

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

Butte County Water Advisory Committee Member – Gene Harris

Contact Information

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Description of the Richvale Sub-Inventory Unit –

The Richvale Sub-Inventory Unit (SIU) covers an area of about 39,400 acres. It is bordered by the Western Canal SIU to the north, Biggs/West Gridley SIU to the south, Thermalito Sub-inventory Unit to the east and Butte Creek to the west. The Richvale SIU corresponds roughly to the service area of the Richvale Irrigation District. Normal-year agricultural production in the sub-inventory unit consists primarily of rice production supported almost solely by surface water. Very Little groundwater pumping occurs in the Richvale SIU during normal years except for domestic use, in and around the town of Richvale. However, in drought years, up to 17% of the Richvale SIU summer agricultural production may be supported by groundwater. During a severe drought and curtailment of supply to the Joint Districts, 35 to 45% of the area could use groundwater to supply water to crops and wildlife habitat.

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 sub-inventory unit.

Geologic Formations Identified In Sub-Inventory Unit –

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

- Basin Deposits
- Modesto Formation
- Riverbank Formation
- Sutter Formation
- Tuscan Unit C (Upper Tuscan)

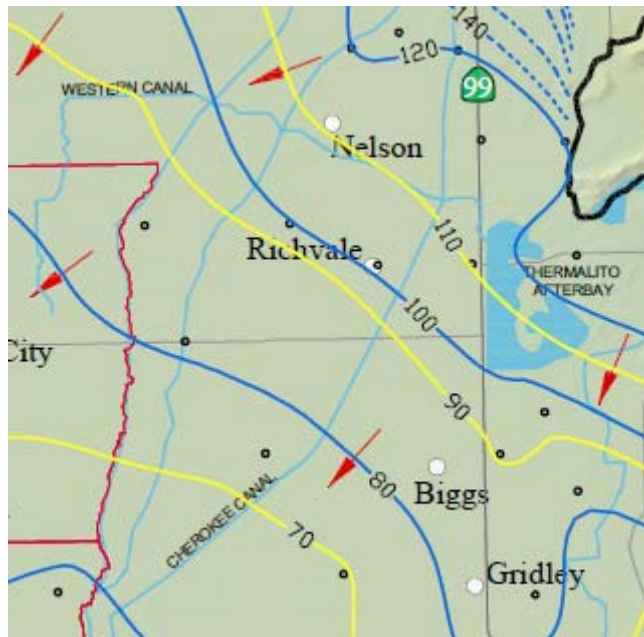
Fresh Water-bearing Units. In the Sacramento Valley Region of Butte County, fresh groundwater-bearing units include, from youngest (shallowest) to oldest (deepest), the Modesto, Riverbank, Laguna, Tehama and Tuscan Formations. Those included in the Richvale SIU are:

- Modesto Formation

Riverbank Formation
 Tuscan Unit C (Upper Tuscan)

Groundwater Flow in the Richvale 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 that the regional pattern of spring groundwater movement in the Richvale SIU is in a south-to-southwesterly direction, at a gradient of about 4 feet per mile, toward Butte Creek and the Sacramento River.



Arrows show the direction of groundwater movement.

2009 Groundwater contours were constructed using groundwater level measurements taken by the Department of Water Resources and Local Cooperators between March 1st and March 20th, 2009. 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	Spring Stage 1 & 2 Alerts Elev. (ft)	Spring Stage 3 Alerts Elev. (ft)
18N01E13A02M	Riverbank/Sutter	Irrigation	68.4	63.4
18N01E15D02M	Riverbank	Domestic	62.9	57.9
19N01E27Q01M	Upper Tuscan	Monitoring	77.3	72.3
19N01E35B01M	Basin Deposits	Monitoring	78.0	73.0
19N02E15N02M	Basin Deposits	Irrigation	95.9	90.9

FALL

Well ID	Aquifer System	Well Type	Fall Stage 1 & 2 Alerts Elev. (ft)	Fall Stage 3 Alerts Elev. (ft)
18N01E13A02M	Riverbank/Sutter	Irrigation	68.1	63.1
18N01E15D02M	Riverbank	Domestic	61.0	56.0
19N01E27Q01M	Upper Tuscan	Monitoring	75.1	70.1
19N01E35B01M	Basin Deposits	Monitoring	77.6	72.6
19N02E15N02M	Basin Deposits	Irrigation	94.6	89.6

BMO Key Wells Selected for Groundwater Quality Monitoring–

Stakeholders in the Richvale 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.

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

State Well Number: 19N/01E-35B01M. 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 Richvale 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. The groundwater quality BMO management actions will be defined once appropriate wells are selected and monitoring begins in August of 2009.

Groundwater Levels – Specific Depth

Stage 1: The first year that spring groundwater levels fall five feet below the average spring groundwater level established for the well.

Stage 2: Stage 2 is reached if spring groundwater levels, for a second consecutive year, remain five feet below the average groundwater level established for the well.

Stage 3: Stage 3 is reached if the spring groundwater levels fall ten feet below the average spring groundwater level established for the well.

Groundwater Quality –

It is hoped that an appropriate water quality monitoring well can be located prior to the August 2009 monitoring period.

Land Subsidence –

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.

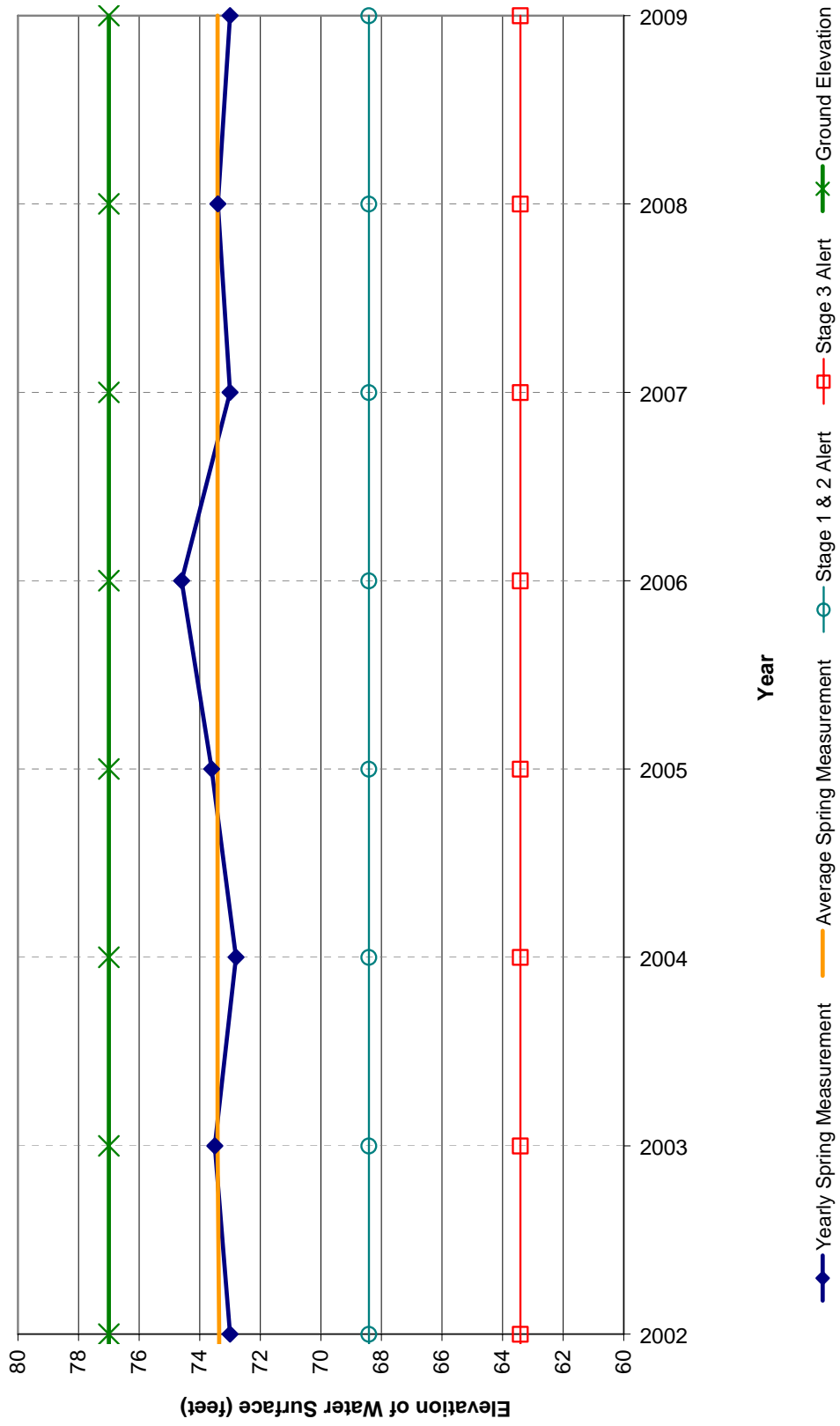
Future Monitoring Recommendations –

Efforts will be made to identify additional wells that could be added to the existing monitoring well network to allow for data collection and development of groundwater quality management objectives in 2009.

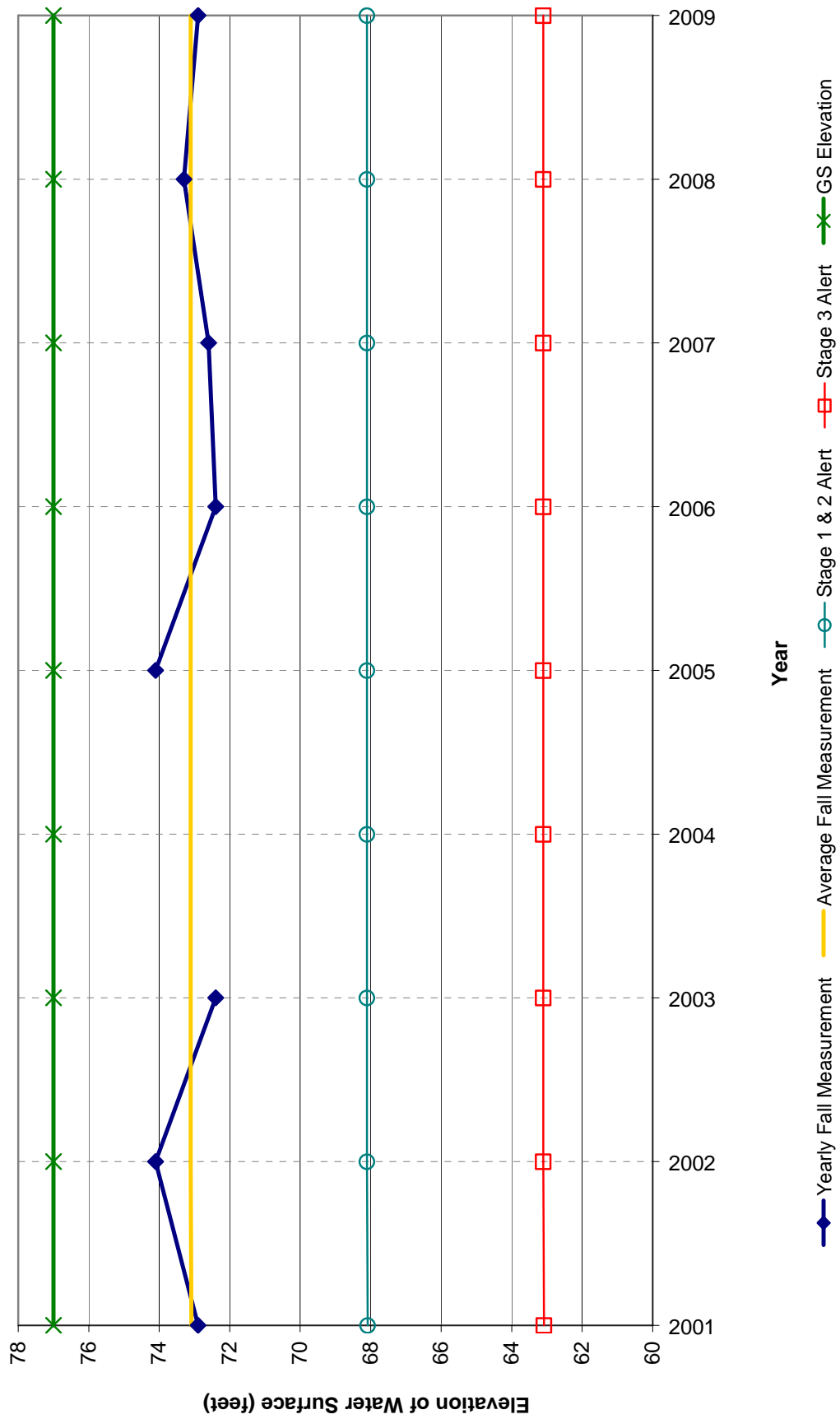
Supporting Data –

Hydrographs depicting yearly spring level measurements, including 2009 data, with established alert levels for calendar year 2010.

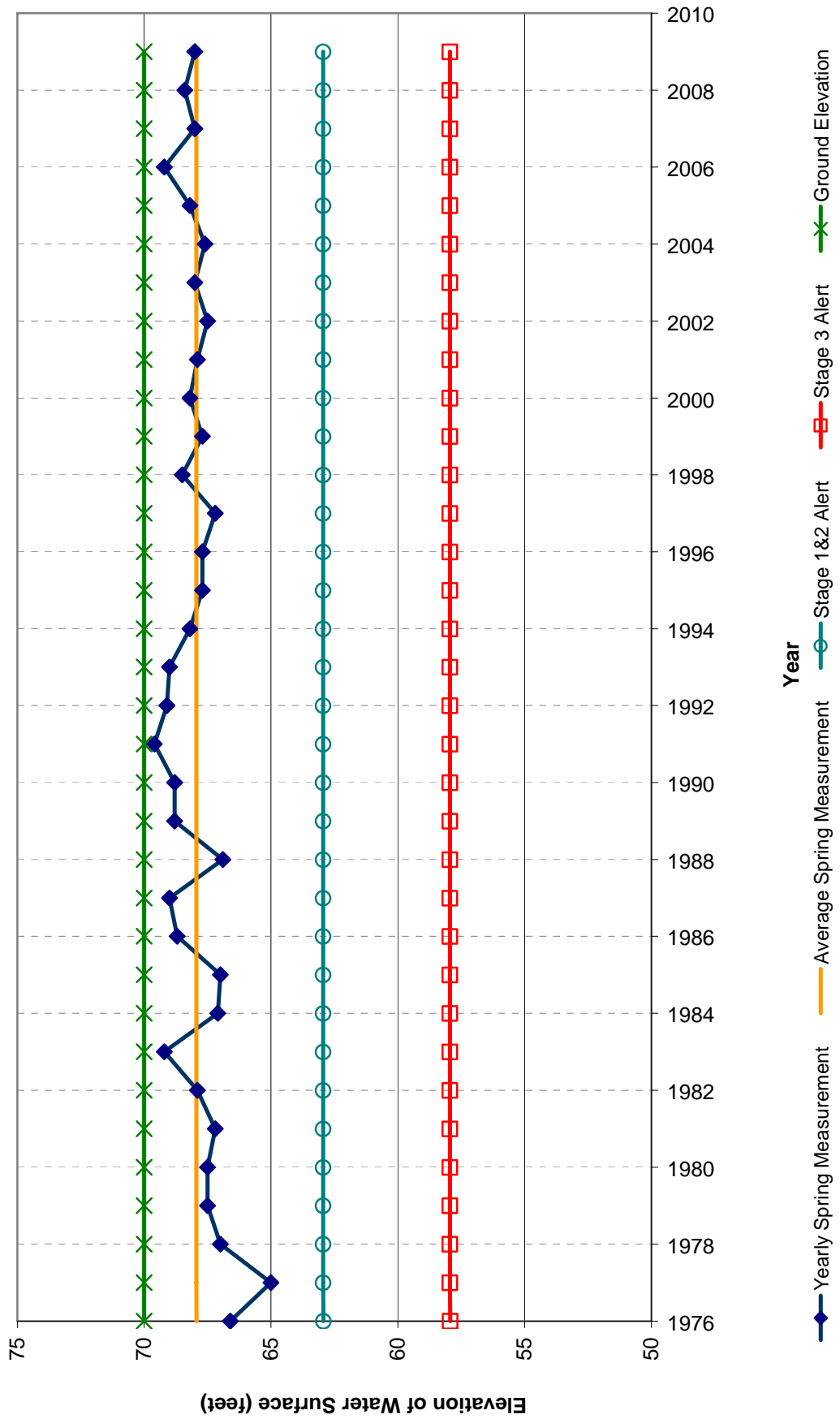
**Spring Groundwater Levels
Richvale - 18N01E13A02**



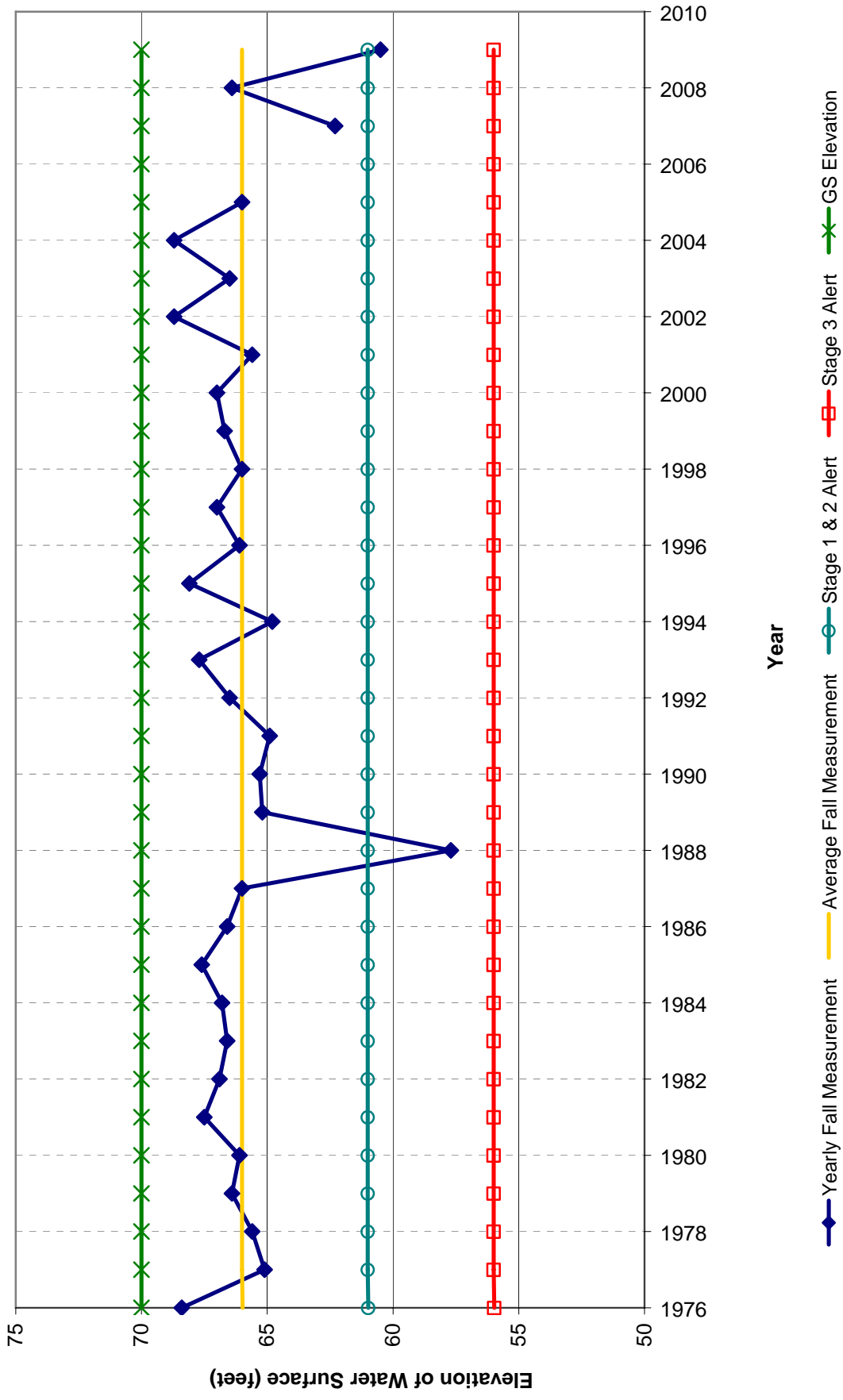
**Fall Groundwater Levels
Richvale - 18N01E13A02**

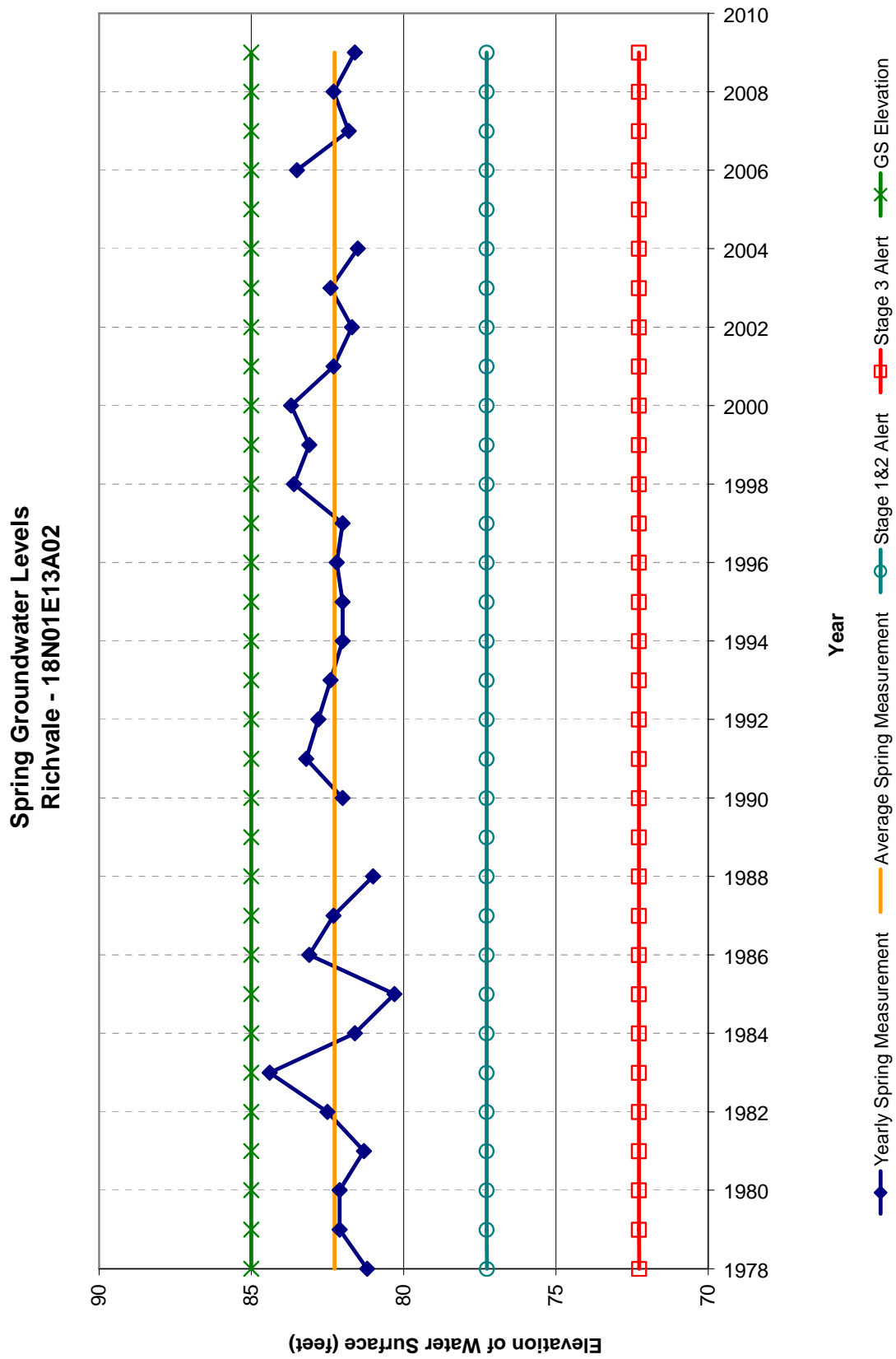


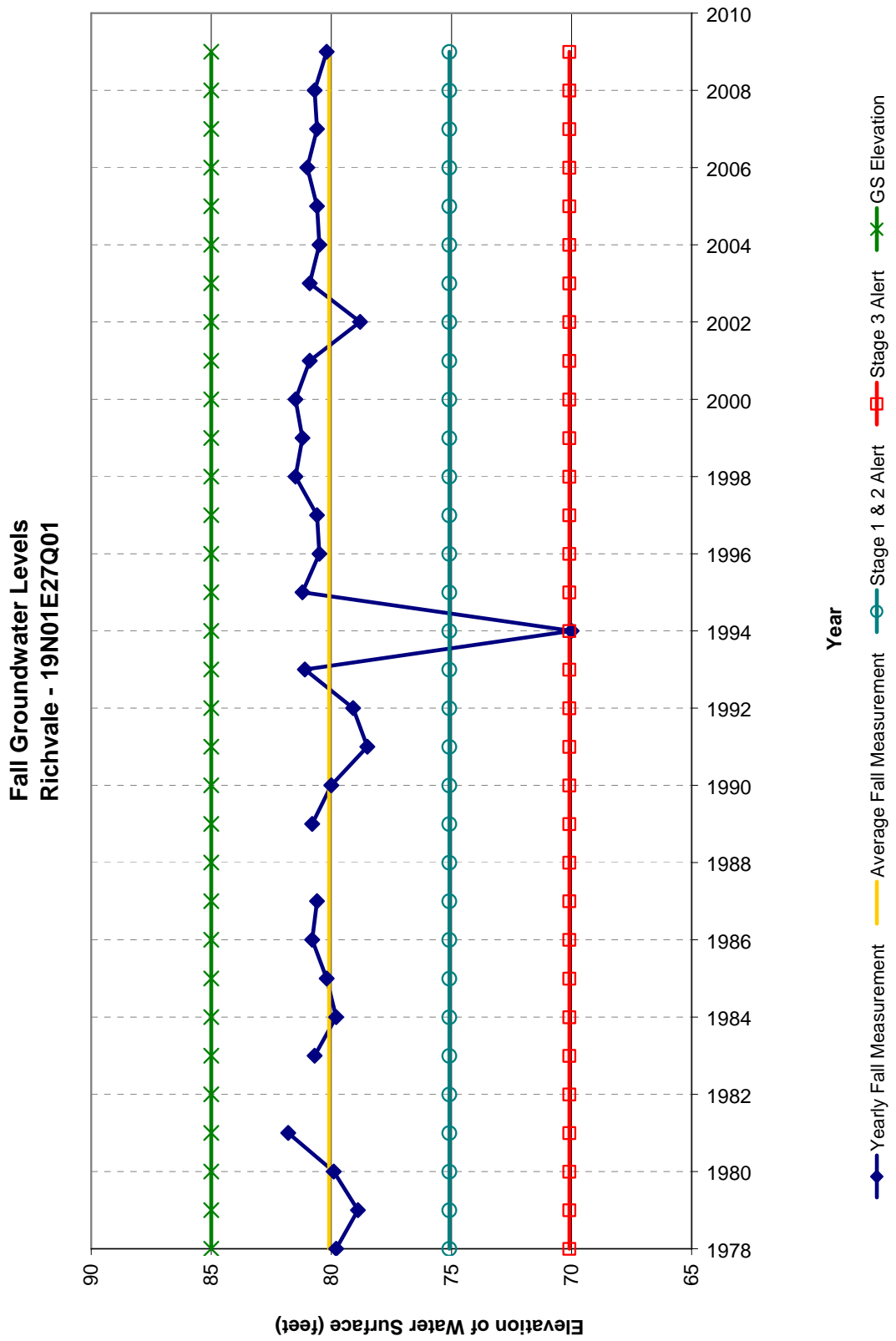
**Spring Groundwater Levels
Richvale - 18N01E15D02**

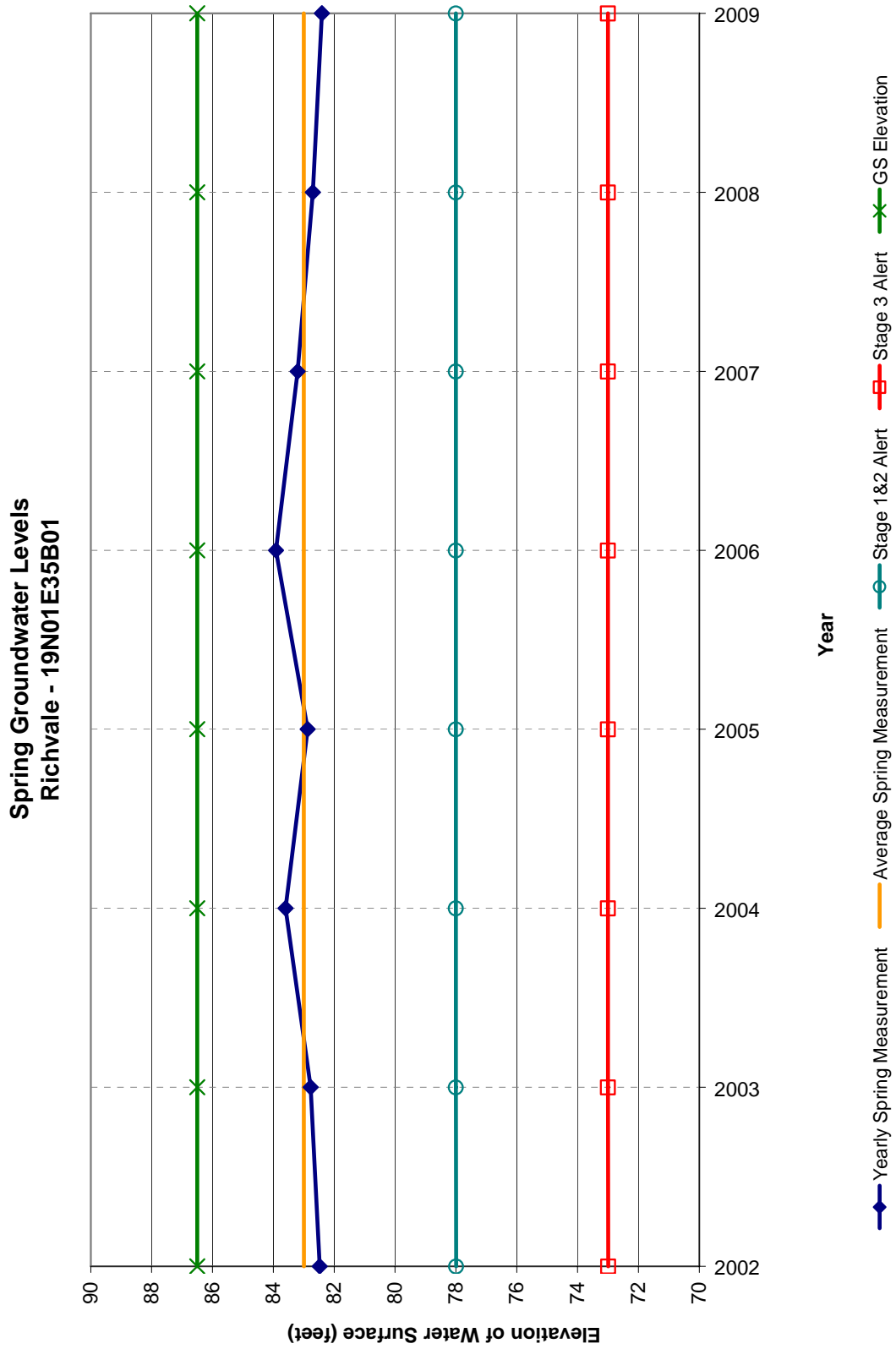


**Fall Groundwater Levels
Richvale - 18N01E15D02**









**Fall Groundwater Levels
Richvale - 19N01E35B01**

