

**Basin Management Objective
Butte County
Sub-Inventory Unit – ESQUON**

Butte County Water Advisory Committee Member – Rick Ponciano

Contact Information

Phone Number: (530) 891-8455

Email Address: rcponciano@hotmail.com

Description of the Esquon Sub-Inventory Unit –

The Esquon Sub-Inventory Unit (SIU) covers an area of about 11,600 acres in the northern portion of the East Butte Inventory Unit. It is bordered by the Pentz SUI to the north, Western Canal SIU to the south, Cherokee SIU to the east, and Butte Creek to the west. The Esquon SIU almost corresponds to the water service areas associated with the Durham Mutual Water Company. Agricultural land use within the SIU includes production of orchards, rice, and grain crops supported by both surface water and groundwater. In a normal year, about 27% of the Esquon SIU is in summer agricultural productions supported by groundwater.

Butte Creek supports a generally declining population of spring run Chinook salmon. In 1998, Rancho Esquon worked with Ducks Unlimited to install a state of the art fish ladder and screen on an existing diversion. This project was designed according to California Department of Fish and Game standards to help with the passage of spring run Chinook salmon. The biological benefits of the project are improved passage of juvenile and adult fish, and a curtailment of juvenile fish in the diversion. The water from the Rancho Esquon diversion supplies water to the orchards, rice and state, federal and private wetlands within the Esquon sub-inventory unit. The water diverted from Butte Creek is believed to help with the recharge of groundwater in the Durham/Nelson area according to the Department of Water Resources, Northern District.

Management Objective –

To maintain the groundwater surface elevation during the peak summer irrigation season (July and August) in all aquifer systems at a level that will assure an adequate and affordable irrigation groundwater supply. It is the intent of this management objective to assure a sustainable agricultural supply of good quality water now and into the future, and to assure the water supply can be utilized without injuring groundwater quality or inducing land subsidence. The management objective is also to assure an adequate groundwater supply of adequate quality from the alluvial aquifer system for all domestic users in the SIU.

Geologic Formations Identified In Sub-Inventory Unit –

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

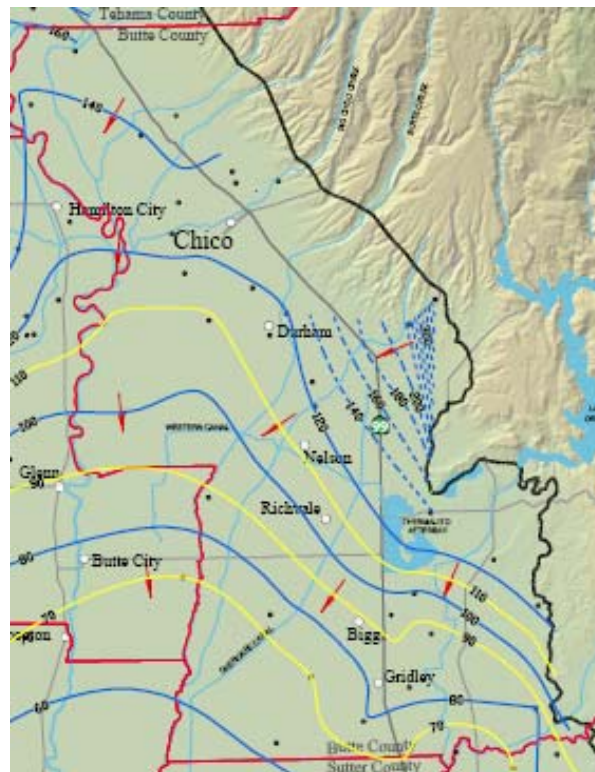
- Basin Deposits
- Modesto Formation
- Tuscan Unit C (Upper Tuscan)
- Tuscan Unit B (Lower Tuscan)

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 Esquon SIU are:

- Modesto Formation
- Tuscan Unit C (Upper Tuscan)
- Tuscan Unit B (Lower Tuscan)

Groundwater Flow in the Esquon 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 Esquon SIU is in a south-to-southwesterly direction, at a gradient of about 4 feet per mile, adjacent to 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 –
SPRING**

Well ID	Aquifer System	Well Type	Stage 1 & 2 Alerts Mid point of Average & Historic Low Elev. (ft)	Stage 3 Alerts Lowest Recorded Elev. (ft)
20N02E09G01M	Lower Tuscan	Monitoring	120.14	114.74
20N02E09L01M	Lower Tuscan	Irrigation	124.90	118.50
21N02E20P01M	Upper Tuscan	Irrigation	124.85	119.60

FALL

Well ID	Aquifer System	Well Type	Stage 1 & 2 Alerts Mid point of Average & Historic Low Elev. (ft)	Stage 3 Alerts Lowest Recorded Elev. (ft)
20N02E09G01M	Lower Tuscan	Monitoring	108.94	105.70
20N02E09L01M	Lower Tuscan	Irrigation	114.48	104.50
21N02E20P01M	Upper Tuscan	Irrigation	112.30	106.60

BMO Key Wells Selected for Groundwater Quality Monitoring–

Groundwater Temperature - 2002 through 2008

Sub-area	2002 Temp °C	2003 Temp °C	2004 Temp °C	2005 Temp °C	2006 Temp °C	2007 Temp °C	2008 Temp °C
Esquon	19.7	18.9	19.6	20.1	20.7	19.0	19.6

Groundwater pH - 2002 through 2008

Sub-area	2002 pH	2003 pH	2004 pH	2005 pH	2006 pH	2007 pH	2008 pH
Esquon	7.3	7.5	7.1	7.4	7.5	7.4	7.2

Groundwater EC - 2002 through 2008

Sub-area	2002 EC	2003 EC	2004 EC	2005 EC	2006 EC	2007 EC	2008 EC
Esquon	388.0	526.0	470.0	557.0	507.0	480.0	439.0

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

State Well Number 20N01E18L03M located in the Western Canal Water District. Maximum annual inelastic land subsidence shall not exceed 0.01 feet per year.

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 Esquon Sub-Inventory Unit will use the following guidelines in the management of the groundwater resources. The groundwater level and land subsidence management objectives are intended to trigger 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.

Groundwater Levels – Specific Depth and Lowest Record

Stage 1: The first year that spring groundwater levels reach or fall below the alert level established for the well. *This alert level represents the mid point between the median spring measurement and the historic low.* The BMO Representative has first hand historic knowledge of agricultural practices throughout the sub-inventory unit. Access to Rancho Esquon historical groundwater data coupled with the historic knowledge serves as the basis for selecting this specific depth methodology.

Stage 2: Stage 2 is reached if spring groundwater levels, for a second consecutive year, remain at or below the Stage 1 alert level established for the well while still above the lowest record spring level for the well.

Stage 3: Stage 3 is reached if the spring groundwater levels reach or fall below the *lowest historic water level* on record for each respective well.

Groundwater Quality –

Any change that exceeds a *20 percent change* from Butte County's 2008 water quality assessment will be cause for review and investigation by the Technical Advisory Committee.

Land Subsidence –

Land Subsidence will be monitored at the closest extensometers located in the M&T and Western Canal sub inventory units. Maximum annual inelastic land subsidence shall not exceed 0.01 feet per year.

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 –

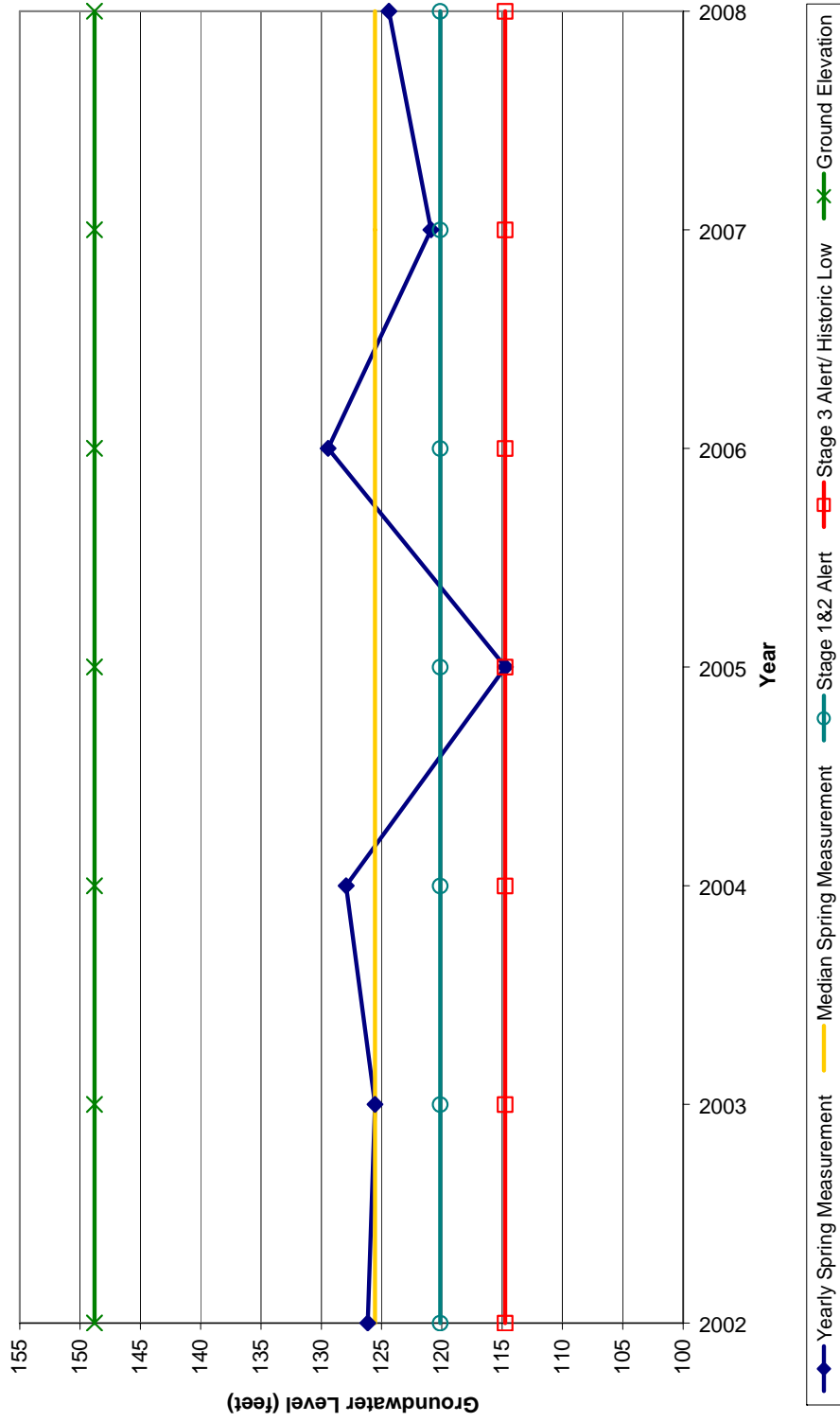
Possibly secure funding for the installation of an extensometer to monitor land subsidence in the Esquon SIU. Explore options for installing multi-completion monitoring wells to more accurately measure aquifer specific water quality and levels.

Supporting Data –

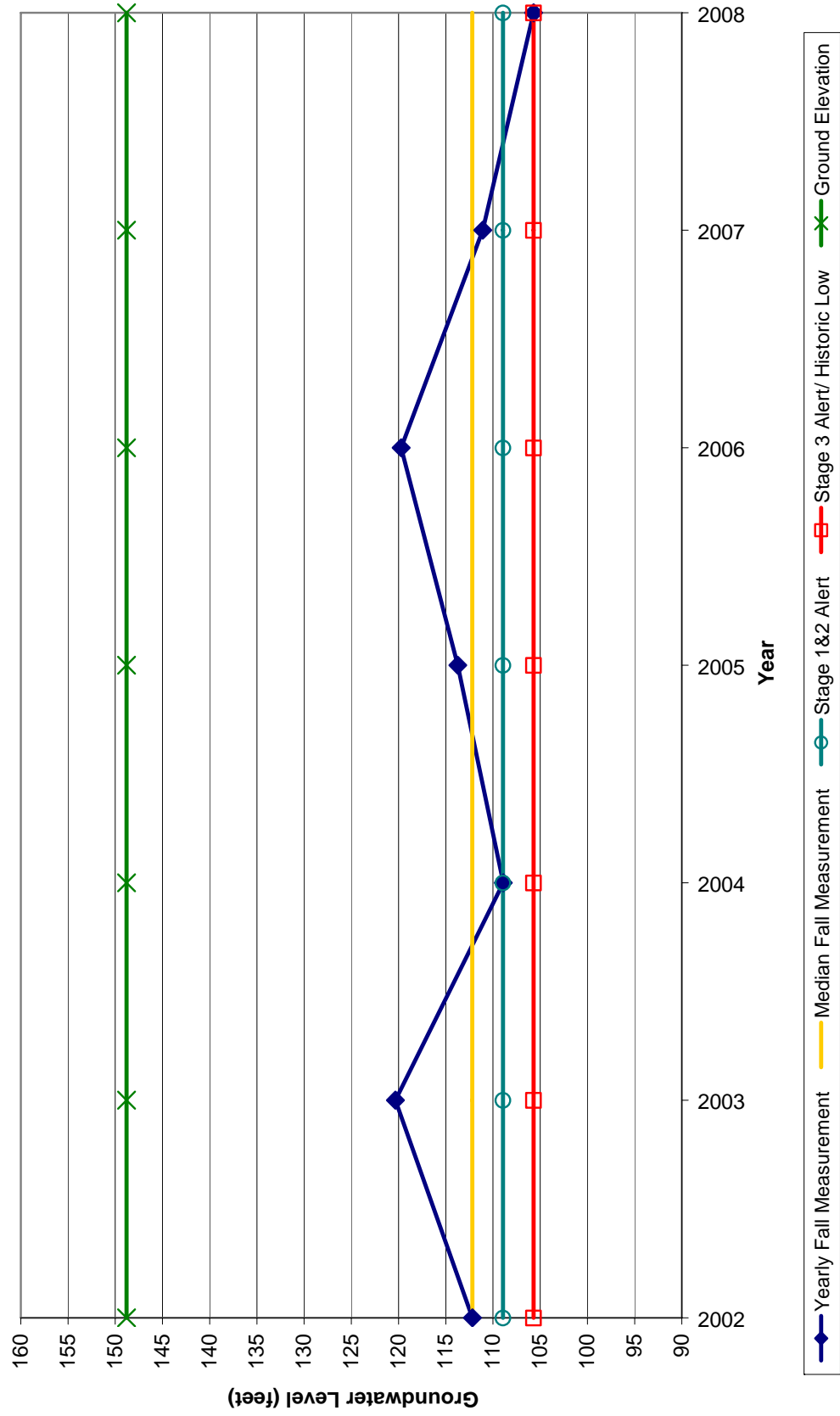
Hydrographs depicting yearly spring level measurements, including 2008 data, with established alert levels.

Summary charts of water quality monitoring.

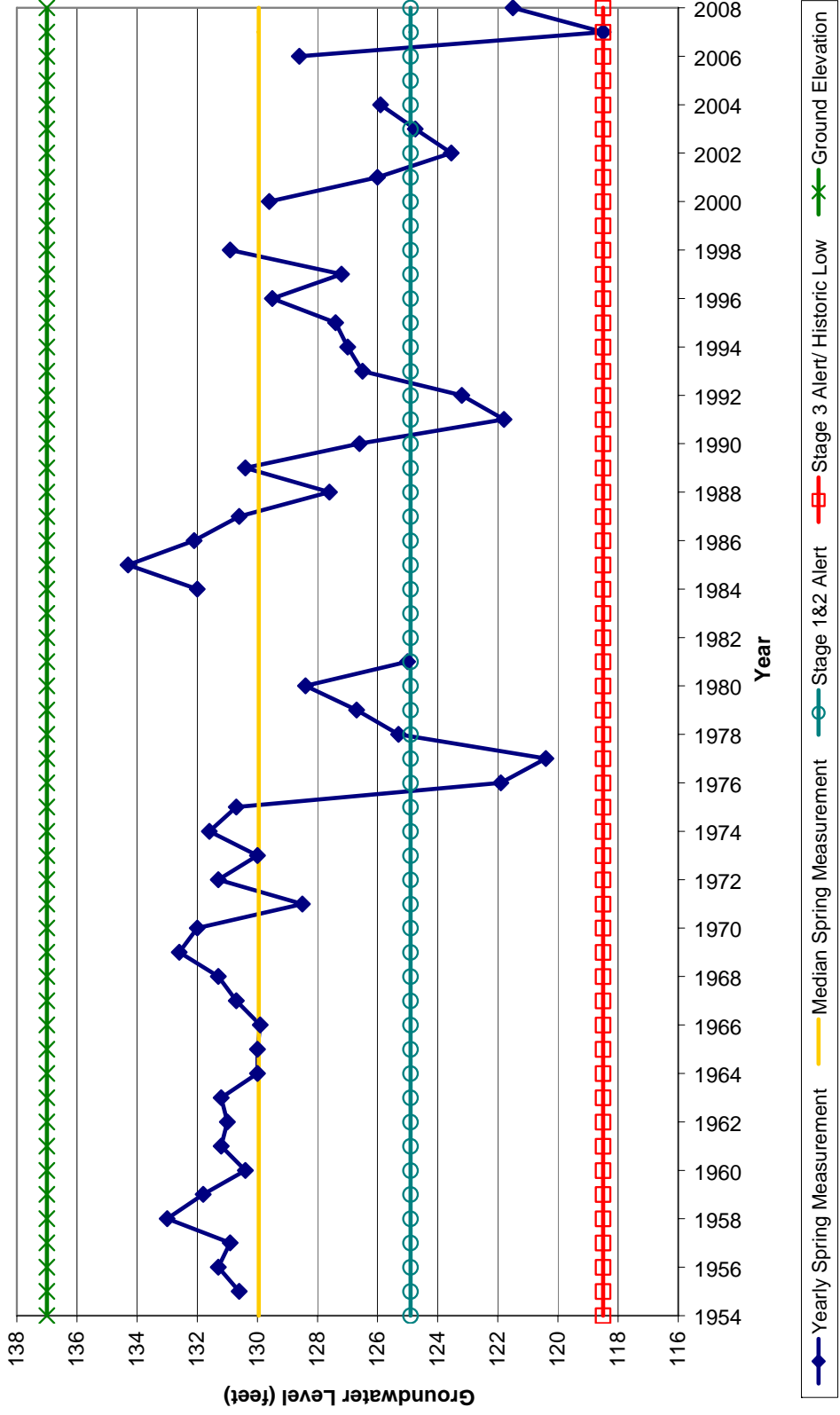
Spring Groundwater Levels Esquon - 20N02E09G01



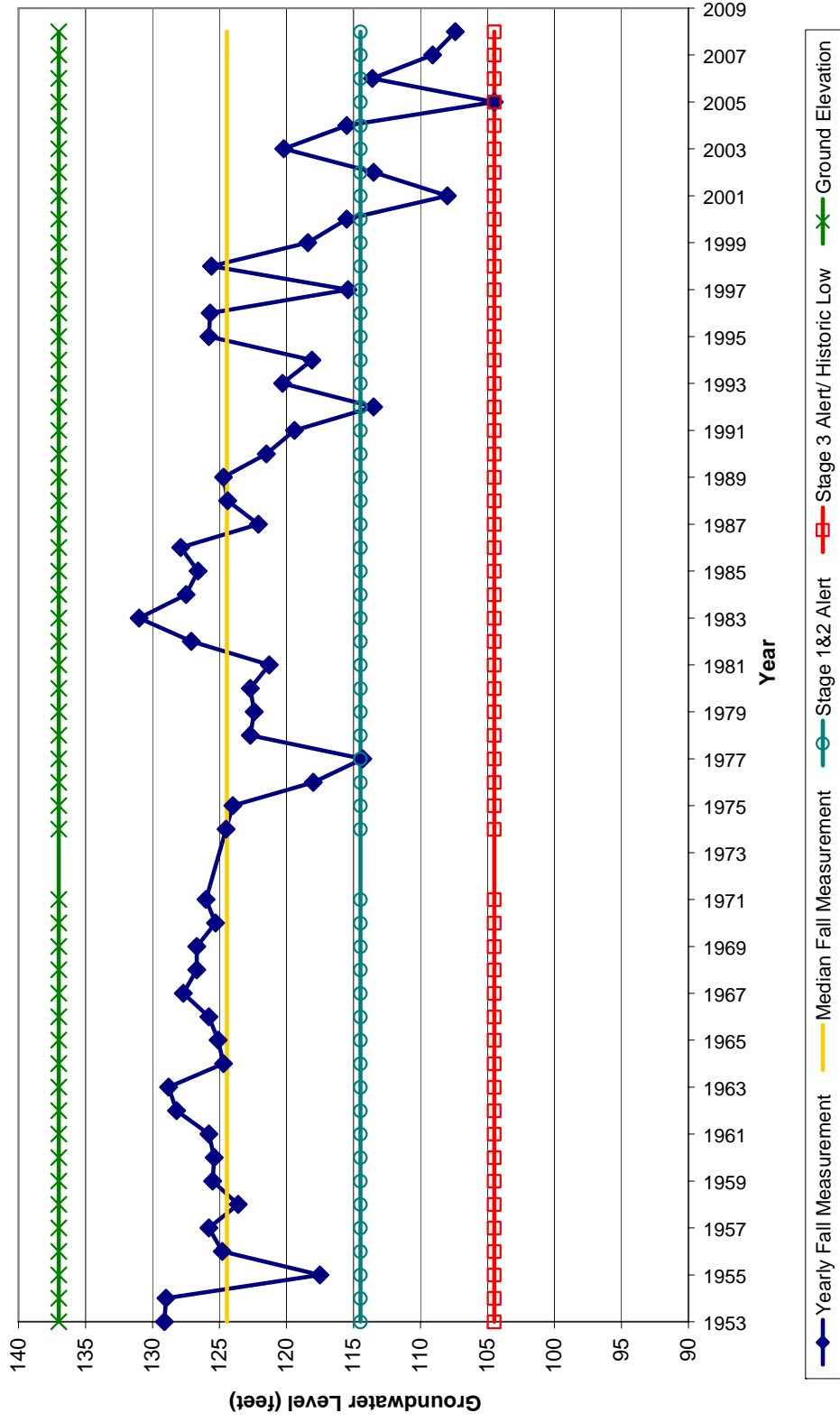
Fall Groundwater Levels
Esquon - 20N02E09G01



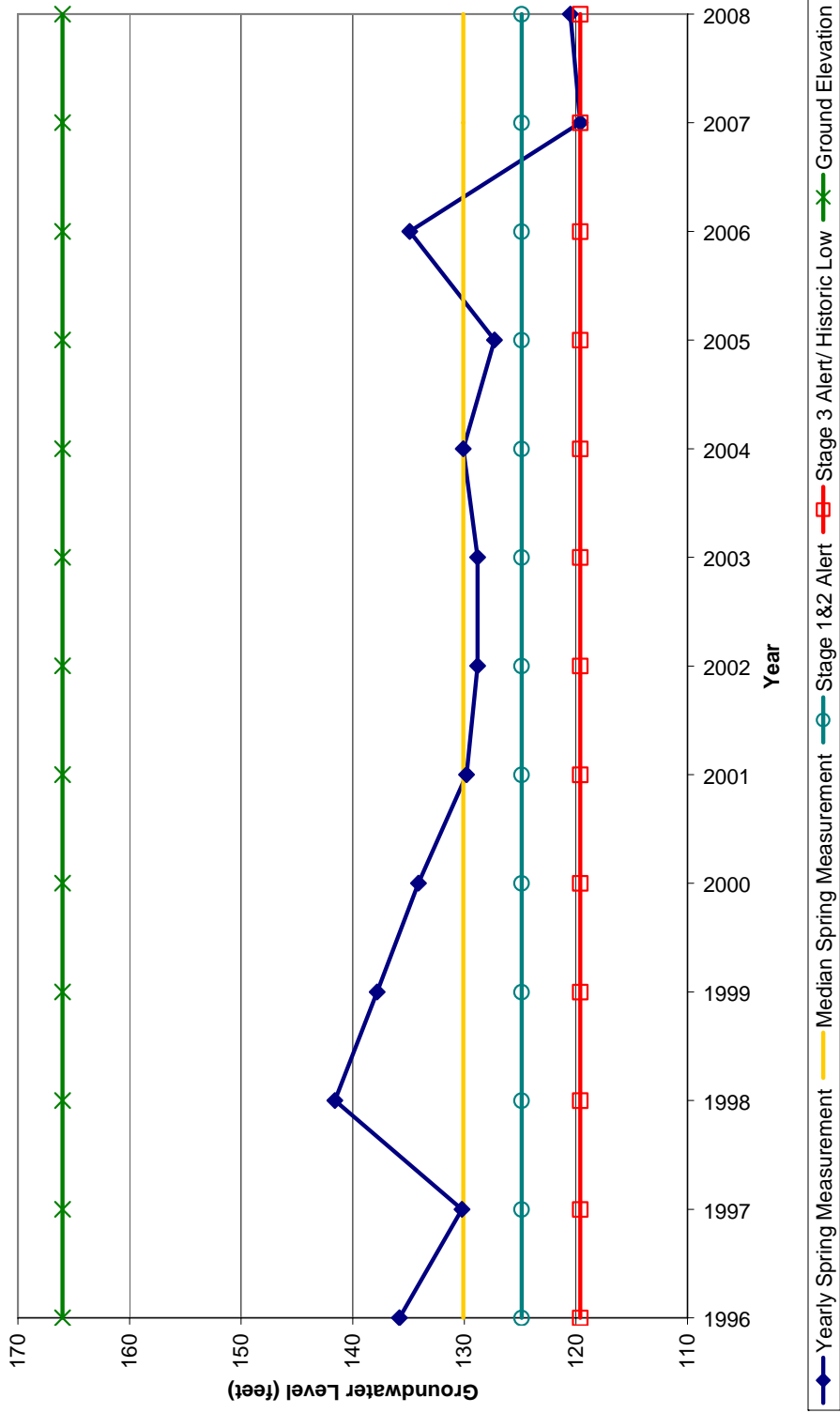
Spring Groundwater Levels Esquon - 20N02E09L01



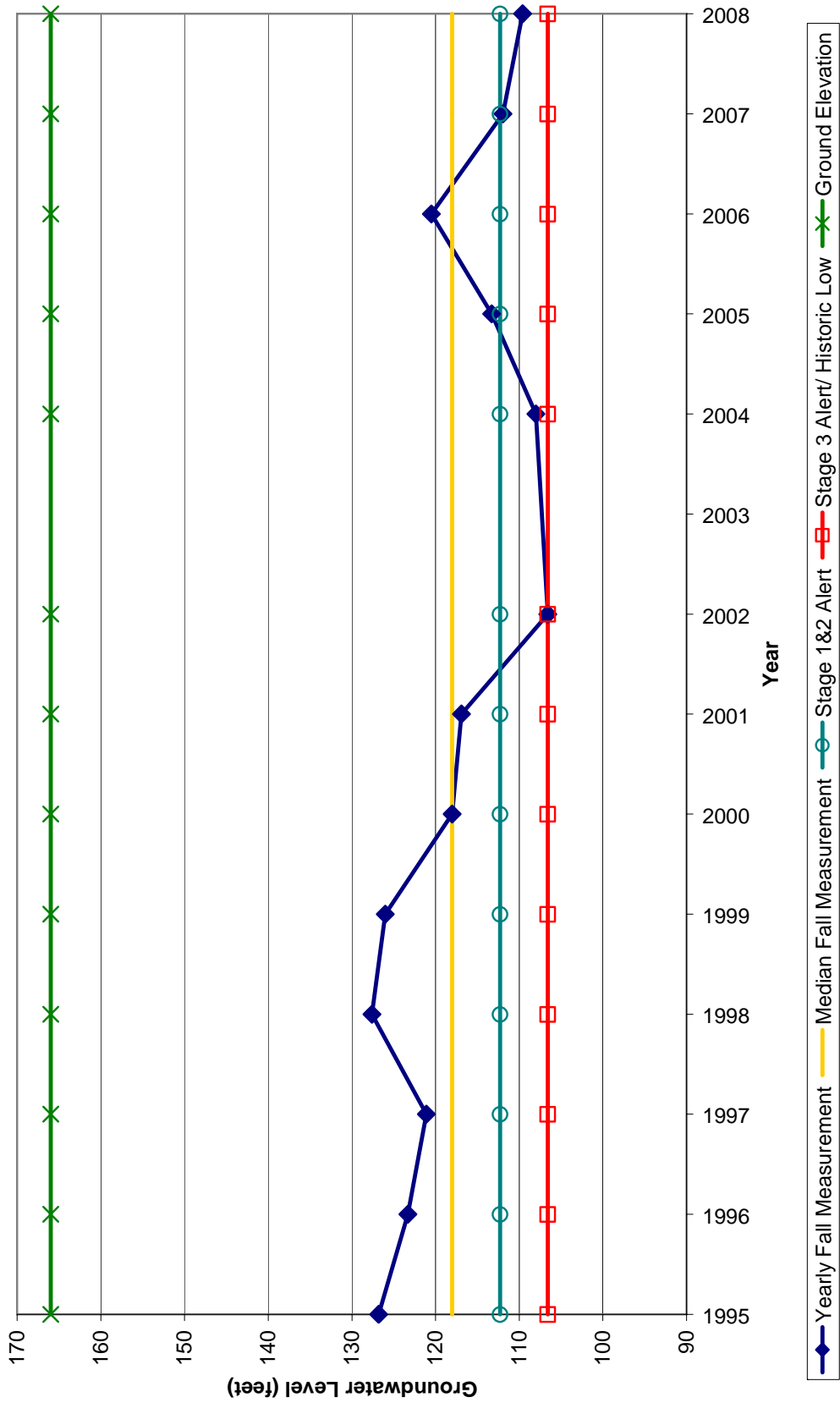
Fall Groundwater Levels
Esquon - 20N02E09L01

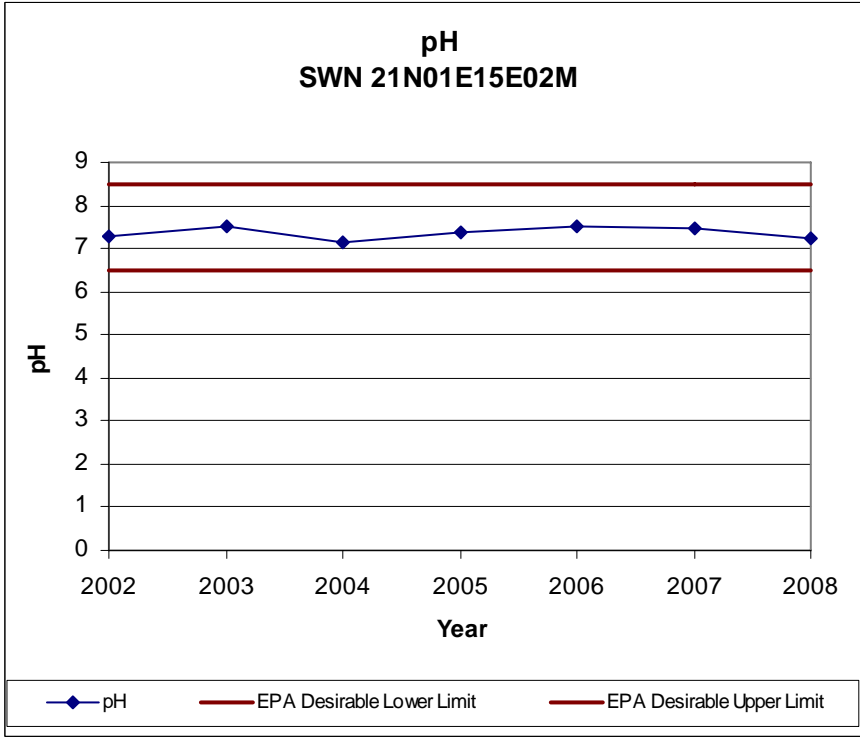
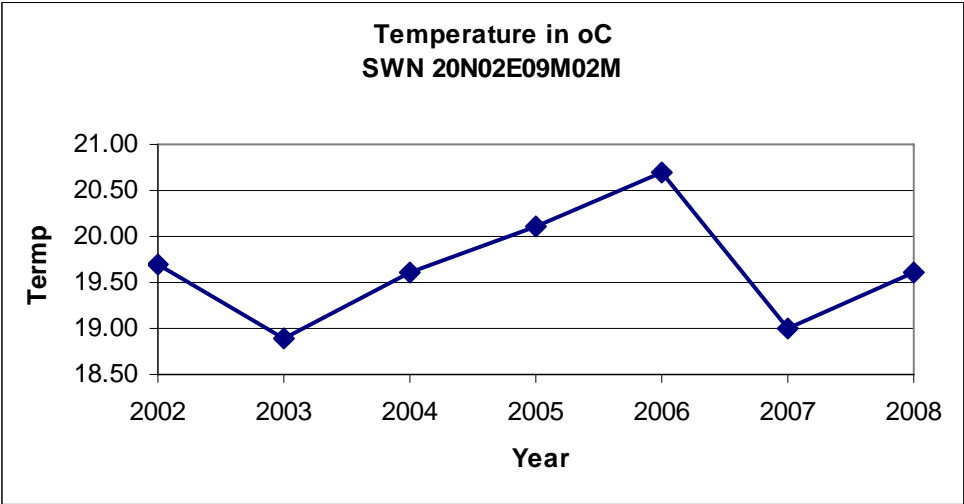


Spring Groundwater Levels Esquon - 21N02E20P01



Fall Groundwater Levels
Esquon - 21N02E20P01





**Electrical Conductivity
SWN 20N02E09M02M**

