

**Basin Management Objective
Butte County
Sub-Inventory Unit – BUTTE SINK**

Butte County Water Advisory Committee Member – Gary Kerhoulas

Contact Information

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Description of the Butte Sink Sub-inventory Unit –

The Butte Sink Sub-inventory Unit (SIU) covers an area of about 10,300 acres, bordered by the Biggs/West Gridley SIU to the north and east, Sutter County to the south, and Butte Creek (the Colusa County boundary) to the west. Much of the Butte Sink area consists of waterfowl refuges and privately managed wetlands habitats. These habitats are primarily composed of native riparian vegetation and support aquatic, terrestrial and avian threatened and/or endangered species along with a diverse component of wetland dependent and associated species. A smaller portion of the SIU supports agricultural production of rice and grain crops. Waterfowl refuges, wetlands and agricultural land use in this area are supported by the application of a combination of surface and groundwater. The Butte Sink SIU is the lowest point of elevation in Butte County and thus receives a tremendous amount of storm runoff. The reduced rate of surface elevation drop in the Butte Sink especially south the Gridley-Colusa highway (collectively known as the lower Butte Sink) allows for prolonged periods of flooding. There is significant opportunity for ground water recharge during the fall application of surface in the wetlands habitats and when weather events cause flooding. The southwestern most portion of the Butte Sink SIU has surface water rights and therefore uses little groundwater. Most of the groundwater pumping occurring within the Butte Sink SIU occurs at the Gray Lodge Wildlife Refuge, and outside of the Butte Sink SIU to the south in Sutter County. This surrounding groundwater pumping likely affects the groundwater levels monitored within the Butte Sink SIU. Land in the Butte Sink SIU receives extensive rice runoff and surface water from Biggs/West Gridley Water District, Richvale Irrigation District and Western Canal Water District. If surface water drainage or deliveries were cut to the Butte Sink SIU area, groundwater use would increase significantly.

Management Objective –

To maintain the groundwater surface elevation in all aquifer systems at a level that will assure the continued sustainability and health of the Butte Sink wetlands. It is also the intent of this management objective to assure a sustainable agricultural and wildlife management water supply of good quality for now and

into the future, and to assure the water supply can be utilized without injuring groundwater quality or inducing inelastic land subsidence. The management objective also strives to assure an adequate supply of good quality groundwater for all users in the sub-inventory unit.

Geologic Formations Identified In Sub-Inventory Unit –

Geologic formations in the Butte Sink SIU, from youngest (shallowest) to oldest (deepest), include:

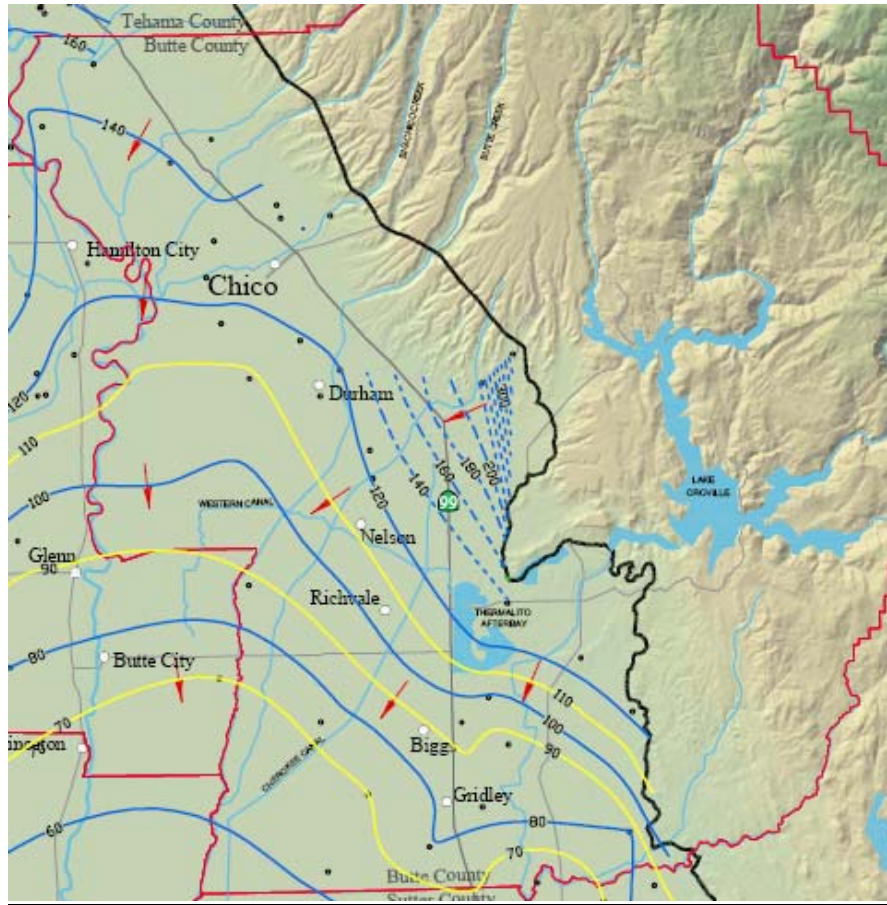
- Quaternary Alluvium
- Basin Deposits
- Modesto Formation
- Riverbank Formation

Fresh Water-bearing Units. In the Sacramento Valley Region of Butte County, fresh groundwater-bearing units include, from youngest (shallowest) to oldest (deepest), the Modesto, Riverbank, Laguna, Tehama and Tuscan Formations. Those included in the Butte Sink SIU are:

- Modesto Formation
- Riverbank Formation
- Tuscan Formation
- Sutter Formation

Groundwater Flow in the Butte Sink Sub-Inventory Unit –

The below figure is a cropped segment of a map prepared by DWR Northern District. It shows the groundwater elevation contours in your sub-inventory unit with arrows indicating the direction of groundwater movement. This graphic indicates that the regional pattern of spring groundwater movement in the Butte Sink SIU is in a southwesterly direction, at a gradient of about 3 feet per mile, toward Butte Creek.



Arrows show the direction of groundwater movement.

2008 Groundwater contours were constructed using groundwater level measurements taken by the Department of Water Resources and Local Cooperators between March 1st and March 20th, 2008. Groundwater contours are based on groundwater level measurements taken from wells constructed within the middle portion of the aquifer system (100 to 400 feet deep). This portion of the aquifer supplies approximately 70% of all domestic, agricultural and municipal wells. Blue contour lines represent 20 foot intervals and yellow contour lines represent 10 foot intervals. Full size contour maps are included in the annual Groundwater Status Report posted on the Department of Water and Resource Conservation website.

BMO Key Wells Selected for Groundwater Level Monitoring –

A new multi-completion dedicated monitoring well was installed by DWR Northern District within the Grey Lodge Wildlife Refuge, SWN 17N01E24A02-5. Groundwater elevation data will be presented in this BMO once enough years of data have been collected for analyzation.

SPRING

Well ID	Well Type	Aquifer	Spring Stage 1 & 2 Alerts**		Stage 3 Alerts**	
			Elev. (ft)	Depth (ft)	Elev. (ft)	Depth (ft)
17N01E17F001M	Monitoring	Riverbank	55.29	7.57	54.12	7.88
17N01E17F002M	Monitoring	Sutter Formation	57.02	5.78	56.87	5.93
17N01E17F003M	Monitoring	Sutter Formation	57.96	4.54	57.47	5.04
17N01E24A002M	Monitoring	Sutter & Tuscan				
17N01E24A003M	Monitoring	Sutter Formation				
17N01E24A004M	Monitoring	Sutter Buttes Rampart				
17N01E24A005M	Monitoring	Sutter Buttes Rampart				
17N02E19J001M	Irrigation	Sutter Formation	62.75	7.95	61.80	8.90

FALL

Well ID	Well Type	Aquifer	Fall Stage 1 & 2 Alerts**		Fall Stage 3 Alerts**	
			Elev. (ft)	Depth (ft)	Elev. (ft)	Depth (ft)
17N01E17F001M	Monitoring	Riverbank	51.71	5.78	56.87	5.93
17N01E17F002M	Monitoring	Sutter Formation	51.39	11.41	50.60	12.20
17N01E17F003M	Monitoring	Sutter Formation	51.14	11.36	50.00	12.50
17N01E24A002M	Monitoring	Sutter & Tuscan				
17N01E24A003M	Monitoring	Sutter Formation				
17N01E24A004M	Monitoring	Sutter Buttes Rampart				
17N01E24A005M	Monitoring	Sutter Buttes Rampart				
17N02E19J001M	Irrigation	Sutter Formation	61.10	9.60	60.50	10.20

Groundwater elevation data will be presented in this BMO once enough years of data have been collected for analyzation from the multi-completion monitoring well installed at the Gray Lodge Wildlife Refuge in 2007.

BMO Key Wells Selected for Groundwater Quality Monitoring–

Stakeholders in the Butte Sink SIU will continue to work with staff to locate additional wells, either irrigation or domestic with sufficient historical construction information, suitable to include in the water quality monitoring network, and initiate data collection in August 2009.

BMO Key Well(s) Selected for Land Subsidence Monitoring–

Land Subsidence is continuously monitored by the Department of Water Resources and Butte County Department of Water and Resource Conservation. The closest extensometer to the sub-inventory unit is in Biggs West-Gridley Water District (18N01E35L001M).

Butte County staff participated in the Sacramento Valley Height Modernization Project during March 2008 as a means to enhance the subsidence monitoring program in the county and the region. This cooperative project between the Department of Water Resources (DWR), the Bureau of Reclamation and local County agencies helped to establish baseline ground elevations in Butte County and other portions of the valley. Land elevations were measured using Global Positioning System (GPS) survey equipment and survey monuments located on

an approximate three to five mile grid. Re-observations are to be done in approximately three years, and will give measurements to compare against the baseline data in order to determine whether or not any subsidence has occurred.

BMO Alert Stage Definitions and Compliance Methodologies–

The Butte Sink Sub Area will use the following guidelines in the management of the groundwater resources. The groundwater level and land subsidence management objectives are intended to initiate predetermined voluntary Ground Water Management Actions, as defined in the accompanying cover report, to remedy declining ground water levels that are not recovering to compliance levels for each index well, or prevent further inelastic land subsidence. Stakeholders in the Butte SIU will work with staff to locate additional wells, either irrigation or domestic, with sufficient historical construction information to include in the water quality monitoring network, and possibly initiate data collection in August 2009.

Groundwater Level – Standard Deviation and Lowest Record

For the Butte Sink SIU the groundwater level objectives were chosen to support both groundwater levels that support wetland habitat and available groundwater in storage in the deeper aquifer systems. The spring groundwater level measurement is intended to measure the change in groundwater in storage in the deeper aquifers and the fall measurements are intended to support the wetlands habitat.

Stage 1: The first year that spring or fall groundwater levels fall below one standard deviation below the mean spring or fall groundwater level established for the well but still above two standard deviations below the mean spring or fall level for the well.

Stage 2: Stage 2 is reached if spring or fall groundwater levels, for a second consecutive year, remain below one standard deviation below the mean spring or fall groundwater level of the well but still above two standard deviations below the mean spring or fall level for the well.

Stage 3: Stage 3 is reached when the spring or fall groundwater level measurement is below the respective lowest historic groundwater level measurement on record.

Groundwater Quality –

Stakeholders in the Butte SIU will work with staff to locate additional wells, either irrigation or domestic, with sufficient historical construction information to include in the water quality monitoring network, and possibly initiate data collection in August 2009.

Land Subsidence –

Stage 1 is reached when the annual elastic subsidence exceeds the average annual elastic subsidence measured over the period of record of the extensometer.

Stage 2 is reached when the annual elastic subsidence exceeds the maximum recorded elastic subsidence over the period of record for the extensometer.

Stage 3 is when inelastic subsidence is detected. Inelastic subsidence shall be detected by comparing reading from the extensometer taken on March 1 of each year against previous March 1 measurements.

Future Monitoring Recommendations –

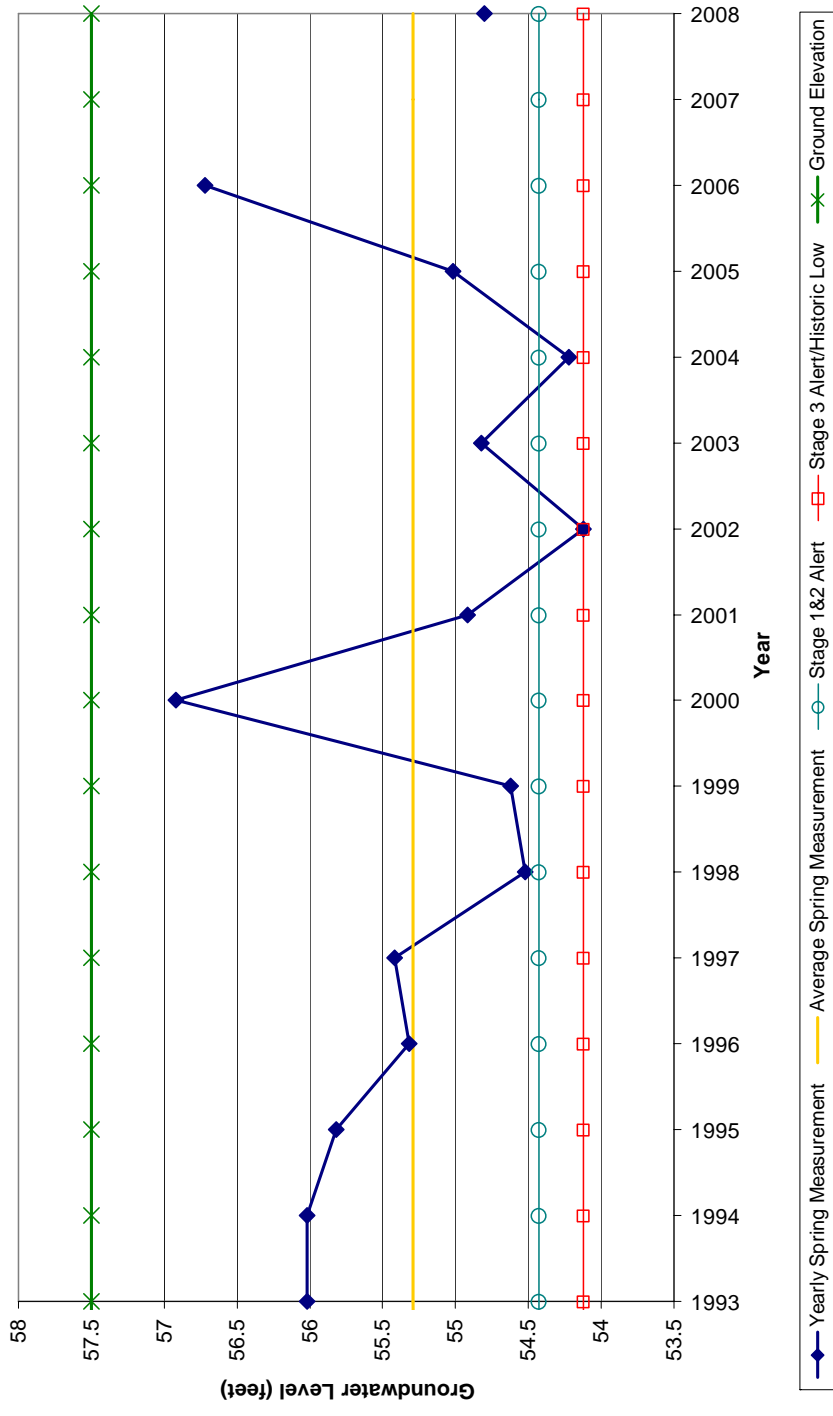
Efforts will be made to identify additional wells that could be added to the existing monitoring well network for water quality trend monitoring. Locate additional wells, either irrigation or domestic, with sufficient historical construction information to include in the water quality monitoring network, and initiate data collection in August 2009.

Supporting Data –

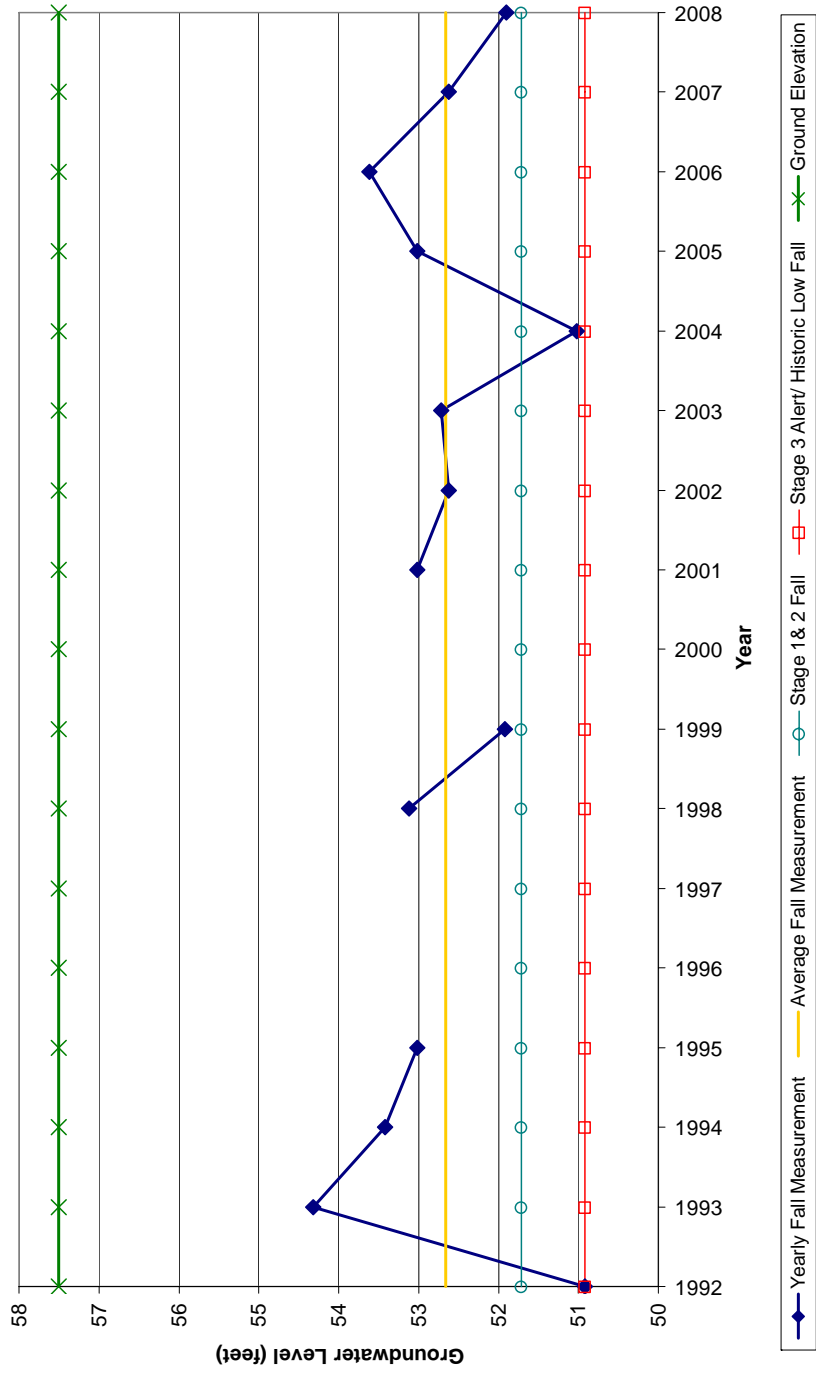
Hydrographs depicting yearly spring level measurements, including 2008 data, with established alert levels.

As-built diagram for the SWN 17N01E24A02-5 multi-completion dedicated monitoring well installed by DWR Northern District within the Grey Lodge Wildlife Refuge.

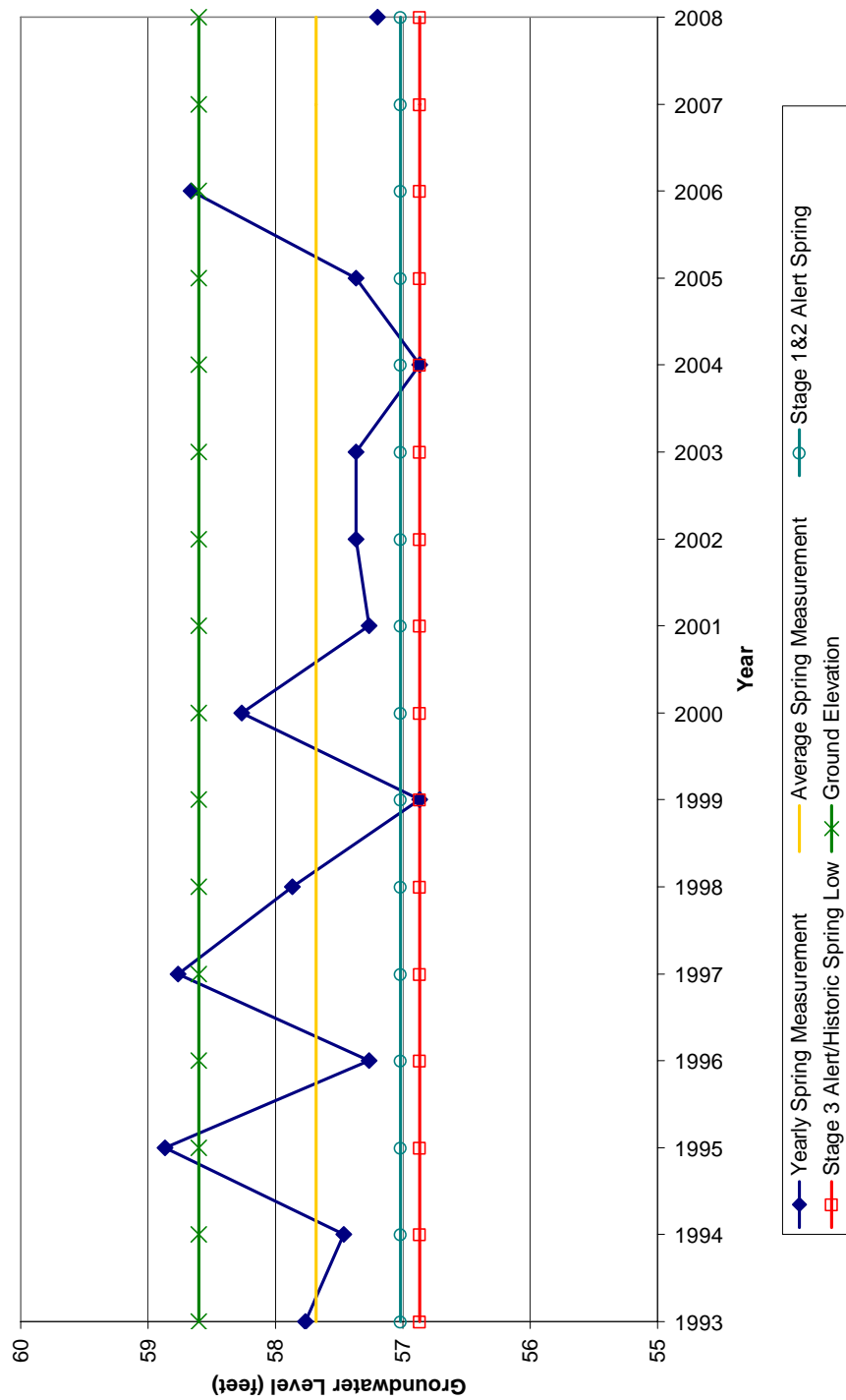
**Spring Groundwater Levels
Butte Sink - 17N01E17F001**



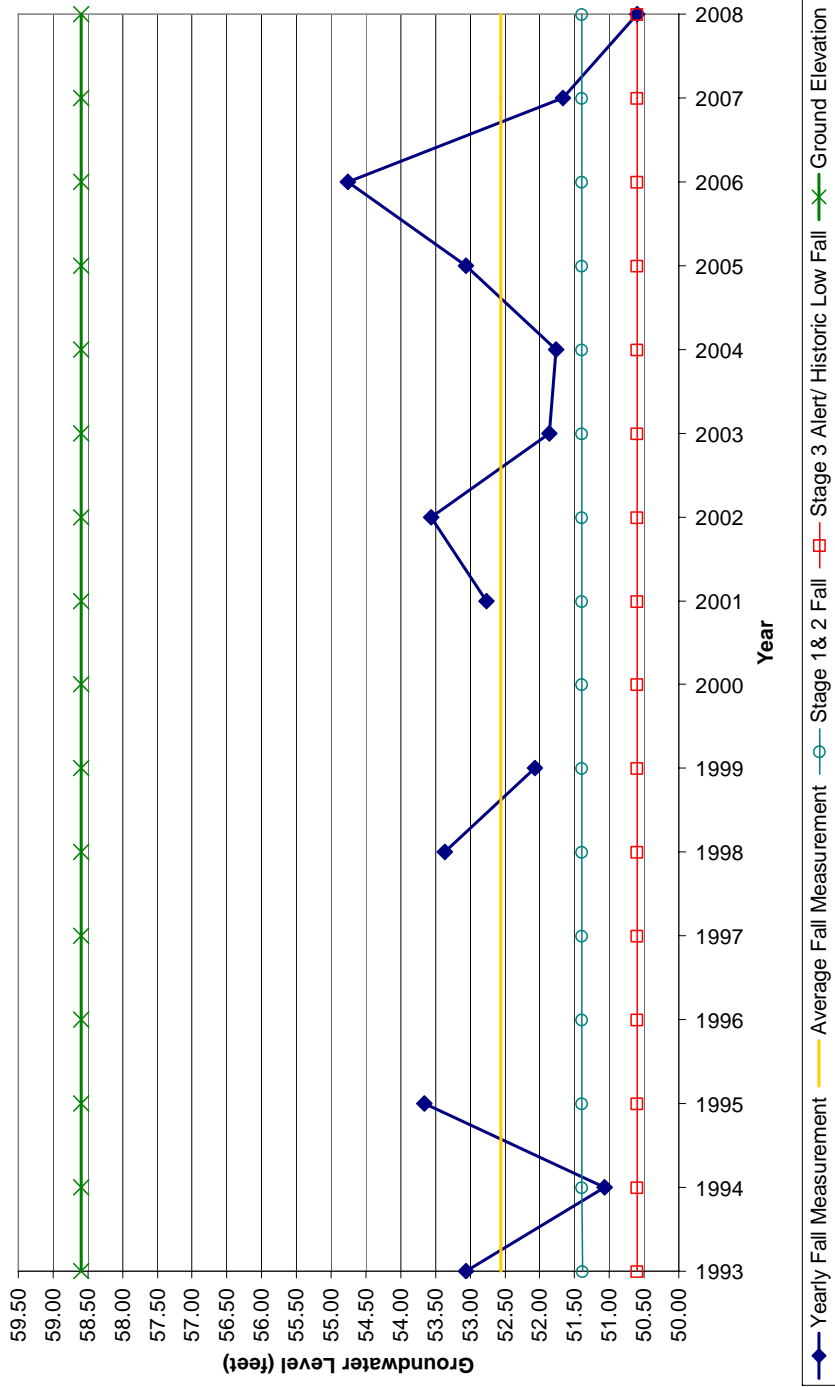
Fall Groundwater Levels
Butte Sink - 17N01E17F001



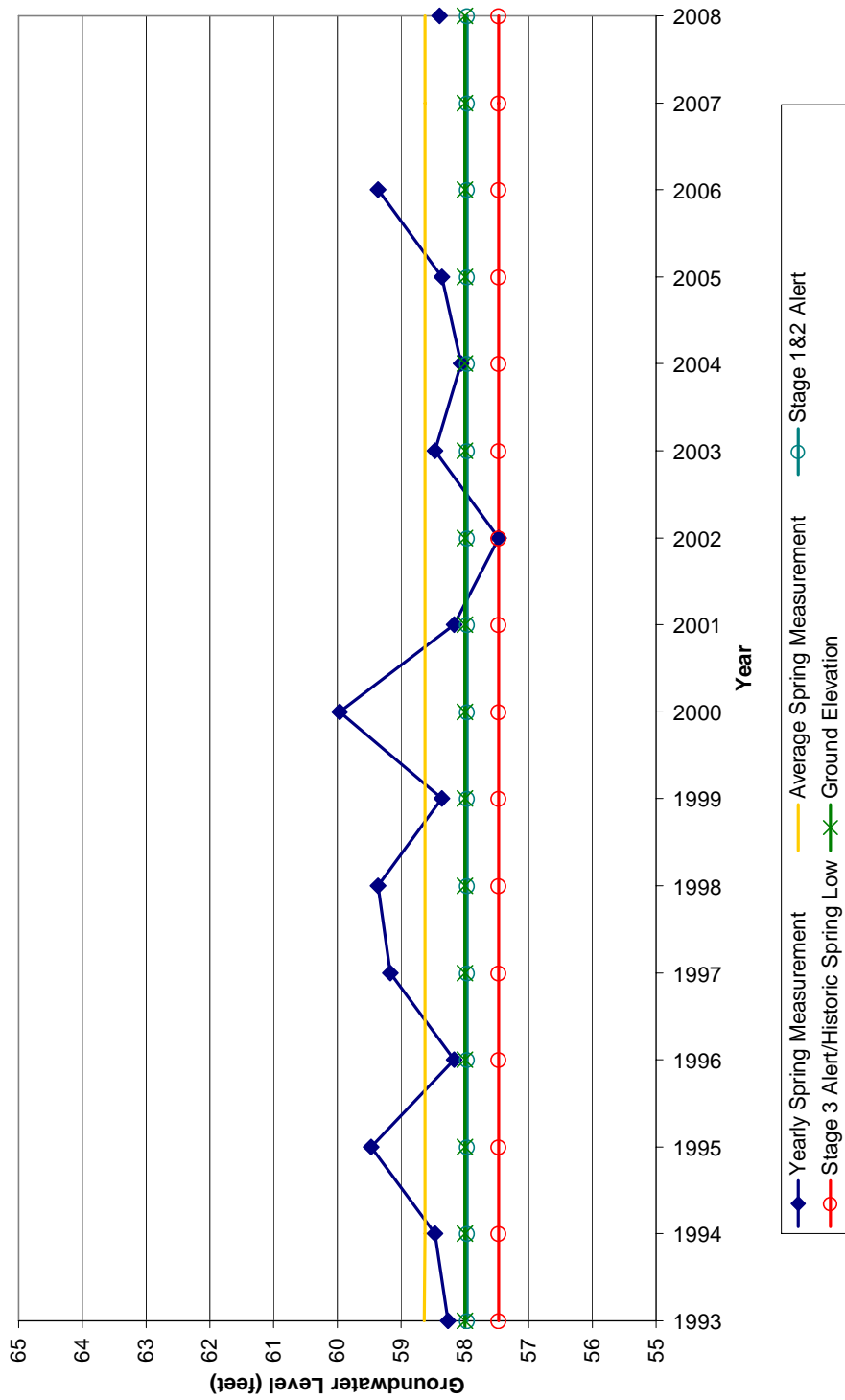
**Spring Groundwater Levels
Butte Sink - 17N01E17F002**



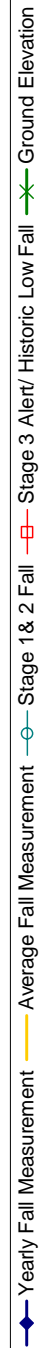
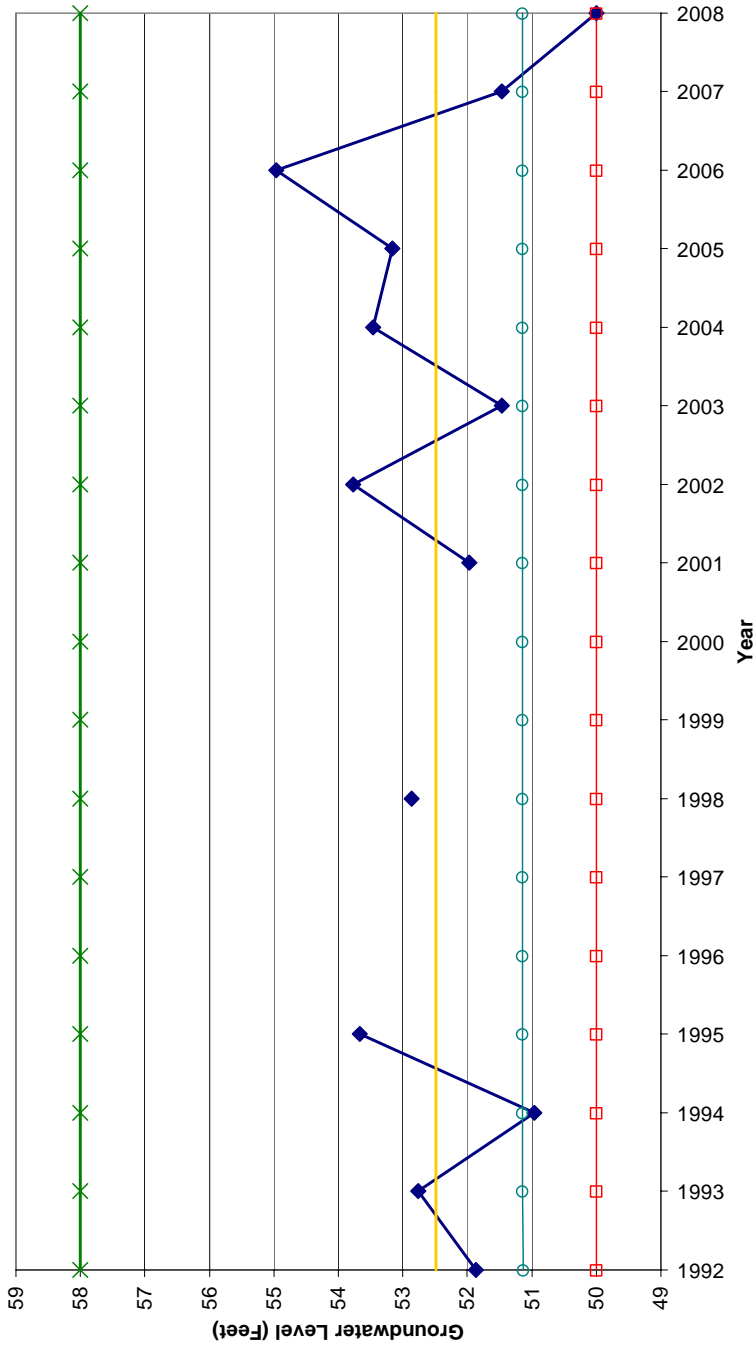
Fall Groundwater Levels
Butte Sink - 17N01E17F002



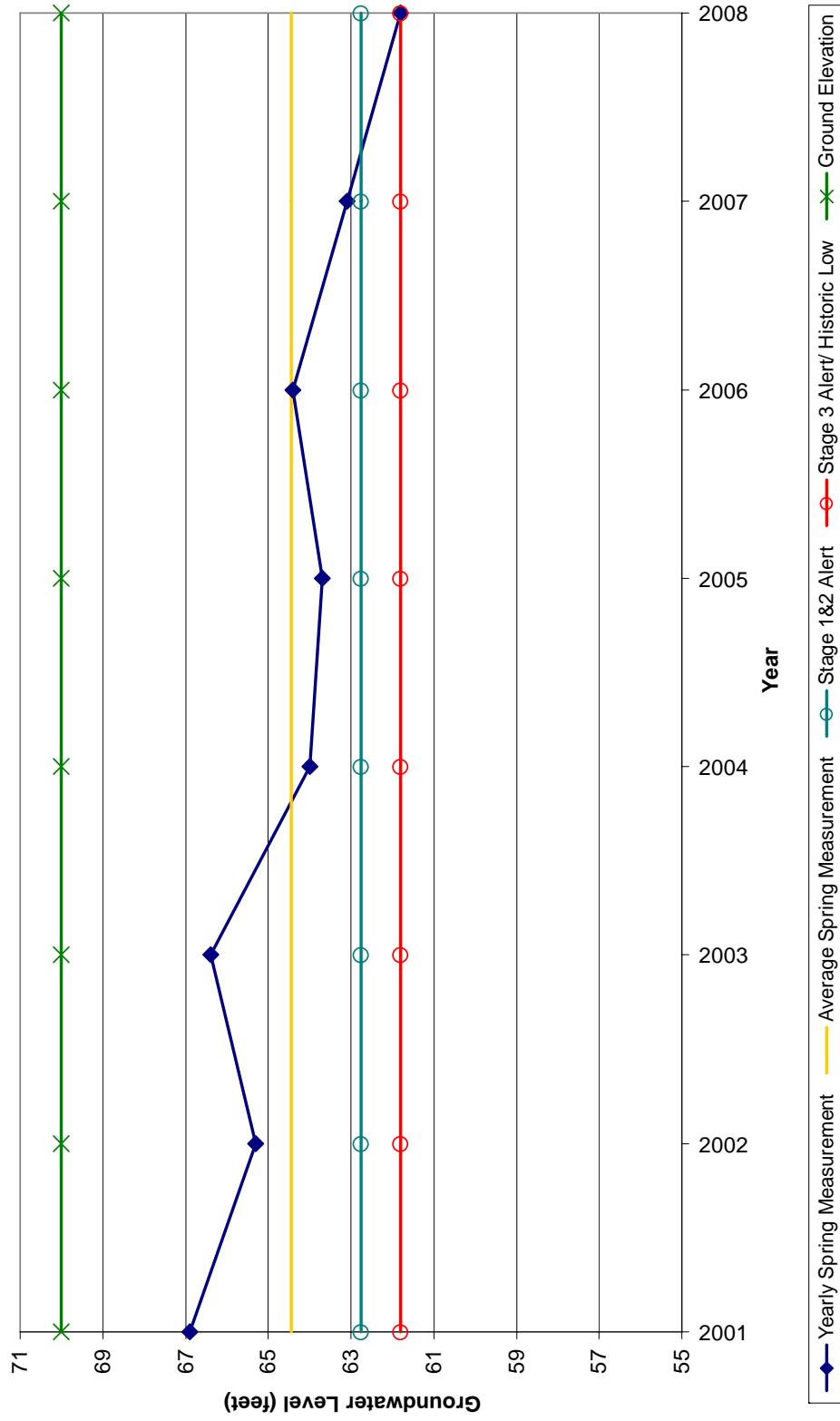
Spring Groundwater Levels
Butte Sink - 17N01E17F003



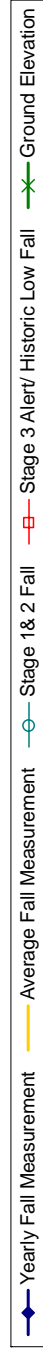
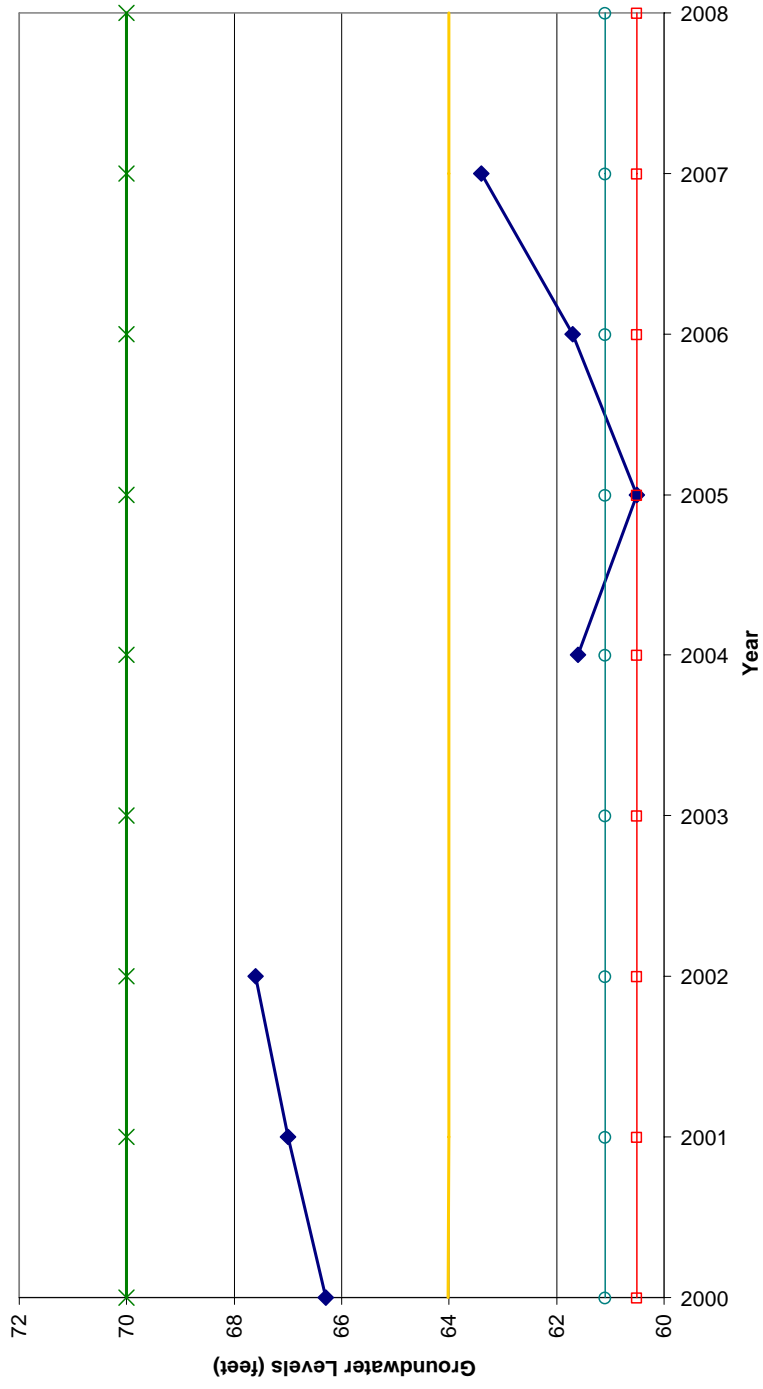
Fall Groundwater Levels
Butte Sink - 17N01E17F003

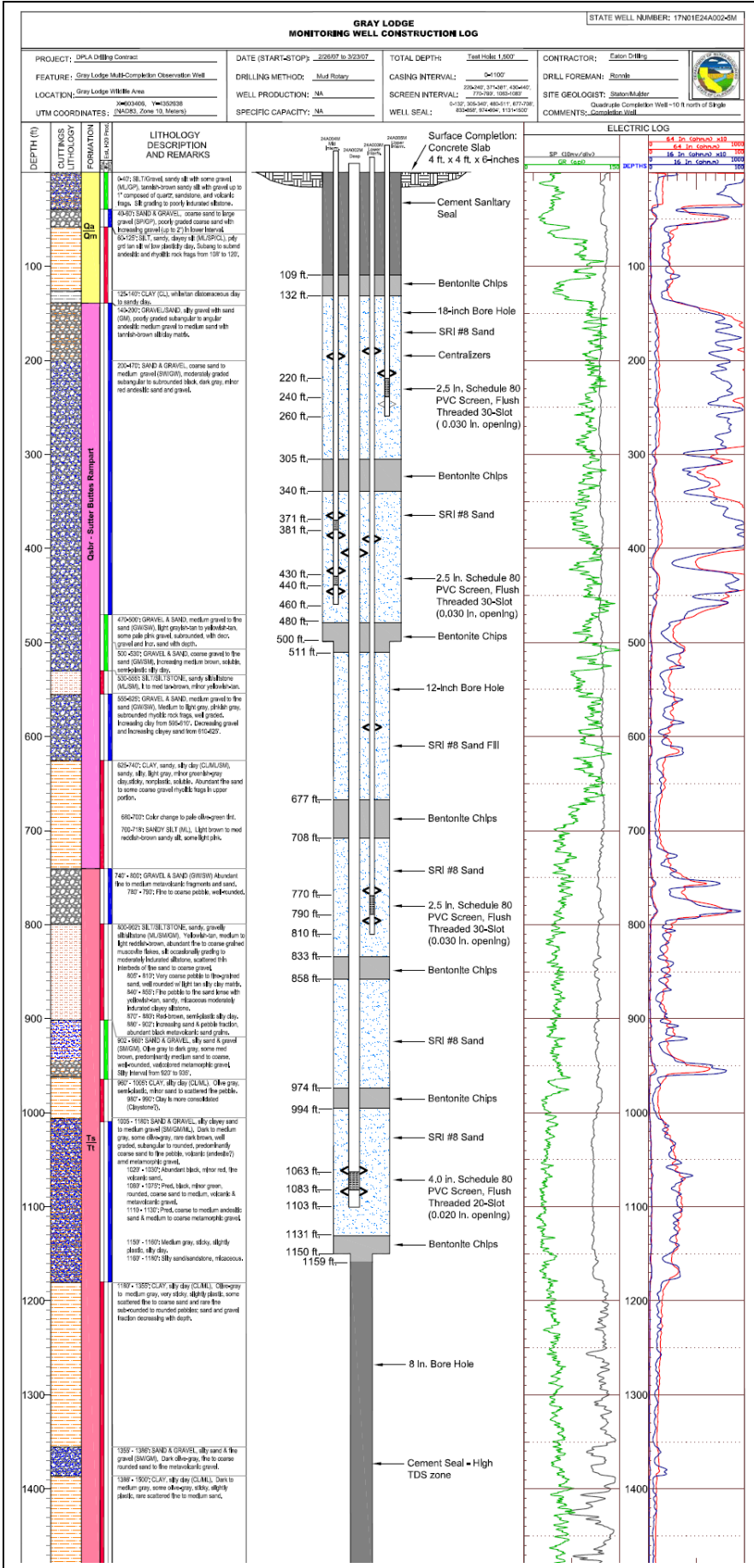


Spring Groundwater Levels
Butte Sink - 17N02E19J001



Fall Groundwater Levels
Butte Sink - 17N02E19J001





As-built diagram of Gray Lodge multi-completion monitoring well.