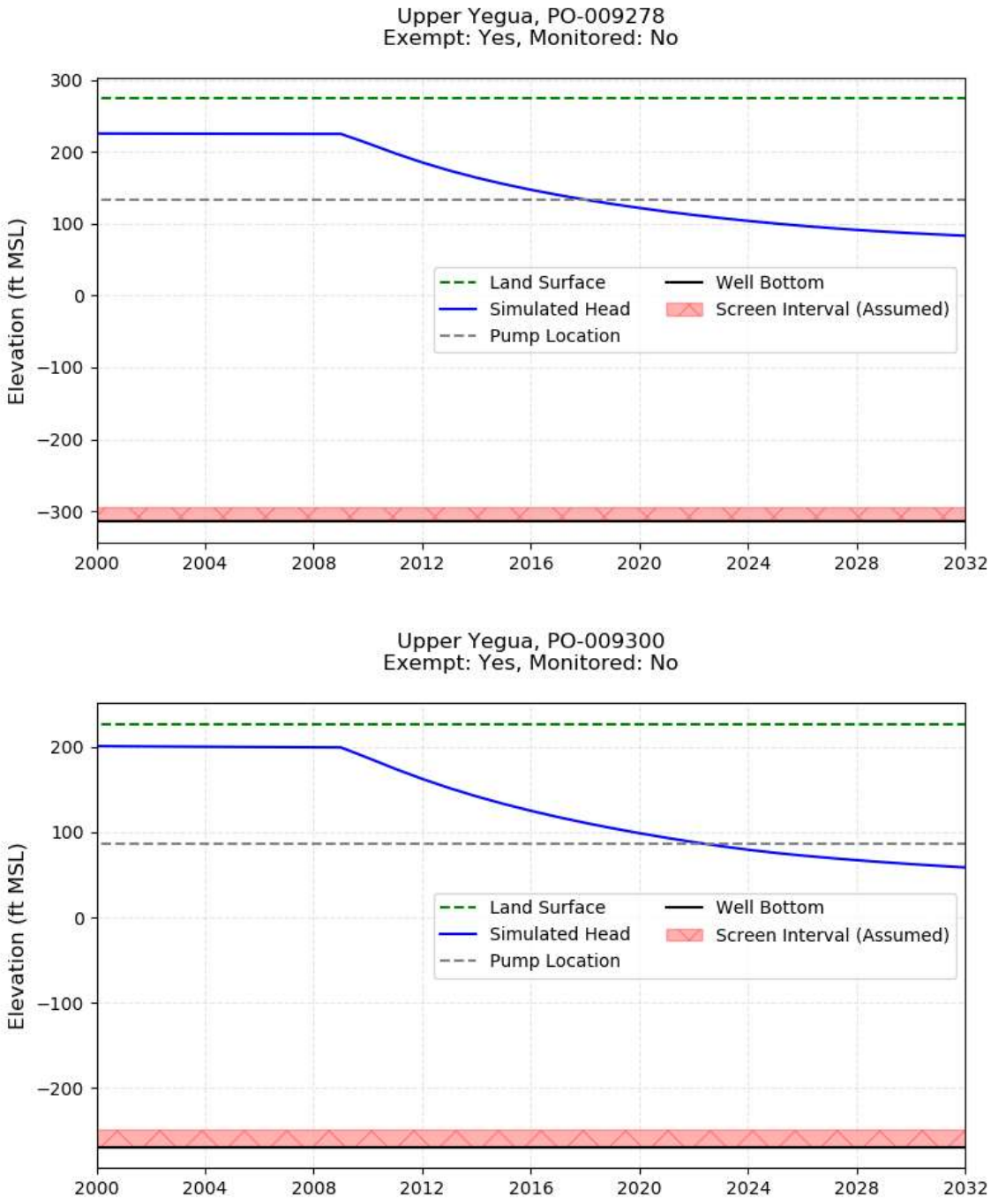


Figure E-49 Simulated water levels for exempt wells PO-009278 and PO-009300 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

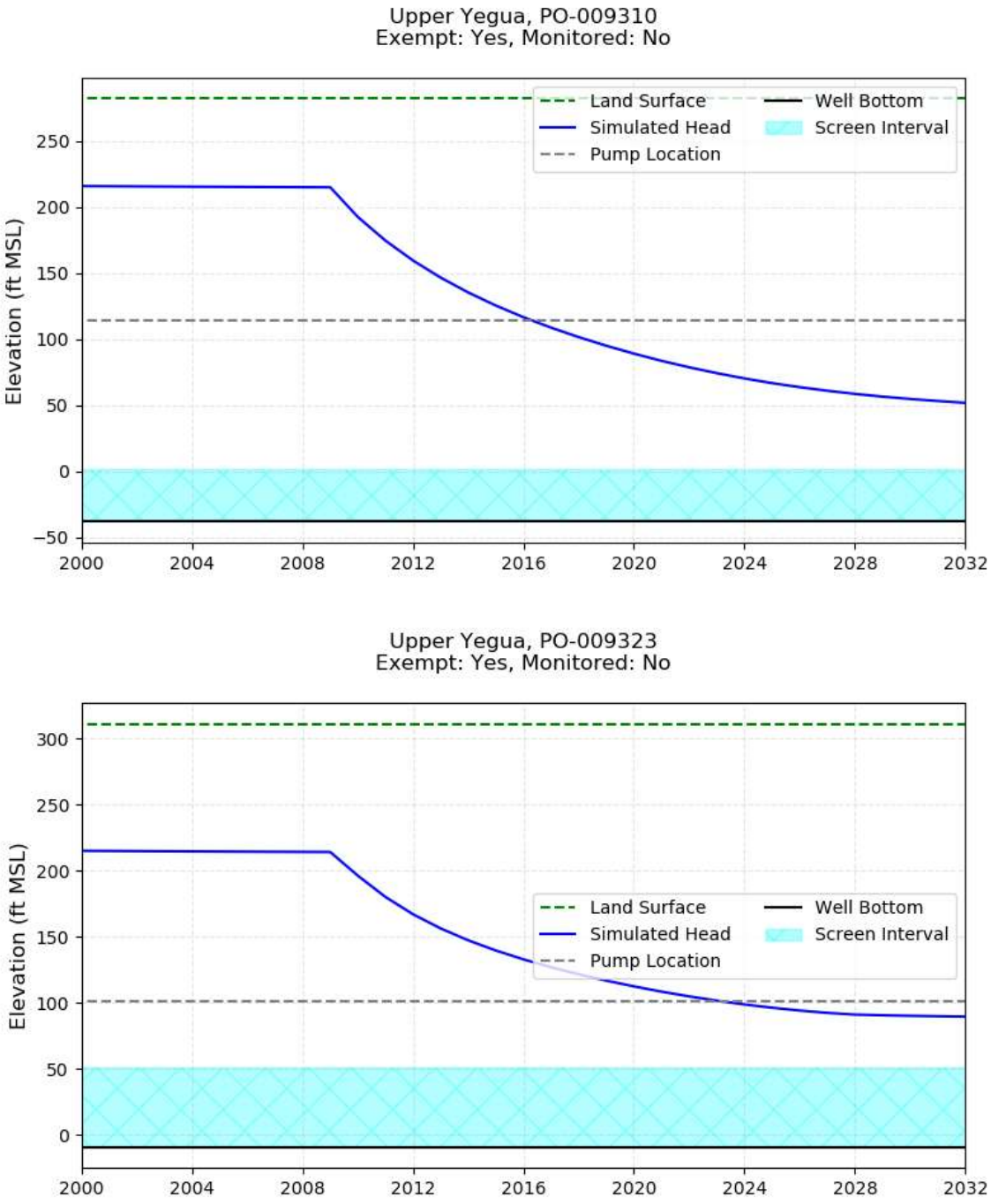


Figure E-50 Simulated water levels for exempt wells PO-009310 and PO-009323 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

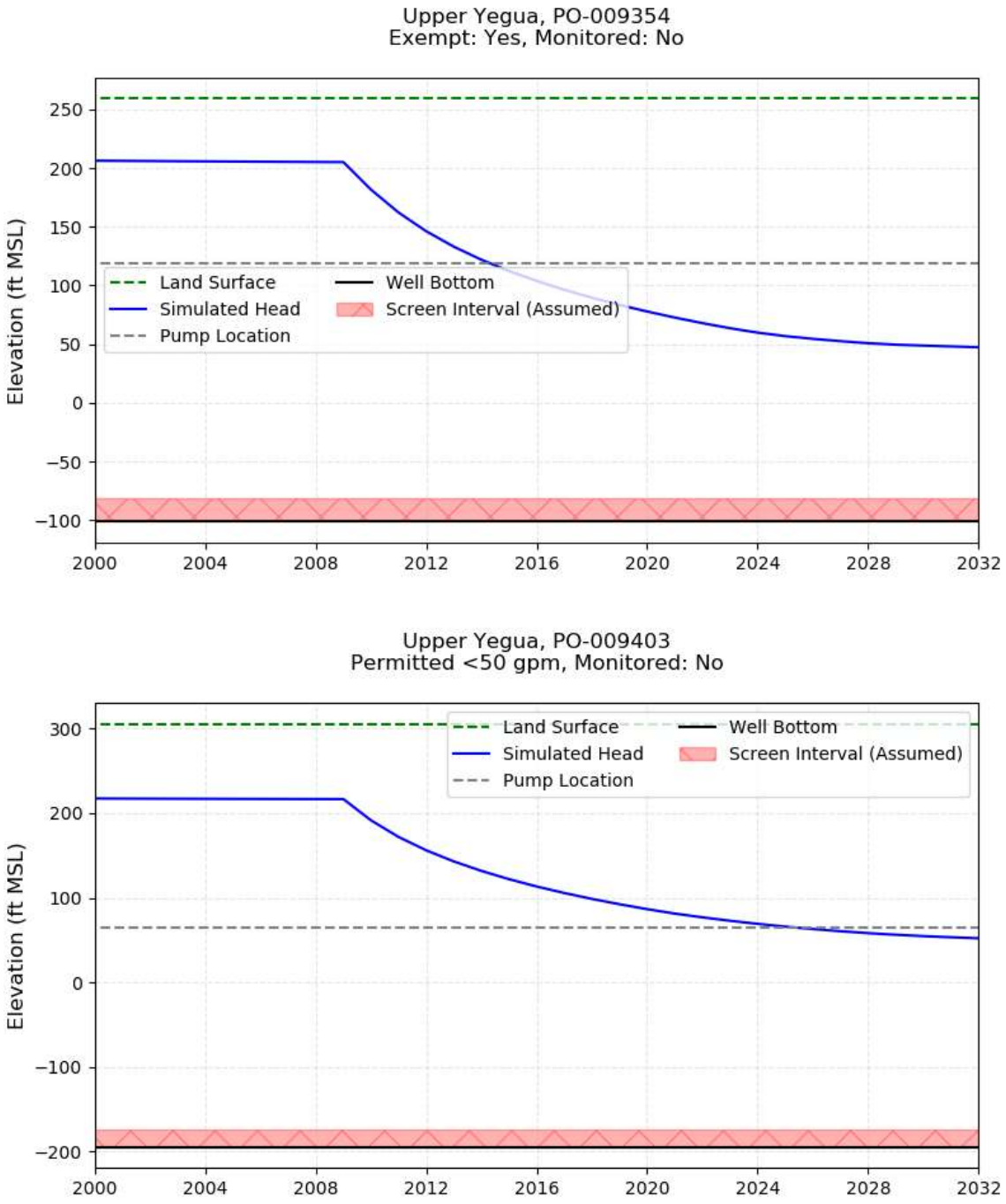


Figure E-51 Simulated water levels for exempt wells PO-009354 and PO-009403 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

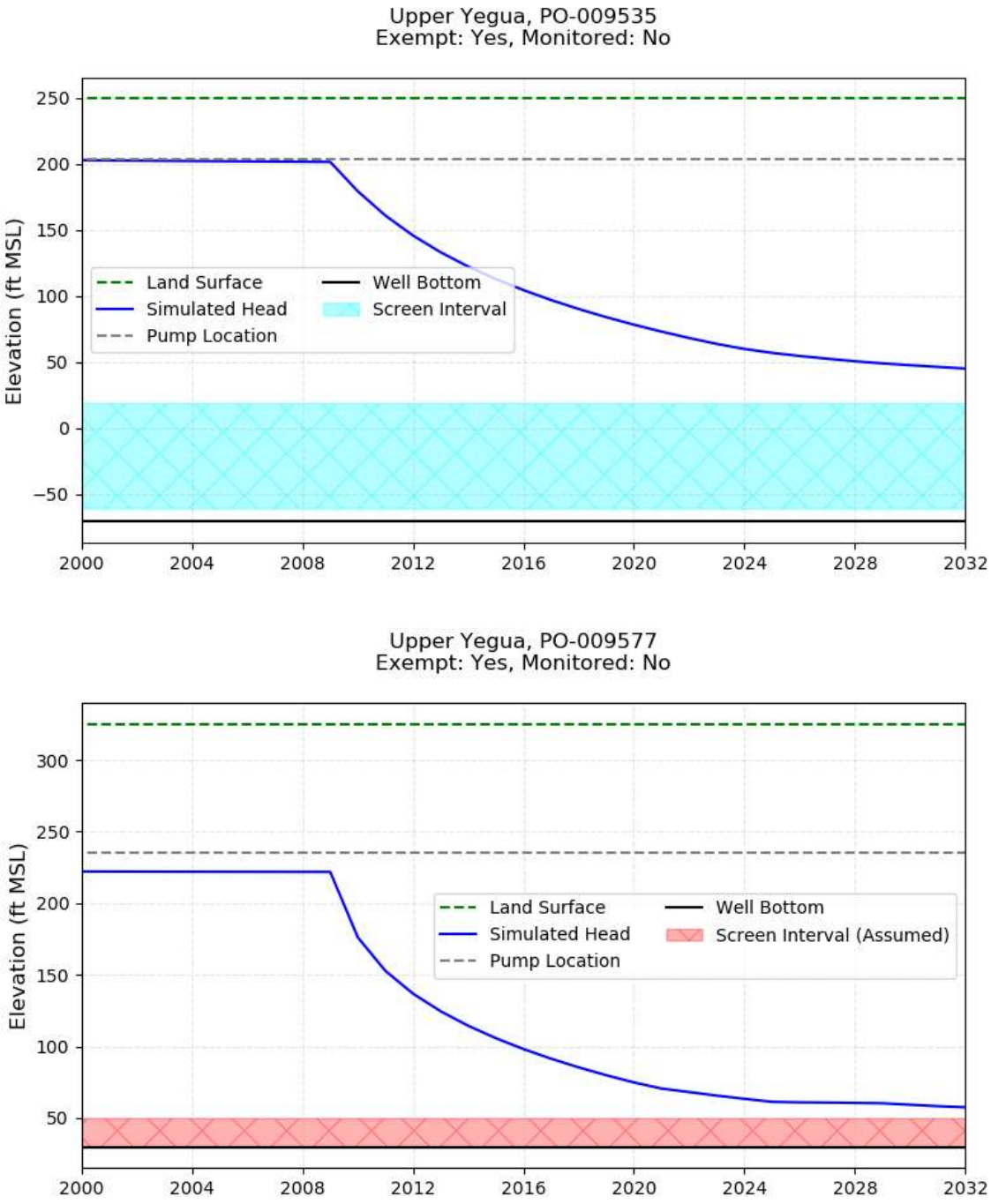


Figure E-52 Simulated water levels for exempt wells PO-009535 and PO-009577 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

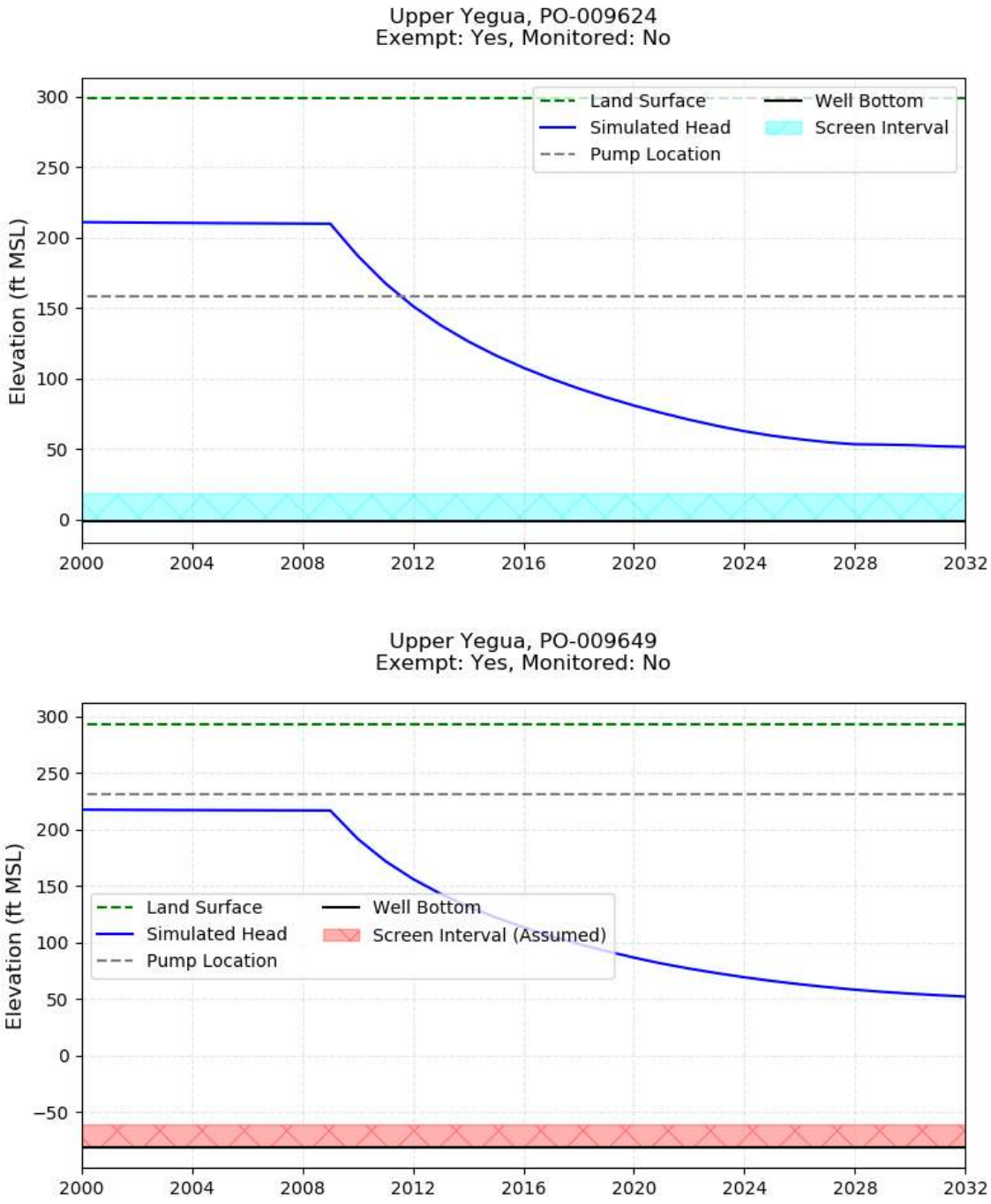


Figure E-53 Simulated water levels for exempt wells PO-009624 and PO-009649 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

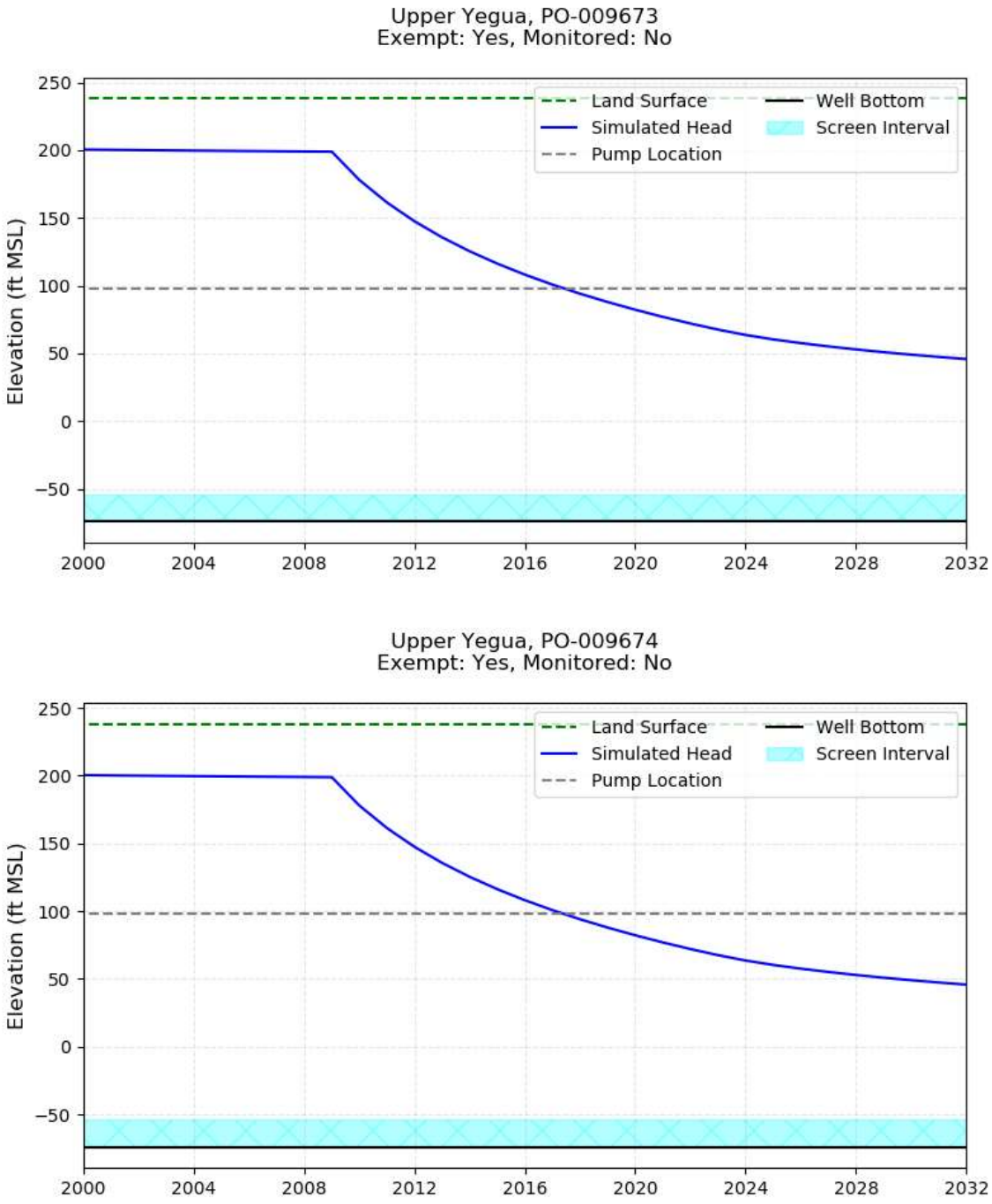


Figure E-54 Simulated water levels for exempt wells PO-009673 and PO-009374 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

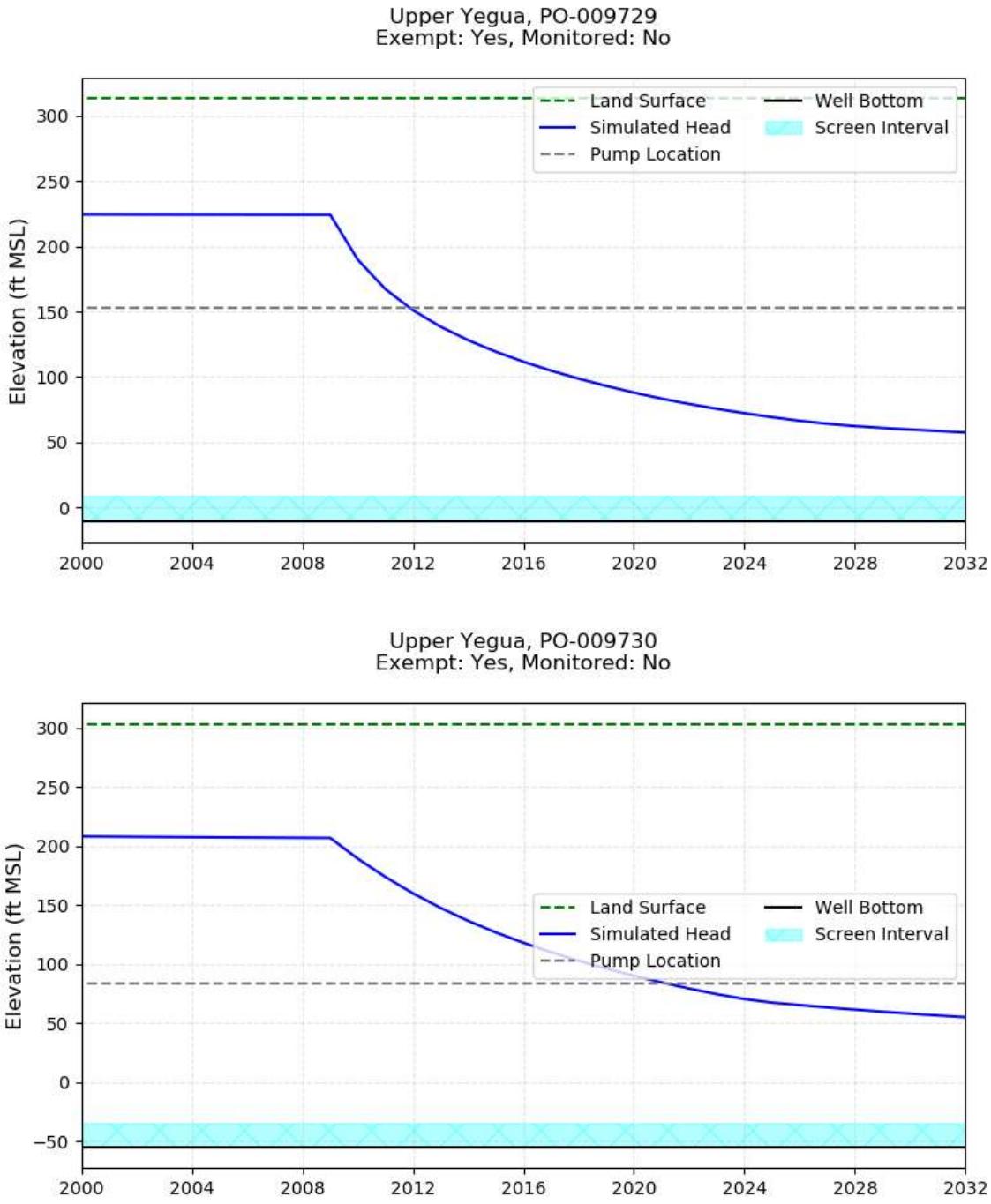


Figure E-55 Simulated water levels for exempt wells PO-009729 and PO-009730 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

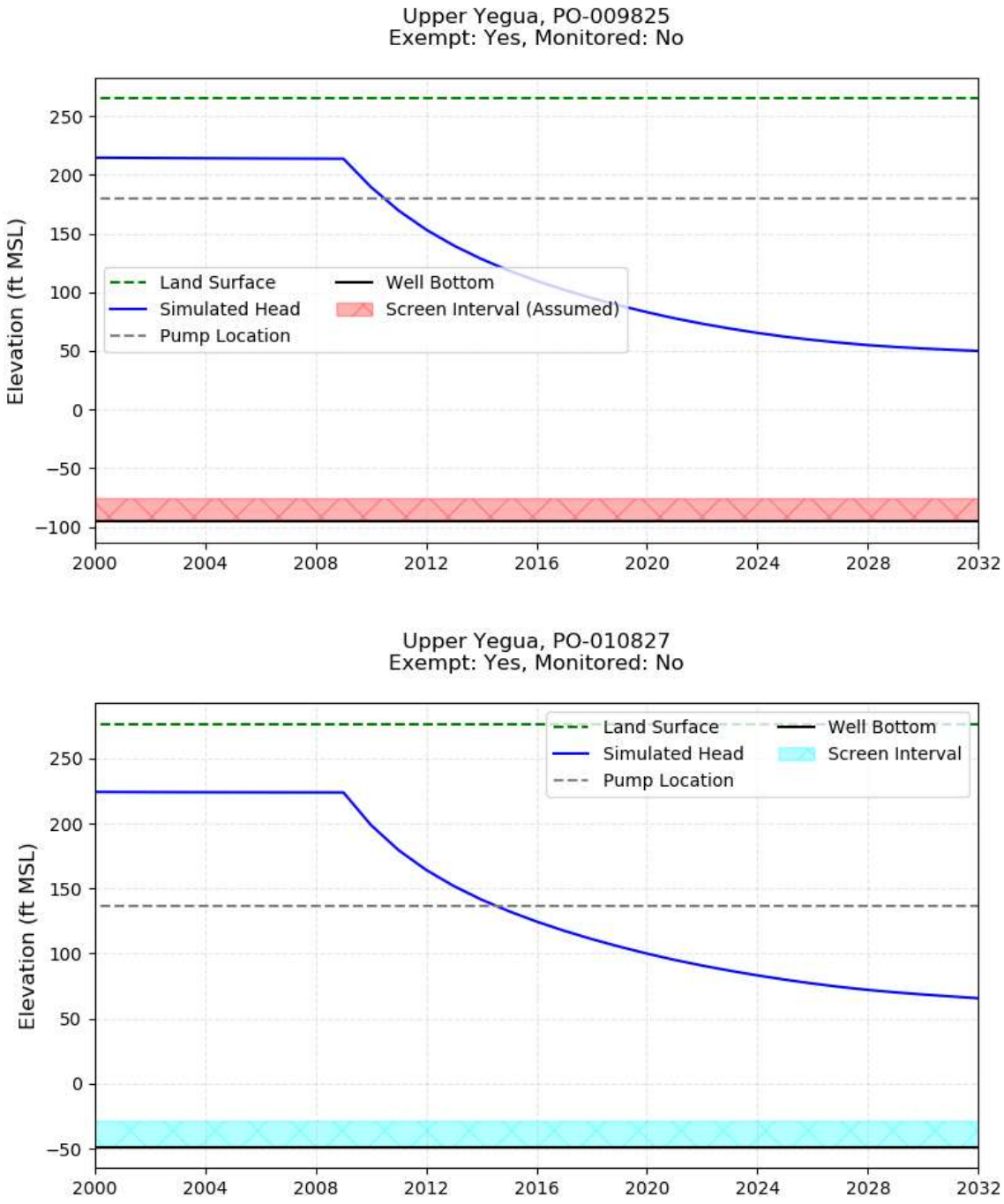


Figure E-56 Simulated water levels for exempt wells PO-009825 and PO-010827 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

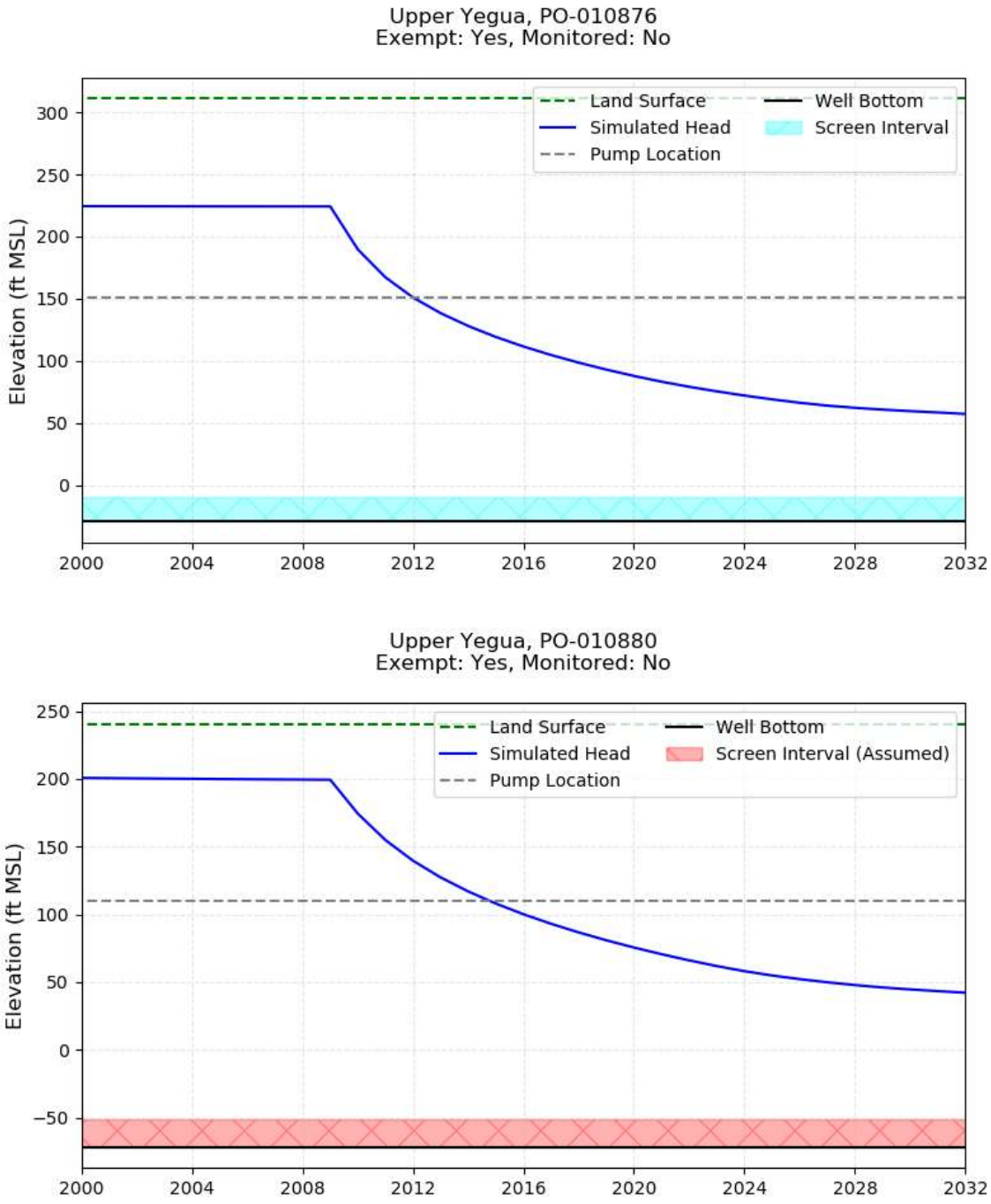


Figure E-57 Simulated water levels for exempt wells PO-010876 and PO-010880 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

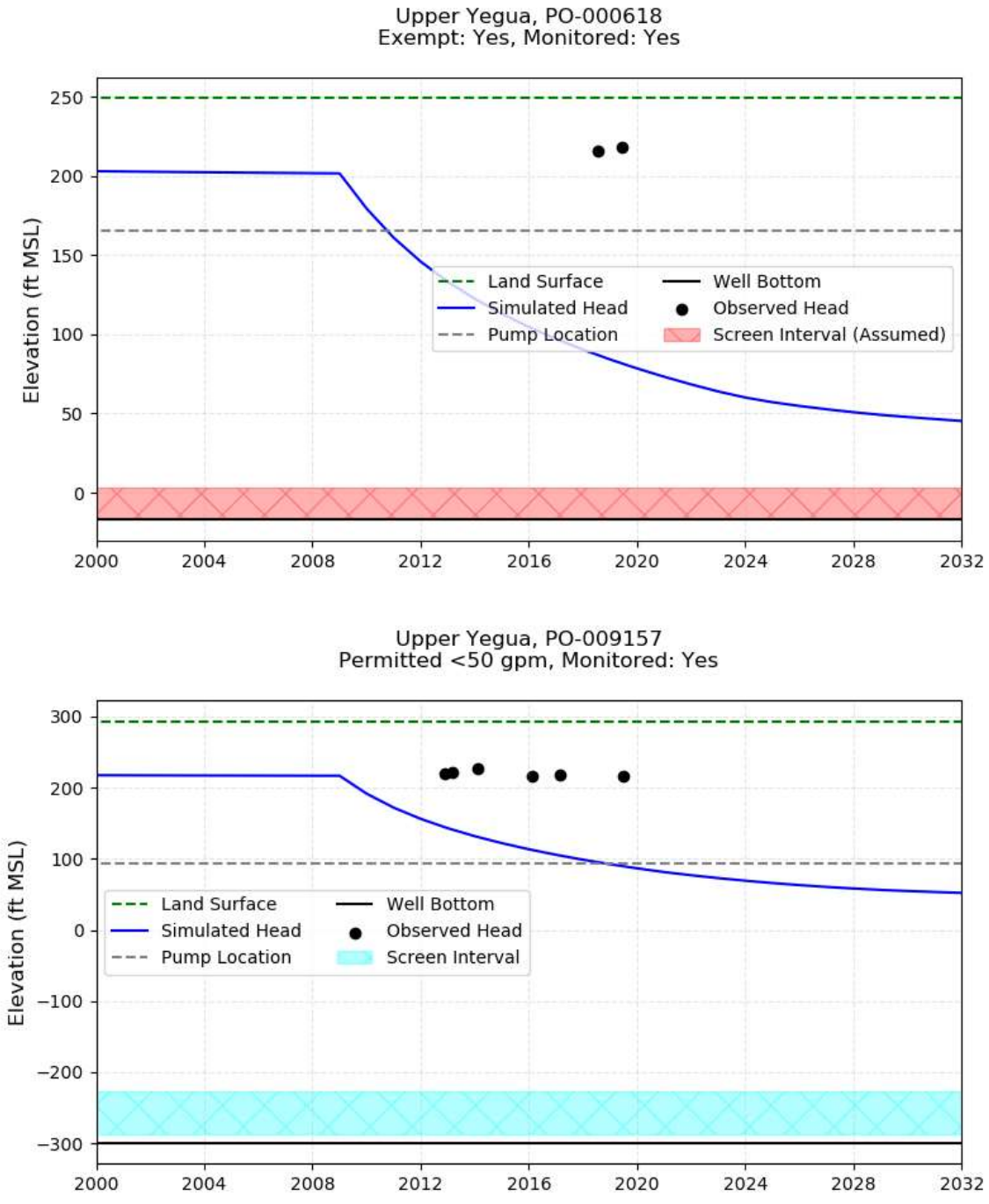


Figure E-58 Simulated water levels for exempt wells PO-000618 and PO-009157 located in the Yegua Jackson Aquifer where simulated water levels in the year 2028 is lower than the elevation the pump setting, as recorded in POGCD well database

APPENDIX F

Comparison of Simulated Water levels to the Elevation of the Pump Setting for Wells Located in the Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro, and Hooper Aquifers

Table F.1 Comparison of Simulated Water levels to the Elevation of the Pump Settings for Wells Located in the Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro, and Hooper Aquifers

WellId	Formation	Monitor Well	Exempt/ Permitted	Water Column Above Pump Setting (if below , value is negative)					Modeled Water Level Below Pump Setting					Drawdown from 2018 to 2028
				1929	2010	2018	2023	2028	1929	2010	2018	2023	2028	
PO-008797	Carrizo	0	1	62	11	6	-62	-83	no	no	no	yes	yes	89
PO-008246	Carrizo	0	1	41	-9	-13	-63	-81	no	yes	yes	yes	yes	68
PO-009377	Calvert Bluff	0	1	-39	-66	-65	-74	-81	yes	yes	yes	yes	yes	16
PO-008616	Simsboro	0	0	376	265	232	45	-76	no	no	no	no	yes	308
PO-000943	Carrizo	1	1	94	48	43	-50	-72	no	no	no	yes	yes	115
PO-010918	Carrizo	0	1	34	-8	-14	-53	-69	no	yes	yes	yes	yes	55
PO-009084	Carrizo	0	1	-36	-49	-51	-54	-58	yes	yes	yes	yes	yes	8
PO-008793	Carrizo	0	1	-36	-46	-47	-49	-52	yes	yes	yes	yes	yes	5
PO-009597	Simsboro	1	1	79	9	2	-11	-49	no	no	no	yes	yes	51
PO-009753	Simsboro	1	1	51	-34	-24	-26	-43	no	yes	yes	yes	yes	19
PO-008478	Carrizo	0	0	27	-8	-9	-30	-40	no	yes	yes	yes	yes	31
PO-009395	Carrizo	0	1	41	4	0	-28	-40	no	no	no	yes	yes	40
PO-009462	Carrizo	0	1	41	4	0	-28	-40	no	no	no	yes	yes	40
PO-009527	Hooper	0	1	-16	-30	-32	-36	-40	yes	yes	yes	yes	yes	7
PO-002014	Simsboro	1	1	66	-19	-9	-13	-34	no	yes	yes	yes	yes	25
PO-001883	Simsboro	1	1	62	-23	-13	-15	-33	no	yes	yes	yes	yes	19
PO-009787	Carrizo	0	1	129	83	78	-10	-32	no	no	no	yes	yes	110
PO-009607	Calvert Bluff	0	1	60	17	14	-10	-27	no	no	no	yes	yes	41
PO-001083	Simsboro	0	0	172	51	58	8	-26	no	no	no	no	yes	84
PO-008322	Carrizo	0	1	138	91	87	-2	-23	no	no	no	yes	yes	110
PO-009754	Simsboro	1	1	67	-18	-7	-7	-21	no	yes	yes	yes	yes	14
PO-007641	Simsboro	0	1	6	-11	-12	-15	-20	no	yes	yes	yes	yes	8
PO-001120	Carrizo	1	0	102	47	45	-1	-18	no	no	no	yes	yes	63
PO-008923	Carrizo	0	1	136	89	84	5	-16	no	no	no	no	yes	100
PO-009033	Queen City	0	1	-1	-16	-16	-16	-16	yes	yes	yes	yes	yes	0
PO-002205	Simsboro	1	1	60	-9	7	-6	-13	no	yes	no	yes	yes	21
PO-008326	Carrizo	0	1	127	76	71	7	-12	no	no	no	no	yes	84
PO-008921	Queen City	0	1	25	9	4	-3	-12	no	no	no	yes	yes	16
PO-009241	Hooper	0	1	-5	-12	-11	-12	-12	yes	yes	yes	yes	yes	0
PO-008054	Carrizo	0	1	137	94	90	13	-9	no	no	no	no	yes	99
PO-009332	Carrizo	0	1	148	101	96	13	-8	no	no	no	no	yes	105
PO-009755	Simsboro	1	1	60	12	19	0	-8	no	no	no	no	yes	27

WellId	Formation	Monitor Well	Exempt/ Permitted	Water Column Above Pump Setting (if below , value is negative)					Modeled Water Level Below Pump Setting					Drawdown from 2018 to 2028
				1929	2010	2018	2023	2028	1929	2010	2018	2023	2028	
PO-008659	Calvert Bluff	0	1	7	-3	-4	-6	-8	no	yes	yes	yes	yes	3
PO-007363	Simsboro	1	1	60	-22	-12	0	-7	no	yes	yes	yes	yes	-4
PO-009434	Carrizo	0	1	145	100	96	14	-7	no	no	no	no	yes	103
PO-006282	Carrizo	0	1	55	29	25	4	-5	no	no	no	no	yes	30
PO-009005	Sparta	0	1	15	-2	-3	-3	-4	no	yes	yes	yes	yes	1
PO-006277	Queen City	0	1	13	4	3	1	-3	no	no	no	no	yes	5
PO-008965	Carrizo	0	1	148	103	99	23	2	no	no	no	no	no	97
PO-008700	Queen City	0	1	14	6	5	4	2	no	no	no	no	no	2
PO-008207	Hooper	0	1	6	5	5	4	3	no	no	no	no	no	1
PO-009372	Queen City	1	1	4	3	4	4	4	no	no	no	no	no	0
PO-008800	Reklaw	0	1	47	31	23	16	5	no	no	no	no	no	18
PO-006415	Carrizo	0	1	153	94	91	26	6	no	no	no	no	no	85
PO-008799	Queen City	0	1	22	13	12	10	7	no	no	no	no	no	5
PO-009770	Hooper	1	1	63	29	29	22	8	no	no	no	no	no	21
PO-009741	Hooper	0	1	20	12	11	10	8	no	no	no	no	no	2
PO-009658	Hooper	0	1	23	13	13	11	9	no	no	no	no	no	4
PO-009288	Sparta	0	1	49	12	11	11	10	no	no	no	no	no	1
PO-009135	Carrizo	0	1	154	112	108	33	10	no	no	no	no	no	98
PO-007242	Calvert Bluff	1	1	57	27	28	18	10	no	no	no	no	no	18
				6	18	17	28	38	6	18	17	28	38	

Appendix G

Comparison of Simulated Water levels to the Elevation of the Pump Setting for Wells Located in the Yegua-Jackson Aquifer

Table G.1 Comparison of Simulated Water levels to the Elevation of the Pump Setting for Wells Located in the Yegua-Jackson Aquifer

WellId	Formation	Monitor Well	Exempt/ Permitted	Water Column Above Pump Setting (if below , value is negative)					Is Water Level Below the Elevation of the Pump Setting					Drawdown from 2018 to 2028
				1900	2000	2018	2023	2028	1900	2000	2018	2023	2028	
PO-009194	LY	0	1	-53	-67	-167	-199	-220	yes	yes	yes	yes	yes	53
PO-009682	LJ	0	1	-21	-28	-163	-181	-190	yes	yes	yes	yes	yes	27
PO-009577	UY	0	1	-2	-13	-150	-169	-174	yes	yes	yes	yes	yes	25
PO-009649	UY	0	1	-3	-14	-132	-158	-173	yes	yes	yes	yes	yes	40
PO-009535	UY	0	1	10	-1	-113	-140	-153	no	yes	yes	yes	yes	40
PO-007437	LY	0	1	26	11	-84	-116	-136	no	no	yes	yes	yes	52
PO-008849	LY	0	1	49	30	-94	-122	-135	no	no	yes	yes	yes	41
PO-009733	LJ	0	1	84	77	-114	-124	-134	no	no	yes	yes	yes	21
PO-009192	LJ	0	1	-20	-24	-96	-114	-125	yes	yes	yes	yes	yes	29
PO-009825	UY	0	1	46	35	-85	-111	-125	no	no	yes	yes	yes	40
PO-007044	UY	0	1	49	38	-80	-106	-119	no	no	yes	yes	yes	38
PO-000618	UY	1	1	49	38	-75	-101	-114	no	no	yes	yes	yes	40
PO-009624	UY	0	1	64	52	-66	-92	-105	no	no	yes	yes	yes	40
PO-008669	UY	0	1	63	53	-64	-89	-103	no	no	yes	yes	yes	40
PO-006978	UY	0	1	62	51	-65	-92	-103	no	no	yes	yes	yes	39
PO-009736	LJ	0	1	80	74	-67	-86	-96	no	no	yes	yes	yes	29
PO-009076	LY	0	1	95	76	-48	-77	-92	no	no	yes	yes	yes	45
PO-008910	UY	0	1	76	65	-49	-77	-92	no	no	yes	yes	yes	43
PO-009729	UY	0	1	82	71	-55	-78	-91	no	no	yes	yes	yes	36
PO-010876	UY	0	1	84	74	-52	-75	-89	no	no	yes	yes	yes	36
PO-006562	UY	0	1	78	66	-53	-76	-89	no	no	yes	yes	yes	35
PO-006493	UY	0	1	83	72	-48	-73	-87	no	no	yes	yes	yes	40
PO-009694	LY	0	1	79	66	-40	-68	-84	no	no	yes	yes	yes	44
PO-006557	LY	0	1	81	68	-38	-66	-82	no	no	yes	yes	yes	44
PO-008846	UY	0	1	92	80	-39	-65	-80	no	no	yes	yes	yes	40
PO-008879	LY	0	1	95	77	-47	-72	-78	no	no	yes	yes	yes	32
PO-008321	LJ	0	1	90	83	-51	-69	-78	no	no	yes	yes	yes	27
PO-007780	UY	0	1	95	84	-42	-65	-78	no	no	yes	yes	yes	36
PO-009276	UY	0	1	94	83	-36	-62	-76	no	no	yes	yes	yes	40
PO-008324	UY	0	1	91	79	-40	-63	-75	no	no	yes	yes	yes	35
PO-008024	LJ	0	1	99	88	-38	-62	-75	no	no	yes	yes	yes	37
PO-009087	LJ	0	1	65	57	-43	-62	-73	no	no	yes	yes	yes	30
PO-010951	LJ	0	1	124	118	-49	-64	-73	no	no	yes	yes	yes	24
PO-009344	LJ	0	1	65	57	-43	-62	-73	no	no	yes	yes	yes	30

WellId	Formation	Monitor Well	Exempt/ Permitted	Water Column Above Pump Setting (if below , value is negative)					Is Water Level Below the Elevation of the Pump Setting					Drawdown from 2018 to 2028
				1900	2000	2018	2023	2028	1900	2000	2018	2023	2028	
PO-008300	UY	0	1	88	77	-34	-62	-70	no	no	yes	yes	yes	36
PO-009354	UY	0	1	98	87	-30	-56	-68	no	no	yes	yes	yes	39
PO-009409	LY	0	1	120	105	-27	-53	-66	no	no	yes	yes	yes	38
PO-009571	LJ	0	1	112	105	-36	-55	-64	no	no	yes	yes	yes	29
PO-007782	LJ	0	1	67	60	-31	-52	-64	no	no	yes	yes	yes	34
PO-010827	UY	0	1	98	88	-25	-50	-64	no	no	yes	yes	yes	39
PO-006373	LJ	0	1	69	62	-31	-52	-64	no	no	yes	yes	yes	32
PO-008273	LJ	0	1	74	67	-33	-53	-63	no	no	yes	yes	yes	30
PO-007320	UY	0	1	90	79	-20	-47	-63	no	no	yes	yes	yes	42
PO-010880	UY	0	1	101	90	-24	-49	-63	no	no	yes	yes	yes	39
PO-008263	LJ	0	1	78	70	-30	-49	-60	no	no	yes	yes	yes	30
PO-008862	LY	0	1	99	85	-10	-42	-59	no	no	yes	yes	yes	50
PO-008999	UY	0	0	109	97	-21	-46	-59	no	no	yes	yes	yes	38
PO-010850	LY	0	1	104	89	-6	-39	-58	no	no	yes	yes	yes	52
PO-006687	UY	0	1	108	97	-18	-46	-57	no	no	yes	yes	yes	39
PO-008282	LY	0	1	120	106	-7	-39	-57	no	no	yes	yes	yes	50
PO-009697	LY	0	1	120	104	-7	-39	-57	no	no	yes	yes	yes	49
PO-009310	UY	0	1	113	102	-13	-40	-56	no	no	yes	yes	yes	43
PO-008152	UY	0	1	104	94	-16	-40	-54	no	no	yes	yes	yes	38
PO-008285	UY	0	1	112	100	-19	-42	-54	no	no	yes	yes	yes	35
PO-009723	LJ	0	1	80	73	-18	-39	-52	no	no	yes	yes	yes	34
PO-003869	UY	0	1	115	105	-13	-38	-51	no	no	yes	yes	yes	38
PO-009287	LJ	0	1	126	119	-22	-40	-50	no	no	yes	yes	yes	29
PO-009011	UY	0	1	116	106	-13	-37	-50	no	no	yes	yes	yes	37
PO-008957	LJ	0	1	111	104	-18	-38	-49	no	no	yes	yes	yes	31
PO-007504	LJ	0	1	90	83	-15	-37	-49	no	no	yes	yes	yes	34
PO-008231	LJ	0	1	86	79	-15	-35	-47	no	no	yes	yes	yes	32
PO-008264	LJ	0	1	85	78	-13	-34	-47	no	no	yes	yes	yes	34
PO-008154	LJ	0	1	87	80	-13	-34	-46	no	no	yes	yes	yes	32
PO-008254	UY	0	1	110	99	-3	-31	-45	no	no	yes	yes	yes	42
PO-009673	UY	0	1	113	102	-4	-31	-45	no	no	yes	yes	yes	41
PO-009674	UY	0	1	113	102	-4	-31	-45	no	no	yes	yes	yes	41
PO-008958	LY	0	1	141	126	-6	-32	-44	no	no	yes	yes	yes	38
PO-009722	LJ	0	1	95	87	-13	-32	-43	no	no	yes	yes	yes	30
PO-009278	UY	0	1	100	91	-1	-26	-43	no	no	yes	yes	yes	42
PO-009371	LJ	0	1	82	76	-9	-30	-43	no	no	yes	yes	yes	33
PO-008807	LJ	0	1	96	89	-9	-30	-42	no	no	yes	yes	yes	34

WellId	Formation	Monitor Well	Exempt/ Permitted	Water Column Above Pump Setting (if below , value is negative)					Is Water Level Below the Elevation of the Pump Setting					Drawdown from 2018 to 2028
				1900	2000	2018	2023	2028	1900	2000	2018	2023	2028	
PO-009136	UY	0	1	123	111	-5	-28	-41	no	no	yes	yes	yes	36
PO-008979	LJ	0	1	92	85	-8	-28	-40	no	no	yes	yes	yes	32
PO-008331	LJ	0	1	91	85	-7	-28	-40	no	no	yes	yes	yes	34
PO-010923	LJ	0	1	73	68	-12	-29	-40	no	no	yes	yes	yes	29
PO-009459	LJ	0	1	99	92	-7	-28	-40	no	no	yes	yes	yes	34
PO-008305	UY	0	1	125	115	-1	-27	-40	no	no	yes	yes	yes	39
PO-008226	UY	0	1	118	107	2	-27	-40	no	no	no	yes	yes	41
PO-009406	LY	0	1	114	102	14	-18	-40	no	no	no	yes	yes	53
PO-009675	LJ	0	1	92	86	-6	-27	-39	no	no	yes	yes	yes	34
PO-009185	LJ	0	1	159	152	-14	-29	-38	no	no	yes	yes	yes	24
PO-007994	UY	0	1	130	119	5	-22	-38	no	no	no	yes	yes	43
PO-004320	UY	0	1	132	121	7	-20	-36	no	no	no	yes	yes	43
PO-006425	LJ	0	1	81	76	-3	-23	-36	no	no	yes	yes	yes	32
PO-009157	UY	1	0	136	125	6	-20	-35	no	no	no	yes	yes	40
PO-007776	LY	0	1	107	95	15	-15	-35	no	no	no	yes	yes	50
PO-010867	LY	0	1	98	88	9	-17	-34	no	no	no	yes	yes	44
PO-008880	UY	0	1	111	102	7	-18	-33	no	no	no	yes	yes	40
PO-009504	LY	0	1	132	123	5	-18	-32	no	no	no	yes	yes	37
PO-008914	UY	0	1	113	104	9	-15	-31	no	no	no	yes	yes	40
PO-008861	LY	0	1	128	114	19	-13	-31	no	no	no	yes	yes	50
PO-009074	UY	0	1	125	115	10	-18	-30	no	no	no	yes	yes	41
PO-008262	LJ	0	1	83	78	5	-14	-27	no	no	no	yes	yes	31
PO-009735	LY	0	1	140	126	27	-6	-27	no	no	no	yes	yes	53
PO-007607	LY	0	1	135	121	25	-7	-26	no	no	no	yes	yes	52
PO-009245	LY	0	1	165	146	13	-13	-26	no	no	no	yes	yes	39
PO-008387	LY	0	0	139	127	24	-6	-25	no	no	no	yes	yes	49
PO-008050	UY	0	1	144	133	19	-8	-24	no	no	no	yes	yes	43
PO-007604	UY	0	1	146	135	12	-10	-23	no	no	no	yes	yes	36
PO-008318	LJ	0	1	109	102	11	-10	-23	no	no	no	yes	yes	34
PO-009730	UY	0	1	136	125	20	-9	-22	no	no	no	yes	yes	41
PO-009300	UY	0	1	125	114	24	-3	-20	no	no	no	yes	yes	44
PO-007878	LY	0	1	130	119	32	2	-17	no	no	no	no	yes	49
PO-009066	UY	0	1	156	146	20	-3	-16	no	no	no	yes	yes	36
PO-008265	LJ	0	1	117	110	15	-4	-16	no	no	no	yes	yes	31
PO-009811	LJ	0	1	109	102	17	-3	-16	no	no	no	yes	yes	33
PO-006655	UY	0	1	146	136	23	1	-12	no	no	no	no	yes	34
PO-007880	UY	0	1	149	139	16	-2	-12	no	no	no	yes	yes	28

WellId	Formation	Monitor Well	Exempt/ Permitted	Water Column Above Pump Setting (if below , value is negative)					Is Water Level Below the Elevation of the Pump Setting					Drawdown from 2018 to 2028
				1900	2000	2018	2023	2028	1900	2000	2018	2023	2028	
PO-009323	UY	0	1	124	114	21	1	-10	no	no	no	no	yes	31
PO-008672	SH	0	1	-8	-8	-8	-8	-9	yes	yes	yes	yes	yes	0
PO-009403	UY	0	0	163	152	33	7	-7	no	no	no	no	yes	40
PO-008268	LJ	0	1	127	120	26	6	-6	no	no	no	no	yes	32
PO-008854	LY	0	1	115	106	37	13	-5	no	no	no	no	yes	41
PO-008296	UY	0	1	157	146	34	6	-3	no	no	no	no	yes	37
PO-009193	UY	0	1	142	131	41	14	-3	no	no	no	no	yes	44
PO-007848	SH	0	1	-34	-4	-2	-2	-2	yes	yes	yes	yes	yes	0
PO-007876	LY	0	1	165	151	54	21	0	no	no	no	no	no	53
PO-010911	SH	0	1	3	3	3	3	2	no	no	no	no	no	0
PO-008911	UY	0	1	171	161	46	19	3	no	no	no	no	no	43
PO-007275	LY	0	1	154	142	56	25	5	no	no	no	no	no	52
PO-009761	LJ	0	1	137	130	39	18	5	no	no	no	no	no	34
PO-009247	SH	0	1	10	10	9	8	7	no	no	no	no	no	2
PO-009315	SH	0	1	9	8	8	8	8	no	no	no	no	no	0
PO-009648	SH	0	1	9	9	9	9	9	no	no	no	no	no	0
PO-009645	LJ	0	1	142	135	41	21	9	no	no	no	no	no	32
PO-008973	LY	0	1	183	165	41	16	9	no	no	no	no	no	32
PO-005713	LY	0	0	185	171	57	27	10	no	no	no	no	no	47

Note: SH=shallow zone, UJ=Upper Jackson, LJ=Lower Jackson, UY=Upper Yegua, LY= Lower Yegua