

**Basin Management Objective  
Butte County  
Sub-Inventory Unit – ANGEL SLOUGH**

**Butte County Water Advisory Committee Member – Catherine Cottle**

**Contact Information**

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**Description of the Angel Slough Sub-Inventory Unit –**

The Angel Slough Sub-inventory Unit (SIU) covers an area of about 5,400 acres in the western portion of the West Butte Inventory Unit. It is bordered by the M&T SIU to the north and east, the Llano Seco SIU to the south, and the Sacramento River to the west. Agricultural land use consists largely of orchards and row crops supported by both groundwater and surface water. In a normal year, about 70% of the Angel Slough SIU is in summer agricultural production supported by groundwater.

**Management Objective –**

It is the intent of this 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, and to assure a sustainable agricultural supply of good quality water now and into the future. The management objective is also to assure a sustainable groundwater supply of good quality from the alluvial aquifer system for all domestic users in the sub-inventory unit and to assure the water supply can be utilized without injuring groundwater quality or inducing land subsidence.

**Geologic Formations Identified In Sub-Inventory Unit:**

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

- Quaternary Alluvium
- Modesto Formation
- Tehama Formation
- Tuscan Unit C (Upper Tuscan)
- Tuscan Unit B (Lower Tuscan)

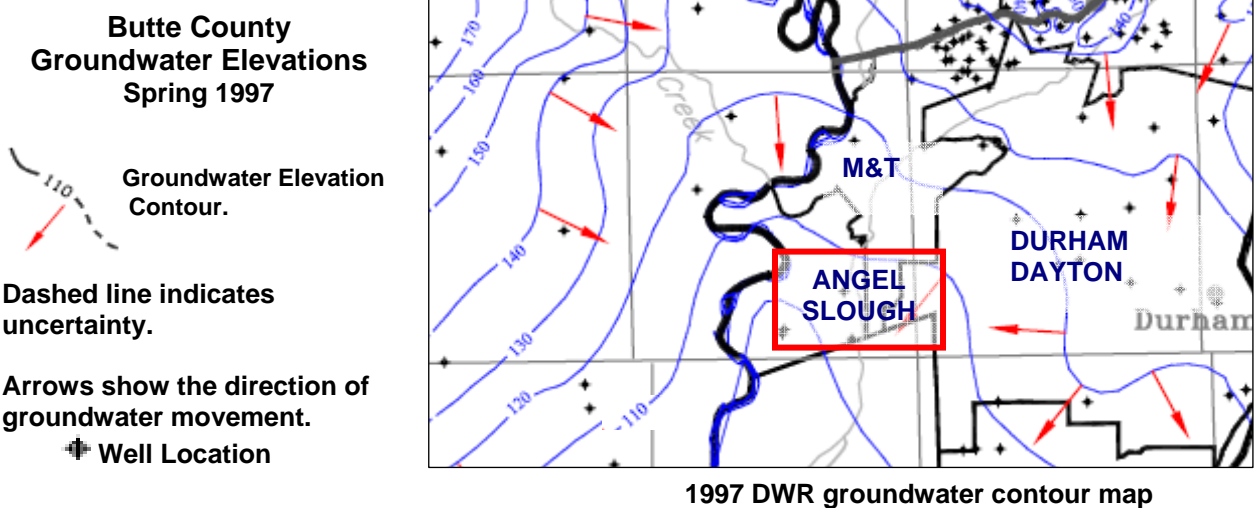
**Fresh Water-bearing Units.** In the Sacramento Valley Region of Butte County, fresh groundwater-bearing units include, from youngest (shallowest) to oldest (deepest), the Modesto, Riverbank, Laguna, Tehama and Tuscan Formations. Those included in the Angel Slough SIU are:

- Modesto Formation
- Tehama Formation

Tuscan Unit C (Upper Tuscan)  
 Tuscan Unit B (Lower Tuscan)

**Groundwater Flow in the Angel Slough 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 Angel Slough SIU is in a south-to-southwesterly direction, at a gradient of about 7 feet per mile, toward the Sacramento River and Angel Slough. The direction of groundwater movement indicates that the Sacramento River is serving as a drain for groundwater from the Angel Slough SIU.



**BMO Key Wells Selected for Groundwater Level Monitoring –**

Well ID	Aquifer System	Well Type	Stage 1 & 2 Alerts* Elev. (ft)	Stage 3 Alerts** Elev. (ft)
21N01W23J01M	Alluvium	Irrigation	108.79	105.80
21N01W25K002	Alluvium	Irrigation	96.95	92.50

**BMO Key Wells Selected for Groundwater Quality Monitoring–**

Stakeholders in the Angel Slough 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 initiate data collection in August 2008.

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

Land Subsidence is continuously monitored by the Department of Water Resources and Butte County Water and Resource Conservation at the closest extensometers in the Western Canal Water District and M&T Ranch sub-inventory units.

**BMO Alert Stage Definitions and Compliance Methodologies–**

The Angel Slough 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 staff report, to remedy declining ground water levels that are not recovering to compliance levels for the index well.

**Groundwater Level – 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 average spring measurement and the historic low.*

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.

Stage 3: Stage 3 is reached if the spring groundwater levels fall below the lowest historic water level on record.

**Groundwater Quality –**

Appropriate water quality monitoring wells will be selected prior to the August 2008 monitoring period.

**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.

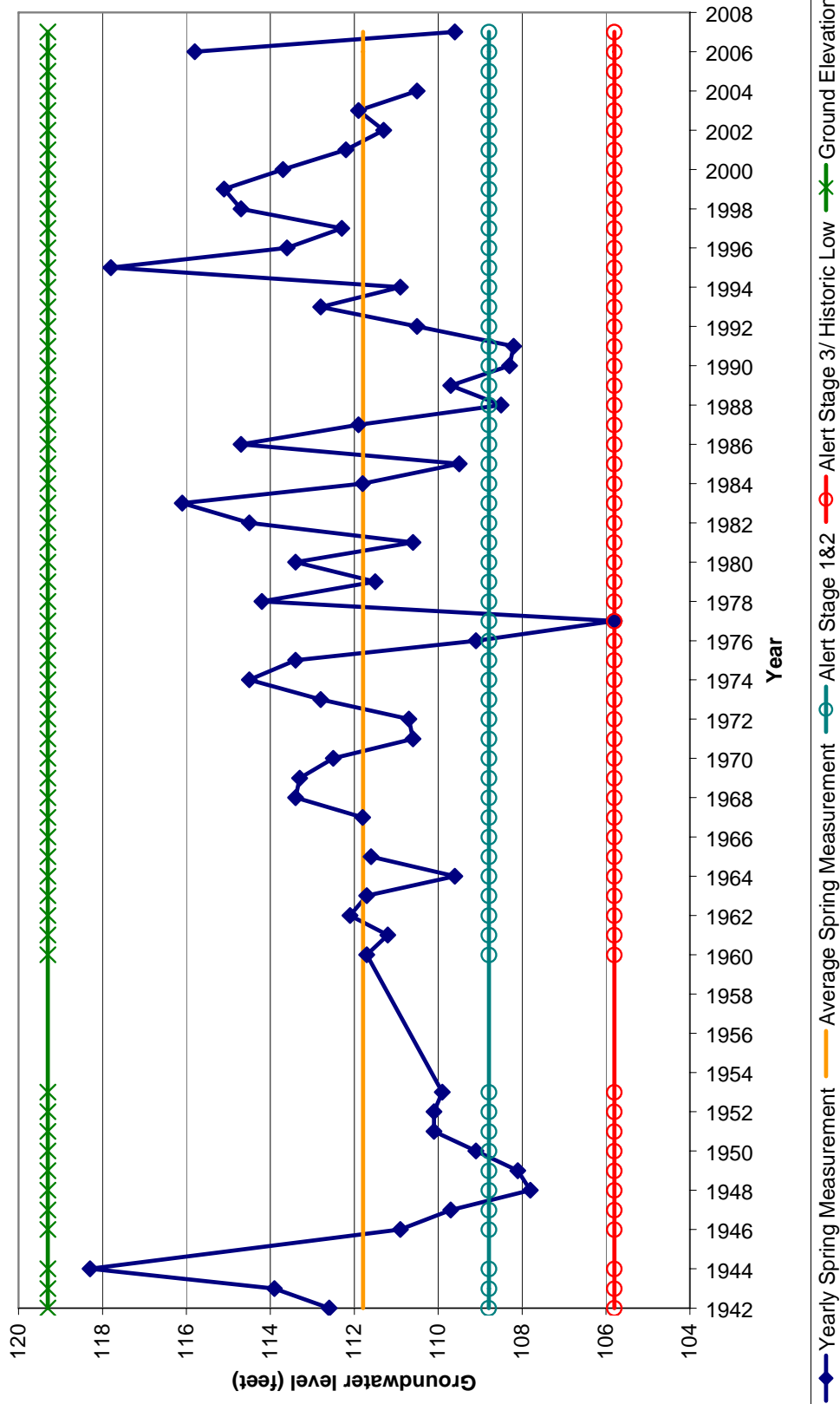
**Future Monitoring Recommendations –**

Efforts will be made to identify additional domestic wells that could be added to the existing monitoring well network in the sub-inventory unit to allow for development of additional management objectives for the alluvial aquifer system. 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 2008.

**Supporting Data –**

Hydrograph depicting yearly spring level measurements, including 2007 data, with established alert levels.

Spring Groundwater Levels  
Angel Slough - 21N01W23J01



Spring Groundwater Levels  
Angel Slough - 21N01W25K002

