

**Basin Management Objective
Butte County
Sub Area – CHEROKEE
Calendar Year -2006**

Butte County Water Advisory Committee Member – Gary Cole

Contact Information:

ADDRESS: 7399 Hwy 99 Oroville, CA 95965

PHONE NUMBER: (530) 343-0916

EMAIL ADDRESS: colewaterinfo@yahoo.com

Description of the Cherokee Sub Area: Cherokee Sub Area covers an area of approximately 14,700 acres.

Cherokee Sub Area (Sub Area) is bordered on the north and east by the foothill area. To the northwest are the Pentz and Esquon Sub Areas, to the southwest lies the Western Canal Sub area, and due south is the Thermalito Sub Area.

Larger capacity agriculture and business production wells tap into the Lower Tuscan Aquifer (Formation Unit B). The Lower Tuscan Unit B (Tuscan B) varies from approximately 700 feet deep from surface level in the western portion of the Sub Area and slopes upward to zero feet thick in some portions on the eastern edge of the Sub Area. The bottom of Tuscan B slopes upward to the surface in some areas of the eastern part of the Sub Area. Underlying Tuscan B, ancient marine layers and salty waters exist.

Some domestic wells of approximately 50-75 feet in depth in the western part of the Sub Area extract water from deposits overlying the Tuscan B aquifer. The majority of domestic wells in the Sub Area are pumping from the Tuscan B.

In the easterly areas (Butte Valley), the potable water aquifer varies from zero feet to a few hundred feet as one travels westward. Drilling too deeply, through the Tuscan B, produces non-drinkable water from marine layers beneath the Tuscan B.

Additionally, upper and lower boundary elevations of the Tuscan B slope upward to the east. The top of the Tuscan B goes from elevations of approximately 120 feet above sea level to the west and south to approximately 400 feet above sea level in the east and comes to the ground surface in some areas.

The majority of water volume pumped from groundwater in the Sub Area is for farmland irrigation. Domestic water supply usage from the aquifer is of smaller volume but equally critical. There are presently few other sources of water from domestic use in the Sub Area. All residents are totally dependent on water from the aquifer system except for few who use water from natural springs near the eastern perimeter of the Sub Area. Rural housing is quickly developing and increasing in numbers in Butte Valley and will increase demands from groundwater in the Sub Area.

According to the Department of Water Resources (DWR), there are 183 wells total in the Sub Area. There are 104 domestic wells (depth from surface: shallow to 260 feet). There are 62 irrigation wells (depth from surface: approximately 300-600 feet). There are two wells for monitoring purposes only, and 15 additional wells classified as other. According to 1997 estimates, approximately 24, 000 acre feet of water was being pumped from groundwater and used in the Sub Area.

Philosophy of the Cherokee Sub Area Stakeholders –

Cherokee Sub Area stakeholders want to participate in the Butte County BMO process, and we want to have direct influence on our underlying groundwater management and aquifer management.

Because of the vital importance of the Lower Tuscan Aquifer underlying the Cherokee Sub Area for the existing environments and habitats, businesses, agriculture, domestic needs, recharge, plant and animal needs, economic values of our properties, and future residential growth and needs, we want to be proactive in its management. Our goals center around maintaining water levels and volume in the Lower Tuscan aquifer at economical levels to sustain and improve its functions for all overlying users.

In the long chain of water users in California, we believe lands overlying aquifers have first rights for use of that groundwater for their needs. Stakeholders have responsibilities to protect all aspects of the aquifers, overlying lands relating to the aquifers, and not pump more than is needed for those overlying lands.

Groundwater is not a commodity to be sold if it causes harm to other stakeholders. It is a resource to be used wisely without harming other overlying stakeholders and environments.

Aquifer Systems Identified In Sub Area:

- Basin Deposits
- Modesto Formation
- Lower Tuscan (Formation Unit B) Aquifer System

Management Objectives –

1. To maintain upper groundwater elevations in the Tuscan B at affordable extraction elevations now and into the future.
 - a. To maintain adequate water elevations in the Tuscan B throughout the year at affordable and dependable elevations from the surface for farming and other larger volume users.
 - b. To maintain adequate water elevations in the Tuscan B aquifer throughout the year for affordable and dependable domestic needs.
2. To maintain dependable and adequate supply (volume) throughout the year at affordable extraction elevations now and into the future.
 - a. To maintain a volume of groundwater in the Tuscan B to insure adequate amounts at affordable extraction elevations for farming and other larger volume users throughout the year.
 - b. To maintain a volume of groundwater in the Tuscan B at affordable extraction elevations for domestic needs throughout the year.

- c. To maintain sufficient volume and elevation of groundwater in the Tuscan B to prevent up-welling and excessive mixing of salt water from underlying marine layers.

3. To maintain and/or improve water quality in the aquifer system. Our minimal intent is to sustain adequate water quality, using US EPA preferable standard guidelines while monitoring agricultural and domestic wells.

4. Monitor for permanent land subsidence. If it is detected anywhere in Butte County where similar geological/aquifer structure and groundwater extraction conditions exist, the we will immediately review the Sub area conditions and take appropriate actions. Since permanent subsidence by definition has already permanently caused damage, our main goal will be to prevent additional subsidence/damage over a larger area or to a greater extent.

5. Monitor to avoid threats of environmental degradation. Degradation could cause additional management expenses from accessing water for overlying uses.

Location of Basin Management Objective Key Wells:

Groundwater Levels – See attached map of monitoring wells

Groundwater Quality – See attached map of monitoring wells

Land Subsidence – See attached map of monitoring wells

Groundwater Levels – Five monitoring wells have been selected for BMO levels as per the ordinance requirements of groundwater level monitoring. Three of those wells are located in the most heavily farmed areas, with one major business water user. Two additional wells, on in central Butte Valley and one on the northeasterly edge of the Sub Area, were selected as primary monitoring wells. Both of the last two wells are in close proximity to the most populated areas of the Sub Area. The agricultural wells selected are critical to our evaluation times because they are continuously monitored.

Groundwater Quality- Currently, Butte County Department of Water and Resource Conservation is monitoring one well in the Sub Area for water quality. The results from the last five years for the measured constituents of temperature, total dissolved solids, electrical conductivity and pH are included in this BMO packet.

Groundwater Level Monitoring Network(s):

Department of Water Resources

Butte County Department of Water and Resource Conservation

Groundwater Quality Network(s):

Butte County Department of Water and Resource Conservation

Land Subsidence Monitoring Network(s):

Department of Water Resources

Butte County Department of Water and Resource Conservation

Monitoring Frequency:

Groundwater Levels – Department of Water Resources - semiannually (fall and spring). Butte County Department of Water and Resource Conservation – July and August in accordance with Chapter 33 of the Butte County Code.

Groundwater Quality – Butte County Department of Water and Resource Conservation - annually

Land Subsidence – Department of Water Resources – Continuously

Well Numbering System(s):

Groundwater Levels – Department of Water Resources (State Well Numbering System). Butte County Department of Water and Resource Conservation (State Well Numbering System).

Groundwater Quality – Butte County Department of Water and Resource Conservation (State Well Numbering System).

Land Subsidence – Department of Water Resources (State Well Numbering System)

Well ID	Aquifer System	Well Type	Stage 1 & 2 Alert UA (LA) Elev. (ft)	Stage 3 Alert UB (LB) Elev. (ft)
20N02E24C01M	Tuscan B	Monitoring	124.5 (110.6)	119.6 (108.0)
20N02E24C02M	Tuscan B	Monitoring	125.0 (113.6)	119.5 (108.0)
20N02E24C03M	Tuscan B	Monitoring	124.5 (115.5)	119.5 (109.0)
20N03E31M01M	Tuscan B	Monitoring	119.1 (110.5)	116.5 (103.5)
20N03E33L01M	Tuscan B	Irrigation	118.4 (107.5)	107.4(95.0)
21N03E22C01M	Tuscan B	Domestic	364.0 (356.5)	353 (353.0)
21N03E32B01M	Tuscan B	Irrigation	223.1 (224.0)	221.1 (216.0)

* - See Staff Report for description of method.

** - See attached hydrographs.

UA and UB refers to spring measurements and LA and LB refers to annual measurements.

Basin Management Objective Key Wells and Compliance Methodology for Groundwater Quality.

Well ID	Aquifer System	Well Type	Alert Level
20N02E24Q01M	Tuscan B	Irrigation	20 % Change

Basin Management Objective Key Wells and Compliance Methodology for Land Subsidence.

Land Subsidence is continuously monitored by the Department of Water Resources and Butte County Department of Water and Resource Conservation in the closest sub area at State Well number 20N01E18L03M, located within the Western Canal sub area.

BMO Alert Stage Definitions:

The Cherokee Sub Area will use the following guidelines in the management of the groundwater resources. The groundwater level, groundwater quality, and land subsidence management objectives are intended to trigger predetermined voluntary Ground Water Management Actions, as defined below, to remedy declining ground water levels that are not recovering to compliance levels for each index well. They are also intended to trigger voluntary Groundwater Managements Actions to prevent land subsidence or degradation of groundwater quality.

Groundwater Levels:

Spring Levels

Average spring level is defined as the spring level determined from all the available data for the years prior to, and including 2006 for the months of January-April.

Stage 1: The first year that spring groundwater levels falls 20 percent of the range of all spring (January-April) groundwater level measurements below the average spring groundwater level established for that well (UA).

Stage 2: Stage 2 is reached if spring groundwater levels, for a second consecutive year remains below the UA level established for the well.

Stage 3: Stage 3 is reached if a spring groundwater levels falls below the historic low spring groundwater level established for that well (UB).

Annual Levels

The average annual level is defined as the average level determined from all the available data for the years prior to, and including 2006.

Stage 1: The first year that any groundwater level falls 20 percent of the range of all groundwater level measurements below the average groundwater level established for that well (LA).

Stage 2: Stage 2 is reached if groundwater levels, for a second consecutive year, remains below the LA level established for the well.

Stage 3: Stage 3 is reached if a groundwater level falls below the historic low groundwater level established for that well (LB).

Groundwater Quality:

Any change that exceeds a 20 percent change from Butte County's 2005 water quality assessment will be cause for review and investigation by the Technical Advisory Committee.

Land Subsidence:

Stage 1. When the annual elastic subsidence exceeds the average annual elastic subsidence measured over the period of record of the extensometer.

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

Stage 3. When inelastic subsidence occurs.

BMO Compliance Evaluation Procedure:

Compliance with the BMO will be determined by the Butte County Water Commission's Technical Advisory Committee following the each measurement period. The groundwater surface elevation at each monitoring well will be compared against the corresponding compliance graph and stage definition criteria to determine if the groundwater surface elevations are above or below specific alert trigger levels. The Technical Advisory Committee of the Butte County Water Commission will perform this evaluation and report the results of the evaluation to the Butte County Water Advisory Committee and Water Commission.

Ground Water Management Actions:

Stage 1. Groundwater management actions to be undertaken following a Stage 1 noncompliance shall be informational. The Butte County Water Advisory Committee (WAC) and Water Commission (WC) will be advised of the noncompliance. At the recommendation of the Water Advisory Committee and the Water Commission public notification of the noncompliance may be initiated.

Stage 2. Groundwater management actions to be undertaken following a Stage 2 noncompliance shall be investigational. Upon identification of the Stage 2 noncompliance the noncompliance will be reported to the WAC and the WC. Following review and concurrence, the WAC shall direct the TAC to initiate an investigation to determine the cause(s) of the noncompliance and make recommendations as how to correct the noncompliance. The TAC shall report their findings and recommendations back to the WAC and WC within 30 days.

Stage 3. Groundwater management actions to be undertaken following a Stage 3 noncompliance shall be actionable. Upon identification of the Stage 3 noncompliance, the noncompliance will be reported to the WAC and the WC. Following review and concurrence, the WAC shall direct the TAC to initiate an investigation to determine the cause(s) of the noncompliance and make recommendations as how to correct the noncompliance. The TAC shall report back their findings and recommendations back to the WAC and WC within 30 days. The WAC will then work with the locals in the sub area to implement needed water management activities necessary to correct the problem. Such water management activities shall include, but not limited to, voluntary water conservation measures, redistribution of groundwater extraction, reduction of groundwater extraction, or other measure(s) identified and approved by the WAC, WC, and the Butte County Board of Supervisors.

Future Monitoring Recommendations:

1. Monitor one to two wells at Butte College and include the collected data in monitoring program during 2006. These wells will be monitored for both groundwater elevations and quality.
2. Locate a domestic well in Butte Valley east of Clark Road to begin monitoring for groundwater elevations.
3. Add additional agriculture wells to our monitoring grid if conditions exist that are different from and not represented adequately by our present monitoring wells.
4. Initiate and participate in actions to protect or make minimal negative impacts to recharge areas of the Lower Tuscan (Unit B) aquifer. We will work with Cherokee Watershed and Butte County on this issue to determine goals, needs, possible solutions, methods and implementation.
5. Keep the Lower Tuscan aquifer a healthy system now and into the future so all overlying land owners have “good water” at an affordable pumping expense, and they have adequate amounts for their needs. Have an aquifer system that can be used by its stakeholders without doing harm to others or increasing the extraction costs of others.
6. Work with Cherokee Watershed, Butte County and other agencies to promote good management of the watershed in groundwater related issues in areas feeding the Lower Tuscan and lands overlying the Lower Tuscan.

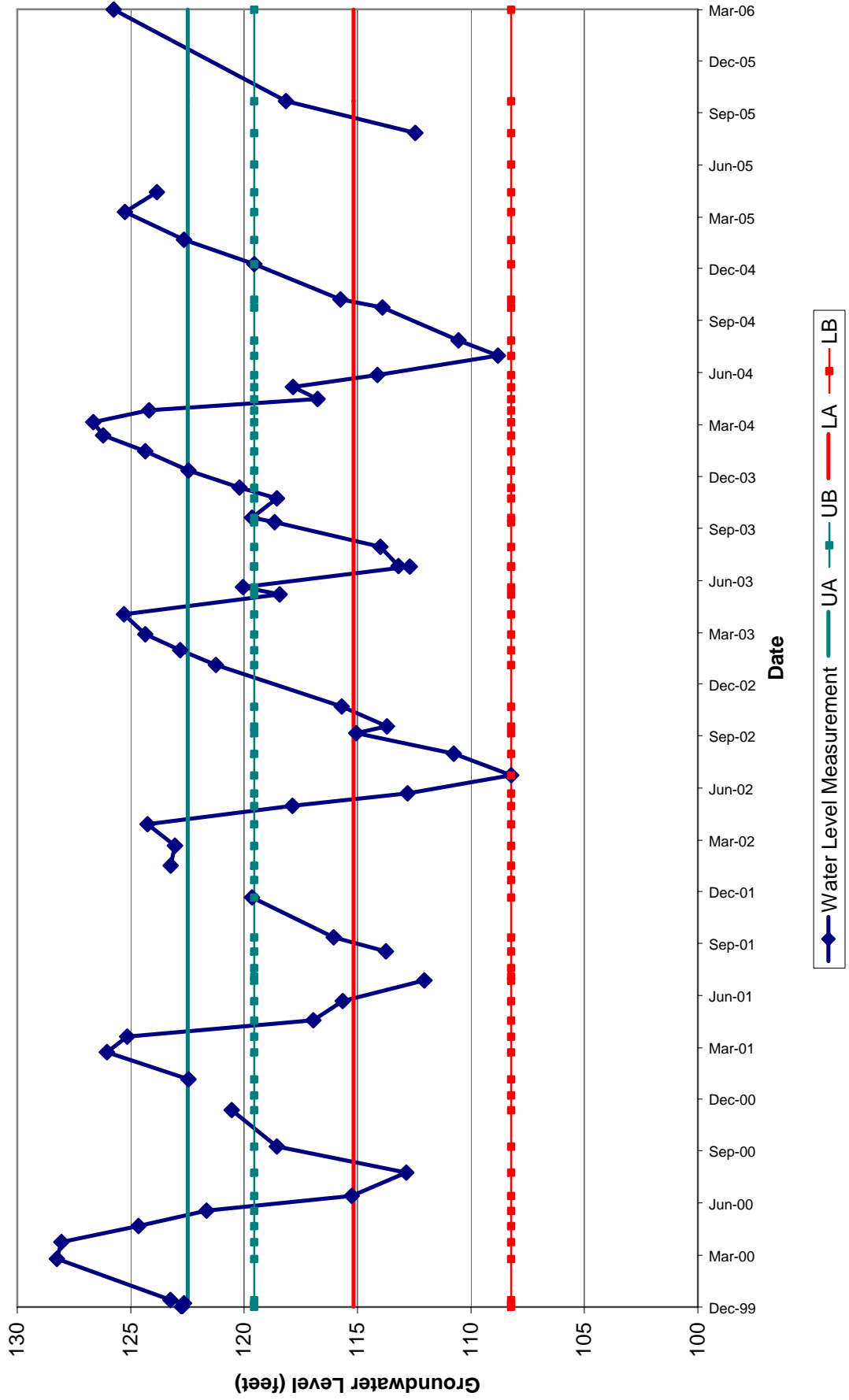
Supporting Data:

See attached hydrographs

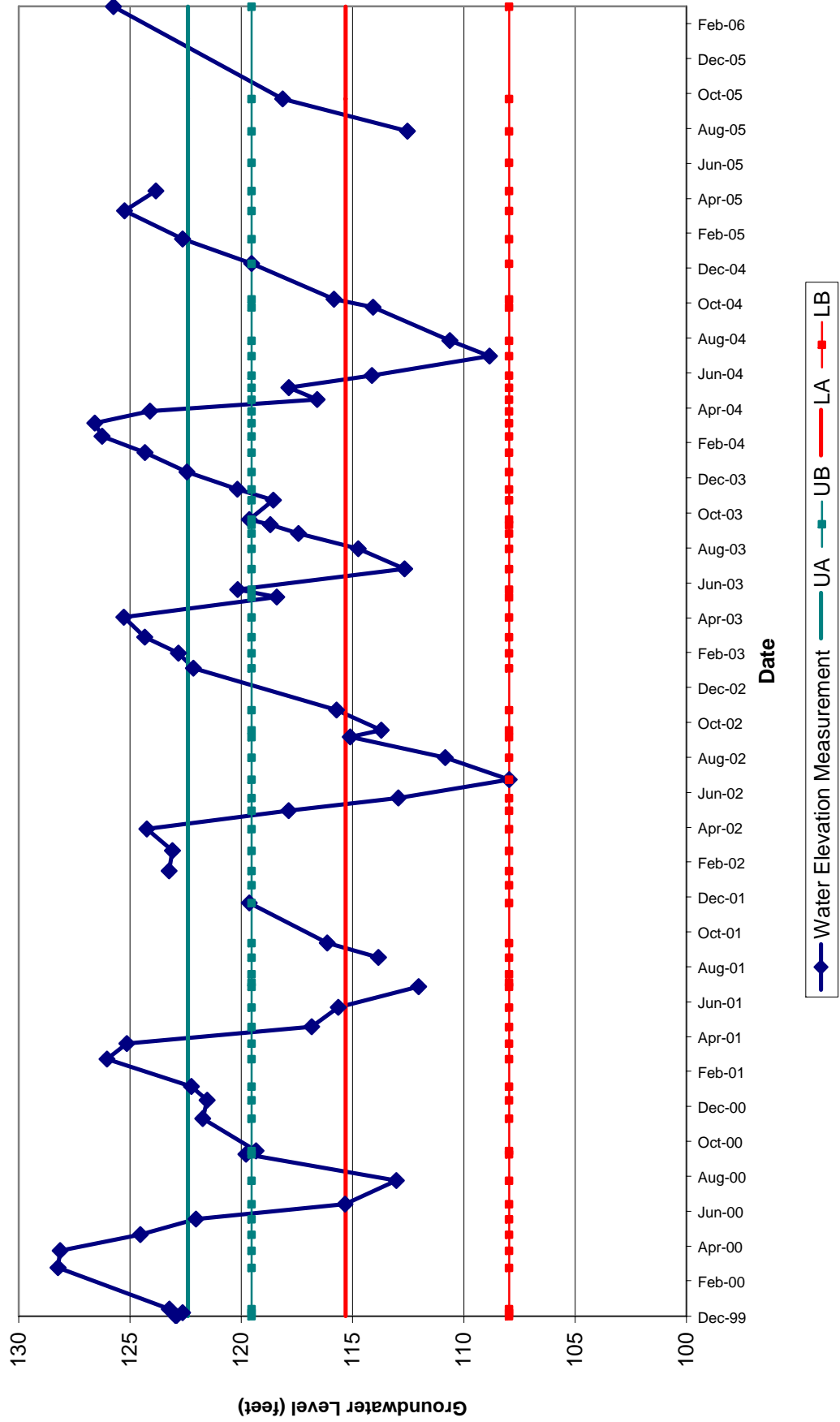
See attached map of existing monitoring wells

See attached map of Sub-Unit Boundaries

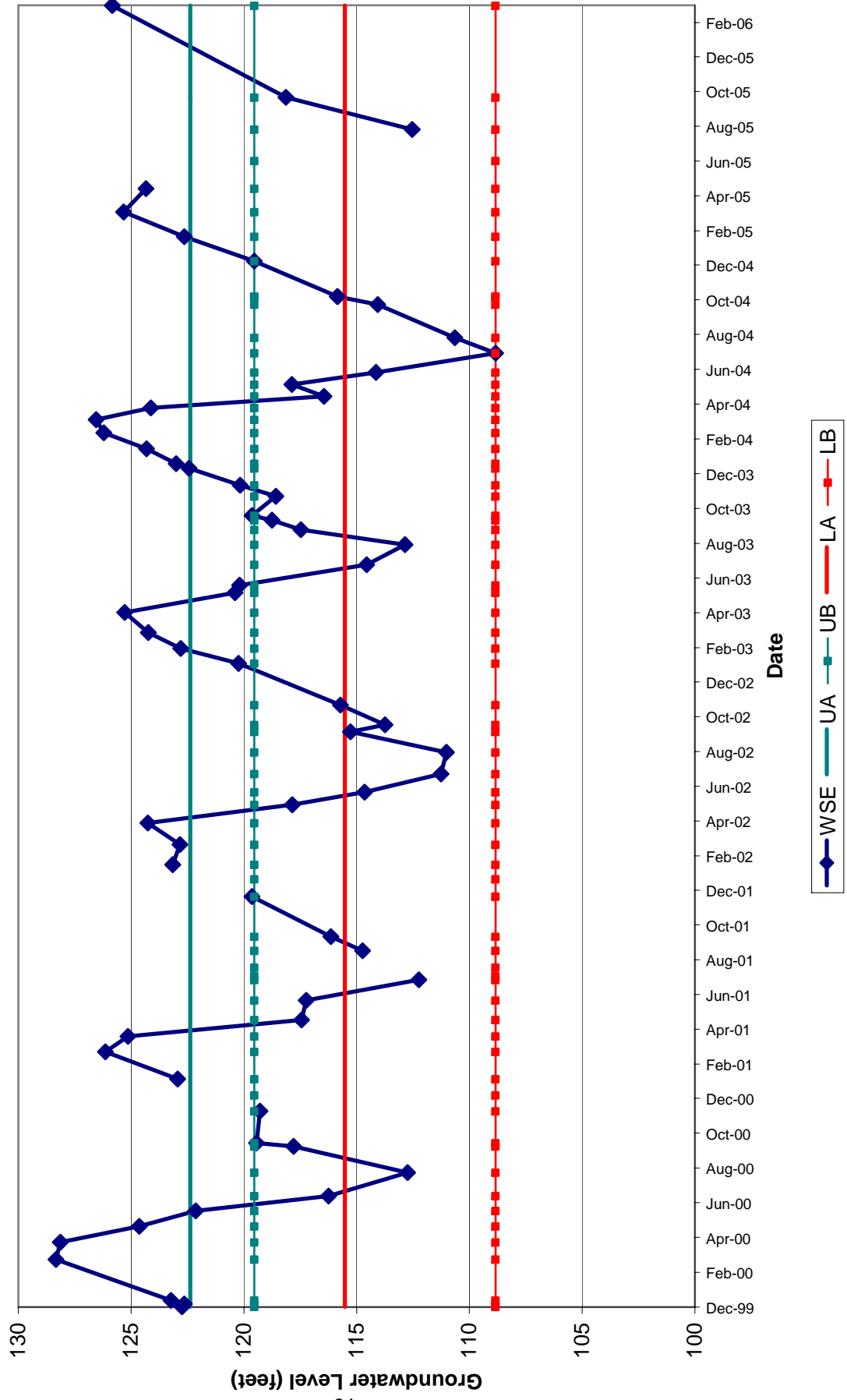
**Groundwater Levels
Cherokee - 20N02E24C01M**



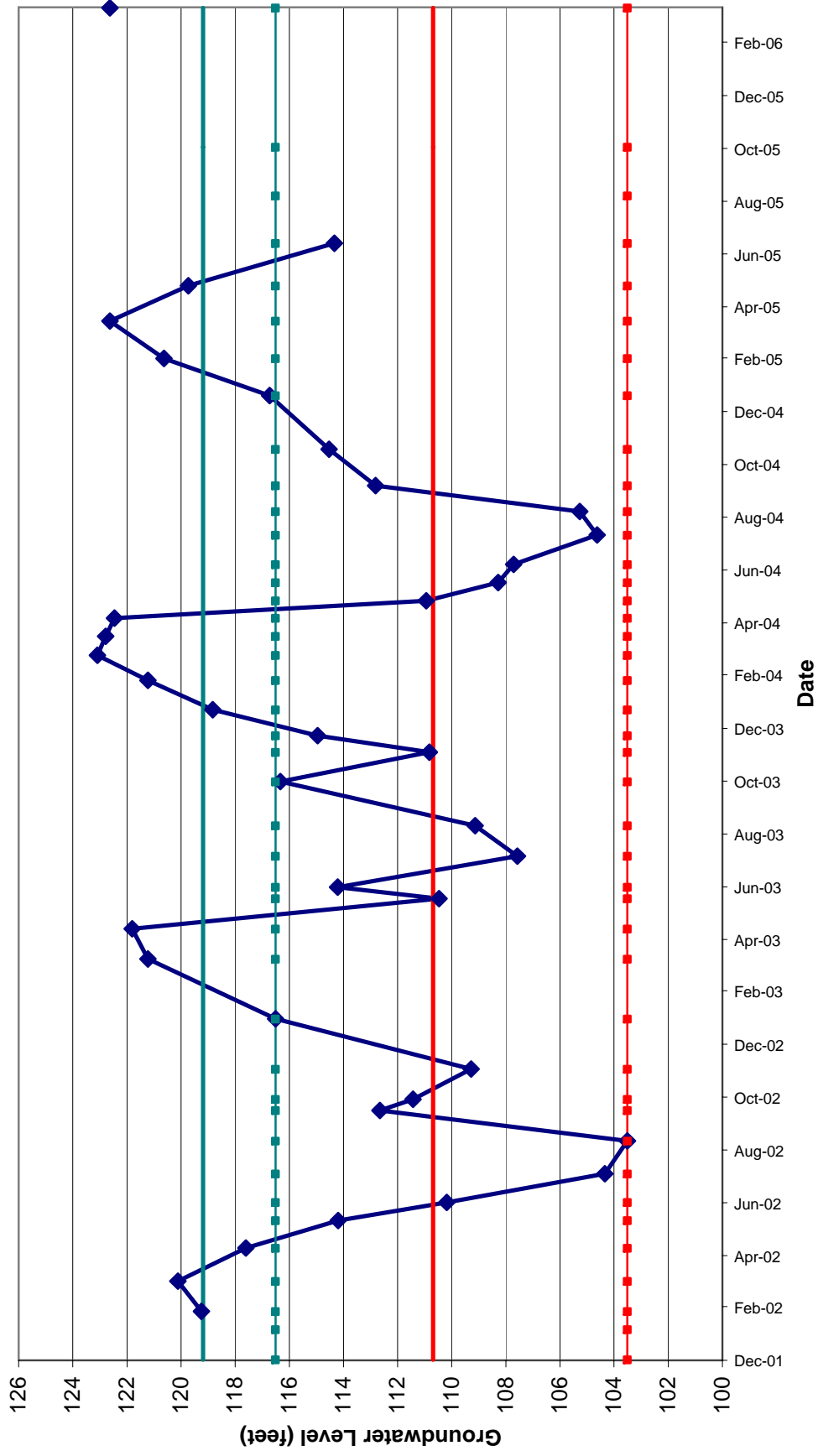
**Groundwater Levels
Cherokee - 20N02E24C02M**



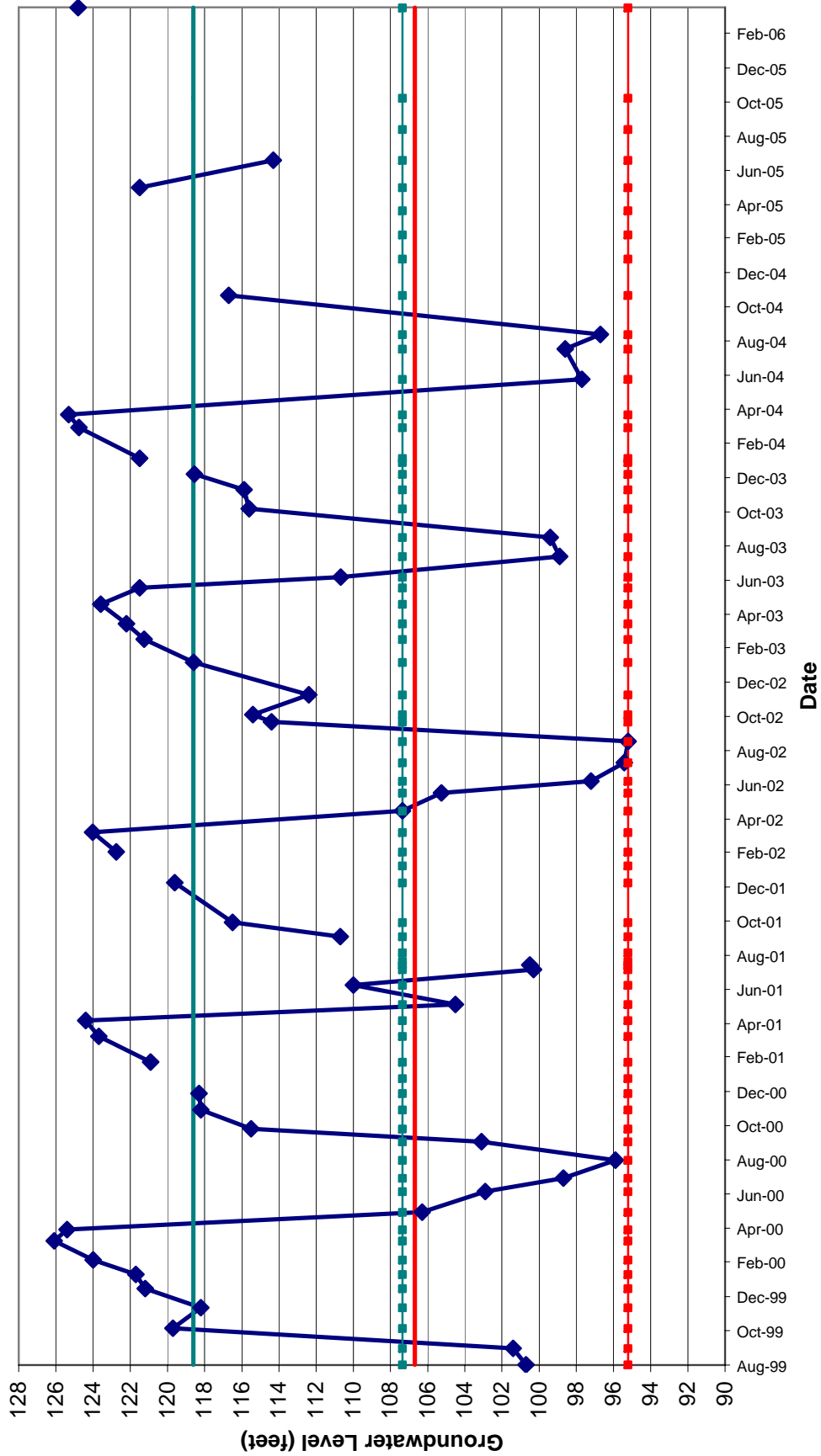
**Groundwater Levels
Cherokee - 20N02E24C03M**



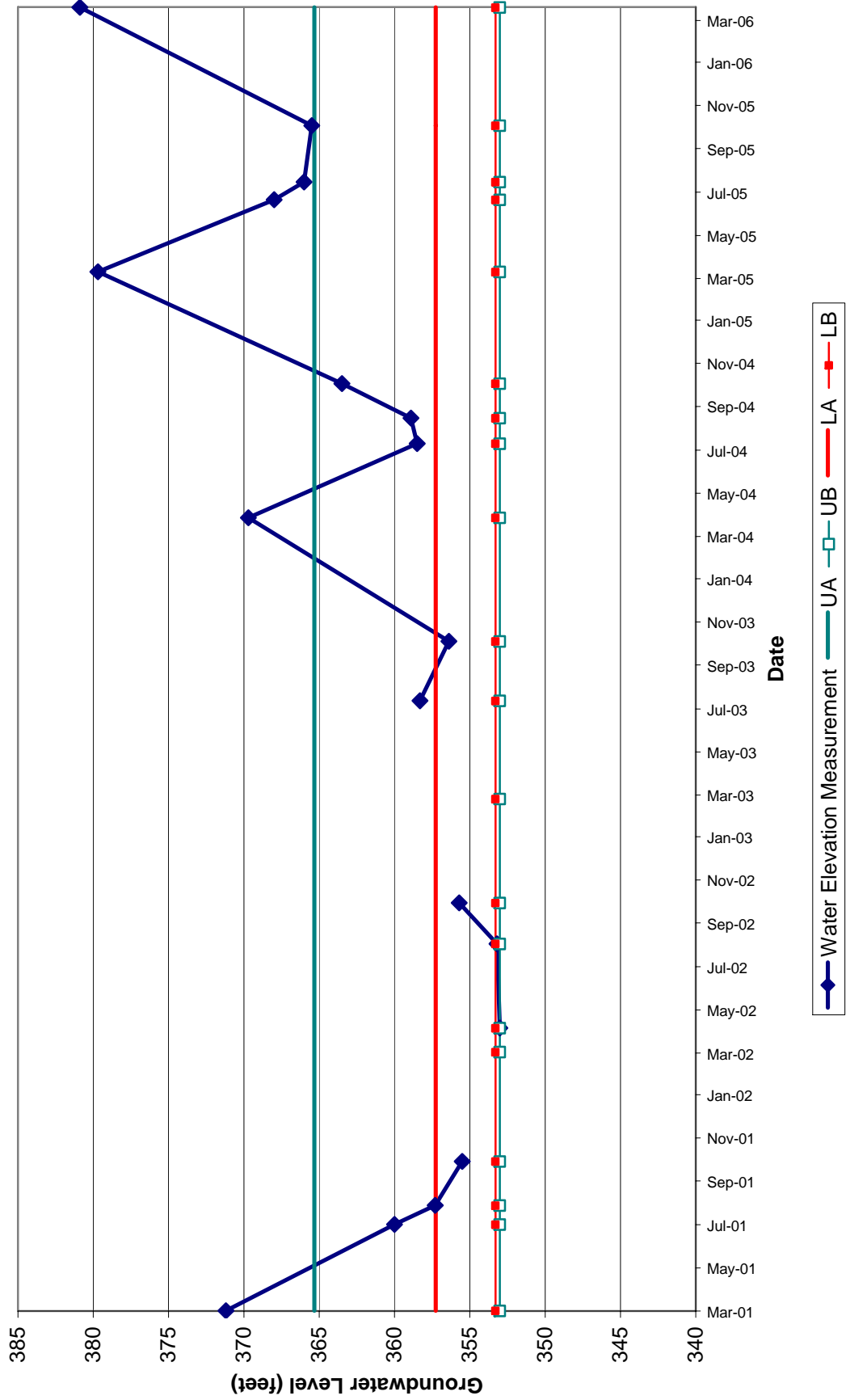
**Groundwater Levels
Cherokee - 20N03E31M01M**



Groundwater Levels
Cherokee - 20N03E33L01



**Groundwater Levels
Cherokee - 21N03E22C01M**



**Groundwater Levels
Cherokee - 21N03E32B01M**

