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Abbreviations

BBWUA – Butte Basin Water Users Association
BSAGWUA – Butte-Sutter Area Groundwater Users Association
BMO – Basin Management Objective
CBDA – California Bay-Delta Authority
CVP – Central Valley Project
CWC – California Water Code
Department – Butte County Department of Water and Resource Conservation
DWR – California Department of Water Resources
EC – Electrical Conductivity
EPA – Environmental Protection Agency
GMP – Butte County AB 3030 Groundwater Management Plan
gpd – gallons per day
gpm – gallons per minute
IWRP – Butte County Integrated Water Resource Plan
msl – mean sea level
ppm – parts per million
Reclamation – Bureau of Reclamation
SWP – State Water Project
SWRCB – State Water Resource Control Board
TAF – 1000 acre-feet
TDS – Total dissolved solids
TAC – Technical Advisory Committee
WAC – Water Advisory Committee
WHPA – wellhead protection area

Section 1
Introduction

1.1 Plan Authority and Administration

On August 26, 2003, the Butte County Board of Supervisors formally approved resolution 03-134 directing the Butte County Department of Water and Resource Conservation (Department) to proceed with the development of a countywide AB 3030 Groundwater Management Plan (GMP). The resolution is included as Appendix A. The County is an authorized groundwater management agency within the meaning of California Water Code (CWC) § 10753[1] (b) as a consequence of the fact that the County provides flood control services in County Service Area 24. The plan does not conflict with existing groundwater ordinances and groundwater management plans, the Department shall endeavor to coordinate this GMP with local agencies that have adopted rules and regulations to implement and enforce their own AB 3030 plans as required by CWC § 10753.9(a).

The Department has been participating in groundwater management activities for multiple years. The Department has focused on helping local users manage groundwater more effectively through several programs. In the last several years, the Department has increased groundwater level and quality monitoring, and has worked with other entities to collect and disseminate water quality and quantity data. Additionally, the Department assists other entities within the County with locally-driven groundwater management activities. The GMP documents the County's existing groundwater management programs, and explains potential future actions to increase the effectiveness of groundwater management.

AB 3030 History

The California Groundwater Management Act, or AB 3030, was adopted by the California legislature in 1992, which created provisions in the California Water Code Sections 10750 et.seq. to manage the safe production, quality and proper storage of groundwater. Though adoption of a Groundwater Management Plan is not required by law it is encouraged. AB 3030 is applicable to local agencies, including counties, to

[1] CWC § 10753(a) Any local agency, whose service area includes a groundwater basin, or a portion of a groundwater basin, that is not subject to groundwater management pursuant to other provisions of law or a court order, judgment, or decree, may, by ordinance, or by resolution if the local agency is not authorized to act by ordinance, adopt and implement a groundwater management plan pursuant to this part within all or a portion of its service area.
(b) Notwithstanding subdivision (a), a local public agency, other than an agency defined in subdivision (g) of Section 10752, that provides flood control, groundwater management, or groundwater replenishment, or a local agency formed pursuant to this code for the principal purpose of providing water service that has not yet provided that service, may exercise the authority of this part within a groundwater basin that is located within its boundaries within areas that are either of the following:
(1) Not served by a local agency.
(2) Served by a local agency whose governing body, by a majority vote, declines to exercise the authority of this part and enters into an agreement with the local public agency pursuant to Section 10750.7 or 10750.8.

develop a county-wide groundwater management plan for portions of the groundwater basin not presently covered by another groundwater management plan. As stated above, in August 2003 the Butte County Board of Supervisors approved Resolution 03-134 (Appendix A) directing the Department of Water and Resource Conservation to proceed with the development of a county-wide AB 3030 Plan.

Per Water Code Section 10750 et.seq., the County's AB 3030 Plan is a stand alone document. According to the State Department of Water Resources (DWR), 149 agencies have adopted AB 3030 plans and others have begun the process. In some basins groundwater is managed by statutory or judicial authority.

One benefit to Butte County's adoption of its AB 3030 Plan is to meet objectives of grant funding opportunities available under the Groundwater Management Assistance Program (AB 303). Last January 2004 Butte County applied for an AB 303 grant in the amount of $236,000 to support the development of a Basin Management Objective (BMO) Information Center, which is a web-based data center with GIS components. The County's grant application was outscored by competing proposals primarily because the County did not have an AB 3030 Plan in place.

The County DW&RC has developed the AB 3030 Plan to remain in context with the proposed County Integrated Water Resources Plan which is anticipated to be considered by the Board in early 2005. The DW&RC desires to perform and evaluate the scientific studies that will be necessary in the future to assist local policy makers.

Section 1.2 discusses the GMP's objectives, and Section 1.3 outlines the area covered by the GMP. The overall plan development process, as required by the CWC, is described in detail in Section 1.4, and the public involvement process is described in Section 1.5

1.2 Plan Objectives

The GMP supports the long-term maintenance of high quality groundwater resources within the Plan Area for agricultural, environmental, rural domestic and urban needs. Specifically, the Butte County Groundwater Management Plan endeavors to:

- Minimize the long-term drawdown of groundwater levels;
- Protect groundwater quality;
- Prevent inelastic land surface subsidence from occurring as a result of groundwater pumping;

- Minimize changes to surface water flows and quality that directly affect groundwater levels or quality;
- Minimize the effect of groundwater pumping on surface water flows and quality; and
- Evaluate groundwater replenishment and cooperative management projects.

1.3 Area Covered by Plan

The Butte County GMP includes those areas overlying a groundwater basin or associated groundwater sub-basin within Butte County not otherwise managed under an existing AB 3030 groundwater management plan (CWC § 10750.2(b)) or regulated by the Public Utilities Commission (CWC § 10750.7(a)). The Sacramento Valley Groundwater Basin resources within Butte County are located in the North Yuba, East Butte, West Butte, and Vina groundwater sub-basins. These sub-basins are shown on Figure 1-1.

The Butte County GMP Plan Area is shown on Figure 1-2. Areas managed under existing AB 3030 Groundwater Management Plans by a local agency (CWC § 10750.2(b)), and therefore excluded from inclusion in this GMP, include those areas within the borders of the Biggs-West Gridley Water District, Butte Water District, Richvale Irrigation District, and Western Canal Water District. Areas overlying the groundwater basin that are regulated by the Public Utilities Commission (CWC § 10750.7(a)), and therefore excluded from inclusion in this GMP, include those areas within the service area of California Water Service Company – Chico and California Water Service Company – Oroville. Additionally, the foothill and mountain areas of the County do not overlie groundwater basins as defined in Department of Water Resources (DWR) Bulletin 118-2003, and are therefore not included under this GMP.

Within Table 1-1, Inventory Units correspond to the above referenced groundwater sub-basins. Inventory Sub-units represent a geographical area that is a subset to an Inventory Unit. Inventory Sub-units generally represent organized water suppliers or other independent water use areas that have common land use and water supply sources. Water resources within Inventory Units and Inventory Sub-units have been characterized in detail in the reports *Butte County Groundwater Inventory Analysis* (DWR, 2000) and *Butte County Water Inventory and Analysis* (CDM, 2001). These reports are available at the Butte County Department of Water and Resource Conservation office library for use by the public.

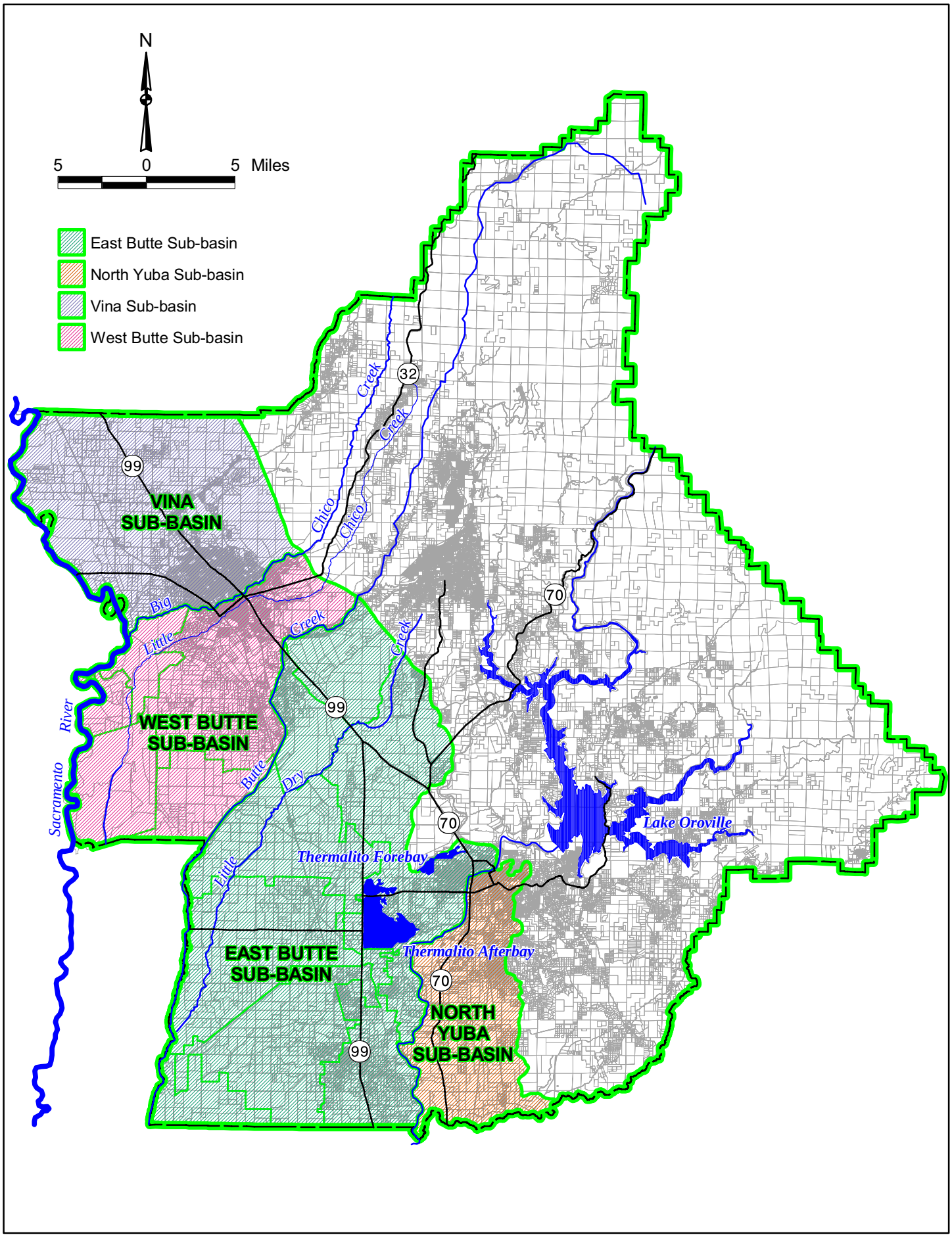


Figure 1-1
Sacramento Valley Groundwater Sub-basins in Butte County

Table 1-1
Butte County AB 3030 GMP Included Areas

Inventory Units	Inventory Sub-Units	Areas Within Sub-Units	Included in Butte County GMP
East Butte	Biggs-West Gridley	Biggs-West Gridley Water District	
		City of Biggs	*
		City of Gridley	*
	Butte	Butte Water District	
		City of Biggs	*
		City of Gridley	*
	Butte Sink	All	*
	Cherokee	All	*
	Esquon	Durham Mutual Water District	*
		All Other Areas	*
	Pentz	All	*
	Richvale	Richvale Irrigation District	
	Thermalito	Thermalito Irrigation District	*
		All Other Areas	*
	Western Canal	Western Canal Water District	
North Yuba	North Yuba	California Water Service, Oroville	
		All Other Areas	*
Vina	Vina	California Water Service, Chico	
		All Other Areas	*
West Butte	Angel Slough	All	*
	Durham/ Dayton	California Water Service, Chico	
		Dayton Mutual Water District	*
		Durham Irrigation District	*
		All Other Areas	*
	Llano Seco	All	*
	M&T	M&T Ranch	*
	Chico Urban Area	All	*
	Western Canal	Western Canal Water District	

Note that the Chico Urban Area, which may include portions of the West Butte and Vina sub-inventory units, or that portions of that BMO sub-unit that are not presently covered by an AB 3030 Plan by the local water purveyor, are addressed in the Butte County GMP.

Areas overlying the groundwater basin that are regulated by the Public Utilities Commission (CWC Section 10750.7(a)), including the area served by the California

Water Service Company – Chico, are managed under an Urban Water Management Plan and are not included in the Butte County GMP.

1.4 Plan Development Process

There are five main steps in the development of an AB 3030 groundwater management plan, defined under CWC § 10753.2 through 10753.6, as summarized below.

Step 1- Provide public notification of a hearing on whether or not to adopt a resolution of intention to draft a GMP and subsequently complete a hearing on whether or not to adopt a resolution of intention to draft a GMP. Following the hearing, draft a resolution of intention to draft a GMP.

Step 2 - Adopt a resolution of intention to draft a GMP and publish the resolution of intention in accordance with public notification (6066 gov code). Upon written request, provide copy of resolution of intention to interested persons. The Butte County Board of Supervisors adopted the resolution of intention to develop a GMP on August 26, 2003.

Step 3 - Prepare draft GMP within 2 years of resolution of intention adoption. Provide to the public a written statement describing the manner in which interested parties may participate in developing the GMP, as discussed in section 1.5 below. This may also include appointing a Technical Advisory Committee (TAC).

Step 4 - Provide public notification (6066 gov code) of a hearing on whether or not to adopt the GMP, followed by a hearing on whether or not to adopt the GMP.

Step 5 - If Protests are received for less than 50% of the assessed value of property in the county area the plan may be adopted within 35 days after completion of Step 4 above. If Protests are received for greater than 50% of the assessed value of the property in the county area, the plan will not be adopted. Section 10753.6 of the California Water Code (re: writing protest: content; majority protest) states that in order for a majority protest to exist to the adoption of the plan, written protests covering over 50% of the assessed value of the land area (as shown in Section 1, Figure 1-2 of the draft GMP) must be filed and not withdrawn before the conclusion of the second public hearing.

At its September 28, 2004 meeting the Butte County Board of Supervisors conducted a public hearing and approved the County GMP on a unanimous vote. The draft Butte County GMP was prepared in accord with CWC Section 10750 et.seq.. The availability of the draft GMP was announced at the April 6, 2004 meeting of the Butte County Water Commission. The public review draft was posted on the Department's (Department of Water and Resource Conservation – DW&RC) web-site and hard copies of the draft were also placed in local Butte County libraries in April 2004.

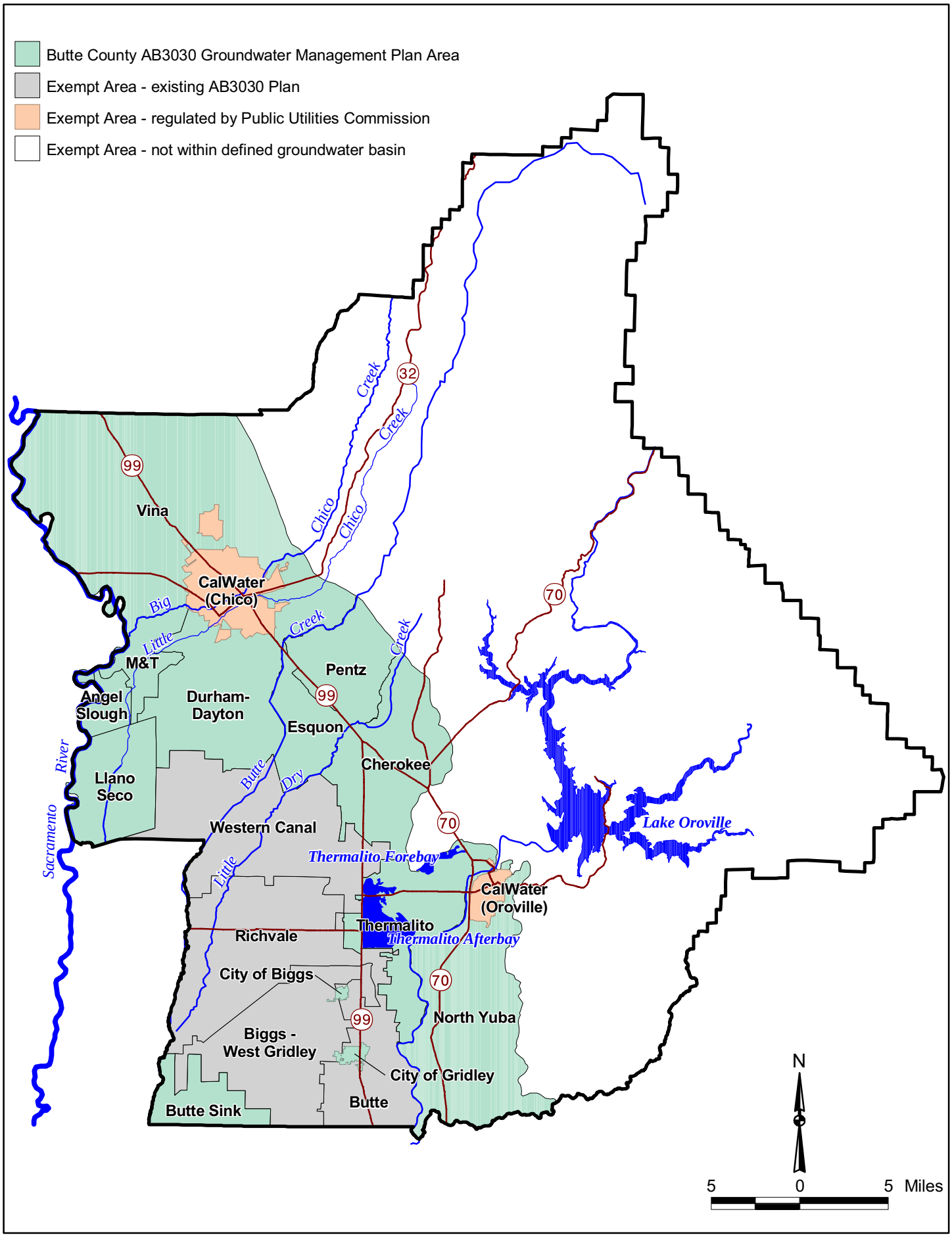


Figure 1-2
Butte County AB 3030 Plan Area

In addition to the activities described above the public was notified of the availability to review the draft GWP in its "WaterSolutions" newsletter which includes a mailing list of approximately 200 persons and organizations. Further, public notices were placed in local newspapers (Gridley, Chico, Oroville, Paradise) in May 2004 to inform the community that the draft GMP was available for review and comment. Comments were requested by June 30, 2004, however, many were received by the Department through late August 2004.

At its August 3, 2004 meeting the Butte County Water Commission moved that the draft GMP be taken to the Board and set a public hearing to announce their intention to adopt a GMP. On August 17, 2004 the Board adopted Resolution No. 04-152 (attached in Appendix G) to schedule a public hearing on September 28, 2004 for the purposes of hearing protests and adopting the draft GMP.

The County received numerous helpful comments to the draft GMP but did not receive written protests regarding the plan's adoption. A copy of Resolution No. 04-181 passed by the Board by unanimous vote on September 28, 2004 is included in Appendix G.

1.5 Public Outreach and Education

Public outreach and education is a primary function of the Butte County Department of Water and Resource Conservation. The Department encourages two-way dialogue, characterized by information dissemination and requests for suggestions and feedback on Department activities. In addition to public outreach completed during development of the GMP as required under CWC § 10753.2 through 10753.6, the Department has regularly disseminated information on GMP development as part of its ongoing public outreach effort.

GMP-related information and draft documentation are available to the public on the Department's website (http://www.buttecounty.net/waterandresource/) and have been included in the Department's monthly newsletter, *Water Solutions*, that is distributed in hardcopy and via e-mail to all interested parties. The Department also provides regular updates on plan development to the Butte County Water Commission and Board of Supervisors, with opportunity for the public to provide comment directly to Water Commission and Board of Supervisor members.

The Department has reported on GMP development during meetings with interested stakeholders. Stakeholder groups include the Butte Basin Water Users Association, Upper Ridge Coordinating Committee, Integrated Plan Steering Committee, and the Integrated Watershed Stakeholders Group. Individuals attending these meetings typically represent a wide range of organizations, including watershed groups, water agencies, independent groundwater users, interest groups and the general public.

Future GMP public outreach and education will focus on GMP implementation activities. Following the Board of Supervisors' February 10, 2004 approval of a Basin Management Objective (BMO) ordinance, the Department is supporting local areas pursuing development of BMOs within their respective areas. Butte County Ordinance 3869, describing BMO development and implementation, is included as Appendix B. The Department has developed a Basin Management Objective Development Packet for use by local BMO representatives in each of the 16 areas identified in the approved ordinance. The packets are intended to provide information and guidance necessary to develop BMOs within each area.

In June 2004 the Department facilitated a meeting in Durham, California to educate the community and to initiate development of BMOs and the formation of a Water Advisory Committee (WAC) to support their development. In July 2004 the Department conducted five additional meetings held in Chico, Oroville, Gridley, Durham and Magalia to introduce the draft County Integrated Water Resource Plan, of which BMOs, and the draft AB 3030 Plan, are important components as they regard integrated water resource planning.

1.6 Management Plan Components

The Butte County GMP includes the following required and recommended components:

- CWC § 10750 *et seq.* (seven mandatory components). Recent amendments to the CWC § 10750 *et seq.* require GMPs to include several components to be eligible for award of funding administered by DWR for the implementation of groundwater related studies, construction of groundwater projects and groundwater quality projects. These amendments to the CWC were included in Senate Bill 1938, effective January 1, 2003.

- CWC § 10750 *et seq.* (12 voluntary components). CWC § 10750 *et seq.* includes 12 specific technical issues that could be addressed in GMPs to manage the basin optimally and protect against adverse conditions.

- DWR Bulletin 118-223 components (seven recommended components).

Table 1-2 summarizes the required and recommended components of an AB 3030 plan pursuant to current guidance and the report section where each component is addressed.

1.7 Organization of AB 3030 Groundwater Management Plan

This GMP is organized into four sections:

- Section 1 – Introduction;

- Section 2 – Water Resources Setting;
- Section 3 – Plan implementation; and
- Section 4 – References.

To support the GMP the following appendices have been added:

- Appendix A – Resolutions passed by the Butte County Board of Supervisors
- Appendix B – Butte County Code, Chapter 33A Groundwater Management (BMO Ordinance)
- Appendix C – Butte Basin Water Users Association Groundwater Status Report 2004
- Appendix D – Butte County Code, Chapter 33 Groundwater Conservation
- Appendix E – Butte County Code, Chapter 23B Water Wells
- Appendix F – California Code of Regulations, Title 3 Pesticides and Pest Controls
- Appendix G – Public comments to the draft GMP and DW&RC responses to comments, discussed at the September 28, 2004 public hearing of the Board of Supervisors

Table 1-2
Butte County AB3030 GMP Components

Plan Component Description	Butte County Plan Section
CWC § 10750 *et seq.*, Mandatory Components	
1. Documentation of public involvement statement	1.5
2. Establish basin management objectives	3.2, 3.5.3, 3.6.1
3. Monitoring and management of groundwater elevations, groundwater quality, inelastic land surface subsidence, and changes in surface water flows and quality that directly affect groundwater levels or quality or are caused by pumping.	3.4
4. Plan to involve other agencies located within groundwater basin.	3.7.2
5. Adoption of monitoring protocols by basin stakeholders.	3.4, 3.5.3
6. Map of groundwater basin showing area of agency subject to GMP, other local agency boundaries, and groundwater basin boundary as defined in DWR Bulletin 118.	Figure 1-1 Figure 1-2
7. For agencies not overlying groundwater basins, prepare GMP using appropriate geologic and hydrogeologic principles.	1.3
CWC § 10750 *et seq.*, Voluntary Components	
8. Control of saline intrusion.	3.4.2, 3.6.2
9. Identification and management of wellhead protection areas and recharge areas.	3.5.6
10. Regulation of the migration of contaminated groundwater.	3.5
11. Administration of well abandonment and well destruction program.	3.5.1

12. Mitigation of conditions of overdraft.	3.6.3
13. Replenishment of groundwater extracted by water producers.	3.6.3
14. Monitoring of groundwater levels and storage.	3.4.1
15. Evaluate conjunctive use operations.	3.6.2, 3.6.3
16. Identification of well construction policies.	3.5.1
17. Construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects.	3.6.3
18. Development of relationships with state and federal regulatory agencies.	3.7.1
19. Review of land use plans and coordination with land use planning agencies to assess activities that create reasonable risk of groundwater contamination.	3.5.5
DWR Bulletin 118 Suggested Components	
20. Manage with Guidance of advisory committee.	3.6.1, 3.7.2
21. Describe area to be managed under GMP.	1.3
22. Create link between BMOs and goals and actions of GMP.	Section 3
23. Describe GMP monitoring program.	3.4
24. Describe integrated water management planning efforts.	3.8
25. Report on implementation of GMP.	3.9.1
26. Evaluate GMP periodically.	3.9.2

Section 2
Water Resource Setting

2.1 Introduction

Butte County encompasses approximately 1,670 square miles in the northern Central Valley, east of the Sacramento River. Butte County borders Tehama County to the north, Plumas County to the east, Yuba and Sutter counties to the south, and Glenn and Colusa counties to the west. Figure 2-1 shows the location of the County.

The majority of Butte County's groundwater resources are located within the Sacramento Valley groundwater basin. The principal groundwater sub-basins (Inventory Units) within the Sacramento Valley basin portion of Butte County are Vina, West Butte, East Butte, and North Yuba. Each Inventory Unit is further divided into Inventory Sub-units, representing areas with common water sources and uses.

2.2 Topography

Elevations within the Sacramento Valley groundwater basin in Butte County increase gently from the southwest to the northeast, with elevations ranging from less than 100 feet above mean sea level (msl) in the southwest to approximately 300 feet above msl in the northeast. Elevations increase to over 7,000 feet in the mountainous eastern area of the county.

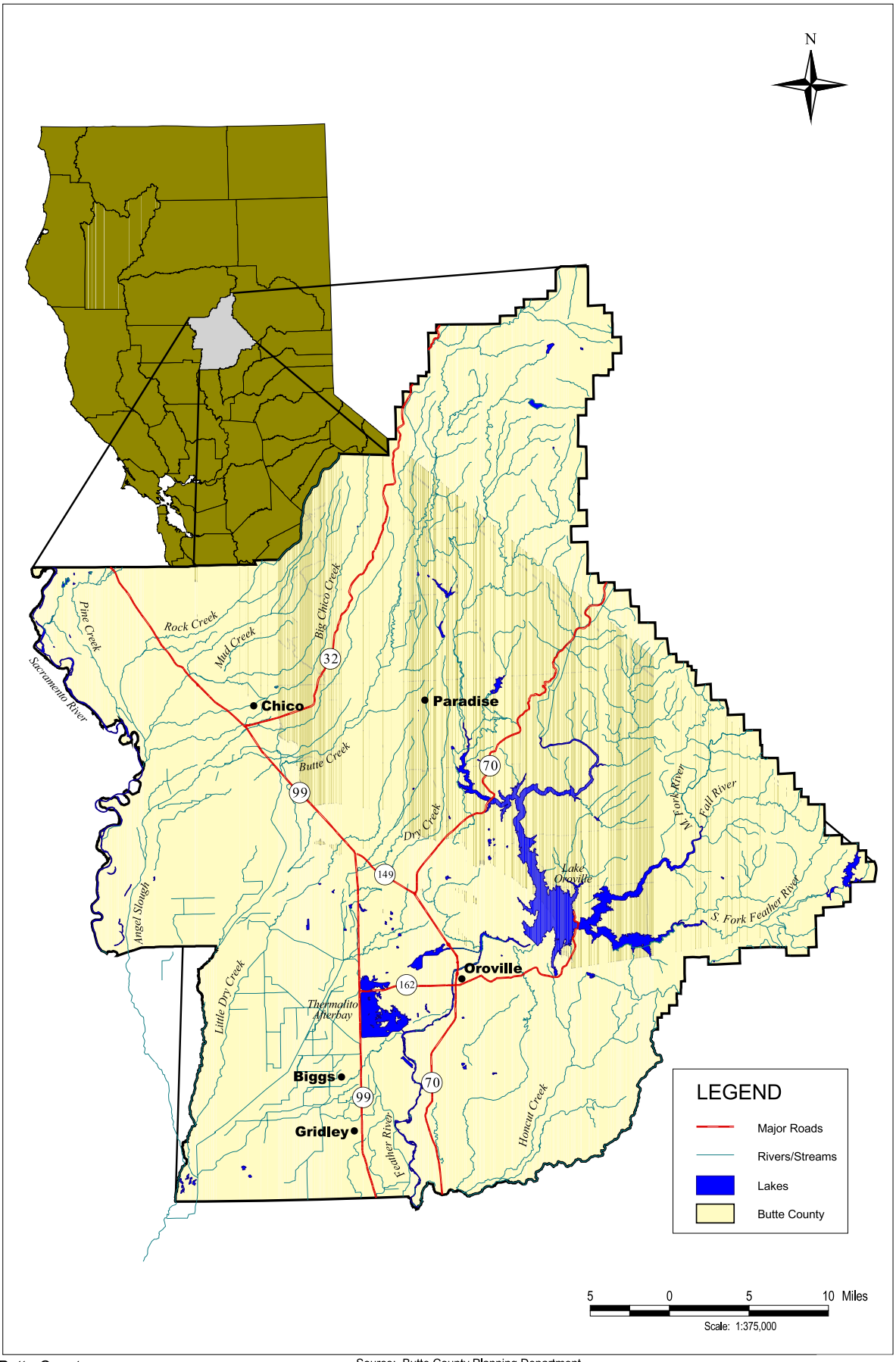
2.3 Climate

Butte County has a Mediterranean-like climate with cool, wet winters and hot, dry summers. Temperature varies with elevation within the county; temperatures are warmer in the valley and cooler in the foothill and mountain areas.

Rainfall and winter snowpack in the Sierra Nevada provide Butte County with significant surface water flows and associated groundwater recharge as surface water traverses the county. Typically ninety percent (90%) of the County's average annual precipitation arrives from October through May. Average annual precipitation increases from west to east across Butte County, associated with increasing elevations. Annual average precipitation is approximately 18 inches in the lower elevation areas of the county that overlie the Sacramento Valley groundwater basin. Precipitation increases to more than 75 inches annually in the mountainous eastern area of the county.

2.4 Surface Water Hydrology

Much of the surface water flow in Butte County originates from rainfall and snowmelt in the foothill and mountain areas. Surface water flows in a southwest direction from the higher elevations, through the basin, to the Sacramento River. Surface water flows in the County are extremely variable, both seasonally and annually, in response to the timing and magnitude of precipitation and snowmelt.



Source: Butte County Planning Department

Butte County
Department of Water & Resource Conservation

Figure 2-1
Location Map

CDM Camp Dresser & McKee Inc.

Larger surface water bodies bordering or within Butte County include the Sacramento River, the Feather River and Lake Oroville facilities, Big Chico Creek, and Butte Creek. Smaller local streams include Little Chico Creek, Rock Creek, Dry Creek, Little Dry Creek, Clear Creek, Angel Slough, Wyandotte Creek, and Honcut Creek. Figure 2-2 illustrates the location of rivers, streams, water supply, and drainage features in the county.

Groundwater recharge is not well understood but it is likely that surface water bodies contribute to groundwater recharge including water distributed for agricultural production throughout Butte County. Combined surface water delivery to the Western Canal Water District and the Joint Water District Board in the southwest portion of the county was approximately 964,000 acre-feet in 2003 (Butte Basin Water Users Association, 2004).

2.5 Hydrogeology

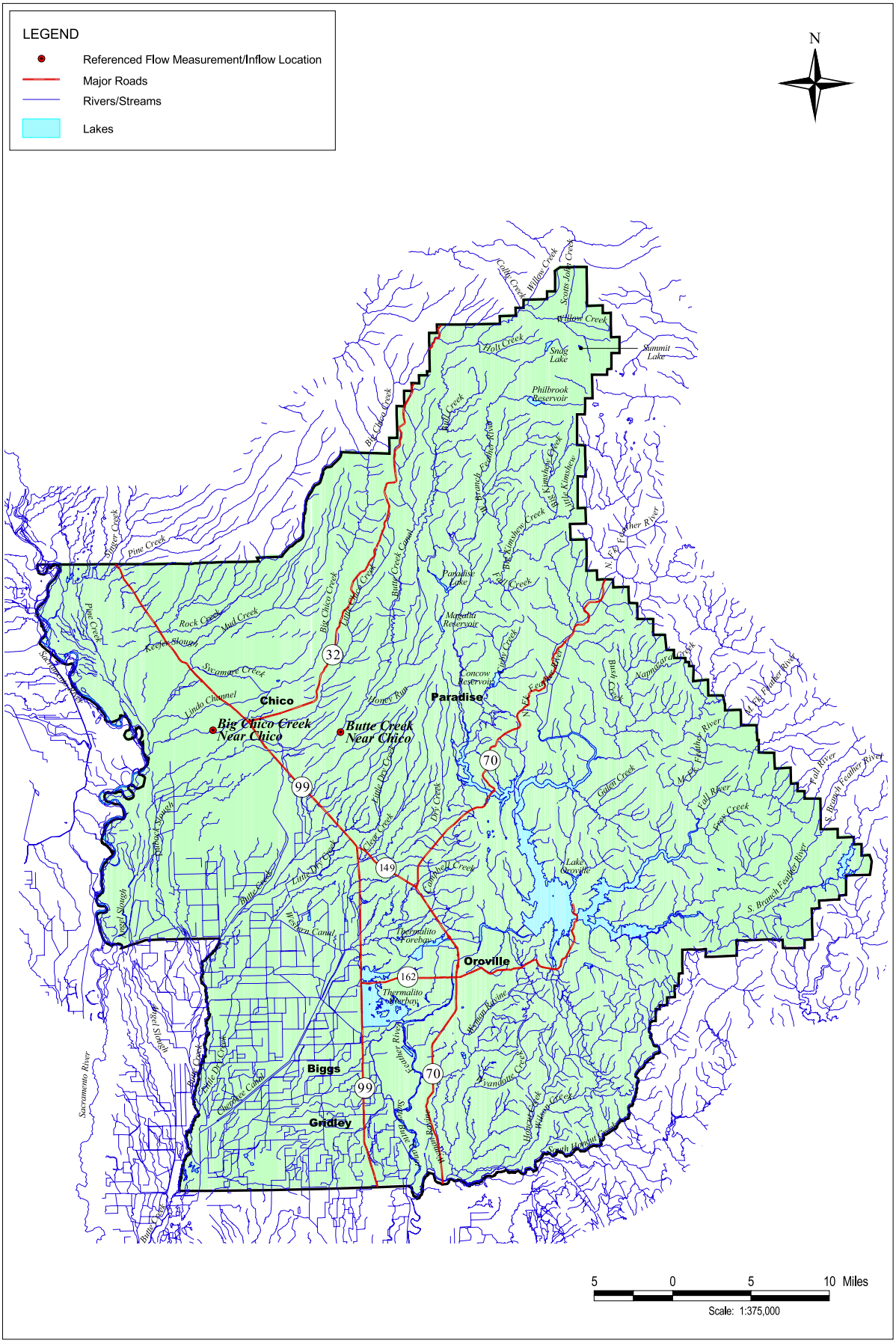
The Sacramento Valley groundwater basin lies between the Coast Range to the west, the Cascade and Sierra Nevada Ranges to the east and extends from Red Bluff in the North to the Delta in the south, covering 4,900 square miles. It covers parts of Sacramento, Placer, Solano, Yolo, Yuba, Colusa, Tehama, Glenn and Butte Counties, and is the major source of groundwater in Butte County (DWR 2000). As defined by the State DWR, the Sacramento River groundwater basin underlies the Sacramento Valley which is bordered by the Coast Range on the west and the Sierra Nevada Range on the east.

The Sacramento Valley groundwater basin is filled with sediments deposited in marine and terrestrial environments. The older marine sediments usually contain saline or brackish water, and the younger terrestrial sediments contain fresh water. The sediments are deposited on metamorphic and granitic rocks that are exposed at the edges of the valley (DWR 2000).

On a regional scale, the base of freshwater is commonly considered to be defined by a salinity threshold of 3,000 micromhos. Water with a specific conductance of less than 3,000 micromhos per centimeter is considered fresh, and water with a specific conductance that exceeds 3,000 micromhos per centimeter is considered to be saline. The approximate depth at the deepest portion of the aquifer to the base of fresh water within each of the inventory units is:

- Vina Inventory Unit 1,600 feet
- West Butte Inventory Unit 1,500 feet
- East Butte Inventory Unit 1,400 feet
- North Yuba Inventory Unit 600 feet

The principal water bearing units in the Sacramento Valley portion of Butte County are the Tuscan, Laguna, Riverbank and Modesto Formations. The Tuscan and Laguna Formations are the source of water for deeper wells such as irrigation and municipal

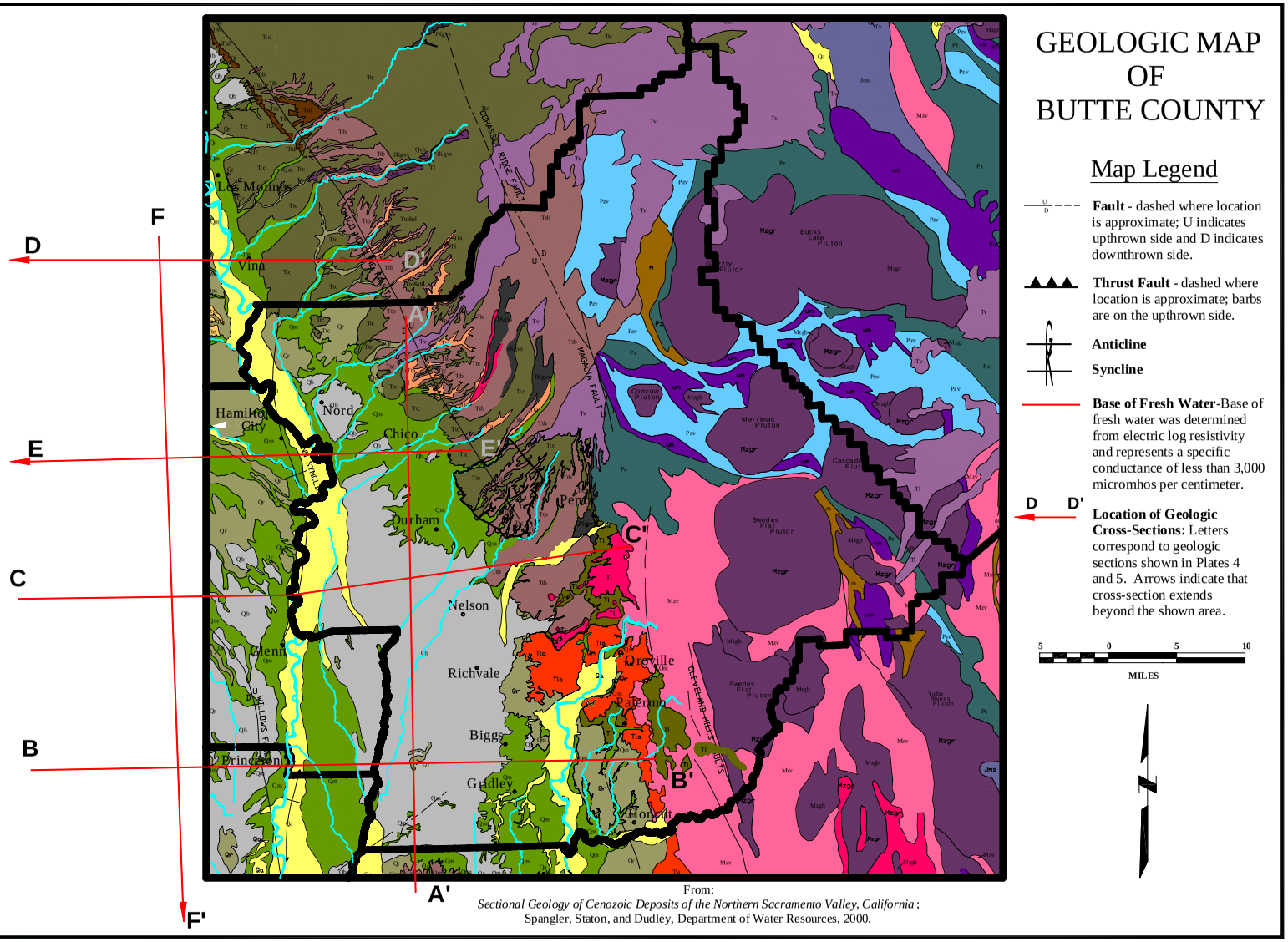


Source: ArcData Online

Butte County
Department of Water & Resource Conservation

CDM Camp Dresser & McKee Inc.

Figure 2-2
Surface Water Features of Butte County

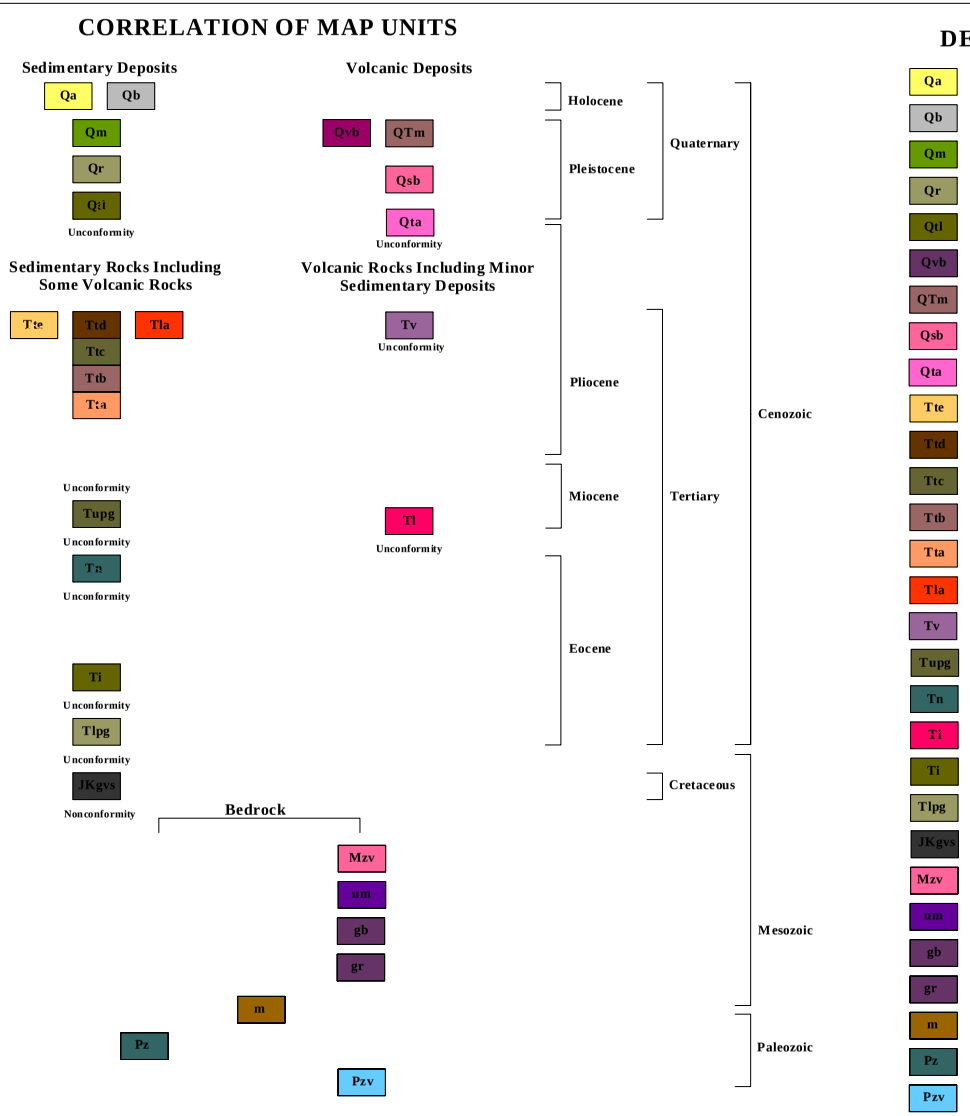


From:
Sectional Geology of Cenozoic Deposits of the Northern Sacramento Valley, California;
Spangler, Staton, and Dudley, Department of Water Resources, 2000.

CDM Camp Dresser & McKee Inc.

Source: Department of Water Resources

Figure 2-3
Geologic Map of Butte County



DESCRIPTION OF MAP UNITS

Alluvium (Holocene)-Includes surficial alluvium and stream channel deposits of unweathered gravel, sand and silt, maximum thickness 80 ft. *(adapted from Harwood and Helley, 1985).*

Basin deposits (Holocene)-Fine-grained silt and clay derived from adjacent mountain ranges, maximum thickness up to 200 ft. *(adapted from Harwood and Helley, 1985).*

Modesto Formation, undifferentiated (Pleistocene)-alluvial fan and terrace deposits consisting of unconsolidated weathered and unweathered gravel, sand, silt and clay, maximum thickness approximately 200 ft. *(adapted from Harwood & Helley, 1985).*

Riverbank Formation, undifferentiated (Pleistocene)-alluvial fan and terrace deposits consisting of unconsolidated to semi-consolidated gravel, sand and silt, maximum thickness approximately 200 ft. *(adapted from Harwood and Helley, 1985).*

Turlock Lake (Pleistocene)-weathered and dissected arkosic gravels with minor amounts of resistant metamorphic rock fragments and quartz pebbles, sand and silt; maximum thickness approximately 100 ft. *(adapted from Harwood and Helley, 1985).*

Volcanic Basalts, undifferentiated (Pleistocene)-younger basalt flows found primarily on the east side of the Sacramento Valley, includes minor exposures of andesite, maximum thickness 100 ft. *(adapted from Harwood and Helley, 1985).*

Tuff Breccia (Pliocene-Pleistocene)-tuff breccia forming outer ring surrounding the Sutter Buttes *(adapted from Harwood and Helley, 1985).*

Alluvium of the Sutter Buttes (Pliocene-Pleistocene)-Volcanic fluvatile sediments, maximum thickness 980 ft.

Volcanic Andesites, undifferentiated (Pleistocene-Pliocene)-younger andesites forming the center of the Sutter Buttes *(adapted from Harwood and Helley, 1985).*

Tehama Formation (Pliocene)-includes Red Bluff Formation. Pale green, gray and tan sandstone and siltstone with lenses of pebble and cobble conglomerate, maximum thickness 2,000 ft *(adapted from Harwood and Helley, 1985).*

Tuscan Unit D (Pliocene)-Fragmental flow deposits characterized by monolithic masses containing gray hornblende and basaltic andesites and black pumice, maximum thickness 160 ft. *(adapted from Harwood and Helley, 1985)*

Tuscan Unit C (Pliocene)-Volcanic lahars with some interbedded volcanic conglomerate and sandstone, maximum thickness 600 ft. *(adapted from Harwood and Helley, 1985; Staton (unpublished), 2000)*

Tuscan Unit B (Pliocene)-Layered, interbedded lahars, volcanic conglomerate, volcanic sandstone and siltstone, maximum thickness 600 ft. *(adapted from Harwood and Helley, 1985; Staton (unpublished), 2000)*

Tuscan Unit A (Pliocene)-Interbedded lahars, volcanic conglomerate, volcanic sandstone, and siltstone containing metamorphic rock fragments, maximum thickness 400 ft. *(adapted from Harwood and Helley, 1985; Staton (unpublished), 2000)*

Laguna Formation (Pliocene)-Interbedded alluvial gravel, sand and silt, maximum thickness 1,000 feet. *(adapted from Harwood and Helley, 1985; Olmsted and Davis, 1961; DWR Bulletin 118-6, 1978).*

Basalts and andesites, undifferentiated (Pliocene)-older basalts and andesites found on the northeastern portion of the Sacramento Valley and southwest of Winters, maximum thickness up to 230 ft. *(adapted from Harwood and Helley, 1985).*

Upper Princeton Gorge (Miocene-Eocene)-Non-marine sediments composed of sandstone with interbeds of mudstone and occasional conglomerate and conglomerate sandstone, maximum thickness 1,400 ft.

Neroly Formation (Miocene)-marine to non-marine sediments, blue-gray tuffaceous andesiticsandstone with interbeds of light grey tuff and tuffaceous shales and occasional conglomerate lenses, maximum thickness 500 ft.

Lovejoy Basalt (Miocene)-Black, dense, hard microcrystalline basalt, maximum thickness 65 feet. *(adapted from Harwood and Helley, 1985)*

Ione Formation (Eocene)-Marine to non-marine deltaic sediments, light colored, commonly white conglomerate, sandstone and siltstone, which is soft and easily eroded, maximum thickness 650 ft.

Lower Princeton Gorge (Eocene)-includes Capay Formation. Marine sandstone, conglomerate and interbedded silty shale, maximum thickness 2,400 ft. *(adapted from Redwine, 1972)*

Great Valley Sequence (Late Jurassic to Upper Cretaceous)-Marine clastic sedimentary rock consisting of siltstone, shale, sandstone and conglomerate, maximum thickness 15,000 ft.

Volcanic and Metavolcanic Rocks (Mesozoic)-Undivided volcanic and metavolcanic rocks, andesite rhyolite flow rocks, greenstone, and volcanic breccia. (*adapted from Jennings, 1977*)

Ultramafic Rocks (Mesozoic)-Primarily composed of serpentine, with peridotite, gabbro, and diabase. (*adapted from Jennings, 1977*)

Gabbro (Mesozoic)-Gabbro and dark diotric rocks. (*adapted from Jennings, 1977*)

Undifferenciated Granitic Plutons (Paleozoic-Mesozoic)-Undivided granitic plutons and related rocks. (*adapted from Jennings, 1977*)

Mixed Rocks (pre-Cenozoic)-Undivided metasedimentary and metavolcanic rocks of greatly varying types. (*adapted from Jennings, 1977*)

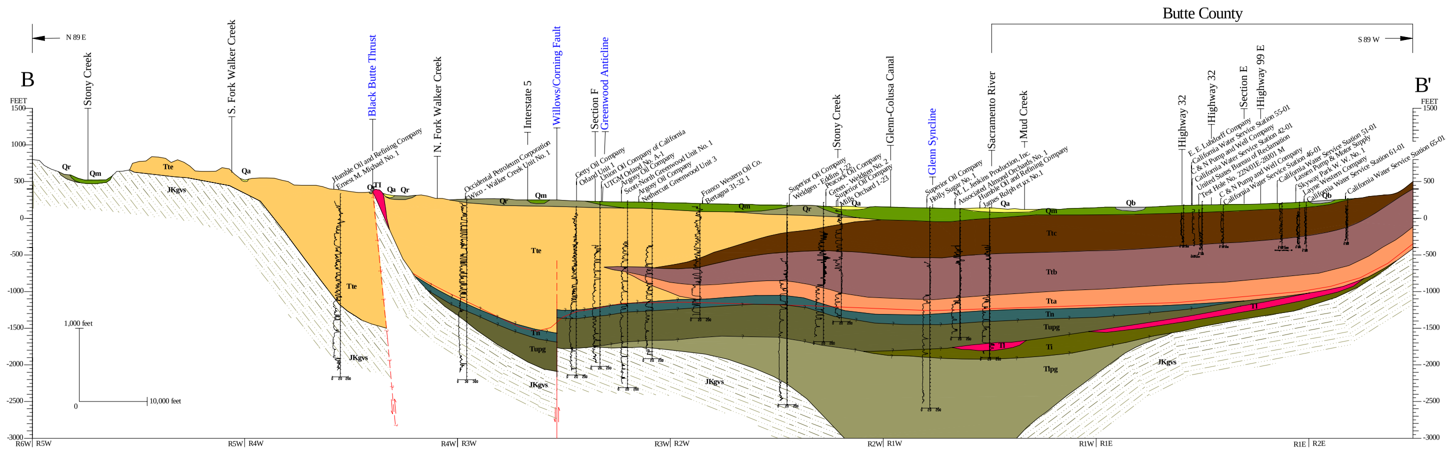
Paleozoic Metasedimentary Rocks (Paleozoic)-Undivided metasedimentary rocks including slate, shale, sandstone, chert, conglomerate, limestone, dolomite, marble, phyllite,schist, hornfels, and quartzite. (*adapted from Jennings, 1977*)

Paleozoic Metavolcanic Rocks (Paleozoic)-Undivided metavolcanic rocks, primarily flows, breccia, and tuff, including greenstone, diabase and pillow lavas. (*adapted from Jennings, 1977*)

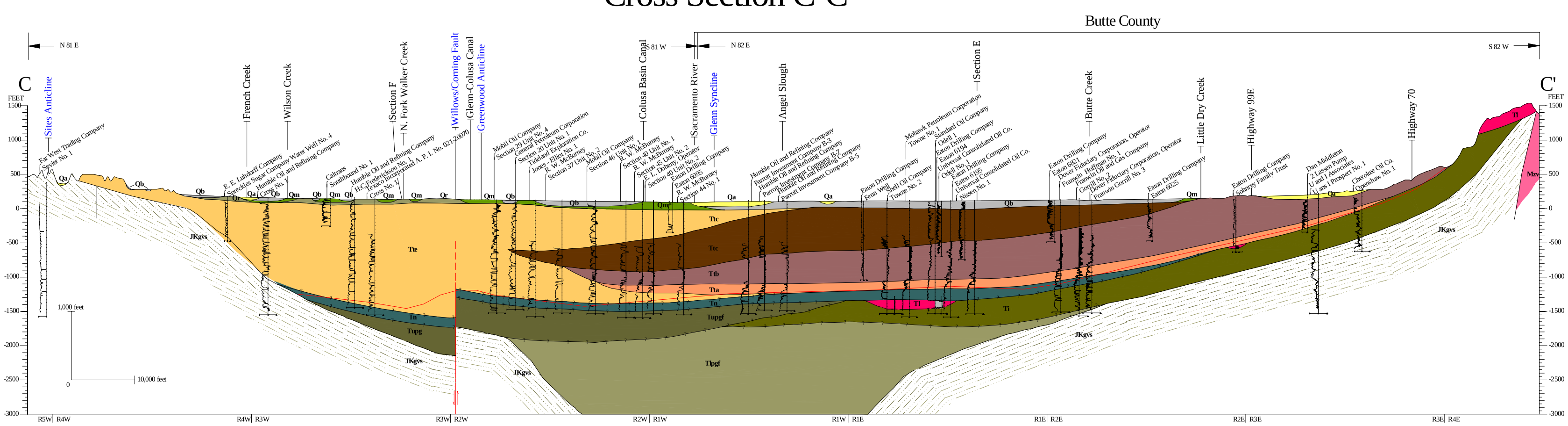
Source: Department of Water Resources

Figure 2-4
Geologic Legend

Cross Section B-B'



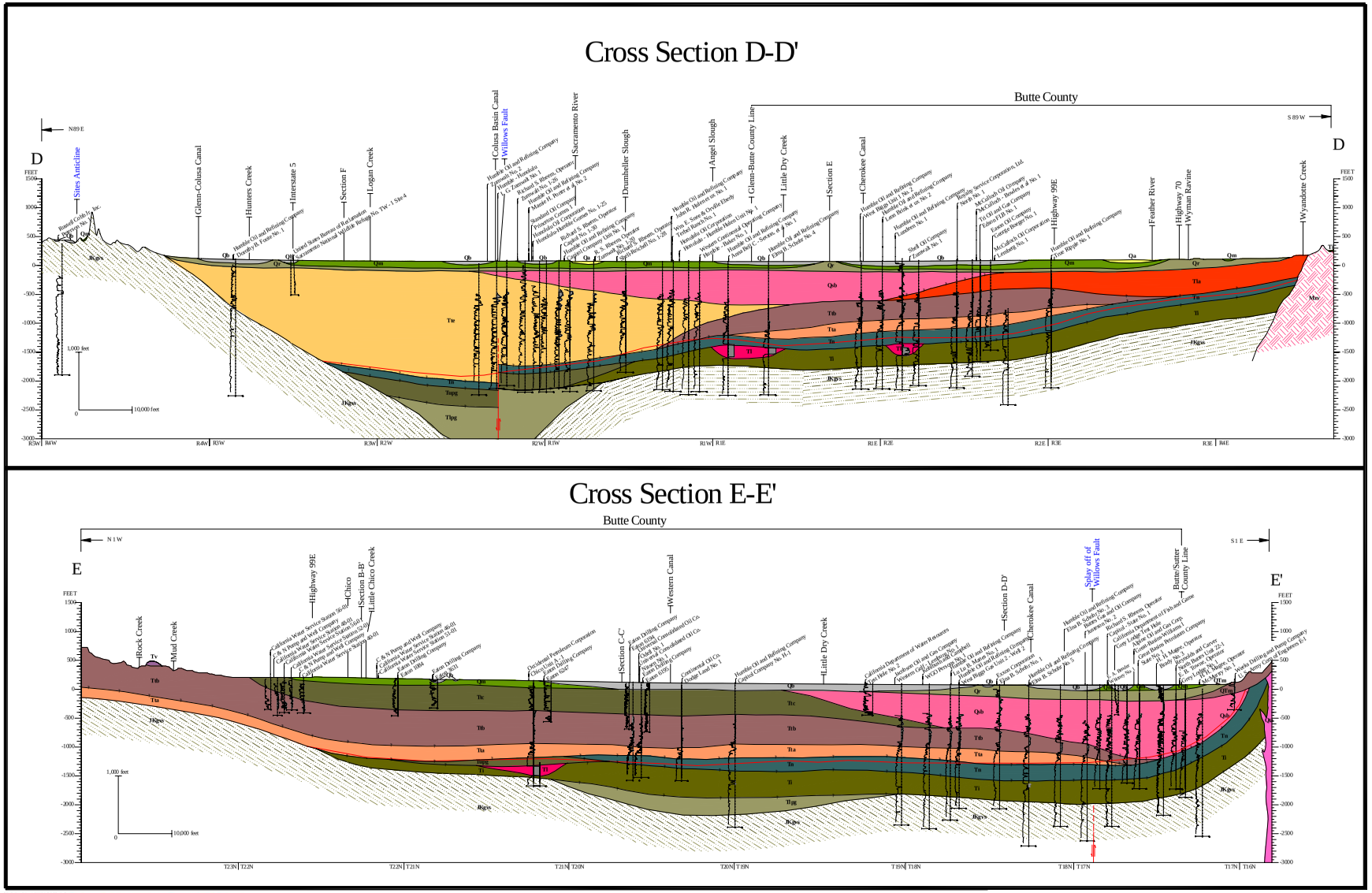
Cross Section C-C'



CDM Camp Dresser & McKee Inc.

Source: Department of Water Resources

Figure 2-5
Butte County Geologic Map Cross Section B-B' and C-C'



CDM Camp Dresser & McKee Inc.

Source: Department of Water Resources

Figure 2-6
Butte County Geologic Map
Cross Section D-D' and E-E'

wells. Ninety percent of the agricultural and municipal wells are completed in the upper 600 feet and 750 feet of the aquifer, respectively. The Riverbank and Modesto Formations are the source of water for shallower wells such as domestic wells. The majority of domestic wells within the county have been completed in the upper 200 feet of the aquifer (DWR 2000). The hydrogeologic analysis of the Northern Sacramento Valley, and extent and properties of the Tuscan Formation, are still exploratory and under evaluation. Section 3 of the *Butte County Water and Inventory Analysis* describes the hydrogeology and geologic setting of the area. Generally speaking, alluvial units tend to pinch out, or become thinner, at the edge of the basins.

The geology of Butte County and surrounding areas is depicted on Figure 2-3. The associated geologic legend is depicted in Figure 2-4. Figures 2-5 and 2-6 illustrate the geology in cross section. The following is a more detailed discussion of Sacramento Valley groundwater basin geologic units and their hydrogeologic properties within Butte County.

Tuscan Formation

The Tuscan Formation consists of four units, Units A through D. Unit A is the oldest deposit and is approximately 250 feet thick. Unit B is approximately 600 feet thick and lies on Unit A. Unit C is 600 feet thick and overlies Unit B (Helley and Harwood 1985). Unit D is not present in Butte County. Units A and B contain the majority of groundwater in the Tuscan Formation. Unit C contains groundwater in the western portion of the valley, and acts as a confining layer above Unit B. The total thickness of the Tuscan Formation is approximately 1,450 feet in Butte County. Figure 2-7 shows the areas where the Tuscan Formation outcrops in Butte County; groundwater recharge is hypothesized to occur in the areas described.

Figure 2-7
Tuscan Formation Recharge Areas

DWR Northern District is studying the confined nature of Tuscan Unit B. The current hypothesis is that Tuscan Unit B is

unconfined in the foothills, progressing through semi-confined near the foothills, to fully confined towards the center of the valley.

DWR reported in the *Butte County Groundwater Inventory Analysis* (DWR, 2000) "Pump test results revealed the range of average well yield from a low of 976 gallons per minute (gpm) in the North Yuba Inventory Unit, to a high of 1,395 gpm in the Vina Inventory Unit. Specific capacities for the valley inventory units ranged from a low of 48 gpm per foot in the North Yuba Inventory Unit to a high of 87 gpm per foot in the Vina Inventory Unit. Transmissivity values within the Butte Basin portion of the East and West Butte Inventory Units ranged from 97,000 to 182,000 gallons per day (gpd) per foot. Storativity values ranged from .0003 to .0015. Specific capacity measurements made for wells reported in a previous study provided a range of 45.7 to 104.7 gpm per foot of drawdown".

The *Butte County Water Inventory and Analysis* (DW&RC, 2001) provides more information on the hydrogeology and fresh water bearing units of the groundwater in Butte County. The *Butte County Water Inventory and Analysis* is available for review in local public libraries and also at *www.buttecounty.net/waterandresource*. Reviewers may click on "Reports" and then on "Inventory Analysis." Section 3 of this report describes Butte County's setting and geological features, but the basic reference is DWR Bulletin 118-3.

Laguna Formation

The Laguna Formation is exposed along the eastern edge of the Sacramento Valley, from Oroville south towards Lodi. Thickness estimates range from 180 feet (Helley and Harwood 1985) to 1,000 feet (Olmstead and Davis 1961).

DWR reported in the *Butte County Groundwater Inventory Analysis* (DWR, 2000) "Quantitative water-bearing data for the Laguna is very limited, especially in the Butte County area. Wells completed in the finer-grained sediments of the Laguna Formation yield only moderate quantities of water. Well yield data from the Sacramento-American River area indicate yields as high as 1,000 gpm, with specific capacity values ranging between 24 and 42 gpm per foot of drawdown (Olmsted and Davis 1961). In areas where soft, well-sorted granitic sand dominates, well yields are much higher. Some of the sand aquifers are highly permeable, but the average permeability is low to moderate. In the Gridley area, a sand unit that is stratigraphically equivalent to the Laguna Formation was reported to have a specific capacity of 60 gpm per foot of drawdown (Olmsted and Davis 1961)."

Riverbank Formation

The Riverbank Formation is exposed in the Vina plains and to the west and south of Oroville. The thickness of the Riverbank Formation ranges from 200 feet to 1 foot depending on location (DWR 2000). The water-bearing capabilities of the formation vary depending on the thickness of the formation locally and the concentration of gravels and sands. Lower yields are found in areas with high silt and clay content or where the formation is thin. The formation provides water to domestic and other

shallow wells and to deeper wells with multiple perforated intervals. Groundwater in the Riverbank Formation occurs under unconfined conditions.

Modesto Formation
The Modesto Formation is exposed in the central portion of Butte County, west and south of Chico. The thickness of the Modesto Formation ranges from 200 to 10 feet depending on location (Helley and Harwood 1985). The water-bearing capabilities of the formation vary depending on the thickness of the formation locally and the concentration of gravels and sands. Lower yields are found in areas with high silt and clay content or where the formation is thin. Groundwater in the Modesto Formation occurs under unconfined conditions.

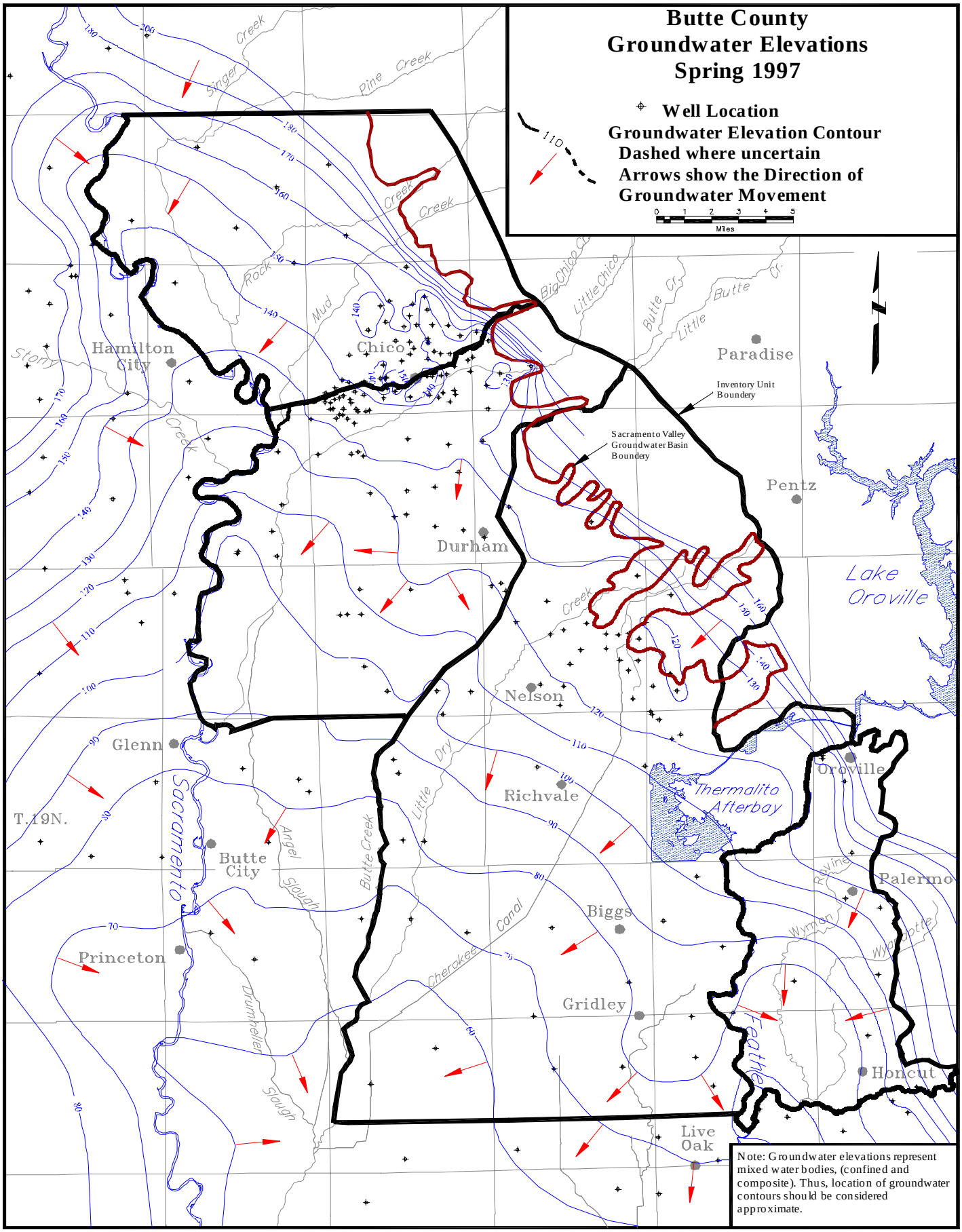
2.5.1 Groundwater Levels

Groundwater levels are monitored in the Sacramento Valley portion of Butte County by DWR and by the DW&RC. DWR reports groundwater levels in feet above mean sea level. Historical monitoring data show that seasonal fluctuation of groundwater levels averages between 5 feet in unconfined aquifers in years of normal precipitation to 20 feet in confined aquifers during times of drought.

Comparison of yearly spring groundwater levels indicates a reduction of groundwater levels during the 1976-77 and 1986-94 droughts, followed by a recovery to pre-drought conditions (DWR 2000). Historical data also indicates a slight decline in groundwater levels from the 1950's to the 1970's, however there has been little change in groundwater levels since the 1970's.

A groundwater elevation contour map for the spring of 1997, prior to the annual period of agricultural use of groundwater, is shown on Figure 2-8. Spring groundwater levels reflect the natural groundwater table's direction of movement in areas unaffected by municipal pumping. Spring groundwater levels vary in elevation from 60 feet above msl in the Butte Sink Inventory Unit, to about 170 feet above msl in the Northeastern part of the Vina Inventory Unit.

Figure 2-9 shows the seasonal change in groundwater levels between the spring and summer during 1997. The contour lines represent lines of equal groundwater elevation change between the spring and summer measurement periods. The figure shows that the seasonal decline in groundwater level ranges from zero, in the southwest portion of the county, to 30 feet in the Durham area. Greater groundwater level decline occurs where groundwater is extracted for agricultural and/or municipal use during the summer months. These areas include the Durham area, the area southeast of Durham (i.e. the Cherokee sub-unit), the area northwest of Chico, the City of Chico, and the area south of Palermo. Historical data indicate that the water level decrease is seasonal and the basin groundwater typically recharges during the winter months (DWR 2000). Though long term historical data shows that well levels seasonally and annually fluctuate, there is no significant difference in the well levels over the long term.

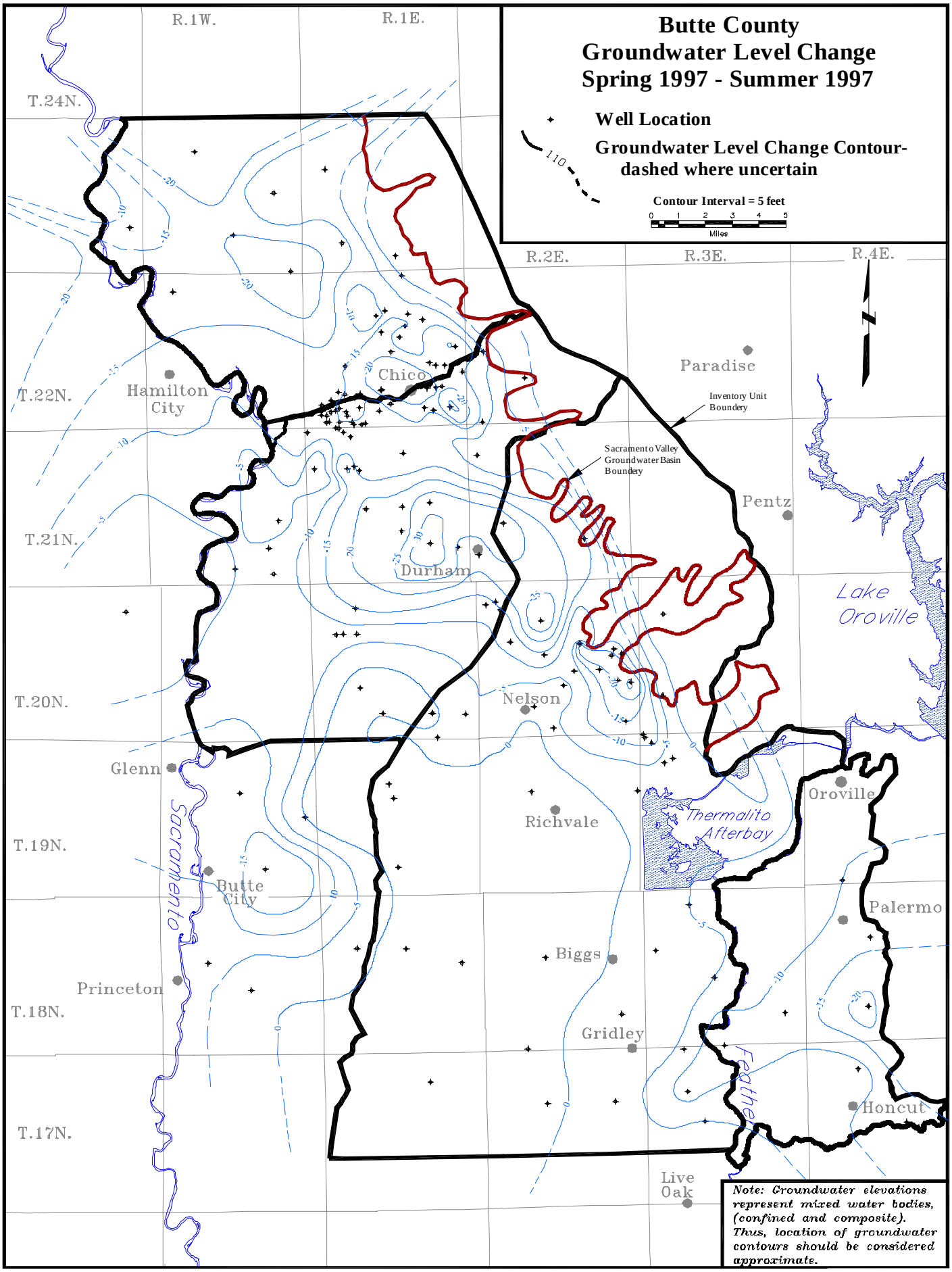


CDM Camp Dresser & McKee Inc.

Source: Department of Water Resources

Figure 2-8

Butte County Groundwater Elevations Spring 1997



CDM Camp Dresser & McKee Inc.

Source: Department of Water Resources

Figure 2-9
Butte County Groundwater Level Change Spring 1997 - Summer 1997

2.5.2 Groundwater Movement

Figure 2-8 illustrates the overall pattern of groundwater movement in Butte County. Spring water level elevation data was utilized. The direction of groundwater movement is illustrated by a series of small arrows perpendicular to the groundwater elevation contours. In general, groundwater flows in a southwesterly direction. The Sacramento River, north of Princeton, is a gaining river, and groundwater flows towards the river. South of Princeton, the Sacramento is a losing river, and the groundwater flows away from the river. Southeast of Princeton water flows into the Butte Sink. Near Butte Creek, a gaining stream, groundwater flows toward the stream.

The groundwater gradient generally reflects the ground surface topography. Along the foothills the gradient is steep, as high as 60 feet per mile. In the center of the valley, west of Biggs and Gridley, the gradient is gentle, as small as 3 feet per mile. The overall gradient in the valley portion of Butte County is approximately 5 feet per mile.

In specific areas, the movement of groundwater varies. There is a groundwater depression under the City of Chico, resulting from municipal pumping for the city's water supply, where groundwater locally flows toward the depression. There is a groundwater mound near the Thermalito Afterbay, associated with recharge from the facility, where groundwater flows outward from the groundwater mound. There is another groundwater mound near Hamilton City; the Stony Creek Fan supplies water for this mound.

In the southeast corner of the East Butte Inventory Unit, groundwater flow converges in the Butte Sink area. Groundwater may act as the source of the wetlands in the Butte Sink area. The Sutter Buttes and Colusa Dome, a subsurface feature west of the Sutter Buttes, impedes groundwater movement to the south in this area. This impediment likely causes the groundwater to move vertically upward, resulting in a shallow groundwater table and the formation of wetlands (DWR 2000).

2.5.3 Groundwater in Storage

Change in groundwater in storage is affected by the rate of groundwater recharge, the rate of groundwater pumping, and climatic conditions. Groundwater levels, which indicate groundwater in storage, change over the course of a year and change from year to year. The groundwater in storage will typically decline throughout summer, when recharge is low and extraction for municipal and irrigation uses is ongoing. Groundwater in storage typically increases during the winter, when extraction decreases and rainfall and associated runoff increase recharge. During periods of drought, groundwater in storage declines and during periods of above average precipitation groundwater in storage increases.

Figure 2-10 shows the annual spring-to-spring change in groundwater in storage for the Sacramento Valley portion of Butte County as calculated by DWR over a twenty-year period from 1980 to 2000. DWR described the calculation of changes in spring-to-spring storage in the *Butte County Groundwater Inventory Analysis* (DWR, 2000). "The

annual spring to spring change in groundwater in storage for the Sacramento Valley portion of Butte County was calculated over a twenty-year period from 1980 to 2000. The spring-to-spring change in groundwater storage was calculated using groundwater contour maps developed from spring groundwater level measurements in the upper portion of the aquifer. Digital three-dimensional surfaces were constructed for each groundwater elevation contour map and the volume differences between consecutive spring to spring groundwater elevation surfaces were calculated."

The spring-to-spring graphs start with a baseline of zero for the spring of 1980. Similar to the 1997 water-year, basin-wide groundwater levels during the spring of 1980 closely characterize groundwater conditions associated with a normal water year. At any specific location, the actual changes in groundwater level and the associated groundwater in storage could vary significantly from the average conditions depicted.

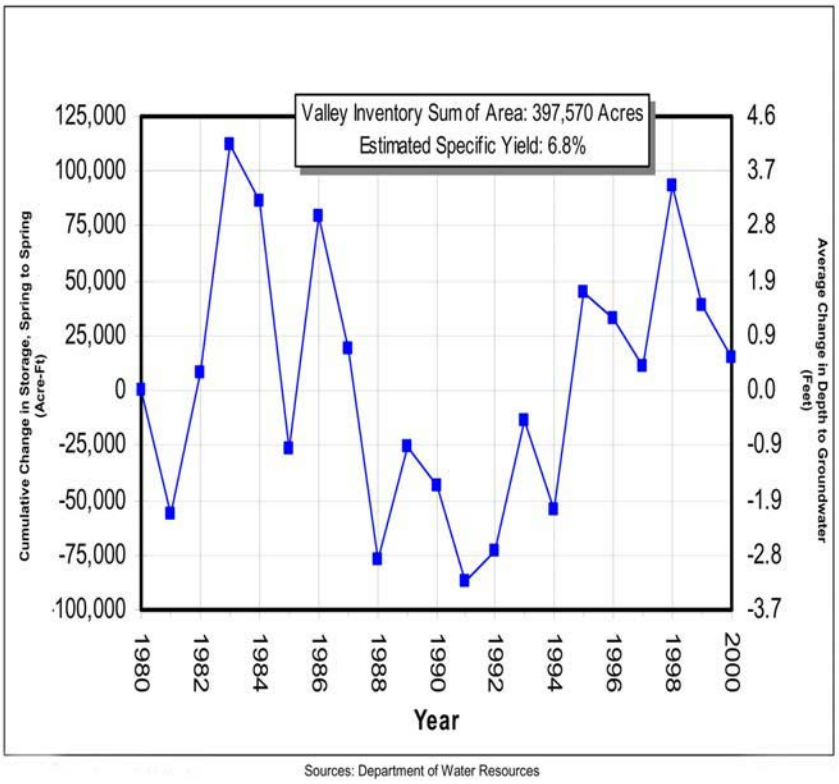


Figure 2-10
Changes in Groundwater Storage

The figure shows that there has not been a significant *net* change in groundwater in storage over the 20-year period. However, there have been significant changes in stored groundwater during periods of drought. The groundwater storage trend indicates that there was slightly more groundwater in storage preceding the 1987 - 1994 drought compared to 1980. Between 1987 and 1988, groundwater storage was reduced by approximately 100,000 acre-feet. The observed lower quantity in groundwater in storage continued until 1995, when the basin recovered relatively rapidly, with an increase of approximately 100,000 acre-feet in groundwater storage between 1994 and 1995.

2.5.4 Groundwater Quality

Groundwater in the Sacramento Valley portion of Butte County is typically of good quality, as evidenced by its low total dissolved solids (TDS) concentrations, which range from 67 parts per million (PPM) to 232 ppm (Newlin 2003). The preferred temperature for drinking water is less than 50˚C, above which there can be plant and/or algae growth. Groundwater temperatures range from 17.6 ˚C to 27 ˚C (Newlin

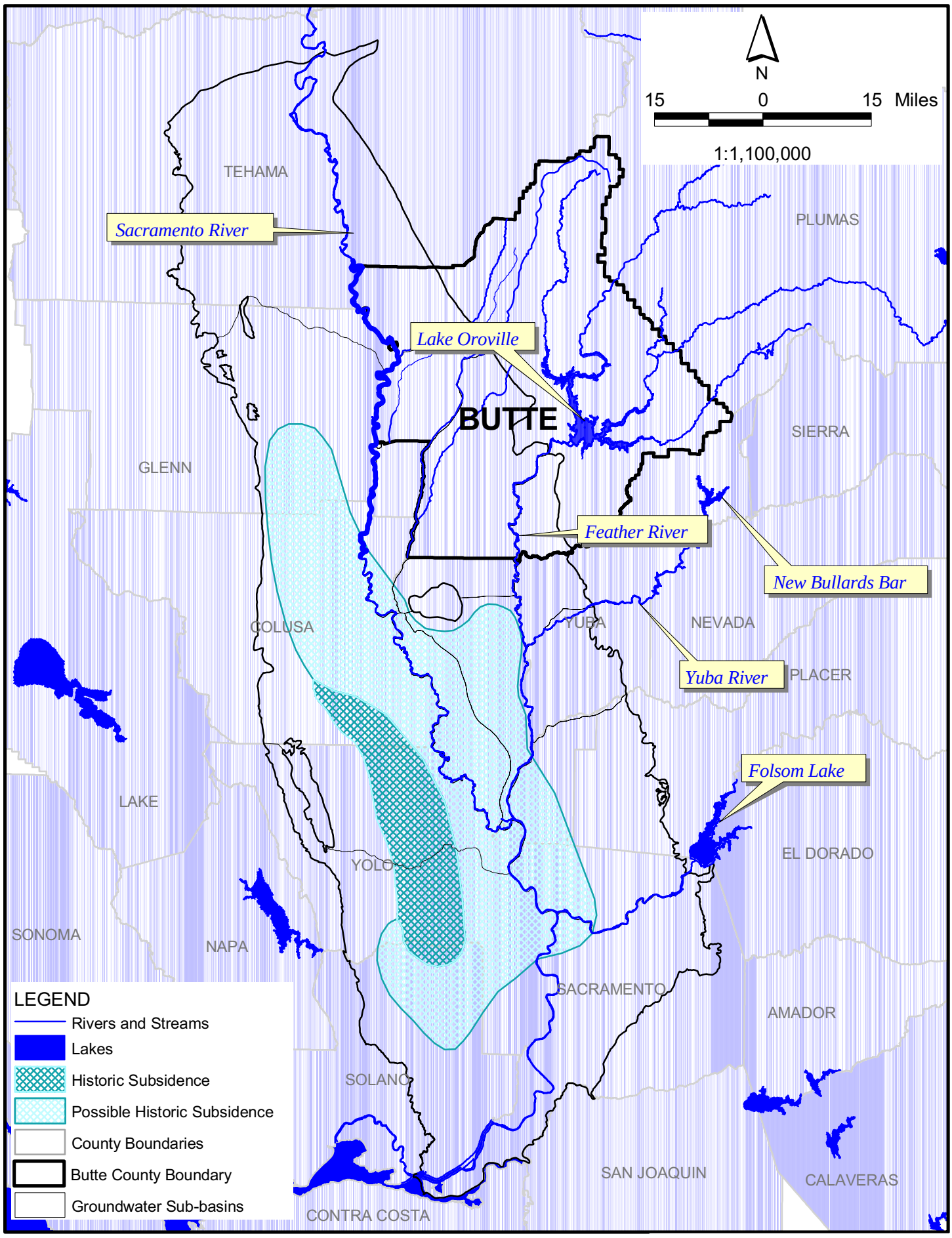


Figure 2-11
Regional Subsidence

2003). The Department's recent monitoring indicates that the basin is a high-quality fresh water basin.

The Butte County Department of Health Services and the California Department of Health Services both serve as repositories for groundwater quality data. Municipal water providers submit their water quality data to these agencies, and these agencies make this data available to the public. The U.S. Geologic Survey performs some groundwater quality monitoring in the County, but it does not have a regular program that monitors the same areas every year. More information about water quality monitoring is in Section 3.1.4.2.

2.5.5 Land Subsidence

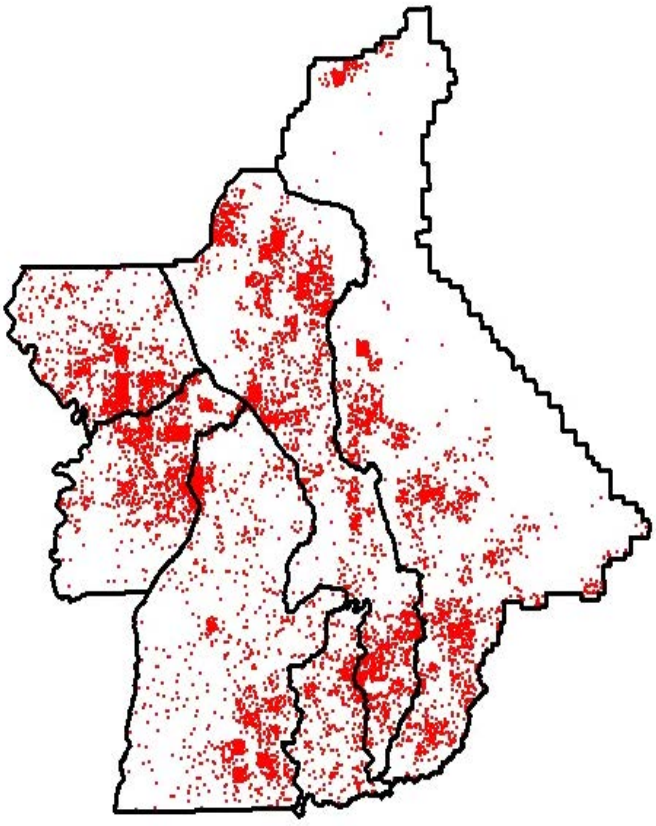
Inelastic land subsidence, for the purpose of the GMP, is the permanent lowering of the ground surface resulting from compaction of geologic materials as a result of groundwater extraction. Permanent compaction is typically observed in fine-grained geologic materials. Land subsidence can damage infrastructure such as canals, wells, and levees. Figure 2-11 shows the extent of groundwater subsidence in the Sacramento Valley.

As indicated on Figure 2-11, no land subsidence has been observed in the Butte County potion of the Sacramento Valley. Areas with historical subsidence are characterized as having thick sequences of fine-grained geologic materials. More information on land subsidence is in section 3.4.1.3.

2.6 Groundwater Well Infrastructure

Butte County has over 14,000 wells. The Sacramento Valley portion of Butte County has approximately 9,400 wells. The wells are classified by purpose as domestic, irrigation, municipal, monitoring, and other. Figure 2-12 illustrates the densities of all wells throughout the county. Table 2-1 presents the numbers of wells by type, inventory unit, and inventory sub-unit throughout the Sacramento Valley portion of the county.

DWR compiled the well infrastructure information using information contained



Source: DWR Northern District

Figure 2-12
Distribution of Wells in Butte County (all types)

y (all types)

A

in DWR's Well Completion Report database. The accuracy of the well location information varies according to the source of the particular data; most locations are correct to within 1 mile (300 feet for monitoring wells).

The number and type of well included within Table 2-1 below include those wells on file at DWR. Wells on file include those for which a Well Completion Report has been filed, as required under the California Water Code since the late 1940s, and additional well logs on file prior to enactment of the requirement. Well data is accessible for review at DWR's Northern District Planning and Local Assistance Branch Office, or at the following web-site: http://well.water.ca.gov/gw/admin/main_menugw.asp.

Table 2-1
Number of Wells By Inventory Unit and Inventory Sub-Unit

INVENTORY UNIT	INVENTORY SUB-UNIT	Domestic Wells	Irrigation Wells	Municipal Wells	Monitoring Wells	Other Wells	Totals
Vina	Vina	2,096	621	55	138	299	**3,209**
Vina and West Butte	*California Water Service	0	0	66	0	0	**66**
West Butte	Durham/Dayton	1,195	568	40	248	310	2,361
	M&T	18	38	0	2	6	64
	Angel Slough	8	43	0	2	2	55
	Llano Seco	1	16	0	5	10	32
	Western Canal (33%)	15	36	0	0	12	63
	Totals:	1,237	701	40	257	340	**2,575**
East Butte	Pentz	172	39	0	12	20	243
	Esquon	291	108	0	2	26	427
	Cherokee	104	62	0	2	15	183
	Western Canal (67%)	32	76	0	2	17	128
	Richvale	87	72	0	4	21	184
	Thermalito	140	56	0	9	36	241
	Biggs-West Gridley	246	92	4	10	33	385
	Butte	571	183	8	29	115	906
	Butte-Sink	4	11	0	1	4	20
	Totals:	1,647	699	12	71	287	**2,717**
North Yuba	North Yuba	504	178	8	95	81	**866**
Total For Sacramento Valley Portion of Butte County:		**5,484**	**2,199**	**182**	**561**	**1,007**	**9,433**
NOTE: Municipal includes wells classified as Municipal and Public "Other" wells includes industrial wells.							

Source: Department of Water Resources

*Note: For water use projections in the Chico Urban Area the California Water Service utilized data compiled in the Butte County Water Inventory and Analysis (DW&RC, 2001). By statute, private utilities such as California Water Service are not covered by legislation that supports AB 3030. However, California Water Service has actively participated in the development of draft water resource planning documents prepared by Butte County.

2.6.1 Well Depths

Well depth and well use data were collected from Well Completion Reports filed with the DWR. A total of approximately 7,800 of the 9,400 well records from the Sacramento Valley portion of Butte County include depth data for domestic, irrigation, and municipal/industrial wells. Monitoring and "Other" wells are not included in the well depth evaluation. Table 2-2 summarizes this information.

The depths of the 5,484 domestic wells range from 14 to 860 feet, and 50 percent of them are installed to a depth of about 133 feet or less. The depths of the 2,198 irrigation wells range from 28 to 1,050 feet, and 50 percent of them are 321 feet or less in depth. Municipal/industrial well depths range from 36 to 924 feet, and 50 percent of them are installed to a depth of 518 feet or less. DWR's *Butte County Groundwater Inventory Analysis* report (DWR 2000) contains a detailed statistical analysis of the well data.

Table 2-2
Summary of Well Numbers and Depths in Butte County by Region[1]

Inventory Unit	Irrigation		Domestic		Municipal		Total Well Count
	Count	Ave Depth (ft)	Count	Ave Depth (ft)	Count	Ave Depth (ft)	
Vina	621	332	2,096	145	55	530	2,772
West Butte	664	321	1,222	106	40	511	1,926
East Butte	735	320	1,662	134	12	278	2,409
North Yuba	178	288	504	139	9	171	691
Cal Water Area	0	-	0	-	66	603	66
Valley Portion of Butte County	**2,199**	**321**	**5,484**	**133**	**182**	**518**	**7,864**

[1]Limited to information available for irrigation, domestic, and municipal wells.

2.6.2 Well Yields

Selected data on water utility well yields are provided in the DWR's *Butte County Groundwater Inventory Analysis* (DWR 2000). Reported average well yields are similar across the basin, with average rates by sub-basin as follows:

- Vina, West Butte: 1,000 gpm
- East Butte: 980 gpm
- North Yuba: 840 gpm

2.7 Water Demand and Supply

In 2001, the Department completed a detailed countywide assessment of applied water demand and supply. The *Butte County Water Inventory and Analysis* report (CDM 2001) and DWR's companion report, *Butte County Groundwater Inventory Analysis* (DWR 2000) present the methodology and findings. Both reports document the "applied" water demand and supply, that is, the measurable and managed

component of the hydrologic cycle used for environmental, agricultural, municipal and industrial, and other purposes.

2.7.1 Water Demand

Butte County residents receive water from both surface water and groundwater sources. Table 2-3 provides a summary of the estimated water demands in the County by sector (agricultural, municipal and industrial, environmental, etc) for normal years. Several points are evident from these water demand estimates:

- The agricultural sector is the largest user of water in the County, with 71% of the total demand. The majority of this agricultural demand is in the valley area.
- The second largest demand component (15 percent) is conveyance loss, which represents the amount of water required to convey supplies to their destination including evaporation, riparian evapotranspiration, percolation to groundwater, and spillage from the system. Some conveyance losses (evaporation and evapotranspiration) are not available to the system for future use, but deep percolation and spillage are available for future use.
- The remaining demand is composed of environmental demands (10%), and urban demands (4%). Environmental demands include water for state and federal wildlife refuges, publicly or privately managed wetland habitat, and agricultural lands flooded for rice straw decomposition or duck habitat. Urban demands include water demands within cities and towns as well as domestic demand within rural areas.
- Increased urban population growth has also contributed to increasing water demand in the valley area.
- The greatest demand is in the East Butte inventory unit (64%), followed by West Butte (18%), Vina (10%), North Yuba (5%), Foothill (2%) and Mountain (1%).

Table 2-3
Normal Year Water Demand (in thousands of acre-feet) (CDM 2001)

Sacramento Valley Region	Agricultural Demand	M&I Demand	Environmental Demand	Conveyance Losses	Total Applied Water
East Butte	629.6	9.5	124	167.6	**930.7**
North Yuba	54	6.7	1.2	5.2	**67.1**
Vina	121.5	19.7	0	2.7	**143.9**
West Butte	201.1	10.3	14	40.2	**265.6**
Valley Region Total	**1006.2**	**46.2**	**139.2**	**215.7**	**1407.3**

2.7.2 Water Supply

Table 2-4 summarizes the estimated water supplies in Butte County for normal years. The supplies are identified by source – either surface or groundwater, and also by surface water system, including local surface water, Feather River water, and deliveries from the State Water Project (SWP) or Central Valley Project (CVP).

Surface-water reuse refers the amount of water that is used more than once after it is diverted from the original surface-water body. Several points are evident from the water supply estimates:

- Relative to the amount of total applied water (i.e. Table 2-3) East Butte and Foothill Inventory Units primarily use surface-water, and the remainder of the county primarily uses groundwater.
- The primary water source within the county is surface water (55%), followed by groundwater (31%) and surface water reuse (14%).
- Supplies are distributed throughout the county in the same pattern as demands, with the most water going to the East Butte inventory unit (64%), followed by West Butte (18%), Vina (10%), North Yuba (5%), Foothill (2%) and Mountain (1%).

Table 2-4

Normal Year Water Supplies (in thousands of acre-feet) (CDM 2001)

Sacramento Valley Region	Local Surface Water	Feather River	SWP	CVP	Ground-water	Surface water reuse	Total Supplies
East Butte	38.3	576.0	0.0	11.2	124.6	180.6	**930.7**
North Yuba	0.0	13.3	0.0	0.0	50.2	3.6	**67.1**
Vina	0.0	0.0	0.0	2.8	138.2	2.9	**143.9**
West Butte	17.7	70.7	0.0	26.6	121.0	29.6	**265.6**
Valley Region Total	**56.0**	**660.0**	**0.0**	**40.6**	**434.0**	**216.7**	**1407.3**

As Table 2-4 shows, the total volume of extracted groundwater in the County is approximately 440 thousand acre-feet (TAF) in normal years. This increases to more than 640 TAF in drought years, primarily due a reduction in surface water from the Feather River (CDM 2001).

Net groundwater extraction is less than total groundwater extraction due to deep percolation of both groundwater and surface water used for irrigation. Deep percolation from applied groundwater and surface water is estimated as approximately 230 TAF during normal years and 240 TAF in drought years. The increase in applied water deep percolation during drought is a direct result of the increased ratio of applied water versus natural water (rainfall) used to produce a crop. In normal years, rainfall provides a higher percentage of the total water required to grow a crop. The hydrogeologic properties of the Sacramento Valley aquifers are still under evaluation. The hydrogeologic character of the aquifers and interaction with streams, confining layers, and recharge is not well understood. Further evaluation is necessary to make any additional statements beyond estimations that have been put forth in this GMP.

2.7.3 Water Demand and Supply Findings

Water demand and supply was calculated in the 2001 *Butte County Water Inventory and Analysis* report (CDM 2001). The total amount of supply called applied water was

calculated from the amount of water supplied to domestic, agricultural, environmental, industrial and municipal water users in Butte County. A brief synopsis of those findings follows:

- Under the normal hydrologic scenario, Butte County currently has an adequate surface water and groundwater supply to meet current demands.
- The drought year shows more groundwater pumping and less surface water use than in the normal year. Surface water decreases from 55% of supply in normal years to 41% during a drought, and groundwater increases from 31% to 44%. Surface water reuse stays essentially the same, going from 14% in a normal year to 15% during a drought.
- Dry year shortages are likely to occur primarily in the southwest portion of the county. Shortages are defined by lack of supply, which in most cases is limited by the groundwater infrastructure available.
- The composition of agricultural, municipal and industrial, and environmental demands does not appear to change substantially from the normal year. In a drought year, the majority of the demand is agricultural, at 74%, followed by conveyance losses (11%), environmental demand (10%) and urban demand (5%).
- The portion on the Sacramento Valley aquifer system under Butte County has recovered from the 1988-1994 drought. Long-term trends in groundwater storage indicate the basin groundwater aquifer is not in a state of decline. During normal to wet years, the aquifer system recharges to its maximum storage capacity by the following spring.
- Future increases in demand will be associated with population growth and environmental regulatory requirements, both within and outside of the county.
- A significant amount of water supplied to meet demand remains available for use through deep percolation to groundwater and outflow to other areas.
- Environmental water use constitutes a substantial part of water demand in the county, extending water demand past the typical irrigation season.

Seasonal fluctuations of groundwater wells levels are determined by the amount of use and climatic conditions. Evaluation of the historical data suggests there is not a significant difference in the annual and seasonal elevation fluctuations of groundwater well levels in Butte County.

2.8 Water Demand Forecast

In October 2003, the Department completed a countywide forecast of water demand for the agricultural and urban water use sectors. The *Butte County Agricultural Water Demand Forecast* and the *Butte County Urban Water Demand Forecast* technical memorandums (CDM 2003) present the methodology and findings of the water demand forecasts.

2.8.1 Agricultural Water Demand Forecast

The analysis developed and evaluated five agricultural water demand scenarios using an economic model of agricultural production developed specifically for Butte County. A "Delphi" group of agricultural experts [note: "Delphi" is a statistical term and its methodology involves a group of experts to provide their judgemental forecast of a variable or variables of interest] from Butte County was convened over several meetings to review and provide independent, unbiased evaluation of the approach, assumptions, data, and results. The analysis forecasted demand for five geographic regions within the County. Table 2-5 summarizes the forecast scenarios.

The model produced results for each scenario in each region. Results indicated changes in crop acreage and applied water use (surface water and groundwater). The Study Team observed the following features from the modeling results:

- Agricultural land conversion decreases acreages of low profit per acre crops;
- Crop idling decreases acreages of high water use per acre crops; and
- Water conservation, agricultural land conversion, and crop idling decrease applied water demand.

Table 2-5
Summary of Agricultural Demand Forecast Scenarios

Scenario	Implementation Method	Magnitudes
Land Conversion	Decrease total land in production	Decrease irrigated land 3% in Vina and West Butte Decrease irrigated land 1% in East Butte
Crop Idling	Decrease surface water used for crop production	Decrease surface water delivery 10%
Crop Prices	Increase relative crop prices	Increase rice and orchards price 10%
Water Conservation	Increase crops irrigation efficiency	Set target irrigation efficiencies for each crop
Combination Scenario – Average and Dry Years	Combines land conversion, crop idling, and conservation scenarios	Decrease irrigated land 3% in Vina and West Butte Decrease irrigated land 1% in East Butte Decrease surface water delivery 10% Set target irrigation efficiencies for each crop

NOTE: Land conversion includes both conversions to urban use and conservation easements. Additional water demand following conversion to urban use is addressed in the County's recent Urban Water Demand Forecast document (October 2003). The Butte County Urban Water Demand Foreceast may be viewed at www.buttecounty.net/waterandresource. Click on "Demand Forecast" and link to "Urban Water Demand." This document may also be viewed at local libraries.

Figure 2-13 is an example of forecast results. It summarizes changes to total applied water under the average year combination scenario in all regions. In the East Butte region, total applied water decreases 55,020 acre-feet, or 8.75 percent. Total crop acreage decreases 3,340 acres, or 2.77 percent (not shown). All other regions also experience decreases in applied water and total acreage.

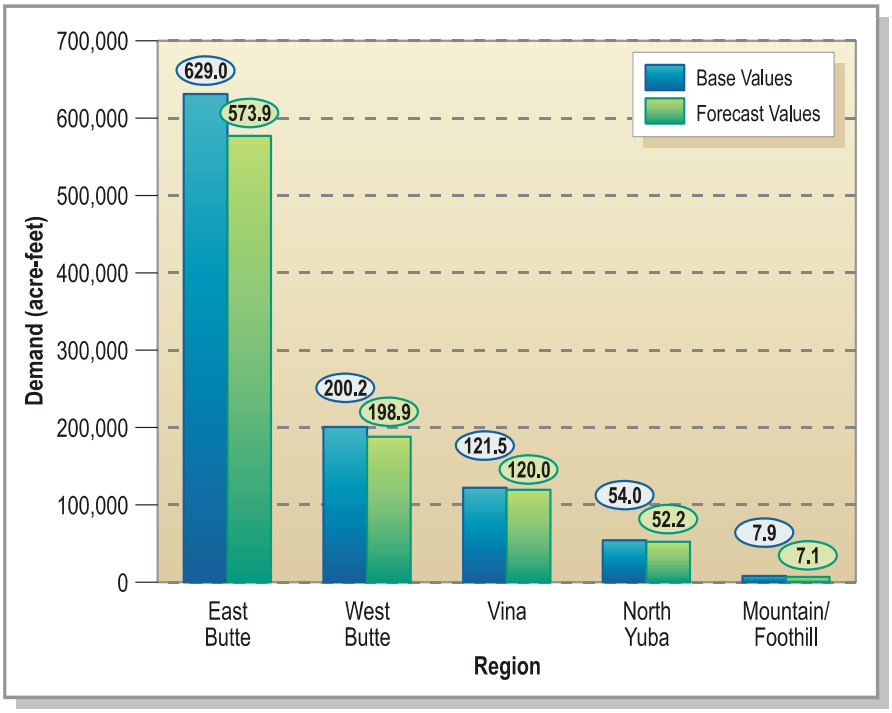


Figure 2-13
Comparison of Total Applied Water
Under Base and Combination (Average Year) Scenarios

The agricultural water demand forecast generated several conclusions important for future water resource planning.

- In general, the analysis indicates that most of the reasonably foreseeable changes evaluated would not result in significant long-term changes in agricultural water demand in Butte County.

  Total applied water demand under the average year combination scenario reduces a minimum of 0.6 percent (1,300 acre-feet) in the West Butte region and a maximum of 8.75 percent (55,020 acre-feet) in the East Butte region. The DW&RC will address agricultural water demand forecasting in the next Water & Inventory Analysis (the proposed 5-year update is 2006). Any new data will be welcomed in that process.

- Crop idling results in the largest decreases to agricultural water demand and provides purveyors with surplus water that could be used by government programs or other water districts.

  Total water demand in the County under the crop idling scenario decreases 63,700 acre-feet (6.3 percent).

- Agricultural land conversion results in a small reduction in irrigated cropland and agricultural water use in the County.

  Total water demand in the County under the agricultural land conversion scenario decreases 9,600 acre-feet (0.9 percent).

- Water conservation would reduce applied water and provide purveyors with surplus water that could be used by government programs or other water districts; however, costs of conservation could be expensive.

  Total water demand in the County under the water conservation scenario decreases 51,800 acre-feet (5.1 percent).

- Relative changes in crop price can have an important effect on agricultural water demand. The analysis presented one plausible case that could increase water demand. However, price forecasting is inexact and has not been attempted in this study. Therefore, results of the price change scenario cannot be viewed as anything more than an example.

- A combination scenario was evaluated that included assumptions of three other scenarios. All three assumptions result in a reduction in agricultural water demand. Although the combination scenario is plausible, readers should consider it a cumulative analysis of potential future conditions.

- The combination scenario was evaluated for both an average year and a dry year condition. The dry year conditions start from the same base level of crop acreage and a higher base level of water use, but the incremental change resulting from the combination scenario is similar to the average conditions.

  Total water demand in the County decreases 60,500 acre-feet (6.0 percent) in an average year and 71,300 acre-feet (6.3 percent) in a dry year under the combination scenario.

2.8.2 Urban Water Demand Forecast

The IWR-MAIN Water Demand Management Suite© was selected to perform the urban water demand forecast, and the selected forecasting method was the *adjusted rate of use* method. This method is consistent with those used by DWR in its statewide planning efforts and is appropriate for the level of data that was available for this analysis.

This analysis forecasted the quantity of water use in several subsectors for the years 2010, 2020, and 2030. Table 2-6 lists the sectors and subsectors for which forecasts were developed.

Table 2-6
Model Sectors and Subsectors

Sector	Subsector
Residential	Single-family
	Multifamily
Nonresidential	Commercial
	Industrial
	Large Landscape

Butte County was divided into six study areas for analysis. Table 2-7 lists the study areas, along with their populations and the purveyors that provide water service to each.

Table 2-7
Forecast Model Study Areas

Study Area	2000 Census Population	Water Purveyor(s)
Biggs	1,799	City of Biggs
Chico	59,444	California Water Service Company, Chico
Gridley	5,450	City of Gridley
Oroville	12,969	California Water Service Company, Oroville
		Oroville Wyandotte Irrigation District
		Thermalito Irrigation District
Paradise	26,451	Paradise Irrigation District
Unincorporated Areas	97,058[1]	Several water purveyors (not listed)
		Private wells
BUTTE COUNTY TOTAL	203,171	Combined private wells and public water purveyors

Estimated as population of incorporated subtracted from population of the entire county.

To calculate water use given subsector, this model multiplied a per unit usage rate by a number of units (people, housing units, or jobs) and by a series of factors that adjust the forecasted quantities to reflect the effect of variables such as income, marginal water price, and weather. DWR public water system statistics provided the basis for the per unit usage rates, which were refined according to information gathered through interviews with water purveyors and planners in the study areas of interest. Figure 2-14 shows the results generated for each study area at the subsector level by the model. Results indicated increases in urban demand over the forecast period.

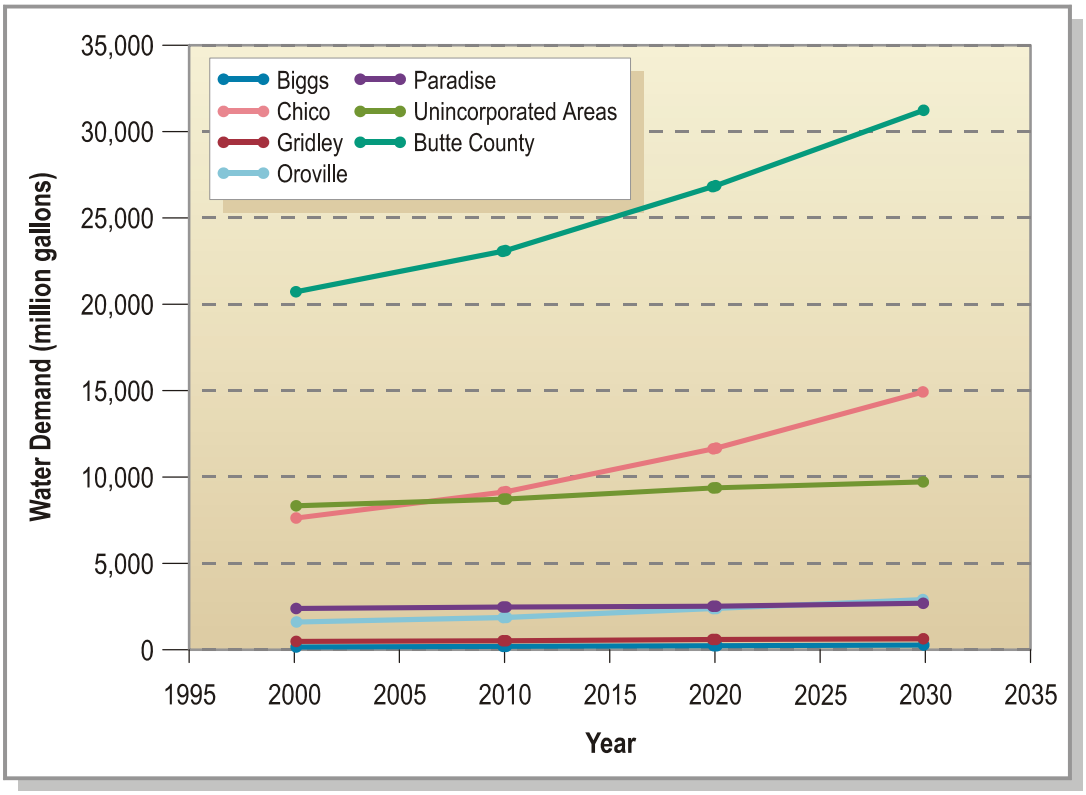


Figure 2-14
Urban Water Demand Forecast Results

Biggs

The demand for Biggs is projected to grow from 186.4 million gallons in 2000 to 269.2 million gallons in 2030, an increase of 44 percent.

Chico

The demand for Chico is projected to grow from 7,616.1 million gallons in 2000 to 14,933.7 million gallons in 2030, an increase of 96 percent.

Gridley

The demand for Gridley is projected to grow from 494.4 million gallons in 2000 to 662.0 million gallons in 2030, an increase of 34 percent.

Oroville

The demand for Oroville is projected to grow from 1,650.4 million gallons in 2000 to 2,927.8 million gallons in 2030, an increase of 77 percent.

Paradise

The demand for Paradise is projected to grow from 2,431.3 million gallons in 2000 to 2,701.2 million gallons in 2030, an increase of 11 percent.

Unincorporated Areas of the County

The demand for the unincorporated areas of the county is projected to grow from 8,322.3 million gallons in 2000 to 9,736.4 million gallons in 2030, an increase of 17 percent.

The Entire County

The demand for the entire county is projected to grow from 20,700.9 million gallons in 2000 to 31,230.3 million gallons in 2030, an increase of 51 percent. The DW&RC will address urban water demand forecasting in the next Water & Inventory Analysis (the proposed 5-year update is in 2006). Any new data will be welcomed in that process.

Section 3
Plan Implementation

The Department is already performing many of the groundwater management activities associated with an AB 3030 Groundwater Management Plan. Through plan implementation, the Department is formalizing its groundwater management goal, management objectives, and plan components that elaborate on both current actions and planned future actions under the GMP.

3.1 Groundwater Management Goal

The goal of the Butte County GMP is to maintain efficient and effective groundwater management, quantity and quality, thereby providing a sustainable, high quality supply for agricultural, environmental, and urban use into the future that remains protective of residents' health, welfare, and safety.

3.2 Groundwater Management Objectives

Butte County began to establish groundwater management objectives in Chapter 33 of the Butte County Code, the Groundwater Conservation Ordinance. The purposes of Chapter 33 include:

> "The groundwater underlying Butte County is a significant water resource which must be reasonably and beneficially used and conserved for the benefit of the overlying land by avoiding extractions which harm the Butte Basin aquifer, causing exceedence of the safe yield or a condition of overdraft."

To accomplish the stated plan goal, the following management objectives are adopted under the Butte County GMP:

- Minimize the long-term drawdown of groundwater levels;
- Protect groundwater quality;
- Prevent inelastic land surface subsidence resulting from groundwater pumping;
- Minimize changes to surface water flows and quality that directly affect groundwater levels or quality;
- Minimize the effect of groundwater pumping on surface water flows and quality; and
- Evaluate groundwater replenishment and cooperative management projects.
- Provide effective and efficient management of groundwater recharge projects and areas.

The Butte County Board of Supervisors February 10, 2004 approval of a groundwater management ordinance, establishing Chapter 33A of the Butte County Code, directs

the Department to support the development and implementation of quantitative BMOs within 16 defined sub-inventory units overlying the groundwater basin by February 2005. The above stated management objectives will guide development of the quantitative BMOs in Butte County. The Butte County Groundwater Management Ordinance is included in Appendix B.

If a conjunctive use or coordinated groundwater management program were to be established within Butte County, a preliminary evaluation must first occur to address and explore the hydrogeology of our region. Economic, engineering, and environmental issues must be determined to assist local decision makers with policy making. Such work would likely involve CEQA and the process would be clear and transparent. Butte County's fiscal condition is always a concern to policy makers. If possible, and if it is environmentally, economically, technically, and socially sound, it is the interest of the County to minimize financial impacts on its General Fund, which in turn preserves the use of tax payer dollars to other vital County functions.

3.3 GMP Components

As discussed in section 1.6 and shown on Table 1-2, a number of mandatory, recommended, and voluntary components constitute the GMP content. These components have been grouped and are discussedunder the following five headings:

- Groundwater Monitoring;
- Groundwater Resource Protection;
- Groundwater Sustainability;
- Stakeholder Involvement; and
- Integrated Water Resource Planning.

3.4 Groundwater Monitoring

The Department, in close cooperation with DWR Northern District, has developed and monitors an extensive monitoring network, as shown on Figure 3-1. Ongoing groundwater monitoring provides information needed to document current conditions, assess long-term trends, and to support development and implementation of BMOs associated with:

- Groundwater levels;
- Water quality; and
- Inelastic land subsidence.

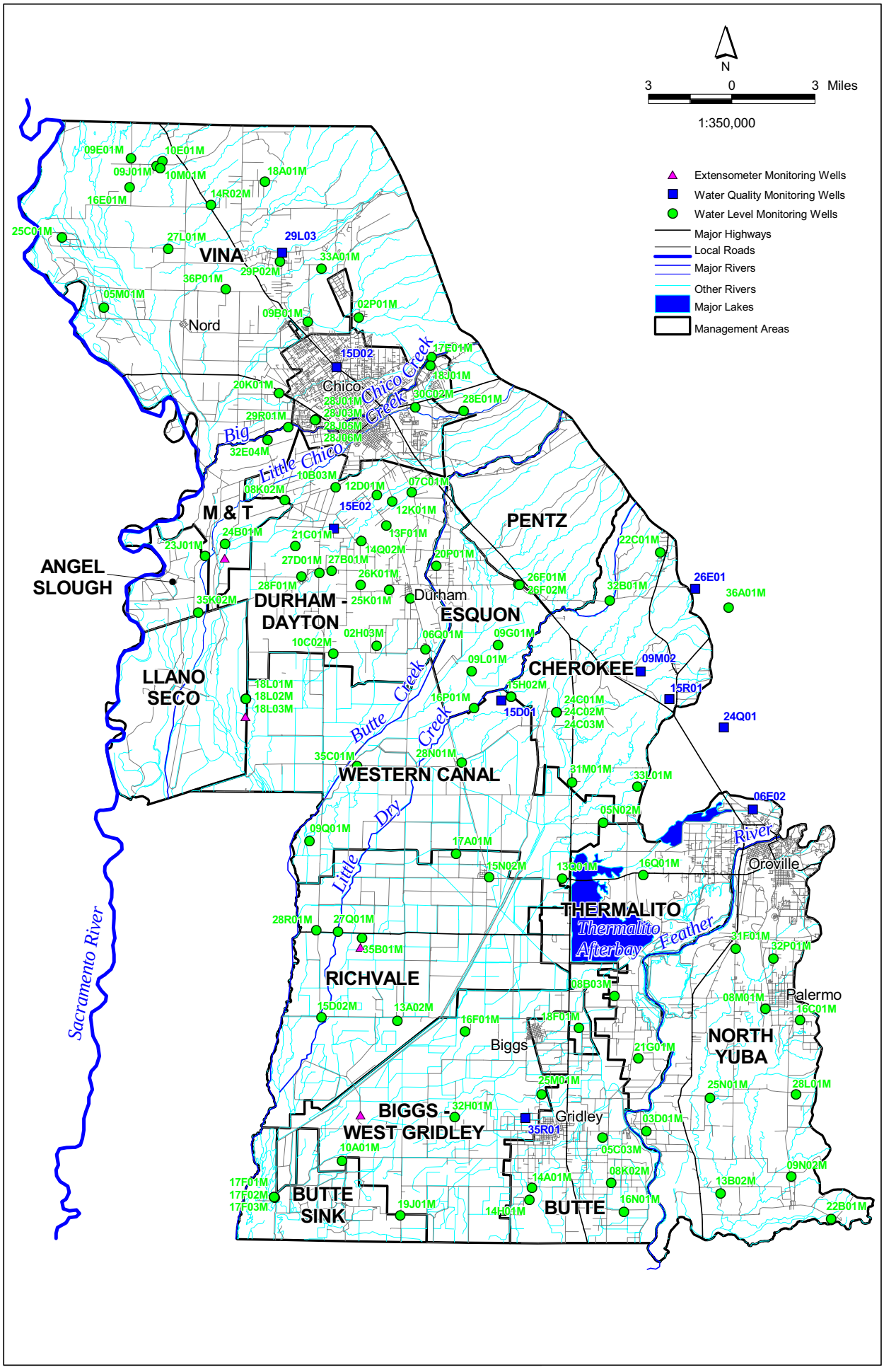
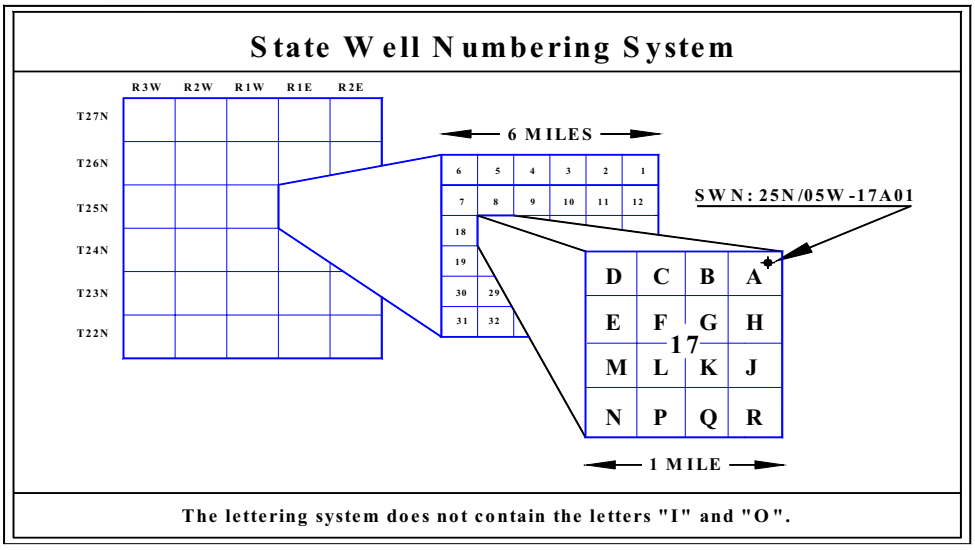


Figure 3-1
Butte County Groundwater Monitoring Grid

3.4.1 Groundwater Elevation Monitoring

The Groundwater Conservation Ordinance (see Section 3.5.3) requires the Department, in cooperation with its Technical Advisory Committee, Butte Basin Water Users Association (BBWUA), DWR and the Regional Water Quality Control Board to develop and coordinate a countywide groundwater monitoring program. The program requires:

- Identification of specific monitoring wells.
- Measurement of groundwater levels in the monitoring wells at least four (4) times per year, during the months of March, July, August, and October.
- Each district and city within in the County is requested by the Department to submit copies of all its groundwater monitoring reports not later than December 1 of each year. Individuals are also encouraged to voluntarily provide any available groundwater data.



Source: Department of Water Resources, Northern District

Figure 3-2
State Well Numbering System

In 1997, the Department, in cooperation with DWR, began to expand the number of wells and frequency of groundwater level monitoring in the valley portion of Butte County. The current monitoring grid has 104 wells that the Department monitors for groundwater level. Approximately 29 of the 104 wells include water level sensors that continuously monitor and record water elevation. The remaining wells are monitored four times per year, in March, July, August, and October.

The monitoring wells are numbered using the state well numbering system. The state well numbering system identifies each well by its location according to the township, range, section, and tract. Figure 3-2 illustrates the State Well Numbering System. An example could be a well designated 25N05W17A01M. The "25N" indicates the township, "05W" indicates the range, "17" indicates the section number, "A"

indicates the tract portion of the section, "01" indicates that this is the first well installed in that area, and "M" stands for Mount Diablo Meridian (the baseline for the township and range system). Maps often represent this well information with just the section, tract portion of section and number; in this case, 17A01.

Recent monitoring results and a discussion of groundwater levels are included in the annual report submitted to the Butte County Water Commission by BBWUA entitled *2003 Groundwater Status Report*. The report is included in Appendix C. In general, the overall health of groundwater elevations is good. Groundwater level declines ranging from 0.8 to 2.0 feet per year have been observed in many areas of the county. The report recommends close observation of groundwater level trends in areas with observed declines, but increased groundwater extraction is not believed to be the cause.

3.4.2 Groundwater Quality Monitoring

Groundwater quality monitoring is now required under the Groundwater Management ordinance as codified in Chapter 33A-9. At a minimum, groundwater samples will be collected once per year during peak groundwater use (July or August) and analyzed for temperature, pH, and electrical conductivity (EC).

The Department last conducted groundwater quality sampling throughout the Butte Basin during the week of July 28 through August 1, 2003. In cooperation with the DWR Northern District and the California State University, Chico, ten actively pumped wells throughout the basin were sampled for temperature, total dissolved solids (TDS), EC and pH. Figure 3-1 shows the sample locations and Table 3-1 presents the results of the water quality testing.

TDS measurements generally indicate the quantity of inorganic salts and small amounts of organic matter. The California state and Environmental Protection Agency (EPA) secondary drinking water standard for TDS is 500 milligrams per liter (mg/L), and the agricultural water quality goal for TDS is 450 mg/L. The secondary standards refer to the levels above which the constituent may be objectionable because of aesthetics or taste. All samples collected in 2003 indicated TDS levels meet both agricultural and drinking water standards.

The EPA's recommended preferable range for pH is from 6.5 and 8.5. All of the pH levels sampled for the basin are within this preferred range.

Table 3-1
Butte County 2003 Groundwater Quality Assessment

State Well Number	Approximate Location	Temperature ˚C	TDS (ppm)	EC (µS)	pH
18N02E35R01M	Gridley	18.5	184	370	7.5
19N04E06E02M	Oroville	17.9	82	164	6.5
20N01E15D01M	Western	18.1	123	248	8.1
20N02E09M02M	Esquon	19.9	213	425	7.5
20N02E15R01M	Western	18.2	172	344	6.6
20N02E24Q01M	Cherokee	21.9	115	232	7.5
21N01E15E02M	Dayton	19.9	175	348	7.2
21N03E26E01M	Butte Valley	26.4	93	186	6.9
22N01E15D02M	M&T	18.2	279	551	7.5
23N01E29L03M	North Chico	20.3	109	225	7.6

TDS – Total Dissolved Solids (parts per million)
EC – Electrical Conductivity (microseimens)

3.4.3 Inelastic Land Subsidence Monitoring

Four extensometers were installed between 1999 and 2003 by DWR in conjunction with the Department. Extensometer locations are shown on Figure 3-1. Two of the four wells are currently capped due to artesian flow. The Department does not currently monitor these two extensometers, but will monitor them after extending the well casing to a level above the well's static water level. Figures 3-3 and 3-4 present the extensometer records from the other two wells. Recent subsidence monitoring results are included in the BBWUA *2003 Groundwater Status Report*. The report is included in Appendix C. Extensometer measurements indicate subsidence is not occurring. Qualitative observation also indicates no subsidence of a significant magnitude.

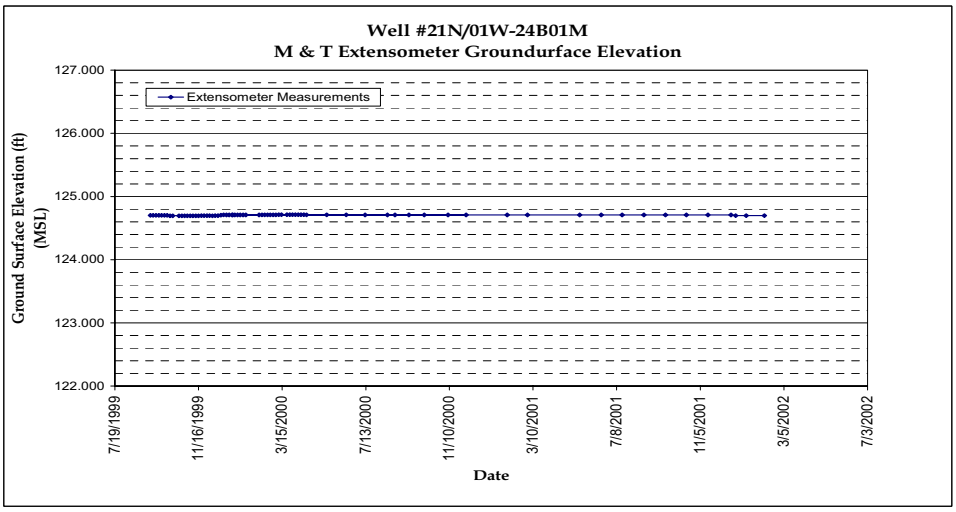
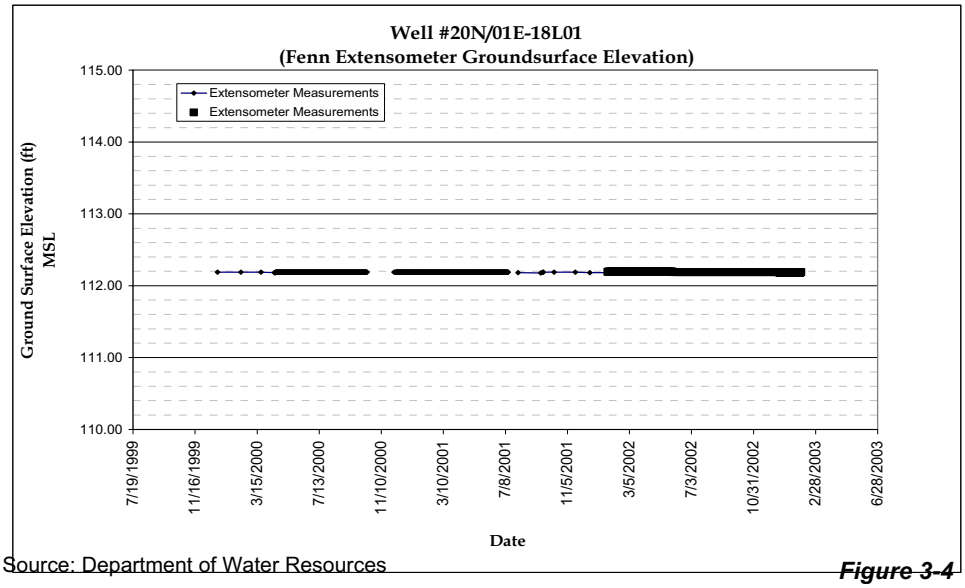


Figure 3-3
Extensometer 21N01W24B01M



Source: Department of Water Resources

Figure 3-4
Extensometer 20N01E18L01M

Groundwater Monitoring Actions: The Department will take the following actions:

- Support the development and implementation of BMOs in 16 sub-inventory areas overlying the groundwater basin.
- Work with local stakeholders and DWR to identify areas that may need additional groundwater level, groundwater quality, or subsidence monitoring based on identified data gaps or negative performance trends.
- Work with state and federal agencies to secure funding for expansion of the monitoring grid.
- Coordinate with DWR and local landowners to ensure that selected wells are maintained as part of a long-term monitoring program.

3.5 Groundwater Resource Protection

Butte County has enacted various ordinances specifically designed to promote the protection of groundwater resources, including:

- Groundwater well ordinances (5);
- Groundwater Management Program and Plan ordinance;
- Groundwater Management ordinance (BMO ordinance); and
- Groundwater Conservation ordinance.

Additional groundwater protection measures are provided under the Conservation Element of the County's General Plan. Wellhead and recharge protection measures may also be considered by the Department. The following sections describe existing groundwater resource protection ordinances and measures.

3.5.1 Groundwater Well Ordinances

The California Water Code (13700 through 13806) requires proper construction of wells, and minimum standards for the construction of wells are specified in DWR Bulletins 74-81 and 74-90. These standards apply to all water wells, cathodic protection wells, and monitoring wells.

Chapter 23B of the Butte County General Ordinances Appendix E of the GMP enforces minimum standards for the construction of wells as specified in DWR Bulletins 74-81 and 74-90, except where superseded by state or federal law or modified by resolution of the Butte County Board of Supervisors, and also provides procedures for well spacing of new wells to reduce potential well interference problems.

The following is an overview of principal Butte County Ordinances related to groundwater well permitting, construction, and abandonment as contained in the Butte County Code.

- **Chapter 23B-3 Well Permitting**. This ordinance requires that any person, firm, association, organization, partnership, joint venture, business trust, corporation, company, federal, state or local agency, or special district formed under the laws of this state shall, within the unincorporated area of the County of Butte, obtain a written permit from the health officer to construct, repair, or deepen any public water supply well or individual well, or destroy any abandoned well. The permit application procedures are outlined in Chapter 23B-4.

- **Chapter 23B-5 Well Standards**. Standards for the construction, repair, reconstruction, deepening, abandonment and destruction of wells in Butte County are specified within Bulletin 74-81, Water Well Standards, State of California, except where superseded by state or federal law or modified by resolution of the Board of Supervisors.

- **Chapter 23B-5a Pumping capacity and parcel size**. The pumping capacity of the well's pump shall not be greater than fifty (50) gallons per minute per acre to reasonably serve the overlying land, including contiguous parcels of land under the same ownership as the land upon which the well is located. The total of the pumping capacities of the pumps for the new well and all existing wells (excepting wells which are exempt under section 23B-5c(1) and section 23B-5c(4)) within the applicable parcels shall not exceed fifty (50) gallons per minute per acre. The limitation on pumping capacity applies to all wells required to have a permit under this chapter and that are installed after July 25, 1996.

- **Chapter 23B-5b Well spacing requirements**. Butte County has established a well spacing ordinance. This ordinance requires that any well required to have a permit under Chapter 23B of the County Ordinances, and installed after July 25, 1996 be subject to the spacing requirements summarized in Table 3-2.

Table 3-2
Summary Butte County Well Spacing Requirements

Engineered Pumping Capacity (Gallons per minute)	Well Spacing Requirement (feet)
1000	450
2000	1,150
3000	1,700
4000	2,200
5000	2,600
Greater than 5000	Variance shall be required

- **Chapter 23B-13 Minimum well depth for domestic wells.** This chapter of the Ordinances requires that new individual well for domestic purposes be drilled to an adequate depth to ensure that it "will operate properly assuming a repeat of the groundwater conditions experienced during the period 1987 through 1994 in the area in which the new well is located."

3.5.2 Groundwater Management Program and Plan Ordinance

Chapter 24A of the General Ordinances of Butte County pertains to the coordination of groundwater management programs and plans adopted by various public agencies within the County. Chapter 24A is provided in Appendix T.

The ordinance requires that the County help coordinate groundwater management programs and plans adopted within the County, and provide a minimum and uniform standard of groundwater protection within the County. To accomplish this, the ordinance states that the County should:

- Identify and implement, on a comprehensive and integrated basis, existing County ordinances and land use planning policies and their applicability and effect on groundwater management and regulation within the County.
- Protect the groundwater resources within the County through the management and regulation of groundwater pursuant to the County's police power and land use authority.
- Coordinate and cooperate with local water agencies, purveyors and groundwater users within the County.
- Participate in annual meetings to coordinate groundwater programs as required by CWC § 10755.3.

3.5.3 Groundwater Management Ordinance (BMO ordinance)

In January 2002, the Water Commission recommended to the Board of Supervisors to investigate the concept of utilizing BMOs as a potential method to manage the groundwater basin. The Board accepted this recommendation and directed the Department to proceed with the development of BMOs for the basin area of the County. The Department drafted and publicly circulated a draft ordinance for consideration by the Board. After significant public comment and ordinance revisions to address comments, the Board approved the ordinance on February 10, 2004.

The ordinance is based on several key guidelines, summarized below:

- The Board finds that the protection of the groundwater resource for beneficial use within the County is of major concern to the residents of the county for the protection of their health, welfare, and safety. The Board further declares that the beneficial use and maintenance of groundwater and protection of recharge zones is of critical importance to the economy and environment of the County.
- The Board intends to ensure the continued sustainability of groundwater quantity and quality within the county.
- The Board intends to protect groundwater quality and prevent land subsidence.
- The County does not hereby intend to regulate, outside of Chapter 33, the use of groundwater; unless established BMOs are exceeded.

- It is essential for information gathering and management purposes that the County maintains a monitoring program addressing groundwater elevations, groundwater quality standards, and land subsidence criteria.

- In adopting this groundwater management ordinance, the County does not intend to limit other means of managing groundwater within the county authorized elsewhere in statute or ordinance, and intends to work cooperatively with local entities and the general public to further develop and implement joint groundwater management practices.

Table 3-3 provides an overview of a generalized BMO development and implementation process. The process for development and implementation of BMOs is discussed in Section 3.6.1.

Table 3-3
Generalized Approach to BMO Development[1]

Planning Phase	
	Develop Organizational Structure Establish Public Input Process Establish Management Areas
Implementation Phase	
	Obtain Statutory Authority Establish Advisory Committees Establish Monitoring Elements Establish Monitoring Program Develop Management Objectives
Management Phase	
	Collect Data Evaluate Data Reevaluate Monitoring Program Reevaluate Management Objectives Determine Need For Resolution
Resolution Phase	
	Technical Advisory Committee Investigation and Recommendation Water Advisory Committee (WAC) Strives For Mutually Agreeable Solution WAC Recommendation To Board Of Supervisors Board Of Supervisors Action

3.5.4 Groundwater Conservation Ordinance

Chapter 33 of the General Ordinances (Appendix D) of Butte County pertains to the protection of groundwater resources from harm resulting from both the extraction of groundwater for use on lands outside the County and the substitution of groundwater for surface water transferred outside the County. The main components of the ordinance are described below:

- **Transfer Pumping Permits**: The ordinance bars the extraction of groundwater for use outside the County without first obtaining a permit. Permits are also required for groundwater pumping for use on land within the county in lieu of surface

[1] From BMO Presentation By Toccoy Dudley, DWR, Northern District

water, if the surface water which would have otherwise been used on the land is proposed to be transferred outside the County.

- **Monitoring**: As described in detail in Section 3.4.1, this ordinance requires that the Department, in coordination with BBWUA, DWR, and the Regional Water Quality Control Board "develop and coordinate a county-wide groundwater monitoring program".

- **Planning/Reporting**: A groundwater status report is to be developed based upon the data gathered and analyzed from the required monitoring program (see Section 3.9.1).

3.5.5 Conservation Element of General Plan

Butte County's General Plan, which sets out the County's adopted goals, objectives, policies and standards for various issues, includes a Conservation Element that emphasizes the importance of Butte County's natural resources, and outlines methods to protect these resources.

As part of the Department's Integrated Water Resource Plan development, the Department has provided technical information to the Butte County Department of Development Services to support an update of the water resource section of the General Plan's Conservation Element.

3.5.6 Wellhead and Recharge Area Protection Measures

To date, Butte County has not formally adopted wellhead or recharge area protection measures. The Department is currently in the process of completing its Integrated Water Resource Plan that includes a policy recommendation specific to protection of groundwater recharge areas through appropriate zoning and other management measures. The Butte County Water Commission and Board of Supervisors will consider implementation of policy recommendations during the plan review and approval process.

Butte County has not pursued a wellhead protection plan, however, a federal program is in place to support development of such a plan if the Department deems it necessary. The purpose of the federal Wellhead Protection Program is to protect groundwater sources of public drinking water supplies from contamination, thereby eliminating the need for costly treatment to meet drinking water standards. The program was established by the Safe Drinking Water Act Amendments of 1986 and is based on the concept that the development and application of land-use controls (usually applied at the local level in California) and other preventative measures can protect ground water.

A Wellhead Protection Area (WHPA), as defined by the 1986 Amendments, is "the surface and subsurface area surrounding a water well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield." The WHPA may also be the recharge area that provides the water to a well or wellfield. Unlike surface watersheds that can be easily

determined from topography, WHPAs can vary in size and shape depending on geology, pumping rates, and well construction.

Under the Act, states are required to develop an EPA-approved Wellhead Protection Program. To date, California has no formal state-mandated program, but instead relies on local agencies to plan and implement programs. For this reason, AB 3030 was enacted. A number of local governments, including Santa Clara Valley Water District, Descanso Community Water District, West San Bernardino County Water District, and Monterey County Water Management District, are in various stages of developing local groundwater management programs that include WHPAs. Wellhead Protection Programs are not regulatory by nature, nor do they address specific sources. They are designed to focus on the management of the resource rather than control a limited set of activities or contamination sources.

Groundwater Resource Protection Actions: The Department will take the following actions:

- Support the development and implementation of BMOs in 16 sub-inventory areas overlying the groundwater basin.
- Participate in the review and provide recommendation for permit applications submitted under the Groundwater Conservation ordinance.
- Support the Butte County Department of Development Services during the policy update of the water resource section of the General Plan's Conservation Element.
- Pursue implementation of Integrated Water Resource Plan policies, programs, and projects approved by the Board of Supervisors, including recommendations addressing protection of groundwater recharge areas and development of a cooperative management program.
- Evaluate the need for a wellhead protection program in Butte County.

Before such policies (i.e. General Plan zoning designations to protect natural recharge areas) are considered by the Board of Supervisors, one of the Department's top priorities is to conduct evaluations of the local hydrogeology and understand the science that would support such zoning policy recommendations.

3.6 Groundwater Sustainability

The Department is currently engaged in various activities that promote groundwater sustainability. Specific actions currently being pursued or studied include:

- Development of quantitative Basin Management Objectives;
- Groundwater modeling; and

- Assessment of the potential for cooperative groundwater management between surface water and groundwater users.

3.6.1 Development of Quantitative Basin Management Objectives

Following the Board of Supervisors' February 10, 2004 approval of a Basin Management Objective (BMO) ordinance, the Department is supporting local areas with development of BMOs within their respective areas. The ordinance states, "The Board intends to ensure the continued sustainability of groundwater quantity and quality within the county." Butte County Ordinance 3869, describing BMO development and implementation, is included as Appendix B.

Water Advisory Committee (WAC) members appointed by the Board of Supervisors will support BMO development and implementation. The Department has developed a BMO Development Packet for use by local BMO representatives in each of the 16 areas identified in the approved ordinance. The packets are intended to provide information and guidance necessary to develop BMOs within each area.

Local representatives will be responsible for the development, implementation of BMOs, monitoring and reporting of groundwater levels, groundwater quality, and inelastic land subsidence within their local area. The Technical Advisory Committee will investigate reported noncompliance. Efforts will be made to resolve noncompliance issues at the local level. If noncompliance issues cannot be resolved at the local level, the Water Advisory Committee may recommend a plan to the Water Commission to modify, reduce or terminate groundwater extraction in the impacted/impacting area.

3.6.2 Groundwater Modeling

Groundwater models can be effectively used to assess how proposed groundwater management actions, changes in cultural practices, or changes in hydrologic conditions may affect groundwater sustainability.

In 1994, BBWUA developed a groundwater flow model of the "Butte Groundwater Basin" following the late 1980s through early 1990s drought. The model provides BBWUA with a tool to improve groundwater management within the basin. The model was last updated in 2002. The Department has entered into an agreement with BBWUA whereby the Department is responsible for model updates and maintenance.

In support of the Department's Integrated Water Resource Plan project, the Department is currently completing a review and update of the Butte Basin Groundwater Model. As part of the model update, the Department is incorporating DWR Northern District's improved interpretation of the basin stratigraphy and hydrogeologic properties. An improved representation of these model properties will allow the Department to more accurately evaluate current and future water management options. The Department is also considering which model code will have the greatest utility during participation in regional groundwater studies and programs.

Once the groundwater model has been reviewed, updated and re-calibrated, it can be used to:

- Evaluate water transfer applications under chapter 33;
- Study short-, medium-, and long-term drought impacts to groundwater;
- Evaluate recharge benefits and impacts;
- Support updates of water inventory and analysis and annual groundwater status reports; and
- Support development of quantitative management objectives (see Section 3.6.1).

A Department priority is also to develop a sophisticated watershed model for the upper watersheds that contribute to Butte County's groundwater system. The Department has contracted with the University of California-Davis for assistance.

3.6.3 Construction and Operation of Groundwater Management Facilities

Ensuring the long-term sustainable use of the groundwater resources within the Plan area may require the planning and construction of projects that:

- Evaluate the need and potential for enhanced groundwater recharge;
- Enhance groundwater recharge;
- Evaluate cooperative management projects through improvements to recharge, extraction, and distribution infrastructure; and
- Protect groundwater quality, or remediate contaminated sites.

The Steering Committee supporting the development of the Integrated Water Resource Plan is currently considering policies, programs, and projects associated with the construction and operation of groundwater management facilities. Regarding the mapping of contamination plumes and their movement with respect to seasonal water extractions, the Department defers to the Butte County Department of Public Health, Division of Environmental Health. Groundwater management facilities, if feasible, must be backed up by scientific evaluation. Further evaluation of the groundwater of Butte County is necessary as existing conditions are not completely understood. Potential action such as the implementation of a recharge district or cooperative management program will be addressed by the Board of Supervisors when more options are evaluated.

Groundwater Sustainability Actions: The Department will take the following actions:

- Provide technical support associated with development of BMOs in Butte County.

- Assist in coordination and management activities of the Water Advisory Committee.
- Complete an update of the BBWUA groundwater model and support maintenance of the model into the future.
- Utilize the groundwater flow model to simulate proposed changes in groundwater management practices that may impact groundwater sustainability.
- As directed by the Board, support the coordinated management of groundwater and surface water.
- Pursue funding from state agencies, federal agencies, and partnerships for groundwater sustainability activities.

3.7 Stakeholder Involvement

Public outreach and education is a primary function of the Butte County Department of Water and Resource Conservation. The Department encourages two-way dialogue, characterized by information dissemination and requests for suggestions and feedback on Department activities. The Department has regularly disseminated information on GMP development as part of its ongoing public outreach effort. GMP-related information and draft documentation are available to the public on the Department's website (http://www.buttecounty.net/waterandresource/) and have been included in the Department's monthly newsletter, *Water Solutions*, that is distributed in hardcopy and via e-mail to all interested parties.

The Department will work closely with the Water Advisory Committee (WAC), Technical Advisory Committee (TAC), and environmental community to assist in meeting public outreach needs. The WAC and TAC are explained in Chapter 33A of the Butte County Code (included as Appendix B of the GMP), which addresses the Basin Management Objective (BMO) ordinance adopted by the Board in February 2004.

The Department also regularly engages in cooperative efforts with state and federal agencies. Additionally, the Department actively encourages the involvement of advisory committees and related stakeholders. The following sections describe the Department's involvement with these water resource stakeholders.

3.7.1 Interagency and District Cooperation

Effective groundwater management requires coordination and cooperation between numerous local, state, and federal agencies. The Department will continue to work proactively with key state and federal regulatory agencies, as well as the local districts and County departments, such as:

Local Districts with AB 3030 Groundwater Management Plans. The Department works closely with local water districts, including those with existing AB 3030 Groundwater Management Plans. Water districts with existing AB 3030 groundwater

management plans are represented on the Butte County Water Commission where they provide coordination between Department activities and groundwater management activities of the local water districts. Also, through his role as Chairman of the Butte Basin Water Users Association, the Department's Director, Ed Craddock, facilitates communication and cooperation between the Department and members of BBWUA.

In Butte County, the following agencies have AB 3030 plans:

- Biggs-West Gridley Water District,
- Butte Water District,
- Richvale Irrigation District, and
- Western Canal Water District.

AB 3030 legislation is not available to municipal utilities that are under control of the Public Utilities Commission. AB 3030 is available to local agencies, including counties and special districts such as water districts, which are recognized as political subdivisions of the State. By statute, under AB 3030, Butte County has no authority over these districts that already have their own authorities under existing legislation. It is the desire of the Department to conservatively manage groundwater resources in Butte County. The implementation of the GMP will ensure that there is a management strategy to address groundwater resource issues.

- **State Water Resources Control Board (SWRCB).** The SWRCB is the lead state water agency responsible for maintaining water quality standards and providing the framework and direction for groundwater protection efforts. The Department has established a working relationship with the SWRCB, which currently funds a number of watershed coordination programs within the County.
- **California Department of Water Resources.** DWR plays in important role in supporting both surface water and groundwater management. The Department and the DWR Northern District have worked cooperatively on a number of important programs, including the Butte County Groundwater and Surface Water Inventory Analysis. DWR also continues to support water level and extensometer monitoring in Butte County. Additionally, DWR is actively studying the Butte groundwater basin to achieve an improved understanding of the rate and direction of groundwater movement. DWR is also assessing groundwater recharge locations and rates within the county. These studies will provide information that could lead to improved groundwater management in the county.
- **Bureau of Reclamation (Reclamation).** The Department is working closely with Reclamation to develop projects to enhance both surface and groundwater management within the County. Reclamation plans to fund the review and update of the Butte County groundwater model.

- **California Bay-Delta Authority.** The Department has an inter-jurisdictional personnel exchange agreement with the California Bay-Delta Authority (CBDA), where a Department staff member is serving as CBDA's Sacramento Valley regional representative. The agreement enhances the Department's interaction with CALFED member agencies and provides a means for the Department to actively communicate the county's position on CBDA programs and activities that have the potential to affect Butte County.

3.7.2 Advisory Committees and Stakeholders

There are a number of important advisory committees and stakeholder groups that play an active role in managing the water resources of Butte County.

- **Butte County Water Commission.** The Butte County Water Commission was appointed by the Board of Supervisors to advise and provide technical information on water management issues affecting the County. The Water Commission is composed of one member representing each board district (nominated by the county supervisor elected to represent that district) and four members at large of whom two are landowners of property served by water districts and two are landowners served by private wells.

- **Water Commission Technical Advisory Committee.** The Water Commission in turn has nominated a seven person Technical Advisory Committee. The Technical Advisory Committee consists of individuals with backgrounds and/or education in water management and hydrology.

- **BMO Water Advisory Committee.** WAC members appointed by the Board of Supervisors will support BMO development and implementation. The WAC will be comprised of area-specific members, with one member appointed from each defined sub-inventory unit, and one each from the Foothill and Mountain inventory units. Additional at-large members will include representatives from the incorporated communities, the agricultural community, the environmental community, and one from each organized watershed group in the county.

- **Butte Basin Water Users Association.** BBWUA is one of the largest water management associations in the County, and was formed in response to a number of events affecting water users in the County, including the 1987-1992 drought. The main function of the association is to inform members of current and potential changes in local, state, and federal water policy that could affect water supplies. Current members of the BBWUA include:

  - Biggs-West Gridley Water District
  - Richvale Irrigation District
  - County of Butte
  - California Water Service Company

- Western Canal Water District
- City of Biggs
- City of Gridley
- Durham Mutual Water Company

- **Butte-Sutter Area Groundwater Users Corporation.** Fred Montgomery formed the Butte-Sutter Area Groundwater Users Corporation (BSAGUC) in the early 1990s to represent independent groundwater producers' interests. BSAGUC is an initial member of BBWUA. The BSAGUC holds periodic meetings of its members to discuss groundwater management issues. As an example, the group provided comments on the recently enacted BMO ordinance in the county. The Department regularly solicits comment from BSAGUC on groundwater-related issues.

Stakeholder Involvement Actions: The Department will take the following actions:

- Continue to work cooperatively with DWR headquarters and DWR Northern District on groundwater management activities.
- Continue to work cooperatively with the Bureau of Reclamation on groundwater management activities.
- Continue to work cooperatively with the California Bay-Delta Authority on programs and policies that support groundwater management efforts in Butte County.
- The Department will be responsive to the needs and requests of the Water Commission, TAC, WAC, BSAGUC and BBWUA.
- The Department will continue to support locally-driven stakeholder groups.
- Consider discussions to jointly develop a countywide coordinated AB3030 GMP that would incorporate areas with existing AB3030 plans.

3.8 Integrated Water Resource Planning

The Department is developing an Integrated Water Resources Plan to provide direction for the long-term enhancement and conservation of the County's resources. The Integrated Plan's stated purpose is "to improve water management in the County and to maintain agricultural viability, meet urban and environmental needs, ensure a future groundwater supply to overlying users, enhance the economy, and protect the citizens and natural resources of Butte County."

The Department initiated an 8-month planning process to develop the Integrated Plan. The Department formed a Steering Committee of local stakeholders

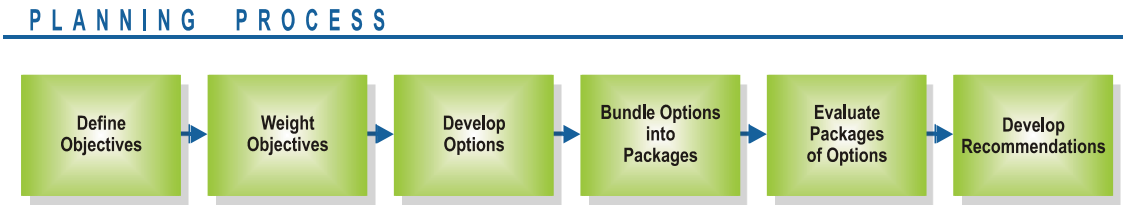


Figure 3-5
IWRP Planning Process

representing agricultural, urban, and environmental interests to participate in development of the Integrated Plan. Figure 3-5 depicts the planning process.

The Committee met six times during the planning process. First, the Committee developed plan objectives, which were grouped into four categories: local control, water supply, economy, and natural resources. Figure 3-6 presents the Plan's objectives. The Committee then developed options to meet the objectives. The options address environmental needs within the County, water conservation opportunities, water supply needs on the Ridge, conjunctive management programs, policy issues, and future management of the SWP allocation. The Committee evaluated each option and created a package of options to be considered for implementation.

The final product of the Integrated Plan is a set of policy recommendations for consideration by the Board of Supervisors. The policy recommendations have the Integrated Plan's objectives as their foundation and incorporate the options as a series implementation steps for each policy. The policy recommendations build off the County's existing water management efforts and if approved, will shape future Butte County water management.

Integrated Water Resource Planning Actions: The Department will take the following actions:

- Assist in the development of plan recommendations for consideration by members of the public, the Water Commission, and the Board of Supervisors.
- Implement plan policies, programs, and projects approved by the Board of Supervisors.
- Pursue funding sources for implementation of plan policies, programs, and projects.

3.9 GMP Implementation, Reporting and Updating

Implementation of the BMO ordinance will result in development of compliance reports associated with water level elevation, water quality, and inelastic land subsidence. The Department is currently receiving annual reports associated with groundwater level and land subsidence monitoring from BBWUA. GMP updates will

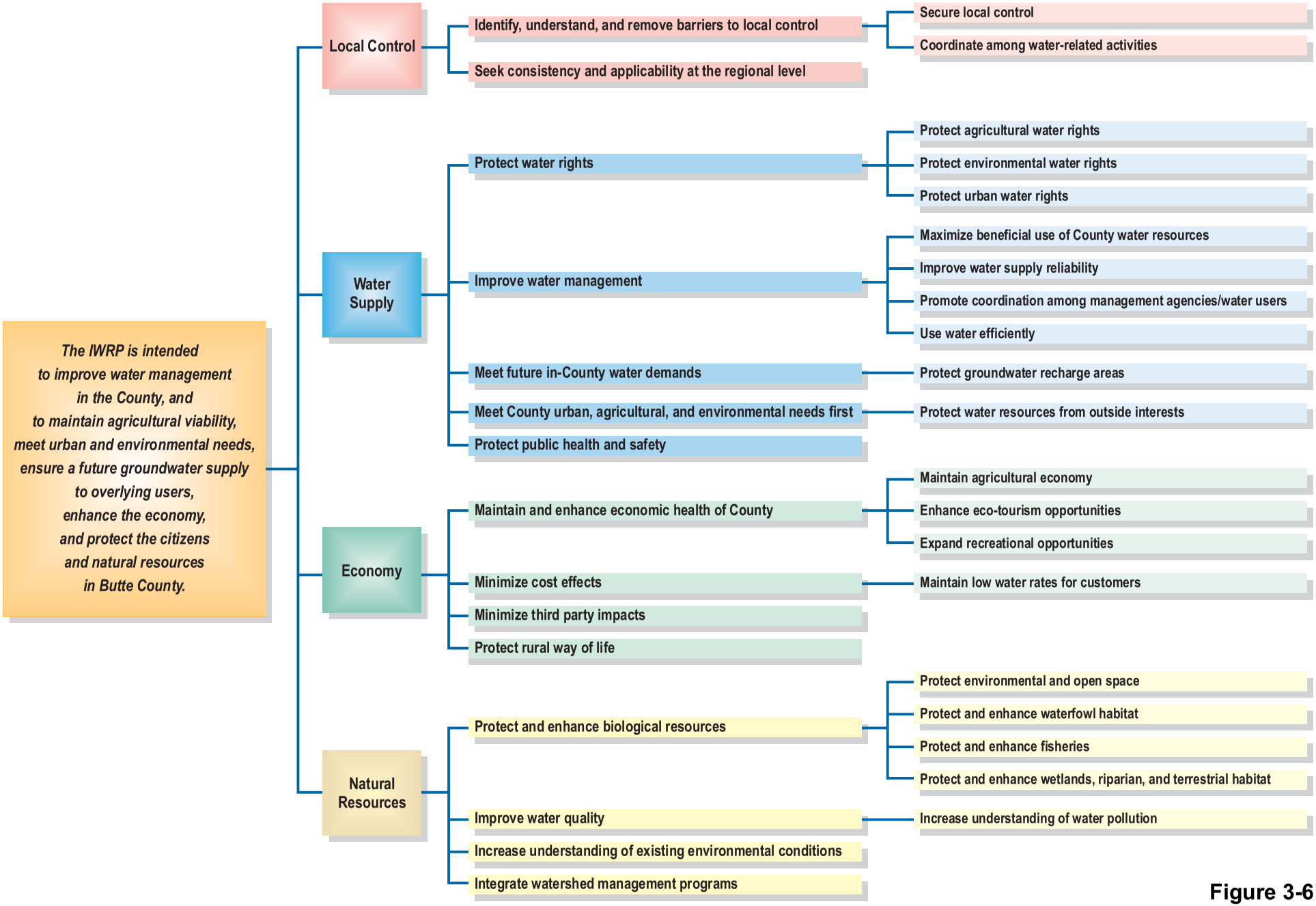


Figure 3-6
IWRP Planning Objectives

be considered each five years or as needed on a more frequent basis. The following sections discuss plan implementation, reporting and updating in additional detail.

3.9.1 GMP Implementation

Plan section 3.3 identifies the five GMP component groups. Individual plan components are described in sections 3.4 through 3.8. Plan implementation actions are identified at the conclusion of each section. Additionally, this section concludes with actions associated with GMP implementation, reporting, and updating. Table 3-4 summarizes implementation actions and the associated implementation schedule.

3.9.2 GMP Implementation Report

Currently, separate groundwater-related reporting is required by BBWUA under the Groundwater Conservation Ordinance (see Section 3.5.4) and by BMO sub-area representatives (see Section 3.6.1). Information contained in these reports is used to:

- Develop groundwater depth or elevation contour maps, which can be used to develop an understanding of the overall groundwater flow patterns in a basin;
- Develop groundwater hydrographs (charts of depth /elevation of groundwater versus time), which can be used to illustrate historic trends or changes in groundwater levels over time;
- Assess the change of groundwater in storage; and
- Measure changes in land surface elevation because of groundwater withdrawals.

Specific to the Groundwater Conservation Ordinance, BBWUA must submit a report summarizing the previous year's monitoring activities to the Department by February of each year. The report must include an analysis of the amount of groundwater pumping that can occur during the water year within each sub-basin without exceeding the safe yield of each sub-basin. Additionally, the Department requests each district and city within the county to submit copies of groundwater monitoring reports to the Department not later than December 1 of each year. The Department also encourages individuals to voluntarily provide any available groundwater data.

Specific to the BMO ordinance, representatives from each of the 16 individual BMO areas are required to submit results associated with groundwater level, groundwater quality, and land subsidence monitoring to the Department within 30 days of collection.

3.9.3 GMP Update

The Department's increasing knowledge of subsurface conditions and management techniques will likely result in the need for periodic plan updates. As further studies of basin geology and groundwater behavior provide new information, the Department must consider if this new information should result in a change in groundwater management. Additionally, as the Department works with different

management techniques, it will likely realize more effective ways to accomplish the objectives within this Plan.

The Department will continually consider improvements to the groundwater management techniques. The Department will work to incorporate these improvements as they develop. In addition, the Department will formalize changes to this AB 3030 plan once every five years, if changes need to be made.

GMP Implementation, Reporting and Updating Actions: The Department will take the following actions:

- Pursue funding for a web-based BMO Information Center to house BMO development, implementation, and reporting information.
- Consider opportunities to consolidate reporting of groundwater level, groundwater quality, and inelastic land subsidence information as currently required of BBWUA and BMO participants.
- Work cooperatively with local stakeholders, county government, and local advisory committees to assess needed GMP updates.
- Sponsor an annual meeting of local districts with AB3030 GMPs to discuss the status of individual plans and opportunities for development of a countywide coordinated AB 3030 GMP.

Table 3-4. Summary of GMP Actions

	Description of Action	Implementation Schedule
I.	**Groundwater Monitoring**	
1	Support the development and implementation of BMOs in 16 sub-inventory areas overlying the groundwater basin.	Spring 2004 – Spring 2005
2	Work with local stakeholders and DWR to identify areas that may need additional groundwater level, groundwater quality, or subsidence monitoring based on identified data gaps or negative performance trends.	Annual
3	Work with state and federal agencies to secure funding for expansion of the monitoring grid.	Annual
4	Coordinate with DWR and local landowners to ensure that selected wells are maintained as part of a long-term monitoring program.	Annual
II.	**Groundwater Resource Protection**	
1	Support the development and implementation of BMOs in 16 sub-inventory areas overlying the groundwater basin.	Spring 2004 - Spring 2005
2	Participate in the review and provide recommendation for permit applications submitted under the Groundwater Conservation ordinance.	Ongoing
3	Support the Butte County Department of Development Services during the policy update of the water resource section of the General Plan's Conservation Element.	Through Completion
4	Pursue implementation of Integrated Water Resource Plan policies, programs, and projects approved by the Board of Supervisors, including recommendations addressing protection of groundwater recharge areas and development of a cooperative management program.	2004 – 2005
5	Evaluate the need for a wellhead protection program in Butte County.	Fall 2004

Table 3-4. Summary of GMP Actions (continued)			
		Description of Action	**Implementation Schedule**
III.		**Groundwater Sustainability**	
	1	Provide technical support associated with development of BMOs in Butte County.	Spring 2004 - Spring 2005
	2	Assist in coordination and management activities of the Water Advisory Committee.	Annual
	3	Complete an update of the BBWUA groundwater model.	Spring 2004 - Spring 2005
	4	Support maintenance of the BBWUA groundwater model.	Annual
	5	Utilize the groundwater flow model to simulate proposed changes in groundwater management practices that may impact groundwater sustainability.	Annual
	6	As directed by the Board, support the coordinated management of groundwater and surface water.	As Needed
	7	Pursue funding from state agencies, federal agencies, and partnerships for groundwater sustainability activities.	Annual
IV.		**Stakeholder Involvement**	
	1	Continue to work cooperatively with DWR headquarters and DWR Northern District on groundwater management activities.	Annual
	2	Continue to work cooperatively with the Bureau of Reclamation and the USACE on groundwater management activities.	Annual
	3	Continue to work cooperatively with the California Bay-Delta Authority on programs and policies that support groundwater management efforts in Butte County.	Annual
	4	The Department will be responsive to the needs and requests of the Water Commission, TAC, WAC, BSAGWUC, and BBWUA.	Ongoing
	5	The Department will continue to support locally-driven stakeholder groups.	Ongoing
	6	Consider discussions to jointly develop a countywide coordinated AB 3030 GMP that would incorporate areas with existing AB 3030 plans.	2004 - 2005
V.		**Integrated Water Resources Planning**	
	1	Assist in the development of plan recommendations for consideration by members of the public, the Water Commission, and the Board of Supervisors.	Spring 2004
	2	Implement plan policies, programs, and projects approved by the Board of Supervisors.	Annual
	3	Pursue funding sources for implementation of plan policies, programs, and projects.	Annual
VI.		**GMP Implementation, Reporting and Updating**	
	1	Pursue funding for a web-based BMO Information Center to house BMO development, implementation, and reporting information.	Spring 2004
	2	Consider opportunities to consolidate reporting of groundwater level, groundwater quality, and inelastic land subsidence information as currently required of BBWUA and BMO participants.	Spring 2005
	3	Work cooperatively with local stakeholders, county government, and local advisory committees to assess needed GMP updates.	Annual
	4	Sponsor an annual meeting of local districts with AB3030 GMPs to discuss the status of individual plans and opportunities for development of a countywide coordinated AB 3030 GMP.	Annual

Section 4
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Appendix A
Butte County Board of Supervisors Resolution of Intent to Prepare a Groundwater Management Plan

BOARD OF SUPERVISORS
COUNTY OF BUTTE, STATE OF CALIFORNIA

Resolution No. 03-134

RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF BUTTE NOTICING THEIR INTENT TO PREPARE A GROUNDWATER MANAGEMENT PLAN UNDER WATER CODE §10750 *et seq.* (AB 3030, STATS 1992) FOR THE AREAS OF BUTTE COUNTY NOT COVERED BY ANOTHER GROUNDWATER MANAGEMENT PLAN UNDER THIS AUTHORITY OR ANY OTHER AUTHORITY

WHEREAS, the Legislature finds and declares that groundwater is a valuable natural resource in California and should be managed to ensure both its safe production and its quality; and

WHEREAS, it is the intent of the Legislature through the passage of AB3030 (Stats 1992) codified as Water Code §10750 *et seq.* to encourage local agencies to work cooperatively to manage groundwater resources within their jurisdictions; and

WHEREAS, the Legislature also finds and declares that the additional study of groundwater resources is necessary to better understand how to manage groundwater effectively to ensure the safe production, quality, and proper storage on groundwater in this state; and

WHEREAS, the adoption of a Groundwater Management Plan is encouraged, but not required by law; and

WHEREAS, any local agency, whose service area includes a groundwater basin, or a portion of a groundwater basin, that is not subject to groundwater management pursuant to other provisions of law or a court order, judgment, or decree, may, by ordinance, or by resolution if the local agency is not authorized to act by ordinance, adopt and implement a groundwater management plan pursuant to this part within all or a portion of its service area not served by a local agency or served by a local agency whose governing body, by a majority vote, declines to exercise the authority to implement a groundwater management plan and enters into an agreement with the local public agency pursuant to Water Code §10750.7 and §10750.8; and

WHEREAS, the County of Butte is interested in the development of a Groundwater Management Plan as defined under Water Code Section 10750, *et seq.* for the areas of the County not covered by another groundwater management plan; and

WHEREAS, prior to adopting a resolution of intention to draft a groundwater management plan, Water Code §10753.2 requires a local agency to hold a hearing, after publication of notice pursuant to Government Code §6066, on whether or not to adopt a resolution of intention to draft a Groundwater Management Plan pursuant to this part for the purposes of implementing the plan and establishing a groundwater management program; and

WHEREAS, such hearing was noticed pursuant to Government Code §6066 and held on August 26, 2003 at 11:30 am in the Board of Supervisors Chambers, 25 County Center Drive in Oroville, California.

WHEREAS, at the conclusion of the hearing, the local agency may draft a resolution of intention to adopt a groundwater management plan pursuant to this part for the purposes of implementing the plan and establishing a groundwater management plan.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors of the County of Butte hereby agree to:

1. Adopt a Resolution of Intention to Draft a Groundwater Management Plan pursuant to Water Code §10750 *et seq.* for the purposes of implementing the plan and establishing a groundwater management program.
2. Direct the Clerk of the Board to publish the Resolution of Intention under Government Code §6066 pursuant to Water Code §10753.3(a).
3. Direct the Department of Water and Resource Conservation to prepare the groundwater management plan under Water Code §10750 *et seq.*
4. Direct the Department of Water and Resource Conservation to prepare the groundwater management plan within two years of the date of the Resolution of Intention pursuant to Water Code §10753.4.

PASSED AND ADOPTED by the Butte County Board of Supervisors this 26th day of August by the following vote:

AYES: Supervisors Dolan, Houx, Josiassen, Yamaguchi and Chair Beeler

NOES: None

ABSENT: None

NOT VOTING: None

R.J. Beeler, Chair of the
Butte County Board of Supervisors

ATTEST:

PAUL E. McINTOSH
Chief Administrative Officer
And Clerk of the Board
By

THE FOREGOING INSTRUMENT IS A CORRECT COPY OF
THE ORIGINAL ON FILE AND OF RECORD IN THIS OFFICE
ATTEST DATE 08/27/03
PAUL McINTOSH Clerk of the Board of Supervisors
In and for the County Of Butte
State of California
By DEPUTY

Appendix B
Butte County Code Chapter 33A – Groundwater Management (BMO Ordinance)

Ordinance No. 3869

AN ORDINANCE AMENDING THE BUTTE COUNTY CODE TO ADD CHAPTER 33A, ENTITLED "GROUNDWATER MANAGEMENT."

The Board of Supervisors of the County of Butte ordains as follows:

Section 1. Chapter 33A is added to the Butte County Code to read as follows:

"33A-1 Legislative Intent

a. The Board finds that the protection of the groundwater resource for beneficial use within the County is of major concern to the residents of the county for the protection of their health, welfare, and safety. The Board further declares that the beneficial use and maintenance of groundwater and protection of recharge zones is of critical importance to the economy and environment of the County.

b. The Board intends to ensure the continued sustainability of groundwater quantity and quality within the county.

c. The Board intends to protect groundwater quality and prevent land subsidence.

d. The Board does not hereby intend to regulate, outside of Chapter 33, the use of groundwater; unless established Basin Management Objectives are exceeded. Absent emergency circumstances, as determined by the Board of Supervisors, the Board shall not consider changing any

established Basin Management Objective until one year has elapsed from the date of the establishment or Board approved change to such Basin Management Objective.

e. It is essential for information gathering and management purposes that the County maintain a monitoring program addressing groundwater elevations, groundwater quality, and land subsidence.

f. In adopting this groundwater management ordinance, the Board does not intend to limit other means of managing groundwater within the county authorized elsewhere in statute or ordinance, and intends to work cooperatively with local entities and the general public to further develop and implement joint groundwater management practices.

g. The lack of groundwater management may have the following negative impacts, including, but not limited to:

1. Lowering of groundwater levels leading to increased energy consumption, a potential decrease in stream flows, the increased cost of deepening existing wells, and the prospect that new wells shall need to be deeper and more costly than would otherwise be required.

2. Damage to public roads, bridges, subterranean infrastructure, canals and other structures caused by land subsidence at substantial cost to the public.

3. Depleting surface and subsurface flows leading to the potential loss of wildlife, and critical

terrestrial and wetland habitat.

4. Degradation of groundwater quality.

5. A degradation of property values and injury to agricultural lands in Butte County.

h. It is the purpose and intent of this chapter to establish an effective policy concerning groundwater that will assure that the overall economy and environment of the county is protected. Through the adoption of this Chapter, the Board of Supervisors seeks to protect the health, safety and welfare of County residents and the general public.

i. The Board does not intend, in adopting this chapter, to determine whether any groundwater in storage above established Basin Management Objectives is surplus groundwater, to define surplus groundwater, or to impose fees, assessments, charges or taxes upon County residents and/or business owners.

33A-2 Definitions.

a. "Aquifer" means a geologic formation that may store, transmit and yield significant quantities of groundwater to wells and springs.

b. "Basin Management Objectives (BMO)" means groundwater elevations; groundwater quality, and land subsidence criteria adopted by the Board of Supervisors for the management of the Butte County groundwater resource under the provisions of this chapter.

c. "Board" means the Board of Supervisors of Butte County.

d. "Commission" means the Butte County Water Commission.

e. "County" means County of Butte.

f. "District" means any purveyor of water wholly or partly within the boundaries of the county that provides water for agricultural, domestic, municipal, or industrial use.

g. "Department" means the Butte County Department of Water and Resource Conservation.

h. "Extensometer" means an instrument for measuring land subsidence.

i. "Groundwater" means all water beneath the surface of the earth below the zone of saturation, but does not include water which flows in known and definite subsurface channels, as set forth in the case of *Los Angeles v. Pomeroy* (1899) 124 Cal. 597.

j. "Groundwater Management Plan" means a plan prepared pursuant to the California Groundwater Management Act (commencing with Water Code Section 10750 et. seq.).

k. "Land Subsidence" means the permanent lowering of the ground surface caused by the inelastic consolidation of clay beds in the aquifer system.

l. "Recharge" means flow to groundwater storage from precipitation, irrigation, infiltration from streams, spreading basins and other sources of water.

m. "Technical Advisory Committee" means the seven (7) person committee nominated by the Water Commission and appointed by the Board as defined under Chapter 33.

n. "Water Advisory Committee" (WAC) means an advisory body appointed by the Board.

33A-3 Actions.

a. Upon approval by the Board, Basin Management Objectives shall be used to establish criteria for:

1. Groundwater elevations
2. Groundwater quality
3. Land subsidence

b. Compliance with the BMO shall be determined by evaluation of data collected from the groundwater level, groundwater quality and land subsidence monitoring networks established within each sub-inventory unit by the local stakeholders. Evaluation of these data shall be the only basis for determining compliance with the BMO. It is the intent that the BMO levels be chosen to assure that the overall economy and environment of each sub-inventory unit within County is protected.

33A-4 Water Advisory Committee.

a. The Water Advisory Committee (WAC) shall be appointed by the Board. The WAC shall be an advisory committee comprised of area-specific members, with one member appointed from each defined sub-inventory unit

within the Sacramento Valley Groundwater Basin portion of the county, and one each from the Foothill and Mountain inventory units, as defined in the 2001 Butte County Water Inventory/Analysis report. Additional at-large members shall be appointed; one from each incorporated municipality in the County: Chico, Oroville, Paradise, Gridley and Biggs; one from the agricultural community, one from the environmental community and one from each organized watershed group in the county. The operation of the Water Advisory Committee shall be governed by bylaws approved by the Board of Supervisors.

b. Sub-inventory Units.

1. Vina
2. M & T
3. Llano Seco
4. Durham/Dayton
5. Western Canal
6. Pentz
7. Esquon
8. Cherokee
9. Richvale
10. Thermalito
11. Biggs-West Gridley
12. Butte Sink
13. Butte
14. North Yuba
15. Angel Slough

16. Chico Urban Area

c. The local representatives of each sub-inventory unit shall be solely responsible for the development of the Basin Management Objective for their sub-inventory unit.

d. Sub-inventory units may be added, modified, or changed as deemed necessary by the stakeholders within the sub-inventory unit. All modifications and changes shall be reviewed by the WAC and approved by the Board.

33A-5 Appointments.

a. The Board shall consider all nominations for appointment to the Water Advisory Committee that meet the following criteria:

1. Candidates who reside, own property or have their principle place of business within the sub-inventory unit or entity which they would represent and are willing to serve in a voluntary capacity; and
2. Candidates nominated by the citizens of the Sub Inventory Unit.

b. Members of the WAC shall serve a four-year term. Terms shall be staggered by lot for two (2) years at the onset and open to reappointment for consecutive terms.

33A-6 Basin Management Objectives.

a. Determination of the BMO: The process instituting the BMO within each sub-inventory unit shall be established within one (1) year following approval of this ordinance

and incorporated into this ordinance by reference. The individual sub-inventory unit BMO shall be initially established, and re-established annually through input from the sub-inventory unit stakeholders. The individual BMO shall be approved by the Board at the first regular meeting of the Board in April of each year. The Board's approval of the BMO shall be based on:

1. Local sub-inventory unit stakeholder input; and
2. The recommendation of the Water Advisory Committee and the Water Commission and
3. Monitoring data and existing conditions of the aquifer system.

b. It is the intent of this chapter that there be one countywide adaptive management plan, incorporating all specific BMO determinations for the individual sub-inventory units.

c. It is the intent of the Board in adopting this chapter that groundwater management practices based on the established BMO criteria for one sub-inventory unit shall not result in exceeding the established BMO criteria in any other sub-inventory unit.

d. In the event that sub-inventory unit stakeholders do not initially establish or reestablish BMO criteria for their sub-inventory unit, the Water Advisory Committee shall establish BMO criteria for that sub-inventory unit and submit it to the Water Commission and the Board of Supervisors for approval.

33A-7 Monitoring BMO Compliance.

a. Monitoring programs designed to detect changes to groundwater elevations, groundwater quality and land subsidence are the key to proper assignment of, and compliance with, the BMO. The monitoring programs shall measure select wells, identified by the local sub-inventory unit stakeholders, to determine changes in groundwater elevation and changes in groundwater quality, and land subsidence. The County shall make available all groundwater monitoring data through the Department website in a timely manner.

33A-8 Monitoring Networks.

a. The monitoring networks used in the development of, and compliance with, the BMO may include as many of the following as are feasible: selected domestic and irrigation wells from water districts, private owners, municipal and industrial water suppliers and dedicated monitoring wells. Individual sub-inventory unit stakeholders may monitor additional wells for compliance with the BMO. Participation in monitoring activities by private landowners shall be on a voluntary basis.

B. Additional monitoring wells may be installed and monitored by the local stakeholders for BMO compliance.

33A-9 Monitoring Frequency.

a. Monitoring Frequency for Groundwater Elevations. At a minimum, groundwater elevations shall be monitored four times during the year; one measurement prior to the irrigation season in March, two measurements during peak groundwater use in July and August, and one measurement following the irrigation season in October. All monitoring data collected by stakeholders shall be submitted to the Department within thirty (30) days of collection.

1. Monitoring Frequency for Groundwater Quality: The frequency of groundwater quality monitoring shall be at a minimum of once a year during peak groundwater use (July or August). The following minimum groundwater quality measurements shall be taken:

i. Groundwater temperature

ii. Groundwater pH

iii. Groundwater electrical conductivity

2. Within each sub-inventory unit, increased frequency and location of groundwater quality monitoring and monitoring constituents may be determined and conducted by the local stakeholders. All monitoring data collected by stakeholders shall be submitted to the Department within thirty (30) days of collection.

b. Monitoring Frequency for Land Subsidence. Land subsidence monitoring shall be conducted on a continuous basis through the use of extensometers. Land Subsidence may also be monitored by resurveying existing

benchmarks in the sub-inventory unit area at a frequency determined by the local stakeholders. All monitoring data collected by stakeholders shall be submitted to the Department within thirty (30) days of collection.

33A-10. Changes in Monitoring.

a. Changes in Monitoring Frequency.

If evaluation of the groundwater elevation, groundwater quality, or land subsidence data indicate a need for greater monitoring frequency, the local stakeholders may make changes to the monitoring schedule once per calendar year. Such changes, if made, shall be submitted to the Department by April 1 of each year.

b. Changes in Monitoring Network.

If evaluation of the groundwater elevation, groundwater quality standards, or land subsidence criteria data indicates a need for a greater number of monitoring wells or survey monuments, the local stakeholders may make changes to their monitoring network once per calendar year. Such changes, if made, shall be submitted to the Department by April 1 of each year.

33A-11 Monitoring Protocol.

a. All data shall be collected and recorded through methods generally accepted in the applicable scientific field.

33A-12 Review of Technical Data.

a. Standard methods for review and analysis of the collected data shall be established by the Water Advisory Committee. Such data shall be reviewed by the Technical Advisory Committee and reported to the Water Commission and the Board annually pursuant to established protocol.

b. During the irrigation season, the Technical Advisory Committee shall review and analyze data for compliance with the current BMO. During the non-irrigation season, the focus shall be on review of BMO compliance for the previous irrigation season and development of new BMO criteria for the following year, if necessary. New BMO criteria shall be developed by sub-inventory unit stakeholders and presented at the first regular meeting of the Board in April of each year.

1. The Department shall establish methods for data collection, storage and dissemination. Methods for collecting groundwater elevations, groundwater quality, and land subsidence shall follow established quality assurance and quality control guidelines.

2. The Department shall disseminate the monitoring data through public presentations and through Internet access on the Department website. At a minimum, the Department shall publicly present findings from the monitoring program on an annual basis to the Board of Supervisors.

33A-13 Action by Technical Advisory Committee.

a. All BMO noncompliance issues shall be resolved through a collaborative process at the sub-inventory unit level, if at all possible. However, in the event that an area of BMO noncompliance is identified to the Department, the Technical Advisory Committee shall investigate and report to the Water Advisory Committee and Water Commission the areal extent and magnitude of the non-compliance. This information shall also be released to the public. This report shall be made in a timely manner not to exceed fourteen (14) days from the time that BMO noncompliance was identified. The Technical Advisory Committee shall not investigate and report any alleged or identified noncompliance in any area until Basin Management Objectives have been approved by the Board of Supervisors in all sub-inventory units within the area allegedly affected.

b. The Technical Advisory Committee shall then collect all available pertinent hydrologic data and investigate possible causes for the BMO non-compliance. The Technical Advisory Committee shall recommend actions to resolve the BMO non-compliance to the Water Advisory Committee, Water Commission, and the Department. The initial Technical Advisory Committee recommendations shall be made in a timely manner not to exceed thirty (30) days from the time at which BMO non-compliance was reported. The Technical Advisory Committee shall first make recommendations that focus on resolving the BMO non-

compliance through negotiations with all parties in the impacted/impacting area(s).

33A-14 Action by Water Advisory Committee.

a. If the noncompliance cannot be resolved through a collaborative process at the sub-inventory unit level or through the review and recommendations of the Technical Advisory Committee and if negotiations with parties in the impacted area do not result in a timely and positive action to re-establish BMO compliance within five (5) days, the Water Advisory Committee may recommend a plan to the Water Commission to modify, reduce or terminate groundwater extraction in the impacted/impacting area(s). This action shall only be taken on the recommendation of the Water Advisory Committee after a thorough technical review of the data."

Section 2. Severability.

If any provision of this Ordinance or the application thereof to any person or circumstances is for any reason held to be invalid by a court of competent jurisdiction, such provision shall be deemed severable, and the invalidity thereof shall not affect the remaining provisions or other applications of the Ordinance which can be given effect without the invalid provision or application thereof.

Section 6. Effective Date and Publication. This Ordinance shall take effect thirty (30) days after the date of its passage. The Clerk of

the Board of Supervisors is authorized and directed to publish this ordinance before the expiration of fifteen (15) days after its passage. This Ordinance shall be published once, with the names of the members of the Board of Supervisors voting for and against it, in the Enterprise-Record, a newspaper of general circulation published in the County of Butte, State of California.

PASSED AND ADOPTED by the Board of Supervisors of the County of Butte, State of California, on the 10th day of February, 2004, by the following vote:

AYES: Supervisors Dolan, Houx, Josiassen, Yamaguchi and Chair Beeler

NOES: None

ABSENT: None

NOT VOTING: None

R.J. BEELER, Chair of the
Butte County Board of Supervisors

ATTEST:

PAUL McINTOSH, Chief
Administrative Officer
and Clerk of the Board

By

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Appendix C
Butte Basin Water Users Association 2004 Groundwater Status Report

GROUNDWATER STATUS REPORT

Prepared for

BUTTE COUNTY WATER COMMISSION

by

BUTTE BASIN WATER USERS ASSOCIATION

February 2005

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FOREWORD

In November 1996, the voters in Butte County voted in "AN ORDINANCE TO PROTECT THE GROUNDWATER RESOURCES IN BUTTE COUNTY". One of the stated purposes of the Ordinance was that "The groundwater underlying Butte County is a significant water resource which must be reasonably and beneficially used and conserved for the benefit of the overlying land by avoiding extractions which harm the Butte Basin aquifer, causing exceedance of the safe yield or a condition of overdraft." The ordinance is now codified as Chapter 33 of the Butte County Code relating to groundwater conservation.

Prior to 2000, Butte County Code, Chapter 33, required that the Groundwater Status Report be delivered to the County by January 15th of each year. During 2000, the Butte County Board of Supervisors amended Chapter 33 to require the Groundwater Status Report be delivered by February 21st of each year.

Section 3.01 – "Groundwater Planning Process" requires that the Butte Basin Water Users Association prepare a groundwater status report based upon the data gathered and analyzed pursuant to Section 3.02 – "Groundwater Monitoring". The Groundwater Status Report is in response to this requirement.

The Department of Water Resources Northern District in Red Bluff supplied monitoring information and hydrographs that are used in this report and we would like to thank them for their cooperation and support in supplying this information.

The purpose of this report is to summarize groundwater level and land subsidence data collected by Butte County and DWR up to and through October 2004. The report presents locations of wells and extensometers, information related to groundwater level trends, and hydrographs depicting groundwater levels over time. It is our intent that this information be used to provide a better basis for understanding groundwater level trends in Butte County.

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Bernoy Bradford, Chairman
Butte Basin Water Users Association

SUMMARY

Based upon the water level measurements taken in 2004, the following points can be made relative to the status of groundwater in Butte County:

- It was noted in the previous status report that groundwater levels in many of Butte County's groundwater dependant sub-areas have steadily declined since the late 1990's. Although the groundwater levels have not recovered to the levels recorded in the late 1990's, the decline has generally stabilized and there is some modest reversal. The notable exception is the Pentz Sub-area where the groundwater level in the key well has continued to decline. It is now below levels measured during either of the recent drought periods (1976-77 and early 1990's).

- The, previously noted, rate of decline in the groundwater levels over the last 6 years varied from about 0.8 to 2.0 feet per year. These declines seem to have stabilized in the past year or two. It is believed that these declines are primarily the result of precipitation patterns and not the result of increased groundwater use. An examination of historical trends on the key hydrographs presented in the report suggests that once precipitation returns to a more normal pattern that groundwater levels should recover. However, the situation should be evaluated closely over the next few annual updates.

- Maintenance on one key well in the California Water Service (Chico) Sub-area prevented measurement of groundwater levels in that well for all months with the exception of December 2004. The 2004 annual groundwater level fluctuation in the other key well was about 20 feet. The minimum depth to water observed in the California Water Service Sub-area key wells during 2004 was 63 feet (Well 1-04) and the maximum was 130 feet (Well 33-01). Groundwater level measurements in the key well that was measured regularly (Well 1-04) indicate a pattern similar to that noted in previous summary statements. The decline noticed over the past few years seems to have stabilized, and modestly reversed, in the two most recent spring measurements.

- No land subsidence was detected in the County from an evaluation of the extensometer records in the Western Canal and M&T Sub-areas. Extensometers were installed in the Chico, Richvale and Biggs-West Gridley Sub-area in 2003. Instrumentation of these wells is in progress and records from these instruments will be evaluated in the 2005 annual update.

INTRODUCTION

This report is a compilation of information related to the monitoring activities in Butte County and includes groundwater hydrographs from "key wells" within each hydrologic sub-area. Groundwater hydrographs for the other wells monitored in the County are available on the DWR website at http://wdl.water.ca.gov.

Most of the material contained in this report was excerpted directly from a draft report titled Butte County Groundwater Analysis, dated December 2000, which was prepared by the Department of Water

Resources, Northern District. This was done to achieve a level of consistency between the findings of the BBWUA, and those of the Butte County Inventory Analysis, which was prepared cooperatively by Butte County Department of Water and Resource Conservation, Camp, Dresser and McKee, Inc., and the Department of Water Resources in March 2000.

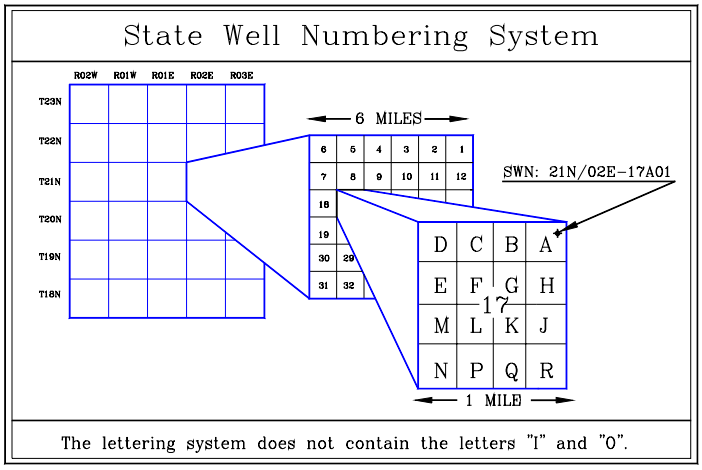
MEASUREMENT FREQUENCY AND PERIOD OF RECORD

Groundwater level monitoring in the Sacramento Valley portion of Butte County is currently being conducted by several private and public agencies. Historically, the Department of Water Resources has maintained the most comprehensive, long-term groundwater level monitoring grid, with approximately 210 different wells monitored over the last 50 years in the Sacramento Valley portion of Butte County. Within this period of time, the annual size of the monitoring grid has fluctuated from as few as 50 wells, to as many as 180 wells, depending upon the activity of special studies in the area. Until 1989, the majority of these wells were measured semi-annually, during the spring and fall. Beginning in 1990, the frequency of groundwater level monitoring was increased to monthly, before returning to a semi-annual measurement in 1995. In 1997, the Butte County Department of Water and Resource Conservation, in cooperation with the Department of Water Resources, began to expand the number and frequency of groundwater level monitoring in the valley portion of Butte County. Currently 104 wells are monitored in Butte County. These wells consist of a mixture of domestic and irrigation wells, along with dedicated observation wells. Approximately 29 of the 104 wells are equipped to continuously monitor and record changes in groundwater levels. The remaining wells are measured four times per-year, during March, July, August and October. The locations of wells monitored in Butte County are shown in Appendix A.

In addition to the groundwater level monitoring conducted by Butte County and Department of Water Resources, California Water Service Company currently measures monthly groundwater levels in approximately 60 municipal groundwater supply wells in the Chico Urban area. California Water Service wells are typically deep wells that draw from the lower Tuscan Formation aquifer system. The U. S. Bureau of Reclamation and USGS are not currently measuring groundwater levels in Butte County, but both agencies have monitored wells in the past.

MONITORING WELL LOCATIONS

Locations of Butte County monitoring wells, including continuously monitored wells and extensometers, are shown in Appendix A. The well locations are approximate, but are estimated to be within 500 feet. The monitoring wells are numbered using the State Well Numbering System. The State Well Numbering System identifies each well by its location according to the township, range, section, and tract system. The figure below illustrates how a State Well Number (SWN) is assigned.

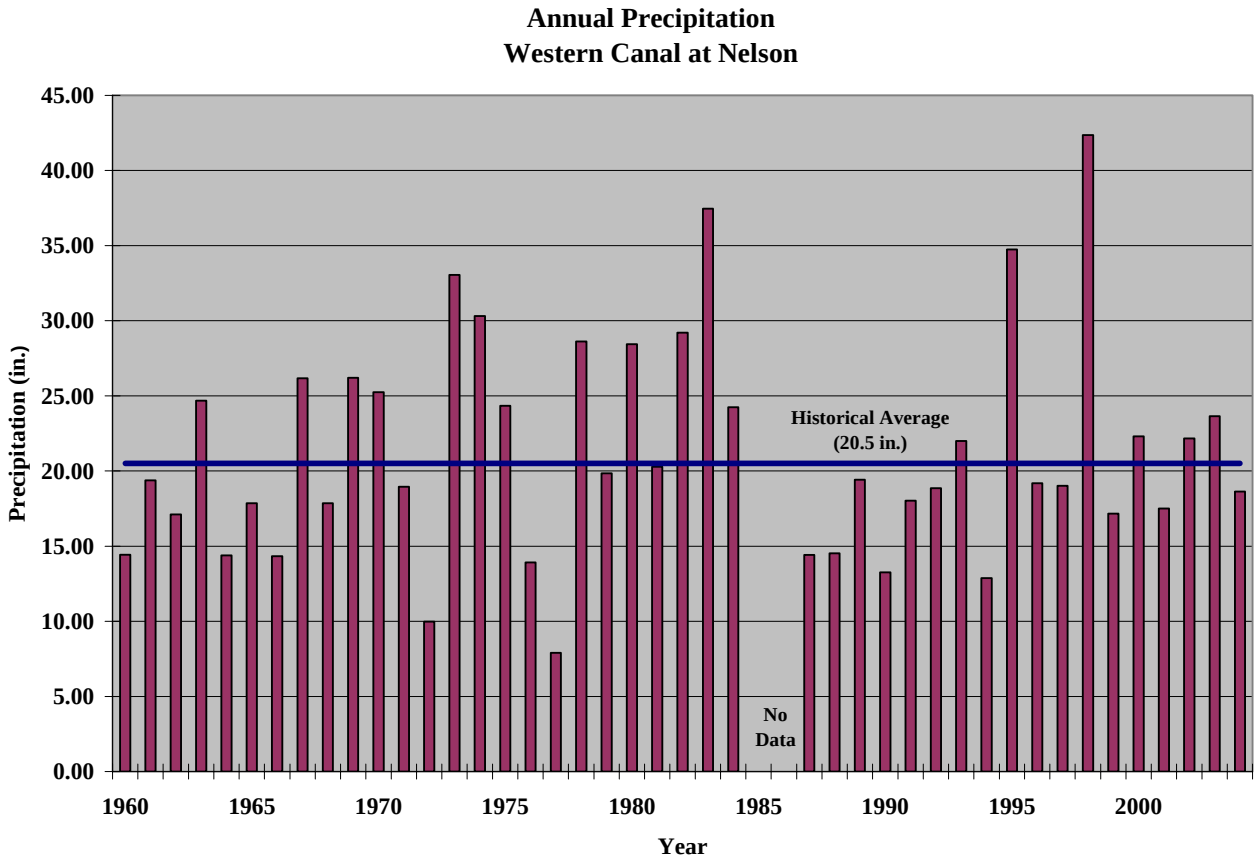


LAND SUBSIDENCE

The locations of the five extensometers that measure land subsidence within the County are shown in Appendix A. These extensometers were installed during 1999 and 2003. Instrumentation is currently underway on several of the extensometers. Records from these extensometers are available by contacting the Department of Water Resources Northern District. To date, no land subsidence has been recorded in Butte County

PRECIPITATION

Precipitation for the water year ending September 30, 2004 at the Western Canal Nelson Climatological Observation Station was 18.64 inches, which is 1.89 inches below the 75-year average of 20.53 inches. The figure below represents the total annual precipitation at the Western Canal Station for the 42-year period 1961 through 2004.



2004 Update

Precipitation for the 2004 water year was slightly below average, and follows five year trend of below normal or near normal precipitation. Since 1987 there have only been two years that are classified as wet. These occurred in 1995 and 1998. Excluding these two years, the 1987 to 2004 time period would be considered dryer than normal.

SURFACE WATER DELIVERIES

Surface water is an important component to aquifer recharge in the Butte Basin. During the 2004 water year just less than 900,000 acre-feet of water were delivered to Western Canal Water District and the Joint Water District Board. The 2004 water deliveries were nearly 100,000 acre-feet less than what was delivered in 2003, and approximately 350,000 acre-feet higher than what was delivered in 1991. The increase in water demand since 1991 is primarily the result of late season water needs for rice straw decomposition and the waterfowl habitat. Summarized below are the deliveries to Western Canal Water District and the Joint Water District Board for the years 1991 to 2004 in acre feet.

Water Year	Western Canal Water District	Joint Water District Board	Total
1991	185,147	344,768	529,915
1992	198,595	349,036	547,631
1993	214,534	515,292	729,827
1994	224,754	586,622	811,377
1995	210,117	568,481	778,598
1996	257,183	615,004	872,187
1997	275,675	658,540	934,214
1998	229,521	590,727	820,248
1999	293,402	690,847	984,248
2000	325,374	707,018	1,032,392
2001	303,074	718,489	1,021,562
2002	299,206	597,529	896,735
2003	282,251	682,403	964,654
2004	263,192	625,883	889,075

GROUNDWATER LEVEL TRENDS

Groundwater levels fluctuate seasonally in response to recharge and extraction. Precipitation, applied irrigation water, local creeks and rivers, and Thermalito Afterbay all recharge groundwater in Butte County. Levels are usually highest in the spring and lowest during the irrigation season in the summer months. Groundwater in the valley portion of Butte County generally flows from northeast to southwest.

Long-term fluctuations occur when there is an imbalance between aquifer recharge and discharge. If long-term recharge exceeds the long-term discharge then groundwater levels will increase. Conversely, if long-term discharge exceeds long-term recharge then groundwater levels will decline. These long-term changes are linked to increased or decreased groundwater extraction or variations in recharge associated with wet or dry climatic cycles.

The seasonal and long-term changes in groundwater levels are determined using water level measurements in wells. This data is typically depicted on hydrographs, which are graphical plots of the water level measurement history. Prior to 1997, data points for each of the hydrographs in Butte County generally consisted of two annual measurements. Since 1997, four measurements are recorded each year. The addition of these summer measurements gives the hydrographs the appearance of greater fluctuation.

Described below, by sub-area, are groundwater level assessments for key wells. Each sub-area assessment includes a discussion of the land use, the historical trend in groundwater levels, and a 2004 update describing recent trends and pertinent findings. The key wells were chosen as being representative of groundwater level conditions within each sub-area. It should be noted that the sub-areas are consistent with the sub-inventory units used in Butte County's Water Inventory Analysis.

When reviewing the hydrographs for the key wells, it is important to note that the solid circles (dots) indicate a static groundwater level measurement while other symbols indicate a measurement that has

been qualified as questionable. The Department of Water Resources assigns a numerical code to all questionable groundwater level measurements in an effort to help increase the accuracy of data analysis. Questionable measurement codes are used to differentiate between static versus pumping groundwater level measurements, identify if nearby wells are in operation during the measurement, or note that other conditions were present that could impact the accuracy of the measurement. A questionable measurement code key is show on each hydrograph.

The accuracy of the groundwater levels shown on these graphs is 0.1 feet on the depth scale and within 1 USGS topographic map contour interval on the elevation scale. Typically in Butte Basin the contour interval is 5 feet.

When interpreting short-term changes in groundwater levels, care should be used to compare only those measurements taken during similar times of the year. When using a hydrograph to evaluate long-term groundwater level data, comparison of the spring measurements is usually recommended. Discontinuities or breaks in a hydrograph represent missing measurements. Following is the list of the key wells presented in this report:

- North Yuba Sub-Area (Well Number 17N/03E-03D01M)
- Thermalito Sub-Area (Well Number 18N/03E-21G01M)
- Western Canal Sub-Area (Well Number 20N/01E-35C01M)
- Richvale Sub-Area (Well Numbers 19N/01E-28R01M & 19N/01E-35B01M)
- Pentz Sub-Area (Well Number 21N/02E-26F01M)
- Esquon Sub-Area (Well Number 20N/02E-09L01M)
- Butte Sink Sub-Area (Well Number 17N/01E-17F01M)
- Butte Sub-Area (Well Number 17N/03E-16N01M)
- Biggs-West Gridley Sub-Area (Well Number 18N/02E-16F01M)
- M & T Sub-Area (Well Number 22N/01E-29R01M)
- Durham-Dayton Sub-Area (Well Number 20N/02E-06Q01M)
- Vina Sub-Area (Well Number 23N/01W-09E01M)
- Cherokee Sub-Area (Well Numbers 20N/02E-13E02M & 20N/02E-24C02M)
- Llano Seco Sub-Area (Well Numbers 20N/01W-26H02 & 20N/01E-18L02M)
- California Water Service (Chico) Sub-Area (Well Numbers 1-04 and 33-01)

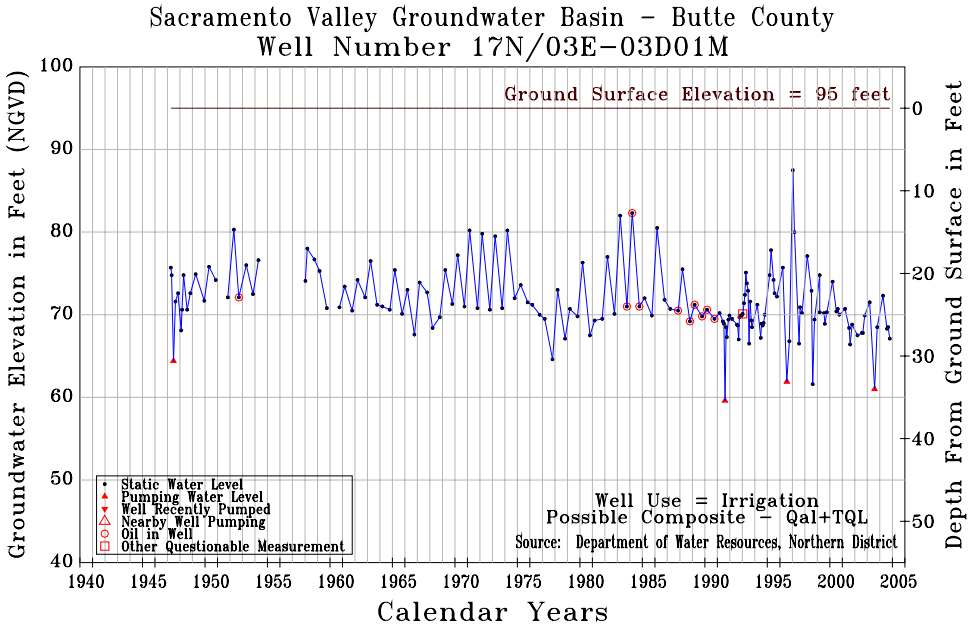
North Yuba Sub-Area (Well Number 17N/03E-03D01M):

The figure below is a hydrograph for well 17N/03E-03D01M, located in the western portion of the North Yuba Sub-area. The area surrounding the well is characterized by rural, agricultural land use supported by the application of both surface and groundwater. The well is an active irrigation well drawing water from the upper and middle portions of the aquifer system, with a groundwater level measurement record dating back to the late 1940s. The groundwater level in this well was monitored on a semi-annual basis until 1991, on a monthly basis from 1991 to approximately 1995, and is currently being measured four times per year, March, July, August and October.

Historical Trend

The figure shows that the seasonal fluctuation in groundwater levels is about 5 to 10 feet during years of normal precipitation and 10 to 15 feet during years of drought. Long-term comparison of spring-to-

spring groundwater levels shows about a 10-foot decline in groundwater levels associated with 1976-77 and 1986-94 droughts, followed by recovery to pre-drought levels. Overall comparison of spring-to-spring groundwater levels indicates that the upper to middle aquifer system in this area has changed little since the 1940s.



Hydrograph for Well 17N/03E-03D01M

2004 Update

The downward trend since 1999 that was noted in previous reports appears to be reversing with two consecutive, increasing spring groundwater level measurements. The spring 2003 and spring 2004 groundwater level measurements in this well were slightly higher than the spring 2002 level. Even with the increase over the last two years, spring water levels in this well are still lower than those measured in the late 1990's and 2000. The trend is probably climate related since the precipitation has generally been at or below the historical average for the past five years. The one noticeably low measurement was taken during the summer of 2003 was a questionable measurement and probably represents non-static conditions. The unusually high spring 1998 groundwater level is likely the result of an exceptionally wet winter and likely indicates that when precipitation patterns return to a more normal trend that groundwater levels should recover. An examination of the overall record reveals that long-term depletion of groundwater in storage is probably not occurring at this time.

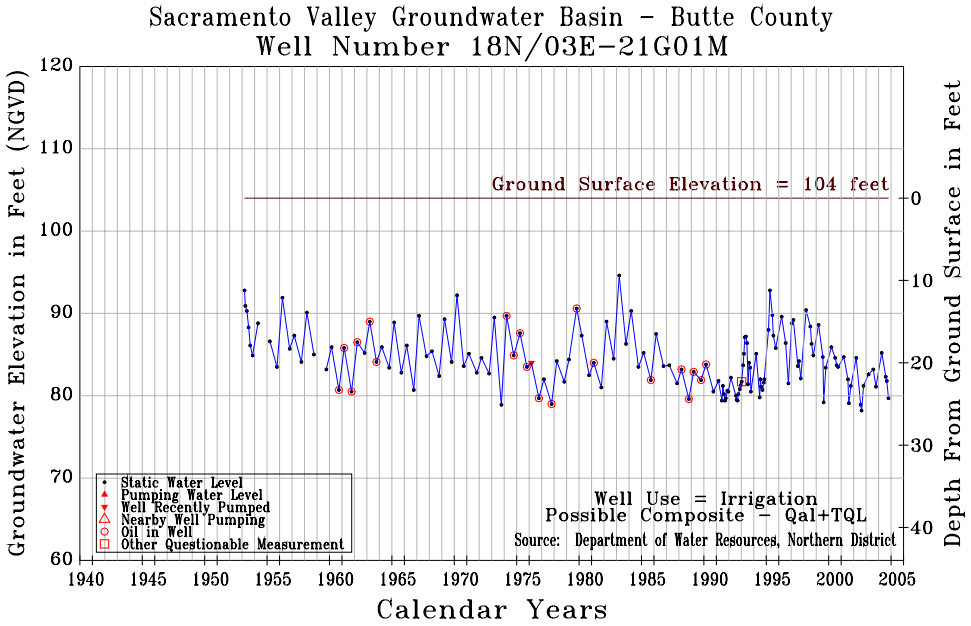
Thermalito Sub-Area (Well Number 18N/03E-21G01M):

The figure below is a hydrograph for well 18N/03E-21G01M, located in the southern portion of the Thermalito Sub-area, approximately one-mile west of the Feather River. The area surrounding this well is characterized as rural agricultural. Agricultural cultivation in this area consists of orchard crops supported primarily by groundwater extraction. This well is an active irrigation well producing groundwater from the shallow to intermediate portion of the aquifer system. The groundwater level measurement record dates back to the late 1940s. Groundwater levels in this well were monitored on a semi-annual basis until 1991, on a monthly basis from 1991 to about 1994, and are currently being monitored four times a year during March, July, August and October.

Historical Trend

This figure shows an interesting spring to summer fluctuation in groundwater levels between normal and drought years. The range of spring to summer fluctuation in groundwater levels is about 5 to 8 feet during years of normal precipitation, but then decreases during years of drought to about 2 to 5 feet. A closer examination of the hydrograph shows that the decrease in spring to summer fluctuation is the result of a drop in spring groundwater levels, while the summer levels remain constant. The drop in spring groundwater levels indicates that the aquifer system in this area does not fully recharge during years of drought. The quick drop, then relatively constant summer water level during drought years, indicates that the aquifer system in this area is likely being recharged from a steady source of surface water; in this case the Feather River. During drought years, groundwater levels drop relatively quickly until they reach the point where the aquifer is interconnected with the Feather River. The hydrograph indicates that, in this area, the surface water - groundwater interconnection takes place at about 23 feet below ground surface, or at an elevation of about 80 feet above mean sea level.

Long-term comparison of spring-to-spring groundwater levels show an overall decline of 5 to 8 feet during the 1976-77 and 1986-94 droughts, followed by recovery to pre-drought levels. Further long-term comparison of spring-to-spring groundwater levels during normal years indicates very little change since the late 1950s.



Hydrograph for Well 18N/03E-21G01M

2004 Update

It was noted in the previous report that successive spring groundwater levels had declined steadily in this well by about 1.5 feet per year since 1998. This trend is less evident in the most recent spring groundwater level measurement. Fall and summer groundwater levels have also declined but at a slower rate of about .5 feet per-year during the same period. Similarly, the trend in the summer and fall measurements is less evident in the most recent groundwater level measurements. These noted declines are probably climate related and not the result of over utilization of the groundwater resource. An examination of the overall record reveals that long-term depletion of groundwater in storage is probably

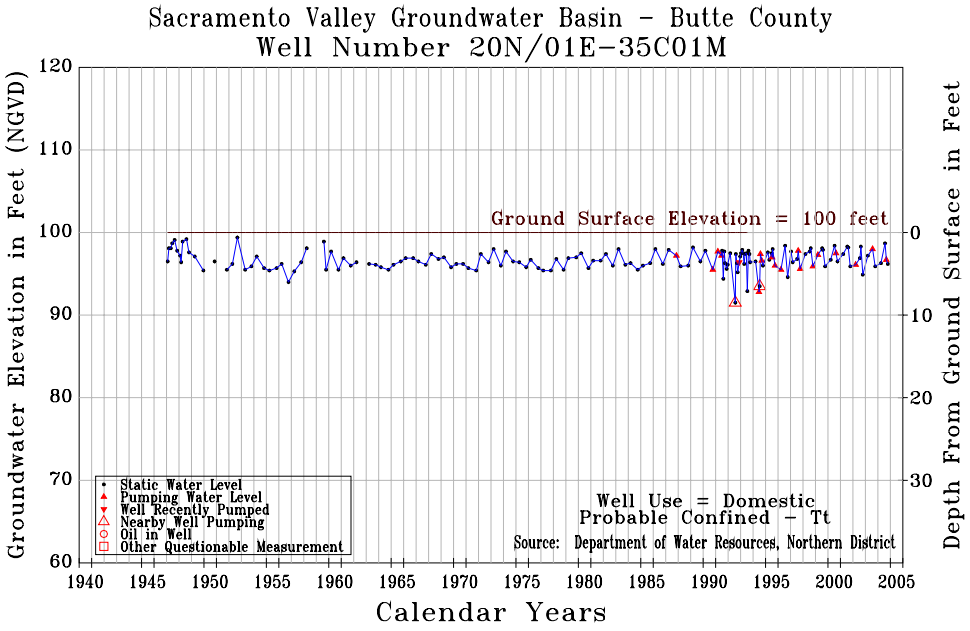
not occurring at this time. It is anticipated that when annual precipitation returns to a more normal pattern that groundwater levels will fully recover.

Western Canal Sub-Area (Well Number 20N/01E-35C01M):

The figure below is a hydrograph for an active domestic well 20N/01E-35C01M, in the central portion of the Western Canal Sub-area. The area surrounding this well is characterized as rural agricultural. Agricultural cultivation in this area consists of rice production supported by surface water in normal years and a combination of surface and groundwater in drought years. The well is constructed in the uppermost aquifer system. The groundwater level measurement for this well record dates back to the mid-1960s. Groundwater levels in this well were monitored on a semi-annual basis until 1991, and on a monthly basis from 1991 to about 1994, and are currently being monitored four times a year during March, July, August and October.

Historical Trend

The figure shows that the spring to summer fluctuation in groundwater levels averages only 2 to 3 feet during years of normal precipitation and 4 to 8 feet during years of drought. Summer groundwater level monitoring indicates that the upper aquifer recharges during summer months due to flood irrigation for rice production. In areas of flood irrigation, it is important that domestic wells have an adequate annular seal in order to restrict potential contamination from surface sources and maintain a high quality source of domestic groundwater. Long-term comparisons of spring-to-spring groundwater levels show almost no change associated with the 1976-77 drought and only a small decline associated with the 1986-94 drought. Further long-term analysis of spring-to-spring groundwater levels indicates very little change since the late 1940s.



Hydrograph for Well 20N/01E-35C01M

2004 Update

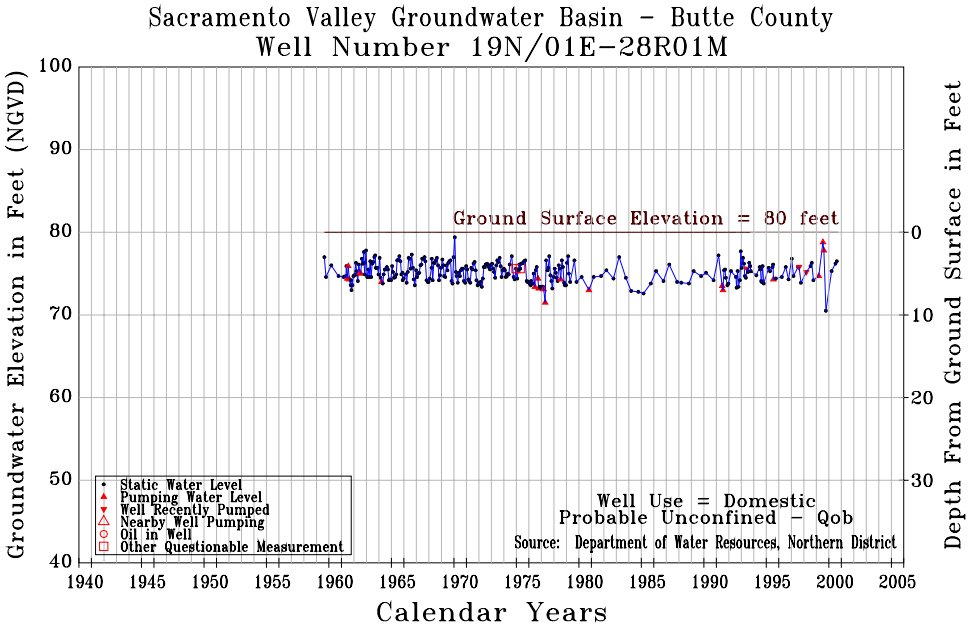
No recent trends or points of concern were observed. At this time groundwater is not being depleted from storage in this sub-area.

Richvale Sub-Area (Well Number 19N/01E-28R01M & 19N/01E-35B01M):

The figure below is a hydrograph for well 19N/01E-28R01M, located in the western portion of the Richvale Sub-area. The area surrounding this well is characterized as rural agricultural. Agricultural cultivation in this area consists of rice production supported by surface water in normal years and a combination of surface and groundwater in drought years. The well is an active domestic well constructed in the upper portion of the aquifer, with a groundwater level measurement record dating back to the late-1950s. Groundwater levels in this well were monitored on a monthly basis from 1959 to 1979, on a semi-annual basis (spring and fall) from 1979 to 1991 and on a monthly basis again from 1991 to about 1994, and on a semi-annual basis until measurements were discontinued in 2000.

Historical Trend

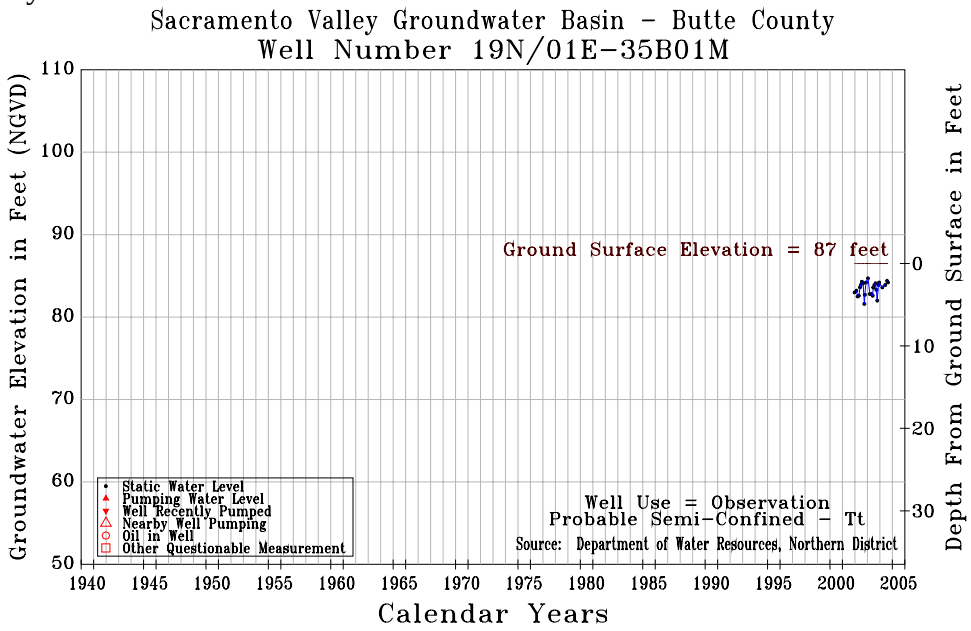
The figure shows that the spring to summer fluctuation of groundwater levels in the unconfined portion of the aquifer system averages only 3 to 4 feet during years of normal precipitation and 4 to 5 feet during years of drought. Close examination of the spring to summer fluctuations indicates that the upper aquifer recharges during summer months due to flood irrigation for rice production. In areas of flood irrigation, it is important that domestic wells have an adequate annular seal in order to restrict potential contamination from surface sources and maintain a high quality source of domestic groundwater. Long-term comparison of spring-to-spring groundwater levels show almost no change in groundwater levels associated with either the 1976-77 and or the 1986-94 droughts. Further long-term analysis of spring-to-spring groundwater levels indicates very little change in groundwater levels since the late 1950s.



Hydrograph for Well 19N/01E-28R01M

Well 19N/01E-35B01 was chosen to replace 19N/01E-28R01M as a key well in the Richvale Sub-area. This is a new dedicated monitoring well that was installed by Butte County during 2001. This well is in the west central portion of the sub-area east of the original key well. Measurements in this well

represent groundwater conditions at a depth of 95-200 feet, in the semi-confined portion of the Upper Tuscan aquifer system.



Hydrograph for Well 19N/01E-35B01M

2004 Update

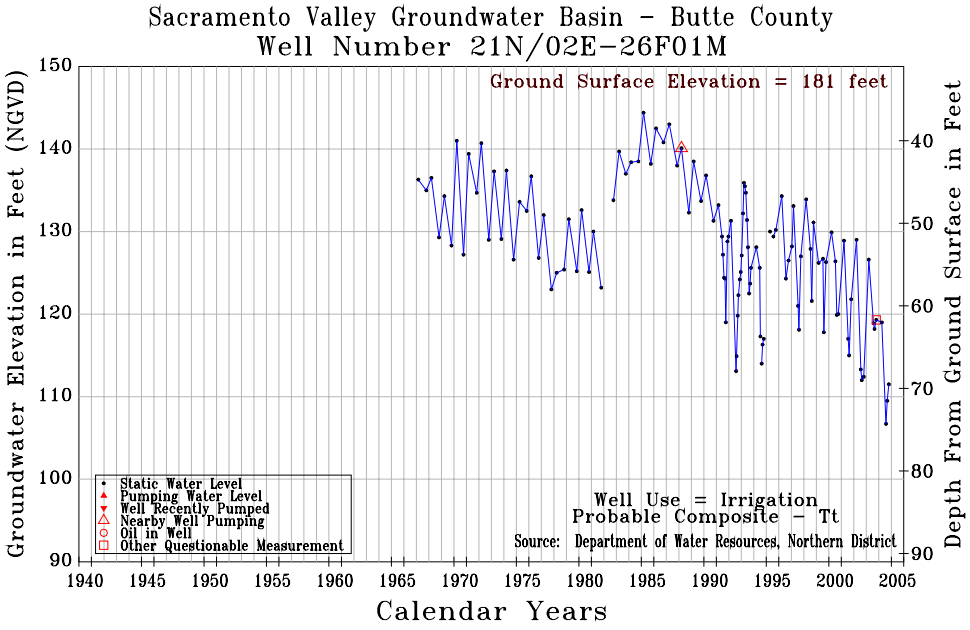
An evaluation of data from both key wells reveals that groundwater levels have changed very little since about 1960, and that groundwater in storage is not currently being depleted in this sub-area.

Pentz Sub-Area (Well Number 21N/02E-26F01M):

The figure below is a hydrograph for an active irrigation well 21N/02E-26F01M, just west of Highway 99E, near the intersection of Durham-Pentz Road and Oro-Chico Highway. Within a two-mile radius of the well, groundwater is used to support agricultural production of orchard and row crops, and small-scale industrial uses associated with a beverage distribution plant. The well is a deep irrigation well with shallow casing, and a groundwater level measurement record dating back to the mid-1960s. Groundwater levels in this well represent a mixture of the unconfined and confined portions of the aquifer system. The groundwater levels in this well were monitored on a semi-annual basis (spring and fall) until 1991, on a monthly basis from 1991 to about 1994, and are currently being monitored four times a year during March, July, August and October.

Historical Trend

The figure shows that the average seasonal fluctuation in groundwater levels averages about 5 to 10 feet during years of normal precipitation and up to 20 feet during years of drought. Long-term comparison of spring-to-spring groundwater levels shows a small decline in groundwater levels associated with the 1976-77 drought, followed by a larger decline associated with the 1986-94 drought. Groundwater levels in this well appear to recover from the 1986-94 drought to groundwater levels similar to those of the early 1980s. However, further long-term analysis of spring-to-spring groundwater levels indicates a 5 to 10 foot decline in groundwater levels since the late 1960s.



Hydrograph for Well 21N/02E-26F01M

2004 Update

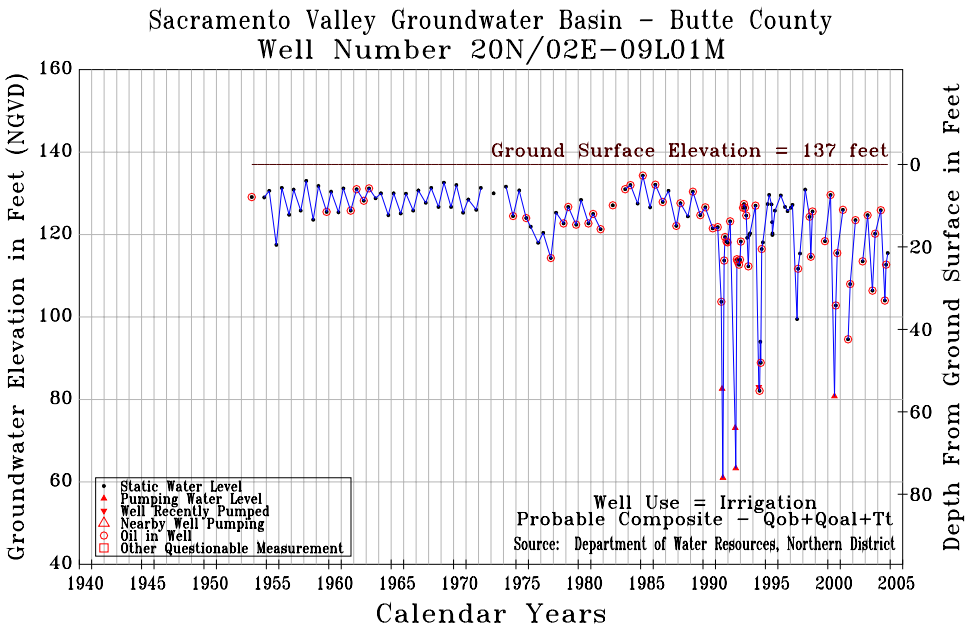
Since 1996, spring, summer, and fall groundwater levels in this well have declined at a rate of about one foot per-year. Currently groundwater levels lower than those measured during the drought of the early 1990's. The reason for the decline is not fully known; however, it is probably related to a combination of factors, including climate patterns and changes in groundwater usage in the area. Hopefully, when precipitation returns to a more normal pattern, the downward trend will reverse itself. This sub-area needs to be watched closely in the future.

Esquon Sub-Area (Well Number 20N/02E-09L01M):

The figure below is a hydrograph for an active irrigation well 20N/02E-09L01M, in the southern portion of the Esquon Sub-area. The area surrounding the well consists primarily of rice production using both surface and groundwater. The well is a deep irrigation well with shallow casing, and a groundwater level measurement record dating back to the 1950s. Groundwater levels in this well represent a mixture of the unconfined and confined portions of the aquifer system. The groundwater levels in this well were monitored on a semi-annual basis until 1991, on a monthly basis from 1991 to about 1994, and are currently being monitored four times a year during March, July, August and October

Historical Trend

The figure shows that the spring to summer fluctuation in groundwater levels averages 10 to 20 feet during years of normal precipitation, and up to 40 feet during the 1994 drought. Long-term comparison of spring-to-spring groundwater levels shows a small decline in groundwater levels associated with the 1976-77 drought, followed by a similar decline associated with the 1986-94 drought. Groundwater levels in this well appear to recover from the 1986-94 drought to groundwater levels similar to those of the early 1980s. However, further long-term analysis of spring-to-spring groundwater levels indicates about a 5-foot decline in groundwater levels since the late 1950s.



Hydrograph for Well 20N/02E-09L01M

2004 Update

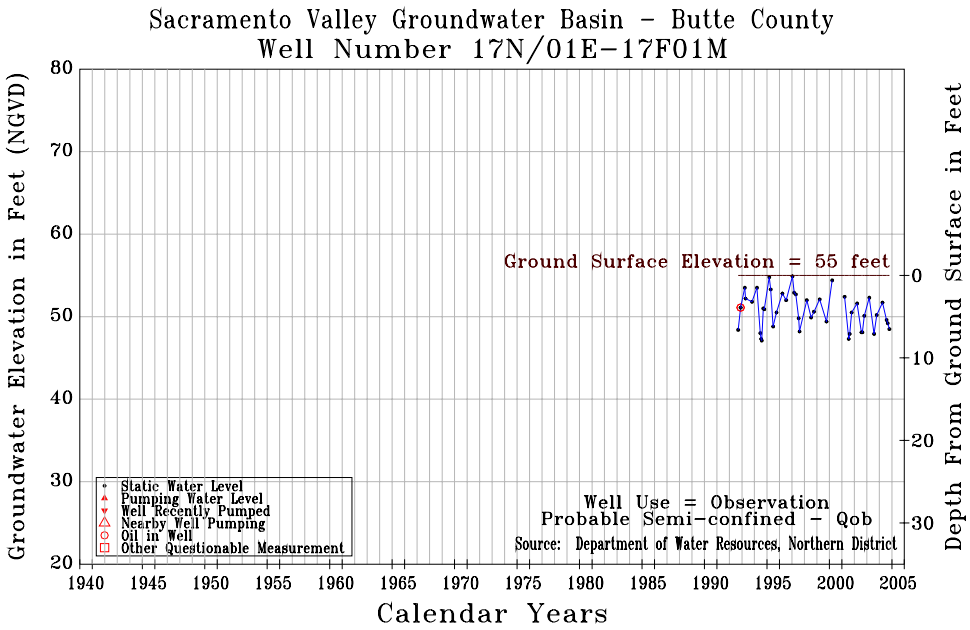
It was noted in the previous report that since 2000 spring and fall groundwater levels have declined in this area at an annual rate of about one foot per year. This trend is less evident in the two most recent spring groundwater level measurements. The noted decline is probably climate related and not from over utilization of the groundwater resource. The large downward spikes on the hydrograph that appear after 1990 are summer measurements that reflect the pumping and not static groundwater levels. Summer groundwater levels were not measured prior to 1990. The sub-area will probably fully recover when precipitation returns to a more normal pattern, but this sub-area should be closely watched in the future.

Butte Sink Sub-Area (Well Number 17N/01E-17F01M):

The figure below is a hydrograph for well 17N/01E-17F01M, in the northwestern portion of the Butte Sink Sub-area. The land use surrounding this well is characterized as native riparian and agricultural. Agricultural cultivation in this area consists of rice production supported primarily by surface water. Surface water is also used as the primary source for flooding of native riparian land for waterfowl habitat. This well is a dedicated monitoring well constructed in the upper to middle portions of the aquifer, with a groundwater level measurement record dating back to 1992. The groundwater levels in this well were monitored on a monthly basis from 1992 to 1995, and are currently monitored four times a year during March, July, August and October.

Historical Trend

The figure shows that the spring to summer fluctuation of groundwater levels in the unconfined portion of the aquifer system averages only 3 to 5 feet during years of normal precipitation and 5 to 8 feet during years of drought. Long-term comparison of spring-to-spring groundwater levels shows little change in spring groundwater levels from 1986-94 drought. Further long-term analysis of spring-to-spring groundwater levels is not possible due to the short monitoring history.



Hydrograph for Well 17N/01E-17F01M

2004 Update

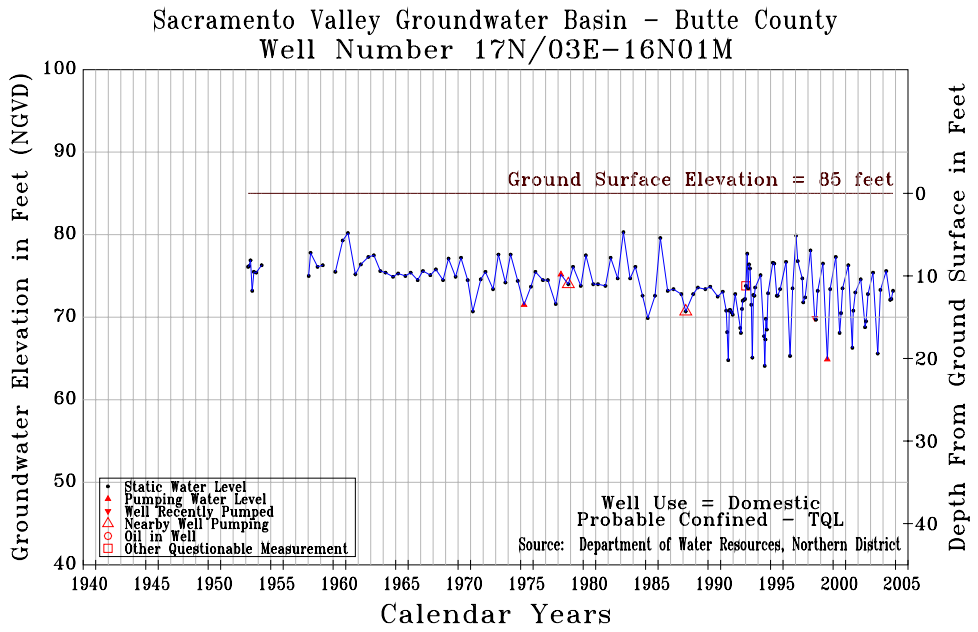
Examination of this record reveals that following 1997, groundwater levels declined about three feet. Since that time groundwater levels have remained relatively stable at that level. It is unknown why the level dropped, and it is not considered significant at this time. Groundwater in storage is not being depleted in the sub-area at this time.

Butte Sub-Area (Well Number 17N/03E-16N01M):

The figure below is a hydrograph for well 17N/03E-16N01M, in the southeastern portion of the Butte Sub-area. The area surrounding this well is characterized as rural agricultural. Agricultural cultivation in this area consists primarily of orchard crops supported by groundwater. The well is an active domestic well constructed over the upper and middle portions of the aquifer, with a groundwater level measurement record dating back to the mid-1950s. The groundwater levels in this well were monitored on a semi-annual basis until approximately 1991, on a monthly basis from approximately 1991 to 1995, and are currently monitored four times a year during March, July, August and October.

Historical Trend

The figure shows that the spring to summer fluctuation of groundwater levels in the unconfined portion of the aquifer system averages only 3 to 6 feet during years of normal precipitation and 5 to 10 feet during years of drought. Long-term comparisons of spring-to-spring groundwater levels shows a small decline in spring groundwater levels associated with the 1976-77 and the 1986-94 droughts, followed by recovery to normal levels. Further long-term analysis of spring-to-spring groundwater levels indicates very little change in groundwater levels since the 1950s.



Hydrograph for Well 17N/03E-16N01M

2004 Update

Evaluation of recent data points of the hydrograph indicates that spring groundwater levels have declined steadily in this well by about 0.8 feet per year since 1998. This trend is less evident in the two most recent spring measurements. Fall and summer groundwater levels, however, have remained relatively constant throughout this same time period. The decline in the spring groundwater levels is probably climate related and not the result of over utilization of the groundwater resource. An examination of the overall record reveals that long-term depletion of groundwater in storage is probably not occurring at this time. It is anticipated that when annual precipitation returns to a more normal pattern that groundwater levels will fully recover.

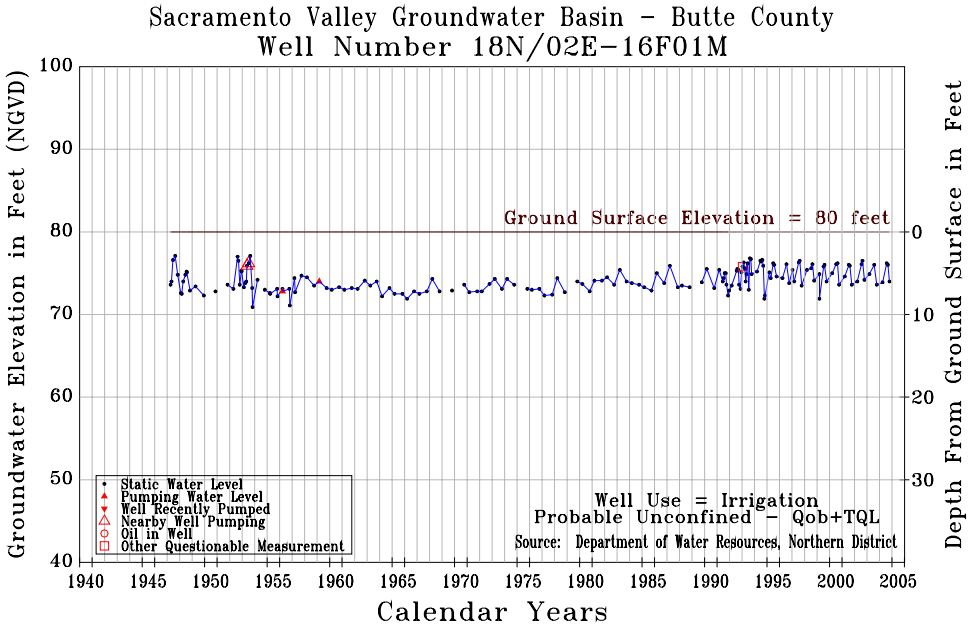
Biggs-West Gridley Sub-Area (Well Number 18N/02E-16F01M):

The figure below is a hydrograph for well 18N/02E-16F01M, in the north-central portion of the Biggs-West Gridley Sub-area. The area surrounding this well is characterized as rural agricultural. Agricultural cultivation in this area consists primarily of rice production supported by a combination of surface and groundwater. The well is an active irrigation well constructed in the upper portion of the aquifer, with a groundwater level measurement record dating back to the late 1940s. Groundwater levels in this well were monitored on a semi-annual basis until 1991, on a monthly basis from 1991 to about 1994 and are currently being monitored four times a year in March, July, August and October.

Historical Trend

The figure shows that the spring to summer fluctuation of groundwater levels in the unconfined portion of the aquifer system averages only 1 to 2 feet during years of normal precipitation and 2 to 4 feet during years of drought. Close examination of the spring to summer fluctuations indicate that groundwater levels rise during the summer months as the upper aquifer recharges due to flood irrigation for rice production. Long-term comparison of spring-to-spring groundwater levels shows almost no change in groundwater levels associated with either the 1976-77 and or the 1986-94 droughts. Further long-term

analysis of spring-to-spring groundwater levels indicates very little change in groundwater levels since the late 1940s.



Hydrograph for Well 18N/02E-16F01M

2004 Update

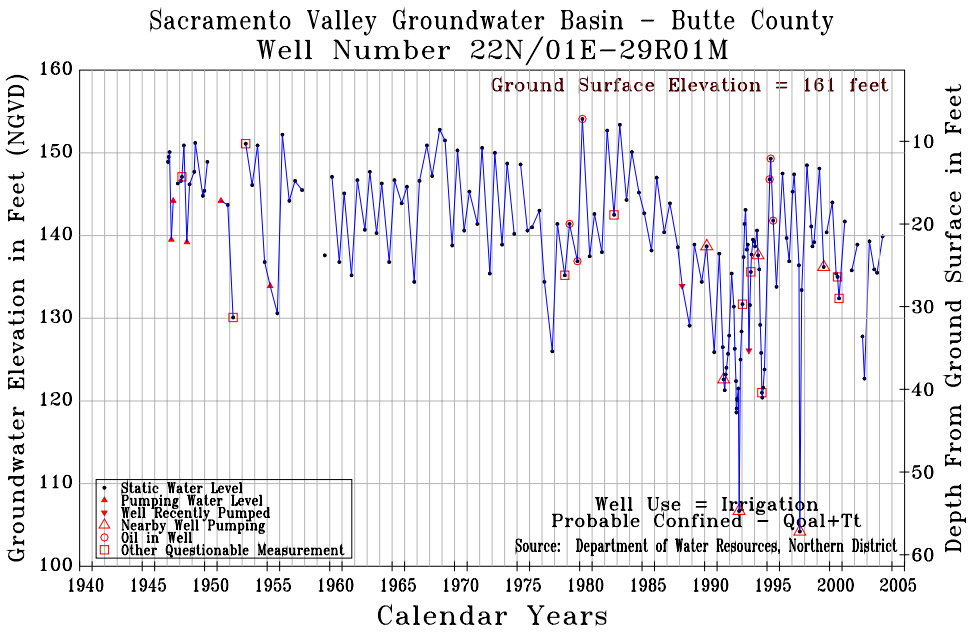
Groundwater levels have remained constant at normal historic levels since about 1950. Groundwater in storage is not being depleted in the sub-area at this time.

M & T Sub-Area (Well Number 22N/01E-29R01M):

The figure below is a hydrograph for well 22N/01E-29R01M, located just south of Big Chico Creek in the northern portion of the M&T Sub-area. The well is surrounded by agricultural orchard production, supported by groundwater extraction. This well is an active irrigation well of intermediate depth, with a groundwater level measurement record dating back to the late-1940s. Groundwater levels in this well represent the confined portion of the aquifer. The groundwater levels in this well were monitored on a semi-annual basis until 1991, on a monthly basis from 1991 to about 1994, and are currently being monitored four times a year during March, July, August and October.

Historical Trends

The figure shows that the average seasonal fluctuation in groundwater levels is about 10 feet during years of normal precipitation and up to 20 feet during years of drought. Long-term comparison of spring-to-spring groundwater levels shows a small decline in groundwater levels associated with the 1976-77 drought, followed by a larger decline associated with the 1986-94 drought. Overall comparison of spring to spring groundwater levels associated with this confined portion of the aquifer system, during years of normal precipitation, have changed little since the early 1960s.



Hydrograph for Well 22N/01E-29R01M

2004 Update

It was noted in the previous report that groundwater levels in this well had declined on average about two feet per year since 1999. This trend is less evident the two most recent spring groundwater level measurements. No measurements were taken on this well for summer or fall 2004 because work done in the immediate area prevented access to the measurement point on the well. The reason for the noted decline is probably two fold. First, climate is probably partly responsible for the groundwater level decline. Secondly, the well is in proximity to the City of Chico so there may be an influence from the municipal groundwater extraction occurring in the California Water Service area. The relative impact of these two factors is currently unknown. The overall record would suggest that when precipitation returns to a more normal pattern, that groundwater levels should recover somewhat. Currently, groundwater levels are near those recorded during the drought of the early 1990's. An examination of the overall record, however, reveals that long-term depletion of groundwater in storage is probably not occurring at this time. This is a sub-area that needs to be watched carefully in the future.

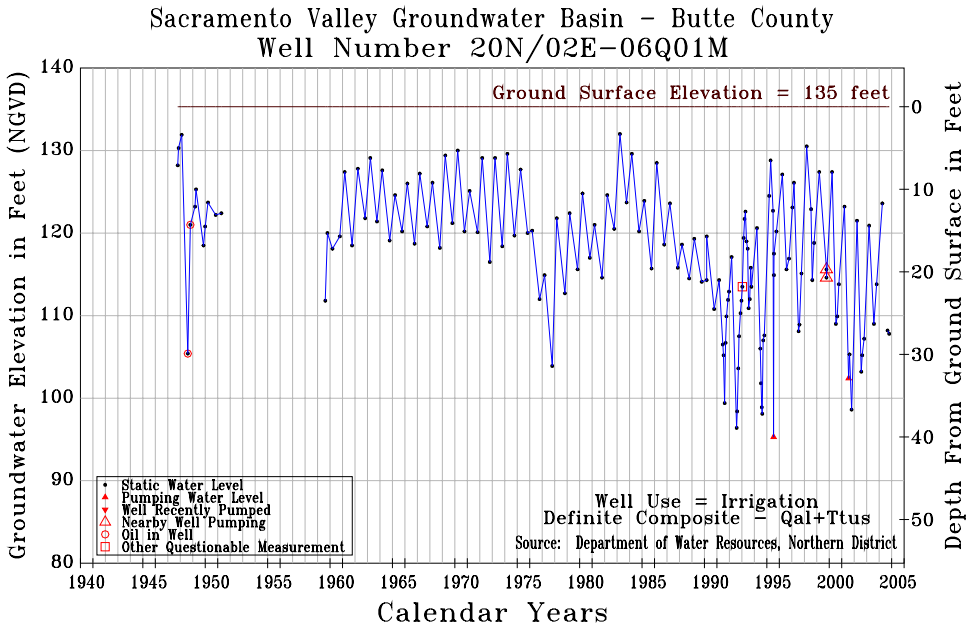
Durham-Dayton Sub-Area (Well Number 20N/02E-06Q01M):

The figure below is a hydrograph for well 20N/02E-06Q01M, located about two miles south of Durham. This area marks a change in agricultural water uses from groundwater to the north and surface water use to the south. The well is a deep irrigation well with shallow casing, and a groundwater level measurement record dating back to the late-1940s. Groundwater levels in this well represent a mixture of the unconfined and confined portions of the aquifer system. The groundwater levels in this well were monitored on a semi-annual basis until 1991, on a monthly basis from 1991 to about 1994, and are currently being monitored four times a year during March, July, August and October.

Historical Trend

The figure shows a seasonal fluctuation in groundwater levels of about 10 to 15 feet during years of normal precipitation and up to 20 feet during years of drought. Long-term comparison of spring-to-spring groundwater levels shows a decline and recovery of groundwater levels associated with the 1976-

77 and 1986-94 droughts. Overall, comparison of spring-to-spring groundwater levels associated with this composite portion of the aquifer system, during years of normal precipitation, has changed little since the early 1970s.



Hydrograph for Well 20N/02E-06Q01M

2004 Update

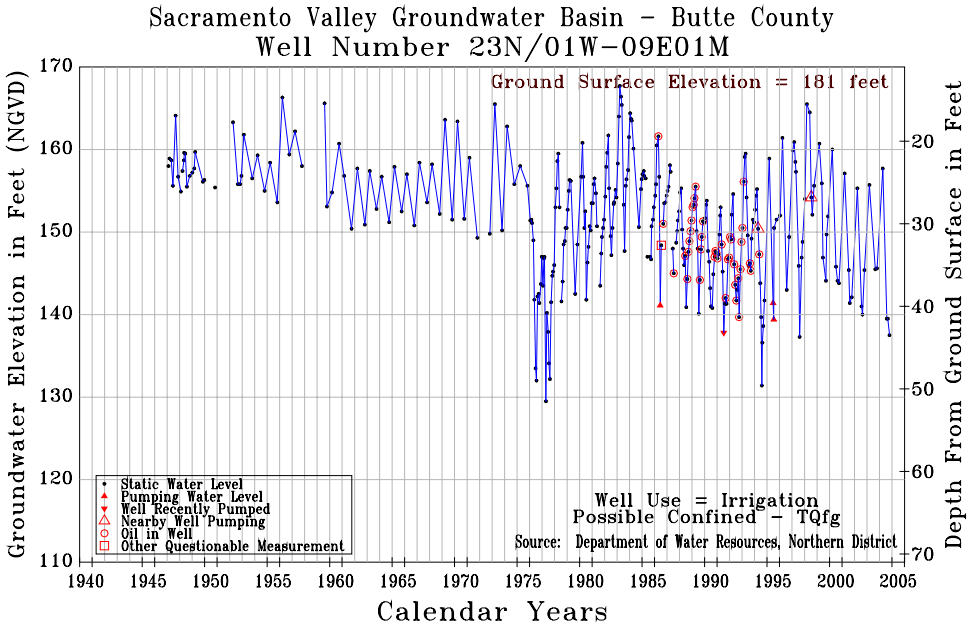
The hydrograph for this well is very similar to the key well in the M&T Sub-area. It was noted in the previous report that groundwater levels in this well had declined on average about two feet per year since 1998. This trend is less evident in the most recent spring groundwater level measurement. The reason for the noted decline is probably two fold. First climate is probably partly responsible for the groundwater level decline. Secondly, the well is in proximity to the City of Chico so there may be an influence from the municipal groundwater extraction occurring in the California Water Service area. The relative impact by these two factors is currently unknown. The overall record suggests that when precipitation returns to a more normal pattern, that groundwater levels should recover. An examination of the overall record reveals that long-term depletion of groundwater in storage is probably not occurring at this time. This is an area that needs to be watched carefully in the future.

Vina Sub-Area (Well Number 23N/01W-09E01M):

The figure below is a hydrograph for well 23N/01W-09E01M, in the northern Vina Sub-area. The area surrounding this well is characterized by rural, agricultural land use supported by groundwater. This well is an irrigation well constructed in the confined portion of the aquifer system, with a groundwater level measurement record dating back to the mid-1940s. The groundwater levels in this well were monitored on a semi-annual basis until the mid-1970s, on a monthly basis from the mid-1970s to 1996, and are currently monitored four times a year during March, July, August and October.

Historical Trend

The figure shows the seasonal and long-term changes in groundwater levels over time. At first glance it appears that the annual fluctuation in groundwater levels has increased since 1976. However, prior to 1976, summer groundwater level data were not collected. Comparison of the seasonal fluctuation of groundwater levels using spring-fall data indicates little change since the 1960s.



Hydrograph for Well 23N/01W-09E01M

2004 Update

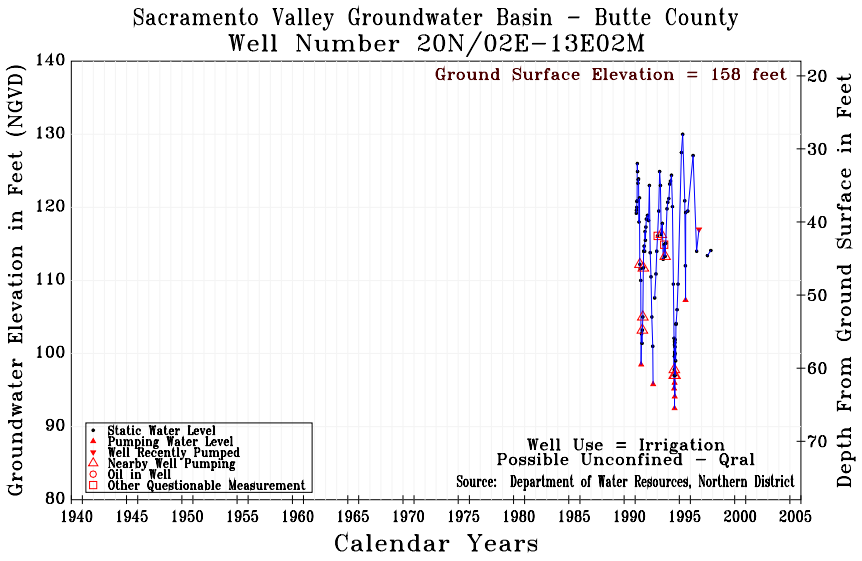
The hydrograph for this well is very similar to the key wells in the M&T and Durham Dayton Sub-areas. It was noted in the previous report that groundwater levels have declined on average about two feet per year since 1998. This trend is less evident in the two most recent spring measurements. The reason for the noted decline is probably climate related. The overall record would suggest that when precipitation returns to a more normal pattern the groundwater levels should recover. Currently, groundwater levels are near those recorded during the drought of the early 1990's. They are, however, higher than they were during the drought of 1976-77. An examination of the overall record reveals that long-term depletion of groundwater in storage is probably not occurring at this time. This sub-area needs to be watched carefully in the future.

Cherokee Sub-Area (Well Number 20N/02E-13E02M & 20N/02E-24C02M):

The figure below is a hydrograph for well 20N/02E-13E02M, located in the western portion of the Cherokee Sub-area. The area surrounding this well is characterized by agricultural production of orchard, rice and row crops supported by both groundwater and surface water. This well is a shallow irrigation well constructed in the unconfined portion of the aquifer system. The groundwater levels in this well were monitored on a monthly basis from 1991 to 1995 and on a semi-annual basis from 1995 to 1996.

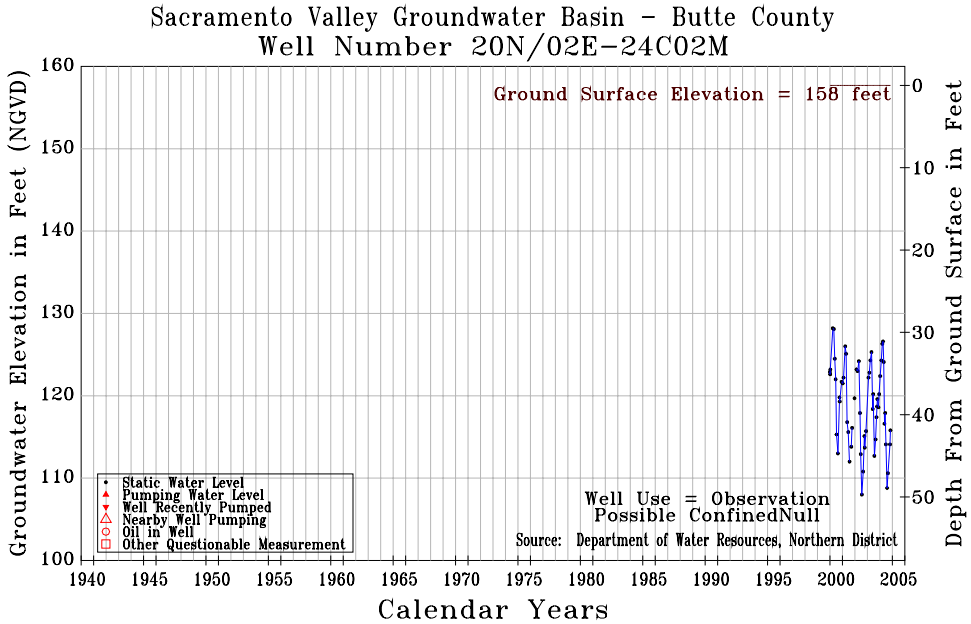
Historical Trend

Due to active pumping within the monitoring well and nearby pumping of surrounding wells, the true seasonal fluctuation of static groundwater levels is difficult to accurately determine. In general, this figure shows that the spring-to-summer fluctuation in groundwater levels averages about 10 to 12 feet during years of normal precipitation (1993 and 1995) and up to 25 feet during years of drought.



Hydrograph for Well 20N/02E-13E02M

Groundwater level monitoring was discontinued in this well. Well 20N/02E-24C02M was chosen to replace this key well in the Cherokee Sub-area. The new key well is part of a dedicated, multi-completion monitoring well set that was installed during 1999. The well is in the west central portion of the sub-area south of the initial key well. Measurements in this well represent groundwater conditions between 336 to 377 feet in the semi-confined portion of the Lower Tuscan aquifer system.



Hydrograph for Well 20N/02E-24C02M

2004 Update

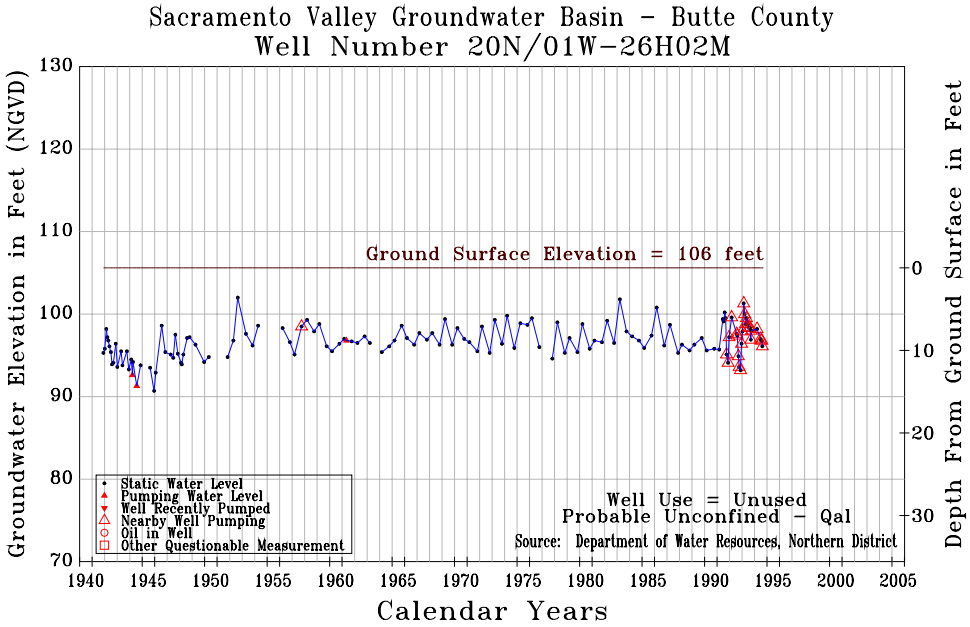
Although the record for this well is short, it appears that the aquifer system recovers by spring of each year. There are not sufficient groundwater level measurements taken in either well and to make a meaningful long-term evaluation of change of groundwater in storage for the sub-area.

Llano Seco Sub-Area (Well Number 20N/01W-26H02M & 20N/01E-18L02M):

The figure below is a hydrograph for well 20N/01W-26H02M, located in the southern portion of the Llano Seco Sub-area. The area surrounding this well is characterized by rural agricultural land use, supported primarily by the application of surface water. This well is an unused irrigation well constructed in the unconfined portion of the aquifer system, with a groundwater level measurement record dating back to the early 1940s. The groundwater levels in this well were monitored on a semi-annual basis until 1991 and on a monthly basis from 1991 to about 1994, when monitoring of this well was discontinued.

Historical Trend

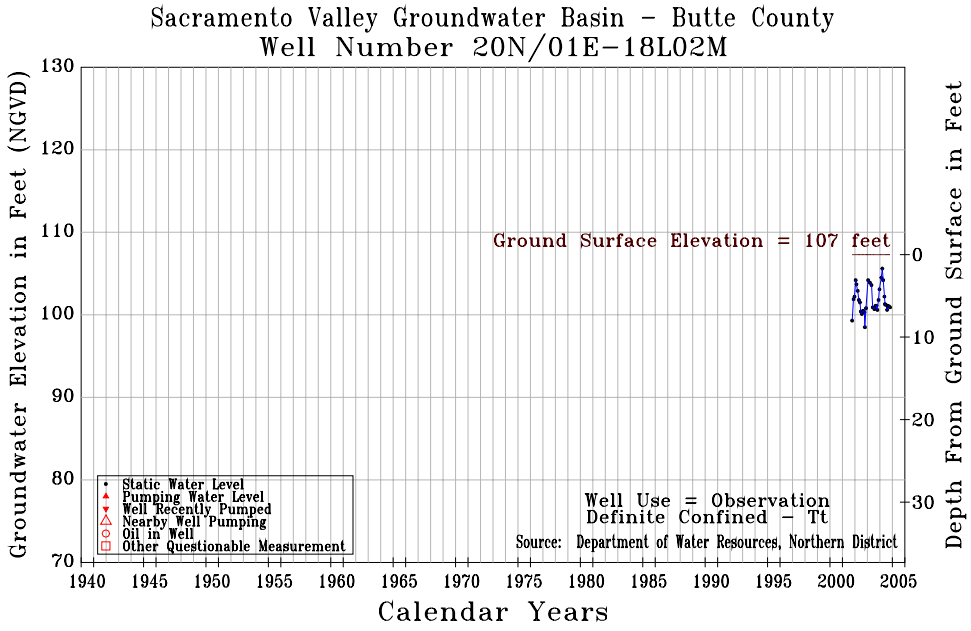
The figure shows that the average seasonal fluctuation in groundwater levels is about 3 to 5 feet during normal and drought years. Long-term comparison of spring-to-spring groundwater levels show little, if any, decline in groundwater levels associated with the 1976-77 and 1986-94 droughts. Overall comparison of spring-to-spring groundwater levels show that there has been very little change in the unconfined aquifer system within this portion of the Llano Seco Sub-area since the early 1940s.



Hydrograph for Well 20N/01W-26H02M

Groundwater level monitoring was discontinued in this well. Well 20N/01E-18L02M was chosen to replace the original key well in the Llano Seco Sub-area. This new well is part of a dedicated, multi-

completion monitoring well set that was installed during 2001. The well is along the eastern margin of the sub-area, due east from the original key well. Measurements in this well represent groundwater conditions between 510-560 feet in the confined portion of the Upper Tuscan aquifer system.



Hydrograph for Well 20N/01E-18L02M

2004 Update

An evaluation of the record from both index wells in the Llano Seco Sub-area reveals that groundwater levels have changed little over time and that no depletion of groundwater in storage is occurring at this time.

California Water Service (Chico) Sub-Area (Well Numbers 1-04 and 33-01):

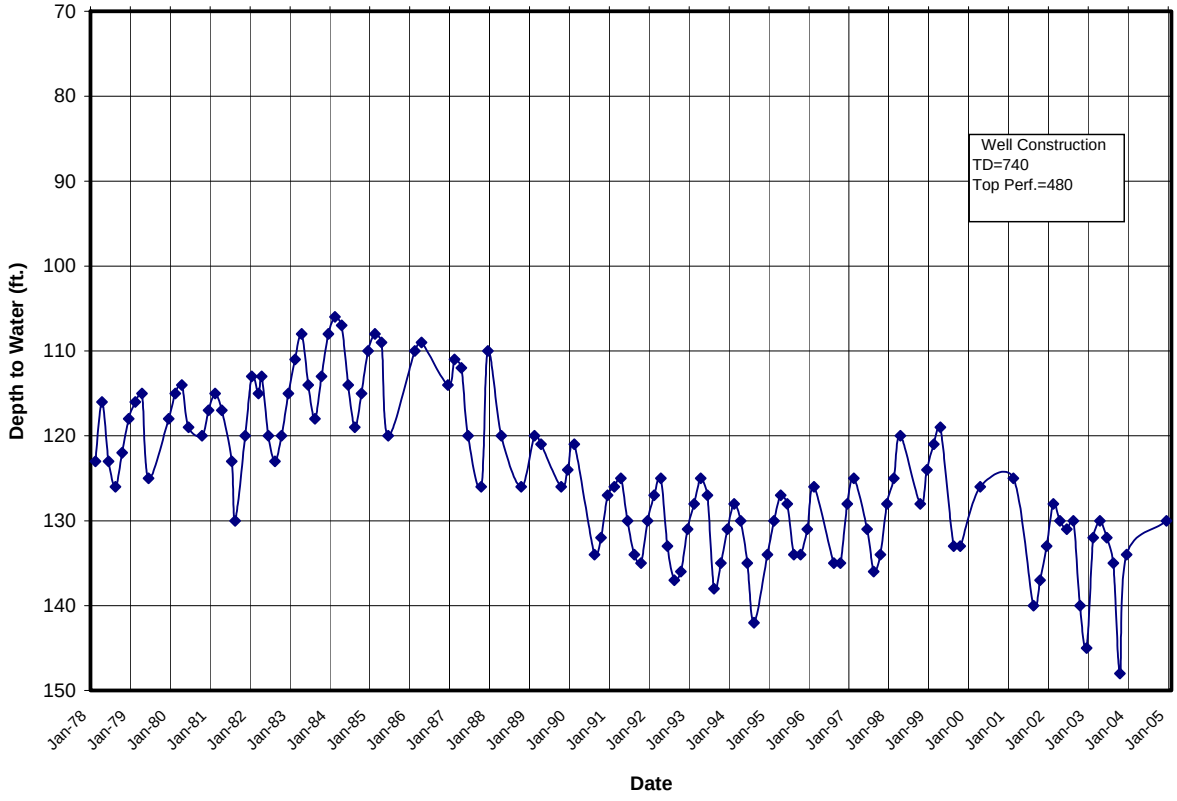
Groundwater hydrographs for the California Water Service monitoring wells were developed using static groundwater level data, provided by California Water Service Company. Although the groundwater level measurements presented in the California Water Service hydrographs were collected when the wells were not pumping (static groundwater levels), it should be noted that the effects from the recent pumping of these production wells could result in groundwater level readings that are deeper than stable static conditions. Hydrographs from two representative wells in the California Water Service Sub-area are shown below.

Historical Trend

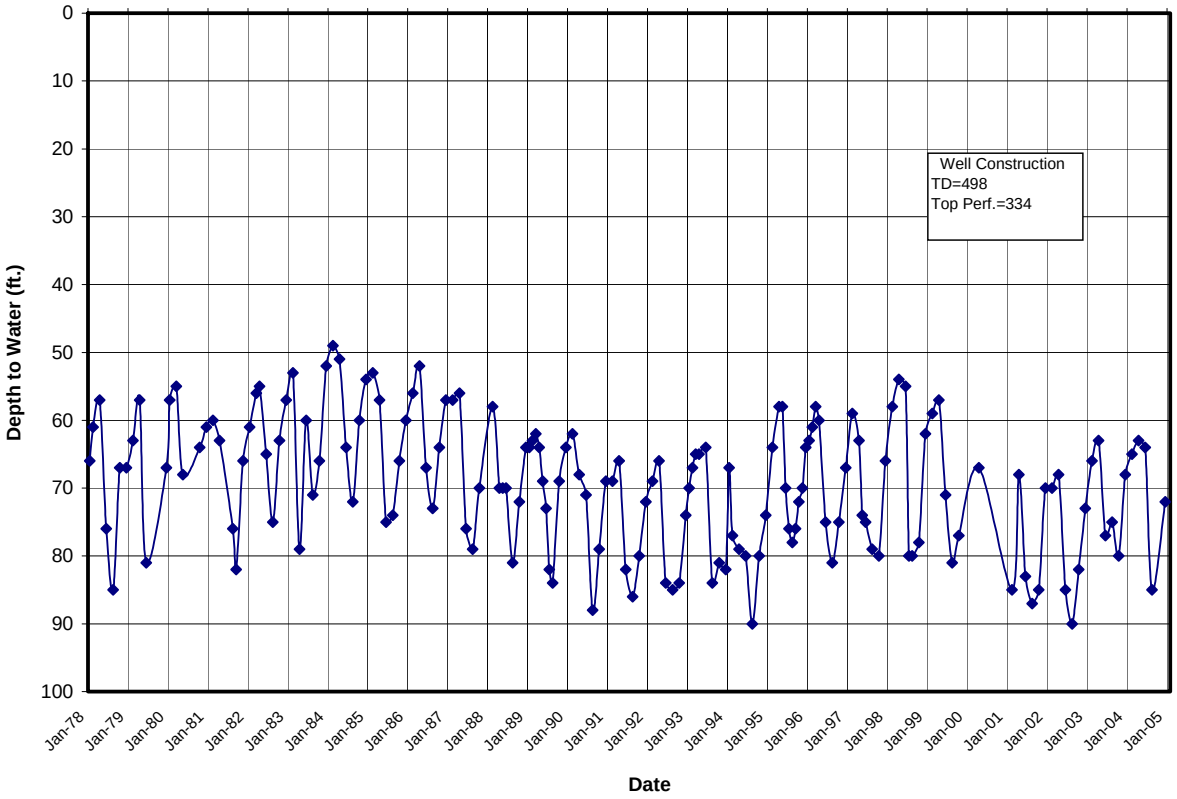
Overall analysis of the seasonal fluctuation of groundwater levels in all of the California Water Service wells with available data indicates a rather consistent seasonal fluctuation of 15 to 20 feet during normal years. Analysis of seasonal groundwater levels during drought years shows a wide range of fluctuation depending upon the individual well. Many wells show little or no seasonal change between wet, normal and dry years, while other wells show large differences. The wide range of response to seasonal change in normal versus drought years is likely due to the wide range of operational scenarios that can be imposed upon these municipal wells.

Overall analysis of these hydrographs indicate that groundwater levels in the California Water Sub-area have declined an average of 12 feet between 1978 and 2000, with most of the decline occurring during the 1987-1994 drought. Analysis of the hydrographs also indicates that groundwater levels in the California Water Service wells have generally stabilized since the drought in 1995.

Although the long-term trend of groundwater levels shows a decline in the California Water Sub-area, it does not necessarily mean that groundwater levels will continue to decline into the future. In municipal service areas it is typical for groundwater levels to experience an initial drop as the demand increases or drought conditions occur. After the initial decline, groundwater levels will commonly reach a new equilibrium with the existing production demand, thereby limiting further declines in groundwater levels.



Hydrograph for California Water Service Well 33-01



Hydrograph for California Water Service Well 1-04

2004 Update

In the previous status report it was noted that groundwater levels in Well 33-1 have been declining at a rate of about 3.5 feet per year since 1999. It was also noted that groundwater levels were at a historic low. It is not possible to determine if this trend continued in 2004 because maintenance (including removal of the pump) prevented groundwater level measurements from being made until the month of December 2004. The December 2004 measurement is slightly higher than the December 2003 measurement. Measurements will be taken in 2005 and the trend will be evaluated in the annual update report.

The reason for the previously noted decline was probably two fold. First, climate is probably partly responsible for the groundwater level decline. Secondly, the well is also influenced by other municipal groundwater extraction that is occurring in the California Water Service area and that water demand has been increasing annually.

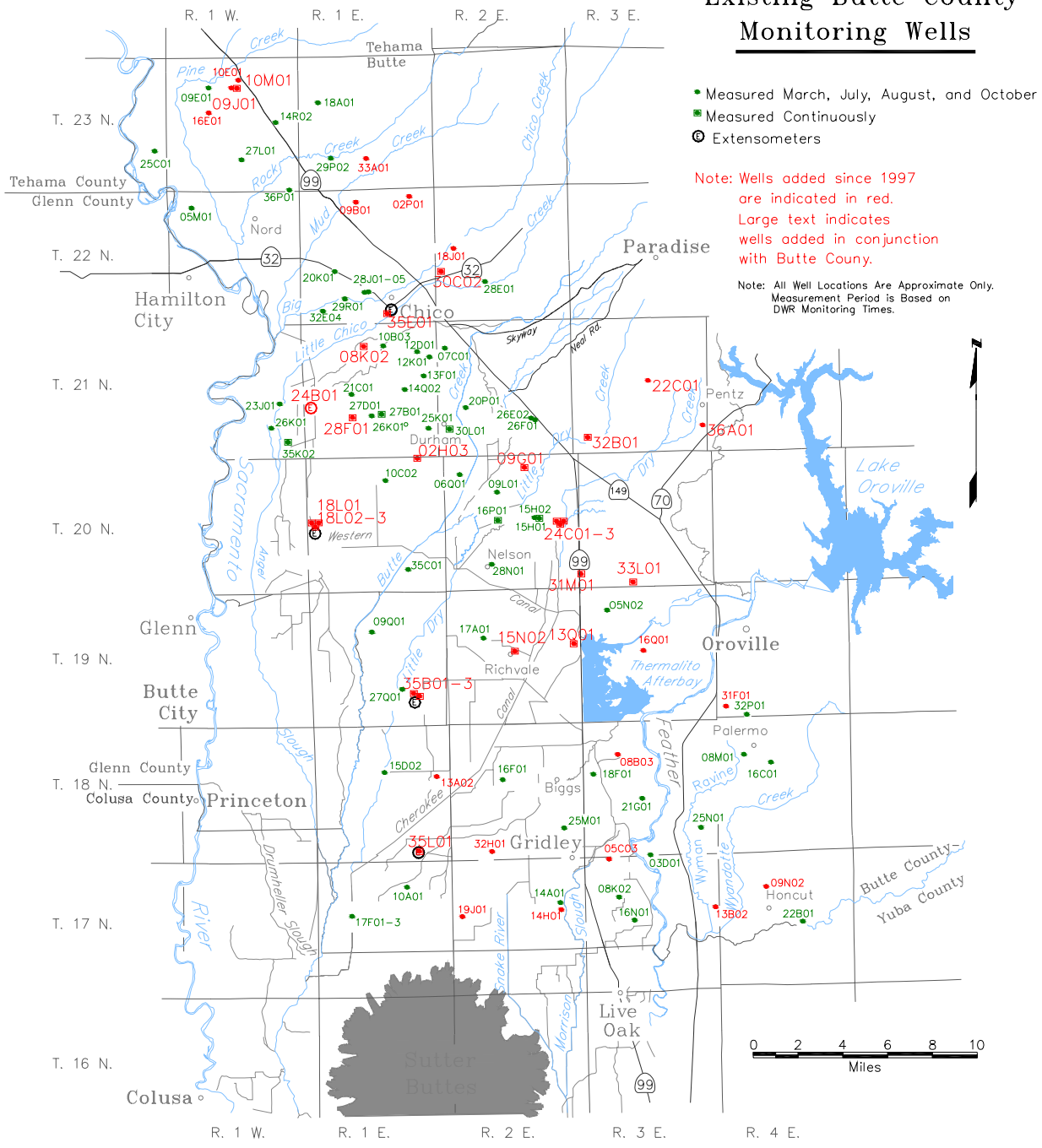
Groundwater levels in Well 1-04 have dropped about 12 feet following the spring of 1999. Since that time groundwater levels have remained relatively stable with a slight increase in the two most recent spring measurements. The 2004 measurements indicate a spring groundwater level similar to that of 2003, but a summer (August) measurement about 5 feet lower than 2003.

Comparison of the two key wells in California Water Service Area (Chico) Sub-area is difficult this year due to the lack of groundwater level measurements for Well 33-01. The 2004 annual groundwater level fluctuation in Well 1-04 was about 20 feet. The minimum depth to water observed in the California

Water Service Sub-area key wells during 2004 was 63 feet (Well 1-04) and the maximum was 130 feet (Well 33-01).

The overall review of both records would suggest that when precipitation returns to a more normal pattern, that groundwater levels should recover somewhat. The degree to which they will recover is currently unknown. Groundwater levels in these two wells are near those recorded during the drought of the early 1990's. This area needs to be watched carefully in the future, like many of the sub-areas in the northern portion of the county.

Butte County Monitoring Grid
Appendix A



Butte County

Revised: December, 2004

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Appendix D
Butte County Code
Chapter 33
Groundwater Conservati

Chapter 33

GROUNDWATER CONSERVATION*

Sections:

*Editor's note—Ord. No. 3303-A, § 7.01, adopted Dec. 10, 1996, repealed former Ch. 33, §§ 33-1—33-8, of the Code, which pertained to groundwater conservation and derived from Ord. No. 1859 § 1, adopted Aug. 23, 1977. Ord. No. 3303-A, §§ 1.01, 2.01, 3.01, 3.02, 4.01—4.11, 5.01, 6.01, 9.01, enacted new provisions which have been included herein as a new Ch. 33, §§ 33-1—33-18, at the direction of the county.

Cross references—Grading and mining, Ch. 13; code enforcement policies and procedures, Ch. 41.

33-1 Purposes.

The people of the county hereby find and declare:

(a) The groundwater underlying Butte County provides the people and lands of Butte County with water for agricultural, domestic, municipal, and other purposes.

(b) The groundwater underlying Butte County is a significant water resource which must be reasonably and beneficially used and conserved for the benefit of the overlying land by avoiding extractions which harm the Butte Basin aquifer, causing exceedance of the safe yield or a condition of overdraft.

(c) It is essential for the protection of the health, welfare, and safety of the residents of the county, and the public benefit of the state, that the groundwater resources of Butte County be protected from harm resulting from both the extraction of groundwater for use on lands outside the county and the substitution of groundwater for surface water transferred outside the county.

(d) The county seeks to foster prudent water management practices to avoid significant environmental, social, and economic impacts. It is therefore essential for the protection of the county's important groundwater resources that the county require a permit to extract groundwater for use outside the county and for the substitution of groundwater for surface water that has been used in the county and is now voluntarily transferred outside the county, to protect against groundwater overdraft and to insure that the safe yield of the groundwater aquifers and subbasins are not exceeded. This chapter is not intended to regulate groundwater in any other way.

(e) In adopting this chapter, the county in no way intends to limit public entities' management of groundwater in accordance with the Groundwater Management Act and any other applicable laws.

(f) Butte County is the county and watershed of origin for much of the groundwater and surface water within the county. The availability of groundwater underlying the county for consumptive uses within the county is inextricably linked to the use of surface water. Increased groundwater pumping within the county which directly results from a transfer of surface water from the county causes a net loss of water resources for consumptive purposes within the county and can have significant adverse impacts on the health, welfare, and safety of the residents of the county. The county does not intend that this chapter invade the province of the Legislature by regulating surface water transfers. The county intends to exercise its police power to require a transferor who will pump amounts of groundwater or cause amounts of groundwater to be pumped to mitigate the potential adverse impacts from any additional groundwater pumping related to the surface water transfer. (Ord. No. 3303-A, § 1.01, 12-10-96; Ord. No. 3542, § 1, 8-10-99)

33-2 Definitions.

The definitions set out in this section shall apply to this chapter.

(a) "Aquifer" means a geologic formation that stores, transmits and yields significant quantities of water to wells and springs.

(b) "Association" means the Butte Basin Water Users Association.

(c) "Board" means the board of supervisors of Butte County.

(d) "Commission" means the Butte County Water Commission, which shall be a nine (9) person commission appointed by the board. The commission shall include one (1) member representing each board district and nominated for appointment by the county supervisor duly elected to represent that district and four (4) members at large of which two (2) are landowners of property served by district water and two (2) are landowners served by private wells.

(e) "County" means the County of Butte.

(f) "District" means a district wholly or in part located within the boundaries of the county, which is a purveyor of water for agricultural, domestic, or municipal use.

(g) "Department" shall mean the Butte County Department of Water and Resource Conservation.

(h) "Groundwater" means all water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water which flows in known and definite channels.

(i) "Groundwater Management Act" means Water Code Sections 10750 et seq.

(j) "Hydraulic gradient" means the slope of the water table.

(k) "Hydrology" means the origin, distribution, and circulation of water through precipitation, stream flow, infiltration, groundwater storage, and evaporation.

(l) "Overdraft" means the condition of an aquifer where the amount of water withdrawn by pumping exceeds the amount of water replenishing the aquifer over the water year and also the point at which extractions from the aquifer exceed its safe yield plus any temporary surplus.

(m) "Percolation" means the movement of water through the soil to the groundwater table.

(n) "Permeability" means the capability of the soil or another geologic formation to transmit water.

(o) "Piezometric surface" means the surface to which the water in a confined aquifer will rise.

(p) "Porosity" means voids or open spaces in alluvium and rocks that can be filled with water.

(q) "Recharge" means flow to groundwater storage from precipitation, irrigation, infiltration from streams, spreading basins and other sources of water.

(r) "Safe yield" means the maximum quantity of water which can be withdrawn annually from an aquifer under a given set of conditions without causing overdraft or adverse water quality conditions.

(s) "Saline intrusion" means the movement of salt water into fresh water aquifers.

(t) "Specific capacity" means the volume of water pumped from a well in gallons per minute per foot of drawn down.

(u) "Spreading water" means discharging native or imported water to a permeable area for the purpose of allowing it to percolate to the zone of saturation. Spreading, artificial recharge and replenishment all refer to operations used to place water in a groundwater table.

(v) "Subbasin" means one (1) of the four (4) subbasins within the county, including the East Butte, Palermo, Vina, and West Butte subbasins defined by the California Department of Water Resources.

(w) "Technical advisory committee" means a seven (7) person committee nominated by the commission and appointed by the board. They each must have substantial expertise in water management or hydrology.

(x) "Transmissivity" means the rate of flow of water through an aquifer.

(y) "Water table" means the surface or level where groundwater is encountered in a well in an unconfined aquifer.

(z) "Water year" means the year beginning February 1 and ending the last day of the following January.

(aa) "Zone of saturation" means the area below the water table in which the soil is completely saturated with groundwater. (Ord. No. 3303-A, § 2.01, 12-10-96; Ord. No. 3329, §§ 1, 2, 5, 5-13-97; Ord. No. 3505, § 1, 4-13-99)

33-3 Groundwater planning process.

The association, unless otherwise designated by the water commission, shall present the reports described in this section to the department by February 21 of each year. These reports shall guide groundwater planning within county and shall be considered in accordance with section 33-9.

(a) A groundwater status report based upon the data gathered and analyzed pursuant to section 33-4.

(b) Using groundwater data for at least the prior twenty (20) years, a report that analyzes the amount of groundwater pumping that can occur during the water year within each county subbasin without exceeding the safe yield of each subbasin. (Ord. No. 3303-A, § 3.01, 12-10-96; Ord. No. 3641, § 1, 10-10-2000)

33-4 Groundwater monitoring.

(a) The water commission through the department, in cooperation with the technical advisory committee, the association, the California Department of Water Resources

and the regional water quality control board, shall develop and coordinate a county-wide groundwater monitoring program.

(b) Specific monitoring wells shall be identified. Permission to enter the property on which each well is located and to take groundwater level measurement shall be obtained voluntarily from the well owner. If permission cannot be obtained, then another well shall be selected.

(c) Groundwater level measurements shall be taken from all designated monitoring wells at least four (4) times per year, during the months of March, July, August, and October.

(d) Each district and city within the county shall be requested to submit copies of all its groundwater monitoring reports to the department as such reports are completed but not later than December 1 of each year. The department shall also encourage individuals to voluntarily provide any available groundwater data. (Ord. No. 3303-A, § 3.02, 12-10-96; Ord. No. 3455, § 1, 10-27-98)

33-5 Permit required for groundwater extraction for use outside county.

It shall be unlawful to extract groundwater underlying county for use of that groundwater so extracted, outside county without first obtaining a permit as provided in this chapter. A permit is not required pursuant to this section if the groundwater is used within the boundaries of either a district or on a contiguous parcel of any property owner which is in part located within county and in part in another county, where such extraction quantities and use are consistent with historical practices of the district or the property owner. The groundwater extractor shall have the burden of supporting an assertion of an historical practice with competent evidence. (Ord. No. 3303-A, § 4.01, 12-10-96)

33-6 Permit required for groundwater substitute pumping.

It shall be unlawful to extract groundwater underlying county for use on a parcel or parcels of land within the county in substitution for surface water which would otherwise be used to serve the parcel or parcels and which surface water is proposed to be transferred for use outside county, without first obtaining a permit as provided in this chapter. A permit is not required pursuant to this section if changed cropping patterns render the use of surface water infeasible or if the transferred surface water is used within the boundaries of either a district or on a contiguous parcel of any property owner which is in part located within county and in part in another county, where such quantity and use are consistent with historical practices of the district or the property owner. The transferor shall have the burden of supporting an assertion of infeasibility or an historical practice with competent evidence. (Ord. No. 3303-A, § 4.02, 12-10-96; Ord. No. 3542, § 1, 8-10-99)

33-7 Exemptions.

This chapter shall not apply to the temporary extraction of groundwater to prevent the flooding of lands or to prevent the saturation of the root zone of farm land. (Ord. No. 3303-A, § 4.03, 12-10-96)

33-8 Application for a permit.

An application for a permit pursuant to this chapter shall be filed with the department on forms provided by the department and shall contain all information required by the department. The department shall require the following information in an application for a permit under section 33-6.

(a) Name, address, telephone number, and fax number (if any) of the applicant.

(b) The amount of surface water available to the land and the amount proposed to be transferred, the transfer period, the physical source of the surface water to be transferred, the applicable surface water right held by the applicant, and the name, address, telephone number, and fax number (if any) of the proposed transferee.

(c) A list of all parcels of land where surface water deliveries are to be reduced.

(d) A list of wells, including the maximum engineered pumping capacity of each well's pump and motor, which are proposed to participate in the groundwater substitute pumping program and their location.

(e) A list of all wells located within the well spacing requirements of the wells listed under subsection (d) of this section along with certification that the owners of such wells have received notice of the application. The well spacing requirements are set forth in section 23B-5b of this code.

(f) A map showing the location of all parcels and wells identified under subsections (c), (d) and (e) of this section.

(g) A groundwater hydrology report paid for or otherwise provided by the applicant identifying adverse impacts on wells listed in subsection (e) and any other agricultural well likely to experience significant adverse impacts. The report shall be prepared by a qualified groundwater hydrologist or licensed professional civil or agricultural engineer.

(h) A description of the proposed monitoring program and the pumping curtailment.

(i) A description of the proposed mitigation program for any identified third party impacts, which may specify a dollar amount held in a trust account to satisfy potential third party claims.

(j) Such additional information as required by the department.

Concurrently, a request for environmental review shall be filed as required by applicable county CEQA guidelines. The application for a permit and request for environmental review shall be accompanied by the required fees established by the board, which shall be reviewed by the board not less than every two (2) years. (Ord. No. 3303-A, § 4.04, 12-10-96)

33-9 Procedures for processing.

(a) Within ten (10) calendar days of filing of the permit application, the department shall provide public notice by publication in a newspaper of general circulation in Butte County, and posting at the courthouse at Oroville and the department office in Chico that an application has been filed, shall send a copy of the notice to all districts and cities within the county and to any interested party who has made a written request to the department for such notice within the last twenty-four (24) calendar months. The department shall review the application to determine whether it is complete for purposes of proceeding under the county guidelines adopted pursuant to the California Environmental Quality Act requirements.

(b) The department shall review the most current reports provided pursuant to section 33-3. The department shall review the matter of the application with the technical advisory committee and may also review the matter of the application with the affected county departments, with the staff of the state department of water resources, with the staff of the Regional Water Quality Control Board—Central Valley Region, and with any interested district within whose boundary the proposed activity will occur. If the applicant is applying to pump groundwater from within the boundaries of a district or city which has adopted a groundwater management plan pursuant to the groundwater management act, the department shall consider a groundwater management plan or any other relevant information provided by the district or city. Any interested person or agency may provide comments relevant to the matter of the extraction of groundwater. Comments shall be submitted within thirty (30) days of the date of mailing the notice of filing the permit application.

(c) The environmental review shall be undertaken in accordance with the California Environmental Quality Act and county guidelines. All costs of the environmental review shall be the responsibility of applicant.

(d) Upon completion of the environmental review, the department shall submit the following documents to the commission: the application, all comments received, the environmental documentation, the most current reports submitted pursuant to section 33-3, the retained expert's report (if applicable), and the department's written report. (Ord. No. 3303-A, § 4.05, 12-10-96)

33-10 Public review concerning issuance of permit.

(a) Upon receipt of the documents described in 33-9(d), the commission shall immediately set a public review on the issuance of the permit which shall be noticed pursuant to Government Code section 6061 and may not be held within fifteen (15) days nor more than thirty (30) days of the time that the commission receives the report from the department.

(b) Formal rules of evidence shall not apply to the public review of the application, but the commission may establish such rules as will enable the expeditious presentation of the matter and relevant information thereto. At the commission review, the applicant shall be entitled to present any oral or documentary evidence relevant to the application, and the applicant shall have the burden of proof of establishing the facts necessary for the commission to make the required findings. The commission may request any additional information it deems necessary for its decision. The commission shall also hear relevant evidence presented by other interested persons and entities, the department, other county staff, the association, and the public. The commission shall consider all effects that the granting of the permit application would have on the subbasin and affected aquifer including, but not limited to, the hydraulic gradient, hydrology; percolation, permeability, piezometric surface, porosity, recharge, safe yield, salt water intrusion, specific capacity, spreading water, transmissivity, water table and zone of saturation. (Ord. No. 3303-A, § 4.06, 12-10-96)

33-11 Granting of permit.

A permit shall be granted pursuant to sections 33-5 and 33-6 only if the commission finds and determines that the extraction will not:

(a) Cause or increase an overdraft of the groundwater underlying the county;

(b) Bring about or increase salt water intrusion;

(c) Exceed the safe yield of the aquifer or subbasins underlying the county;

(d) Result in uncompensated injury to overlying groundwater users or other water users; or

(e) Cause subsidence.

In granting a permit, the commission shall impose appropriate conditions upon the permit to satisfy the above findings, and may impose other conditions that it deems necessary for the health, safety and welfare of the people of the county. Conditions in the permit may include, but are not limited to, requiring metering of the wells under the permit, both short-term and annual pumping limits, prescribed groundwater levels at which groundwater pumping must cease, and additional requirements for observation and/or monitoring wells.

In denying a permit, the commission shall make specific findings in any of the subsections (a) through (e) to support its decision.

The decision of the commission relating to section 33-5 shall be made upon an affirmative vote of six (6) members of the commission and relating to section 33-6 shall be made upon an affirmative vote of a majority of the quorum present. Such decisions may be appealed in accordance with section 33-12 or 33-13. (Ord. No. 3303-A, § 4.07, 12-10-96)

33-12 Appeal of granting or denial of a permit.

The applicant or any interested party or public entity may appeal the decision of the commission by filing a written request with the clerk of the board within thirty (30) days of issuance of the decision. The clerk shall set a time for review by the board within twenty (20) days of receipt of the request for appeal. Notice of appeal shall be given to the commission, the permittee, appellant, as well as to the districts and cities within the county, and to interested parties who have requested notice of such appeals within the last twenty-four (24) months. The board shall hear the appeal as to those disputed matters which were heard by the commission and which are specifically set out in the appeal request. The standard of review shall require that substantial evidence be presented to prevail on an issue. The appeal before the board shall not be conducted with formal rules of evidence but under such rules as set by the board for the expeditious presentation of the matter and relevant information pertaining thereto by the appellant and by those opposed to the reversal of the commission decision. The decision of a majority of the board shall be the final decision in the matter. (Ord. No. 3303-A, § 4.08, 12-10-96; Ord. No. 3542, § 1, 8-10-99)

33-13 Challenge to approved permit.

(a) Any interested party or public entity may challenge the continuation of the permit during the term of the permit when any of the following information exists:

(1) There is a violation of the conditions of the permit;

(2) Extraction of groundwater pursuant to the permit:

a. Causes or increases an overdraft in the basin; or

b. Brings about or increases salt water intrusion, or

c. Exceeds the safe yield of the subbasin(s), or

d. Results in uncompensated injury to overlying groundwater users or other water users, or

e. Causes subsidence.

(b) A challenge pursuant to this section is commenced by filing a written request with the department which alleges any one (1) of the above situations and generally described the supporting facts for such allegation. If the department determines that the supporting facts make a prima facie showing of one (1) of the above categories, the department shall within ten (10) days of the receipt of such challenge, give notice of the challenge to the commission, the permittee, appellant, to any interested party who filed a written request for such notice within the past twenty-four (24) months, and also to districts and cities within the county. A commission review shall be held on the matter following the procedure set out in section 33-11. The commission's decision may be to deny the challenge, grant the challenge and terminate the permit, or to establish modified conditions to the permit.

(c) The standard for review shall be substantial evidence.

(d) Any interested party or public entity may challenge the issuance of a permit by the commission on the basis that the permit was not issued in accordance with the procedural requirements of this chapter by filing an appeal in the same manner and within the same time period specified in section 33-12. The requirements of section 33-12 shall govern appeals filed pursuant to this subsection. (Ord. No. 3303-A, § 4.09, 12-10-96; Ord. No. 3542, § 1, 8-10-99)

33-14 Duration of permit.

All permits shall be valid for a three-year term unless the commission finds that a shorter term is required by the findings in section 33-11(a) through (e). For the purpose of calculation, the water year in which the permit is granted shall not be counted in determining the three (3) year time period if less than four (4) months remains in the then water year. Provided, however, nothing contained in this chapter nor in the conditions of the permit shall be construed to give permittee an exclusive right to groundwater. (Ord. No. 3303-A, § 4.10, 12-10-96)

33-15 Limitation of permit.

The permit process in this chapter is not to be construed as a grant of any right or entitlement but rather the permit evidences that the health, welfare, and safety of the residents of the county will not be harmed by the extraction of groundwater for use outside the county or the substitution of groundwater for surface water that has been transferred outside county. The permit in no way exempts, supersedes, or replaces any other provisions of federal, state, and local laws and regulations including but not limited to Water Code Section 1220, the Groundwater Management Act, and any actions provided for in California groundwater law, well drilling and maintenance in accordance with Chapter 23B of the Butte County Code, or building permit requirements. (Ord. No. 3303-A, § 4.11, 12-10-96)

33-16 Inspection.

The department, with good cause, may at any and all reasonable times enter any and all places, property, enclosures and structures, where a well is located, for the purposes of making examinations and investigations to determine whether any provision of this chapter is being violated. (Ord. No. 3303-A, § 5.01, 12-10-96)

33-17 Civil penalty.

The county may elect to proceed with a civil action against a violator, including seeking injunctive relief. Any person who or entity which violates this chapter shall be subject to fines of up to five thousand dollars ($5,000.00) per separate violation. A person or entity shall be deemed to have committed separate violations for each and every day or portion thereof during which any such violation is committed, continued or permitted as well as for each and every separate groundwater well with which any such violation is committed, continued, or permitted. (Ord. No. 3303-A, § 5.01, 12-10-96)

33-18 Amendment.

The board may amend this chapter or any of its provisions following a properly noticed public hearing. The clerk shall publish notice of such hearing as provided in Section 6066 of the Government Code, prior to the date set for hearing, in a newspaper of general circulation printed and published in the county. (Ord. No. 3303-A, § 9.01, 12-10-96; Ord. No. 3329, § 3, 6-13-97)

33.19 Severability.

If any provision of this chapter or the application thereof to any person or circumstances is for any reason held to be invalid by a court of competent jurisdiction, such provision shall be deemed severable, and the invalidity thereof shall not affect the remaining provisions or other applications of the chapter which can be given effect without the invalid provision or application thereof. (Ord. No. 3542, § 1, 8-10-99)

Appendix E
Butte County Code
Chapter 23B
Water Wells

Chapter 23B

WATER WELLS*

Sections:

*Editor's note—Section 1 of Ord. No. 3272, adopted June 25, 1996, amended this chapter to read as herein set out. Formerly, Ch. 23B consisted of §§ 23B-1—23B-4a, 23B-5—23B-6a, 23B-7—23B-8a, 23B-9—23B-9c, and 23B-10—23B-13, which pertained to water wells and derived from § 1 of Ord. No. 1845, adopted July 26, 1977; § 3 of Ord. No. 2113, adopted June 10, 1980; §§ 1—11 of Ord. No. 2411, adopted July 3, 1984; §§ 1 and 2 of Ord. No. 2432, adopted Sep. 25, 1984; § 1 of Ord. No. 2707-H, adopted Sep. 20, 1988; and § 1 of Ord. No. 3228, adopted Dec. 5, 1995.

Cross reference—Enforcement by code enforcement policies, § 41-1.

23B-1 Purposes.

It is the purpose of this chapter to provide minimum procedures for the proper construction of water wells and for the proper destruction of abandoned wells in order to ensure that water obtained from wells within the County of Butte will be suitable for the purposes for which used and that wells constructed or abandoned pursuant to this chapter will not cause pollution or impairment of the quality of the groundwater within the county. An additional purpose of this chapter is to attempt to reduce potential well interference problems to existing wells and potential adverse impacts to the environment which could be caused by the construction of new wells or the repair or deepening of existing wells where a permit is required under this chapter. (Ord. No. 3272, § 1, 6-25-96)

23B-2 Definitions.

For the purposes of this chapter, the following words and phrases shall have the meanings respectively ascribed to them by this section:

(a) Public water supply well: A water well constructed or used to supply water for domestic purposes in systems subject to the requirements of sections 4010 et seq. of the California Health and Safety Code (California State Safe Drinking Water Act), or as amended.

(b) Individual well: A well or water well meeting the definitions of wells or water wells in chapter II, part I, general A-K (bulletin 74-81), Water Well Standards, State of California, except groundwater monitoring wells less than fifteen (15) feet in depth. This definition includes agricultural wells.

(c) Abandoned well: A well which is a public nuisance or which has not been used for a period of one (1) year and is not being properly maintained. For purposes of this definition, proper maintenance shall include but not be limited to (1) the prevention of conditions which could impair the quality of water in the well or in the water-bearing formations penetrated and (2) marking the well and keeping the surrounding area clear of brush and debris so that the well can be clearly seen. Abandoned wells shall include a well drilled to secure water but which is a "dry hole" and not to be used for water. Dry holes not cased, sealed and completed as an individual well or public water supply well shall be destroyed under permit prior to abandonment of the site by the well driller or commencement of a new drill hole. Abandoned wells shall also include drainage wells which are no longer being utilized for drainage.

(d) Drainage well: "Drainage well" shall mean any hole or well dug, drilled, bored or otherwise constructed for the purpose of disposing of storm drainage water into subsurface strata.

(e) Health officer: The health officer of the County of Butte or his or her authorized representative.

(f) Pitless adapter: Watertight casing surface seal unit manufactured for the purpose of providing a leaktight casing.

(g) District: Means a district wholly or in part located within the boundaries of the county, which is a purveyor of waters for agricultural, domestic, or municipal use and which has adopted a resolution of intention to adopt a groundwater management plan for purposes of implementing the plan and establishing a groundwater management program pursuant to the provisions of Water Code sections 10753.2 et seq.

(h) Groundwater: Means all water beneath the surface of the ground, whether or not flowing through known and definite channels.

(i) Property owner: Property owner and address as shown on the last equalized assessment roll or current public record of the Butte County Assessor.

(j) Consolidated formation: Hard rock-material strata of sedimentary; igneous or metamorphic rock.

(k) Engineered pumping capacity: The pumping capacity of a pump in gallons per minute considering normal operating conditions and total head loss of an integrated piping/irrigation system. (Ord. No. 3272, § 1, 6-25-96)

23B-3 Permit required.

No person, firm, association, organization, partnership, joint venture, business trust, corporation, company, federal, state or local agency, or special district formed under the laws of this state shall, within the unincorporated area of the County of Butte, construct, repair or deepen any public water supply well, or individual well, or destroy any abandoned well unless a written permit has first been obtained from the health officer as provided in this chapter. (Ord. No. 3272, § 1, 6-25-96)

Cross reference—Penalty, § 1-7(b).

23B-4 Permit application.

Applications for permits shall be made to the health officer together with the required fee established by ordinance by the board of supervisors of the County of Butte. If construction, repair, deepening or destruction of a well is begun prior to obtaining a permit, the fee for such permit may be doubled, but shall not relieve any person from fully complying with the provisions of this chapter nor from any other penalties described in this chapter. Applications shall be made on forms provided by the health officer. Applications for permits to construct, repair or deepen a well shall include the following information:

(a) Location of the well on the property/parcels and the location and size in acreage of the contiguous properties, assessor's parcel number, township, range and section of the parcels to be served.

(b) Name, address and contractor's license number of the person who will construct the well.

(c) The proposed depth of the well.

(d) Proposed use of the well.

(e) An accurate plot plan which will show the following:

(1) Property lines with dimensions and existing and proposed buildings.

(2) Sewage disposal systems, sewer lines, and any other works carrying or containing sewage within two hundred (200) feet of the proposed well.

(3) All intermittent perennial, natural or artificial bodies of water or watercourses.

(4) All other existing wells.

(5) The approximate surface drainage pattern of the property and areas subject to flooding.

(6) Location of the well to be constructed, repaired, or deepened.

(7) Wells subject to section 23B-5b. and the engineered pumping capacity of the pump to be installed or replaced.

(f) Proposed diameter of the well casing for the well to be constructed, repaired, or deepened.

(g) Such additional information as reasonably required by the health officer. Applications for permits to destroy an abandoned well shall include such information as the health officer deems necessary.

(h) The health officer is authorized to reduce the amount of information required to be included in a permit application for any well which comes within section 23B-5c. (Ord. No. 3272, § 1, 6-25-96)

23B-4a Coordination of review of permit application by local agency having adopted a groundwater management plan and notification of contiguous parcel owners.

(a) If a permit application is for a well located within the boundaries and/or service area of a local agency which has adopted a groundwater management plan pursuant to part 2.75 of division 6 of the California Water Code (commencing at section 10750), then the health officer shall give such local agency at least thirty (30) days to review and comment on the permit application before the health officer acts on the application. Provided further that whenever an application to drill a well within the boundaries or service area of a local agency is received,

the health officer shall submit a copy of the application to the local agency if requested by the local agency.

(b) Any person, public or private agency at the time of application for a permit to drill a well with a casing diameter in excess of eight (8) inches shall deliver a copy of the well application or notification form provided by the health officer by mail to the last known address of all parcel owners within the area defined in section 23B-5b. The health officer shall issue a permit not sooner than thirty (30) working days after receiving a declaration or affidavit from the permit applicant stating compliance with this notice requirement or receiving other evidence of compliance with this section.

(c) Any person, public or private agency, at the time of application for a permit to drill a monitoring and/or mitigation well shall deliver a copy of the well application by mail to the last known address of all contiguous parcel owners. (Ord. No. 3272, § 1, 6-25-96)

23B-5 Well standards.

Standards for the construction, repair, reconstruction, deepening, abandonment and destruction of wells in Butte County shall be as specified within bulletin 74-81, Water Well Standards, State of California, except where superseded by state or federal law or modified by resolution of the board of supervisors. (Ord. No. 3272, § 1, 6-25-96)

23B-5a Pumping capacity and parcel size.

The pumping capacity of the pump for a well required to have a new permit under this chapter after July 25, 1996, shall not be greater than fifty (50) gallons per minute per acre to reasonably serve the overlying land, including contiguous parcels of land under the same ownership as the land upon which the well is located. The total of the pumping capacities of the pumps for the new well and all existing wells (excepting wells which are exempt under section 23B-5c(1) and section 23B-5c(4)) located within the applicable parcels shall not exceed fifty (50) gallons per minute per acre. (Ord. No. 3272, § 1, 6-25-96)

23B-5b Well spacing requirements.

After July 25, 1996, any well required to have a new permit under this chapter with a pump having an engineered pumping capacity stated below shall be located no closer to an existing well than as indicated on the graph entitled, "Well Spacing Requirement" and dated March 1, 1995, which graph is incorporated herein by reference, (Attachment A of Ordinance No. 3272), except that one (1) well may be located within a parcel so long as the well is in compliance with section 23B-5a. Where a new well complies with section 23B-5a but cannot comply with this section 23B-5b, the health officer shall require that the well's location comply with the well spacing requirement to the extent reasonably possible. All wells with an engineered pumping capacity of greater than five thousand (5,000) gallons per minute must apply for a variance under this chapter. The following table shows examples of the engineered pumping capacity to well spacing requirement:

Engineered Pumping Capacity (gallons per minute)	Well Spacing Requirement (feet)
1,000	450
2,000	1,150
3,000	1,700
4,000	2,200
5,000	2,600
Greater than 5,000	Variance shall be required

(Ord. No. 3272, § 1, 6-25-96)

23B-5c Exempt wells.

The following wells shall not be subject to sections 23B-5a and 23B-5b, except as noted herein:

(1) A well with an eight-inch or smaller diameter well casing.

(2) The repair or deepening of an existing well which requires a permit under this chapter, if the engineered pumping capacity of the pump is not increased.

(3) Replacement of a well that is destroyed in accordance with this chapter with a well having a pump that has the same engineered pumping capacity as the pump for the well that is destroyed and is drilled within one hundred (100) feet of the destroyed well.

(4) Limited purpose wells, including.

a. Frost protection well where the well shall only be operated during the crop frost seasons. These wells shall be subject to section 23B-5b and not section 23B-5a;

b. Well which is only used for fire suppression;

c. Monitoring and mitigation wells.

(5) Public water supply wells located within the public water supply agency's service area, except that the section 23B-5b well spacing requirements shall apply to new public water supply wells as they relate to existing wells located outside of the public water supply agency's service area. (Ord. No. 3272, § 1, 6-25-96)

23B-6 Persons to whom permits shall be granted.

Permits shall be granted pursuant to this chapter only to persons licensed to drill water wells, pursuant to the

provisions of Business and Professions Code section 7000 et seq., possessing a C-57 water well contractors license required by section 13750.5 of the California Water Code, or to the owner of the property or authorized representative. (Ord. No. 3272, § 1, 6-25-96)

23B-6a Persons permitted to drill a well.

All wells shall be drilled only by a person licensed to drill water wells pursuant to the provisions of Business and Professions Code section 7000 et seq. possessing a C-57 water well contractors license required by section 13750.5 of the California Water Code. (Ord. No. 3272, § 1, 6-25-96)

23B-7 Permit valid for one year.

Permits issued pursuant to this chapter shall be valid for one (1) year from date of issuance and shall automatically become void one (1) year from the date of issuance unless renewed prior to the expiration date. One (1) renewal may be granted by the health officer for a fee of half the original application fee. (Ord. No. 3272, § 1, 6-25-96)

23B-8 Filing of well driller's report.

Upon completion of a well, the owner or licensed well driller shall file a copy of a well driller's report with the health officer. Said report shall be filled out completely, signed by the well driller and shall be in the same form and content as the California State Department of Water Resources Well Drillers Report, and shall include such other information as will enable the health officer to determine that the well was installed in compliance with the standards required by this chapter and required well standards. This provision shall not be deemed to release any person from the requirement to file said report with the state department of water resources. No work shall be deemed to have been completed until the well driller's report has been received by the health officer. (Ord. No. 3272, § 1, 6-25-96)

23B-8a Well registration.

Owners of existing wells within the county may register their wells by completing and filing with the health officer a well registration form prescribed by the county. The well registration information will assist the county in administering this chapter and, in cooperation with water agencies within the county, in developing groundwater management plans. (Ord. No. 3272, § 1, 6-25-96)

23B-9 Inspections.

(a) The health officer or his designated representatives are hereby empowered to enter upon private property in order to make inspections for the purpose of enforcing the provisions of this chapter, as it relates to well construction. A final inspection of the work performed on any well pursuant to this chapter shall be made by the health officer unless such inspection is waived by him. No permittee shall be deemed to have complied with this chapter or his permit until such inspection has been either made and the installation approved, or waived.

(b) The Butte County Health Department, Division of Environmental Health, shall be notified a minimum of twenty-four (24) hours prior to installing or placing a sanitary seal. Drillers who anticipate completing a well in less than a day may notify the health officer twenty-four (24) hours prior to commencement of drilling and provide the anticipated time to commence the sanitary seal. If the health officer fails to appear at the well site at the time designated for sealing, the well may be sealed without the presence of the health officer. (Ord. No. 3272, § 1, 6-25-96)

23B-9a Drainage wells prohibited.

The installation or construction of drainage wells within the unincorporated area of the County of Butte is prohibited. Abandoned existing drainage wells shall be destroyed under a well permit in a manner approved by the health officer. The health officer may approve subsurface drainage trenches meeting the location and depth requirements for individual sewage disposal leaching fields for the temporary disposal of drainage where no other drainage method is feasible. Permits for other types of recharge or injection wells shall not be issued by the health officer without written approval of the California State Regional Water Quality Control Board. (Ord. No. 3272, § 1, 6-25-96)

23B-9b Well sealing.

In addition to well sealing requirements specified within state well standards bulletin 74-81, all wells shall be sealed to minimize the risk of introducing shallow water contamination into a deep aquifer. The annular seal shall be of sufficient depth to exclude water above the fifty-foot depth. Unless otherwise specified by the health officer the seal shall be extended five (5) feet into the first consolidated formation encountered below fifteen (15) feet to a maximum required sealing depth of fifty (50) feet. (Ord. No. 3272, § 1, 6-25-96)

23B-9c Flood protection.

Whenever possible, wells shall be located outside of any area subject to flooding. If it is not possible to locate a

well outside of a flood area, the well casing shall extend three (3) feet or more above the 100-year flood elevation. Within "areas of special flood hazard," as defined in section 26-29 of this Code, for which flood elevations have been established, the casing shall terminate three (3) feet or more above the established 100-year flood elevation. The health officer may accept an approved watertight "pitless adapter" as a means to provide flood protection for an individual well to serve a single-family residence. (Ord. No. 3272, § 1, 6-25-96)

23B-9d Well casing.

In addition to the well casing requirements of state well bulletin 74-81, unless otherwise approved by the health officer, the minimum thickness of steel casing shall be three sixteenths (3/16) inch. (Ord. No. 3272, § 1, 6-25-96)

23B-10 Violations; penalties.

Any construction, repair or reconstruction of any well or any destruction of any abandoned well in violation of the provisions of this chapter shall constitute a misdemeanor punishable as prescribed in section 1-7 of this Code; provided, however, that nothing herein shall be deemed to abrogate or annul the right to enjoin or abate such violations by civil action. (Ord. No. 3272, § 1, 6-25-96)

23B-11 County action not guarantee.

This chapter shall not be construed as imposing upon the county any liability or responsibility for damage resulting from defective construction, repair or reconstruction of any well or any destruction of any abandoned well or for damage to or interference with wells on adjoining or other properties. Further, neither the issuance of a permit pursuant to this chapter, final inspection of work performed on any well pursuant to this chapter nor the waiver of such final inspection shall be, nor construed to be, a guarantee by the County of Butte that suitable water in sufficient quantity is available from any well. (Ord. No. 3272, § 1, 6-25-96)

23B-12 Water quality requirement.

Any well which produces water with a water quality greater than two thousand five hundred (2,500) parts per million of total dissolved solids shall be destroyed in accordance with this chapter unless the well owner can prove to the satisfaction of the health officer that the well can be sealed to prevent the lower quality water from entering the well and that result is actually achieved. (Ord. No. 3272, § 1, 6-25-96)

23B-13 Minimum well depth of new individual wells for domestic purposes.

It shall be the responsibility of the well owner to insure that a new individual well for domestic purposes will operate properly assuming a repeat of the groundwater conditions experienced during the period 1987 through 1994 in the area in which the new well is located. (Ord. No. 3272, § 1, 6-25-96)

23B-14 Variances.

Upon application therefor and after notice is given as required under this chapter, the health officer may issue a variance permit and shall prescribe thereon such conditions as, in the health officer's judgment, are necessary to carry out the purposes of this chapter. If the health officer needs the advice of an expert geologist or groundwater hydrologist in order to make a decision on the variance application, the health officer may retain such expert and the costs shall be borne by the applicant. The health officer shall inform the applicant of the not-to-exceed cost of such expert advice before the cost is incurred, and the applicant may withdraw the variance application before any such costs are incurred. Following the issuance of a variance, the health officer shall not issue a well permit for a period of fifteen (15) days. (Ord. No. 3272, § 1, 6-25-96)

23B-15 Appeal.

(a) Any person whose application for a permit or for an approval has been revoked or denied, may, within thirty (30) days after the date of such denial or revocation, appeal therefrom in writing, accompanied with the appropriate appeal fees, to the board of supervisors. Upon the filing of a sufficient and proper appeal and payment of the fees provided for in this Code, the clerk of the board shall fix a time and place for a public hearing. The board shall affirm or overrule the denial or revocation. This section does not authorize appeals to the board from any action of the health officer authorized or required by state law or regulation.

(b) Any person, may, within fifteen (15) days after the date of the issuance of a variance under this chapter, appeal therefrom in writing, accompanied with the appropriate appeal fees, to the board of supervisors. Upon the filing of a sufficient and proper appeal and payment of the fees provided for in this Code, the clerk of the board shall fix a time and place for a public hearing. The board shall affirm or overrule the issuance of a variance. This section does not authorize appeals to the board from any

action of the health officer authorized or required by state law or regulation.

(c) If the board needs the advice of an expert geologist or groundwater hydrologist in order to make a decision on the appeal, the board may retain such expert advice, and the costs shall be borne by the appellant. The board shall inform the appellant of the not-to-exceed cost of such expert advice before the cost is incurred and the appellant may withdraw the appeal before any such costs are incurred. If the board needs to retain an expert, then the hearing on the appeal may be continued for up to sixty (60) days so as to allow the expert time to investigate and to write a report on the results of that investigation. The report shall be a public document and a copy of the report shall be given to the appellant.

(d) At the hearing of an appeal to the board of supervisors, any interested party may present oral or written evidence. Following the hearing, the board shall render a decision upon the appeal and may sustain, modify, or reverse any action of the health officer. The decision of the board shall be final. (Ord. No. 3272, § 1, 6-25-96)

23B-16 Fees and notices.

(a) Permit processing fee. A processing fee shall be paid together with and in addition to any other permit application fee payable pursuant to section 23B-4 and chapter 43 of this Code, as to any application to construct, repair or deepen any well with a well casing larger than eight (8) inches.

(b) Variance and appeal fees. Any person filing an application for a variance permit shall pay a fee equal to the actual cost for county employees' time in reviewing and otherwise processing, the application and for the county's costs of publishing hearing notices. Appeal fees are payable pursuant to section 23B-4 and Chapter 43 of this Code. The variance fees will be payable as follows:

(1) The application shall be accompanied by an initial fee deposit paid to the health officer.

(2) When the initial deposited funds are depleted to an amount equal to twenty-five (25) percent of the original deposit, no additional processing of the application will occur until the applicant or appellant deposits with the health officer sufficient funds to restore a balance equal to the amount required by chapter 43 of this Code, unless a lesser amount is approved by the health officer. In the event the applicant or appellant does not provide sufficient funds to continue processing the application, the application will be deemed denied.

(3) All deposited funds shall be maintained in a separate budget control account.

(4) After final action on the application, any funds remaining in the account shall be returned to the applicant or appellant. If the actual cost for county employee's time and publishing are less than the money deposited, the remaining amount shall be returned. If the costs are greater than the money deposited, the applicant or appellant shall pay the additional amount. In the event that payment is not received for the additional amount within thirty (30) days' notice by the health officer or the clerk of the board of supervisors, as applicable, effective upon mailing by first class mail, the matter will be immediately referred to central collections.

(c) Notices.

(1) Variances. A notice of application for a variance shall be mailed to the property owners located within the area specified under section 23B-5b, including the owners of all wells registered with the county pursuant to section 23B-8a or identified by the applicant in the application. Such notice shall be mailed at least fifteen (15) days before the health officer shall take action on the variance.

(2) Appeals. A notice of hearing on an appeal shall be both published in a newspaper of general circulation in accordance with Government Code sections 6060 and 6061 and be mailed to the owners of all property located within the area specified under section 23B-5b, including the owners of all wells registered with the county pursuant to section 23B-8a or identified by the applicant in the application.

(3) The notice shall be mailed to the property owners or to the owners shown on the section 23B-8a well registration roll. The notice shall indicate the time, date and place of the hearing and the location of the subject well property. Notice is not required to be given to property owners who are served by a public water supply well and notice shall instead be given to their public water supplier. Failure of any property owner to receive such a notice shall not affect in any manner the action taken by the board of supervisors. (Ord. No. 3272, § 1, 6-25-96)

Appendix F
California Code Regulations
Title 3 Pesticides and Pest Controls

August 10, 2004

SUMMARY OF NEW GROUND WATER PROTECTION REGULATIONS
(Title 3 of the California Code of Regulations)

Section 6000. Definitions

- Defines "artificial recharge basin" as a surface facility, such as an infiltration pond or basin, or spreading ground specifically designed and managed to increase the infiltration of introduced surface water supplies into a ground water basin. "Artificial recharge basin" does not include ditches, canals or reservoirs designed primarily to transport or store water, or stream channels, lakes, and other naturally occurring water bodies that are not principally managed to recharge ground water.

- Defines "engineered rights of way" as areas within a ground water protection area (GWPA) that are constructed in a way that results in increased runoff and collection of stormwater, such as railroad ballast and berms, public roadsides and highway median strips or similar areas, but not canal or ditch banks or utility lines.

- Defines "evapotranspiration" as the combination of water transpired from vegetation and evaporated from the soil and plant surfaces.

- Defines "field capacity" as the amount of water remaining in soil when the downward water flow due to gravity becomes negligible.

- Defines "leaching GWPAs" as sections of land where pesticide residues move from the soil surface downward through the soil matrix with percolating water to ground water, and "runoff GWPAs" as sections of land where pesticide residues are carried in runoff water to more direct routes to ground water such as dry or drainage wells, poorly sealed production wells, or soil cracks, or to areas where leaching can occur. Sections of land determined to be GWPAs are identified in a referenced document.

- Defines "net irrigation requirement" as the amount of water needed to bring the soil in the crop root zone to field capacity at the time of irrigation. It can be determined by direct measurements of soil moisture, such as by using tensiometers, or indirect measurements of soil moisture, such as by estimating evapotranspiration that has accumulated since the last irrigation.

Section 6416. Ground Water Protection Restrictions

- A permit is required for all agricultural, outdoor industrial and outdoor institutional uses of pesticides listed in section 6800(a) when used in GWPAs.

Section 6457. Bentazon.

- This section is created to retain the following two current bentazon use restrictions previously listed in section 6486.6: the prohibition of use on rice and the prohibition of use in Humboldt and Del Norte counties. (Bentazon is also be subject to the new use restrictions listed in sections 6487.1 – 6487.5)

Section 6486. Restrictions for Ground Water Protection List Pesticides Listed in Section 6800(a)

- For bentazon, the current provisions requiring sprinkler irrigation on treated sites and prohibiting applications between September 1 and March 1 are deleted.

- Except for bentazon in some cases, all use restrictions for pesticides listed in section 6800(a) are deleted and replaced by the restrictions specified in sections 6487.1-6487.5.

Section 6487.1. Artificial Recharge Basins

- Use of pesticides listed in section 6800(a) is prohibited below the high water line in artificial recharge basins, except under certain conditions.

Section 6487.2. Inside Canal and Ditch Banks

- Use of pesticides listed in section 6800(a) is prohibited below the high water line inside canal and ditchbanks, except under certain conditions.

Section 6487.3. Engineered Rights of Way Within Ground Water Protection Areas

- Use of pesticides registered for agricultural, outdoor industrial and outdoor institutional use containing chemicals listed in section 6800(a) is prohibited on engineered rights of way in GWPAs unless one of the following management options can be met and is designated by the commissioner on the permit:
  (a) The property operator complies with section 6487.4, or
  (b) Any runoff from the treated right of way passes through a fully vegetated area adjacent, and equal in area, to the treated area, or is spread out onto an adjacent unenclosed fallow field that is at least 300 feet long, or
  (c) The property operator complies with any permit issued pursuant to the storm-water provisions of the federal Clean Water Act pertaining to the treated area.

Section 6487.4. Runoff Ground Water Protection Areas

- In runoff GWPAs, use of pesticides listed in sections 6800(a) is prohibited unless any one of the following is designated on the permit:

1. Soil is disturbed within 7 days before pesticide is applied (Note: this restriction is not an option for bentazon, and does not apply to the treated area that is immediately adjacent to the crop row and that does not exceed 33% of the distance between crop rows), or

2. Pesticide is incorporated on at least 90% of the area treated within 48 hours after the day the pesticide is applied, by mechanical means or sprinkler or low flow irrigation (1/4 - 1 inch), including chemigation if allowed by the label (Note: this restriction is not an option for bentazon, and does not apply to the treated area that is immediately adjacent to the crop row and that does not exceed 33% of the distance between crop rows), or

3. Pesticide is applied as a band treatment, not to exceed 33% of the distance between crop rows, or

4. Pesticide is applied between April 1 and July 31, or

5. Runoff water is kept on the field or site for 6 months after application, provided that the soil percolation rate is less than or equal to 0.2 inches per hour, or

6. Runoff water is stored offsite in a basin, provided that the soil percolation rate is less than or equal to 0.2 inches per hour, controlled by the property operator for 6 months after application, or

7. For six months following application, runoff shall be managed so that it runs off onto an adjacent unenclosed fallow field at least 300 feet long that is not irrigated for six months after application, with full consideration of any plant back restrictions.

Section 6487.5. Leaching Ground Water Protection Areas

- In leaching GWPAs, use of pesticides listed in sections 6800(a) is prohibited unless any one of the following is designated on the permit:

  1. No irrigation water is applied for 6 months, or

  2. The pesticide is applied so that there is no contact with downward leaching irrigation water (such as to raised beds or berms under furrow irrigation), or

  3. The permittee manages irrigation water so that, for each irrigation applied for 6 months after the pesticide is applied, the net amount of irrigation water applied (as defined) divided by the net irrigation requirement (as defined) is 1.33 or less.

Sections 6487.3-6487.5. Alternative Use and Interim Use in GWPAs

- (1) Upon written request, the Director will evaluate and may approve use of alternative management practices (to those covered in the regulations) that are based on scientific data demonstrating their effectiveness in reducing movement of pesticides to ground water; or

  (2) Upon written request, the Director may make a determination to allow the interim unmitigated use of a pesticide containing a chemical listed in section 6800(a) for a period not to exceed three years. The Director's determination will be based on evidence that the available management practices are not feasible for the specific crop or site and there are no feasible alternatives for a specific crop or site. The formal request must include a study protocol(s) that is acceptable to the Director to develop feasible alternatives or alternative management practices. The study protocol must include a description of the objective, personnel, study plan, sampling methods including number of samples to be analyzed, data analysis, chemical analytical methods including appropriate quality control, timetable, and references, if any. The requestor must submit a written progress report every six months. If the progress report does not support the submitted study protocol(s), or if a report is not submitted, the Director could rescind the determination to allow the use of the pesticide within GWPAs.
  (3) The Director would issue a public notice stating the reasons alternative or interim use has been approved under (1) or (2).

Section 6557. Advisories for Groundwater Protection.

- This section is deleted.

Section 6570. Groundwater Protection Material Requirements.

- This section is deleted

Section 6609. Wellhead Protection

- Wellhead protection

  1. Except a provided in the next paragraph, the following activities are prohibited within 100 feet of any well (including domestic, municipal, agricultural, dry or drainage, monitoring or abandoned wells):

     (a) mixing, loading, and storage of pesticides
     (b) rinsing of spray equipment or pesticide containers
     (c) maintenance of spray equipment that could result in spillage of pesticide residues on the soil
     (d) applications of preemergent herbicides.

  2. Wells are not subject to the requirements in the previous paragraph if they are:

(a) sited so that runoff water from irrigation or rainfall does not contact any part of the well including the concrete pad or foundation or
(b) protected by a berm that prevents movement of surface runoff water to the well

3. No application of preemergent herbicides is allowed inside the berm adjacent to the well.

Section 6800(a) Ground Water Protection List

- Diuron products containing less than 7% diuron and that are applied to foliage are excluded from the 6800(a) list.

Section 6802. Pesticide Management Zones

- All Pesticide Management Zones are deleted (and included in the list of GWPAs).

TITLE 3. CALIFORNIA CODE OF REGULATIONS
DIVISION 6. PESTICIDES AND PEST CONTROL OPERATIONS
CHAPTER 1. PESTICIDE REGULATORY PROGRAM
SUBCHAPTER 1. DEFINITION OF TERMS
ARTICLE 1. DEFINITIONS FOR DIVISION 6

6000. Definitions.

. . .

"Artificial recharge basin" means a surface facility, such as an infiltration pond or basin, or spreading ground specifically designed and managed to increase the infiltration of introduced surface water supplies into a ground water basin. "Artificial recharge basin" does not include ditches, canals, or reservoirs designed primarily to transport and store water, or stream channels, lakes, and other naturally occurring water bodies that are not principally managed to recharge ground water.

"Engineered rights-of-way" means areas within a ground water protection area that are constructed in a way that results in increased runoff and collection of storm water, such as railroad ballasts and berms, public roadsides, and highway median strips or similar areas, but not canal or ditch banks or utility lines.

"Evapotranspiration" is the combination of water transpired from vegetation and evaporated from the soil and plant surfaces. Evapotranspiration data can be obtained from the California Irrigation Management Information System (CIMIS) or other local sources.

"Field capacity" is the amount of water remaining in soil when the downward water flow due to gravity becomes negligible.

"Ground water protection area" means an area of land that has been determined by the Director to be vulnerable to the movement of pesticides to ground water, as identified in the Department of Pesticide Regulation document EH03-05 (Est. 08/03), hereby incorporated by reference, entitled "Ground Water Protection Areas," in Appendix I. The determination of a ground water protection area is based on factors, such as soil type, climate, and depth to the ground water, that are characteristic of areas where legally applied pesticides or their breakdown products have been detected and verified in ground water.

"Leaching ground water protection areas" are sections of land designated as "leaching" in the Department of Pesticide Regulation document EH03-05 (Est.08/03), hereby incorporated by reference, entitled "Ground Water Protection Areas," where pesticide residues move from the soil surface downward through the soil matrix with percolating water to ground water.

"Net irrigation requirement" is the amount of water needed to bring the soil in the crop root zone to field capacity at the time of irrigation. It can be determined by direct measurements of soil moisture, such as by using tensiometers, or indirect measurements of soil moisture, such as by estimating evapotranspiration that has accumulated since the last irrigation.

"Runoff ground water protection areas" are sections of land designated as "runoff" in the Department of Pesticide Regulation document EH03-05 (Est. 08/03) hereby incorporated by reference, entitled "Ground Water Protection Areas," where pesticide residues are carried in runoff water to more direct routes to ground water such as dry or drainage wells, poorly sealed production wells, or soil cracks, or to areas where leaching can occur.

. . .

NOTE: Authority cited: Sections 11456, 11502, 12111, 12781, 12976, 12981, 13145, 14001, and 14005, Food and Agricultural Code.
Reference: Sections 11401.2, 11408, 11410, 11501, 11701, 11702(b), 11704, 11708(a), 12042(f), 12103, 12971, 12972, 12973, 12980, 12981, 13145, 13146 and 14006, Food and Agricultural Code.

CHAPTER 2. PESTICIDES
SUBCHAPTER 4.RESTRICTED MATERIALS
ARTICLE 2. POSSESSION AND USE LIMITATIONS

6416. Groundwater Protection Restrictions.

(a) A permit is required for the possession or use of a pesticide containing a chemical listed in section 6800(a) when the pesticide is:

(1) applied in an agricultural, outdoor institutional, or outdoor industrial use within a runoff ground water protection area or in a leaching ground water protection area, or

(2) restricted for purposes other than ground water protection.

(b) A permit is not required for the possession or use of a pesticide containing a chemical listed in section 6800(a) when the pesticide is used in a pest eradication program approved by the Department of Food and Agriculture, unless the pesticide is also restricted for purposes other than ground water protection.

(c) Notwithstanding the provisions of this article and Article 4, the chemicals listed in section 6800(a) may be applied for research or experimental purposes pursuant to a valid research authorization. The applicant must provide the location of the research or experimental site with the research authorization request. The exemptions found in section 6268 do not apply when a person wishes to use these chemicals for research or experimental purposes.

NOTE: Authority cited: Sections 11456, 12976, 13145, 14004.5, 14005, 14006, and 14102, Food and Agricultural Code.
Reference: Sections 11501, 13145, 13150, 14004.5, 14005, and 14006, Food and Agricultural Code.

CHAPTER 2. PESTICIDES
SUBCHAPTER 4. RESTRICTED MATERIALS
ARTICLE 4. USE REQUIREMENTS

6457. Bentazon (Basagran).

In addition to the restrictions specified in sections 6487.1, 6487.2, 6487.3, and 6487.4, the following restrictions apply for agricultural, outdoor institutional, and outdoor industrial uses of bentazon for the purpose of ground water protection:

(a) Bentazon shall not be applied in Del Norte or Humboldt Counties.

(b) Bentazon shall not be used in the production of rice.

NOTE: Authority cited: Sections 11456, 12976, 13145, 14005 and 14006, Food and Agricultural Code.
Reference: Sections 13145, 13150 and 14006, Food and Agricultural Code.

6487.1. Artificial Recharge Basins.

Use of pesticides registered for agricultural, outdoor industrial, and outdoor institutional use containing chemicals listed in section 6800(a) shall be prohibited below the high water line inside artificial recharge basins, unless the pesticide is applied six months or more before the basin is used to recharge ground water.

NOTE: Authority cited: Sections 11456, 12976, 13145, and 14102, Food and Agricultural Code.
Reference: Sections 13145, 13150, and 14102, Food and Agricultural Code.

6487.2. Inside Canal and Ditch Banks.

Use of pesticides registered for agricultural, outdoor industrial, and outdoor institutional use containing chemicals listed in section 6800(a) shall be prohibited below the high water line inside unlined canals and ditches, unless at least one of the following applies:

(a) the pesticide user can document that the percolation rate of the canal or ditch is equal to or less than 0.2 inches per hour (0.002 gallons per minute per square foot); or

(b) the pesticide is applied six months before water is run in the canal or ditch.

NOTE: Authority cited: Sections 11456, 12976, 13145, and 14102, Food and Agricultural Code.
Reference: Sections 13145, 13150, and 14102, Food and Agricultural Code.

6487.3. Engineered Rights-of-Way Within Ground Water Protection Areas.

Use of pesticides registered for agricultural, outdoor industrial, and outdoor institutional use containing chemicals listed in section 6800(a) shall be prohibited on engineered rights-of-way in leaching or runoff ground water protection areas unless one of the following management options can be met and is designated by the commissioner on the permit:

(a) The property operator complies with section 6487.4; or

(b) Any runoff from the treated right-of-way shall pass through a noncrop fully vegetated area adjacent, and equal in area, to the treated area, or spread out onto an adjacent unenclosed fallow field that is at least 300 feet long and that will not be irrigated for six months following application, with full consideration of any plantback restrictions; or

(c) The property operator complies with any permit issued pursuant to the storm water provisions of the federal Clean Water Act pertaining to the treated area; or

(d) An alternative management practice or pesticide approved by the Director as follows:

(1) Upon written request, the Director may evaluate and approve use of management practices that are based on scientific data demonstrating their effectiveness in reducing movement of pesticides to ground water; or

(2) Upon written request, the Director may make a determination to allow the interim use of a pesticide containing a chemical listed in section 6800(a) on an engineered right-of-way within a ground water protection area, for a period not to exceed three years. The Director's determination shall be based on evidence that the available management practices are not feasible for a specific crop or site, and that there are no feasible alternatives for the specific crop or site. The formal request shall include a study protocol(s) that is acceptable to the Director to develop feasible alternatives or alternate management practices. The study protocol shall include a description of the objective, personnel, study plan, sampling methods including number of samples to be analyzed, data analysis, chemical analytical methods including appropriate quality control, timetable, and references, if any. The requestor shall submit a written progress report every six months. If the progress report does not support the submitted study protocol(s), or if a report is not submitted, the Director may rescind the determination to allow the use of the pesticide within a ground water protection area.

(3) The Director will issue a public notice stating the reasons interim use has been approved under (1) or (2). The notice will be posted on the Department's Web site.

NOTE: Authority cited: Sections 11456, 12976, 13145, and 14102, Food and Agricultural Code. Reference: Sections 13145, 13150, and 14102, Food and Agricultural Code.

6487.4. Runoff Ground Water Protection Areas.

Except as provided in sections 6487.1, 6487.2, and 6487.3, use of pesticides registered for agricultural, outdoor industrial, and outdoor institutional use containing chemicals listed in section 6800(a) shall be prohibited in runoff ground water protection areas unless one of the following management practices can be met and is designated by the commissioner on the permit. The management practice identified in (b), "Incorporation of the pesticide," does not apply to bentazon.

(a) Soil disturbance. Within seven days before the pesticide is applied, the soil to be treated shall be disturbed by using a disc, harrow, rotary tiller, or other mechanical method. This subsection does not apply to bentazon, and does not apply to the area to be treated that is immediately adjacent to the crop row and that does not exceed 33 percent of the distance between crop rows; or

(b) Incorporation of the pesticide. Within 48 hours after the day the pesticide is applied, the pesticide shall be incorporated on at least 90 percent of the area treated; using a disc, harrow, rotary tiller, or other mechanical method, or by sprinkler or low flow irrigation, including chemigation if allowed by the label, using a minimum of ¼ inch of irrigation water and a maximum of either one inch or the maximum amount of irrigation water specified on the label, at application rates that do not cause surface water runoff from the treated property or to wells on the treated property. This subsection does not apply to bentazon, and does not apply to the area treated with other pesticides listed in section 6800(a) that is immediately adjacent to the crop row and that does not exceed 33 percent of the distance between crop rows; or

(c) Band treatment. The pesticide shall be applied as a band treatment immediately adjacent to the crop row so that not more than 33 percent of the distance between rows is treated; or

(d) Timing of application. The pesticide shall be applied between April 1 and July 31; or

(e) Retention of runoff on field. For six months following the application, the field shall be designed, by berms, levees, or nondraining circulation systems, to retain all irrigation runoff and all precipitation on, and drainage through, the field. The retention area on the field shall not have a percolation rate of more than 0.2 inches per hour (5 inches per 24 hours); or

(f) Retention of runoff in a holding area off the field. For six months following the application, all runoff shall be channeled to a holding area off the application site, under the control of the property operator, that is designed to retain all irrigation runoff and all precipitation on, and drainage through, the treated field and all other areas draining into that holding area. The holding area shall not have a percolation rate of more than 0.2 inches per hour (5 inches per 24 hours); or

(g) Runoff onto a fallow field. For six months following application, runoff shall be managed so that it runs off onto an adjacent unenclosed fallow field at least 300 feet long that is not irrigated for six months after application, with full consideration of any plant back restrictions; or

(h) An alternative management practice or pesticide approved by the Director as follows:

(1) Upon written request, the Director may evaluate and approve use of alternative management practices that are based on scientific data demonstrating their effectiveness in reducing movement of pesticides to ground water; or

(2) Upon written request, the Director may make a determination to allow the interim use of a pesticide containing a chemical listed in section 6800(a) within a runoff ground water protection area, for a period not to exceed three years. The Director's determination shall be based on evidence that the available management practices are not feasible for a specific crop or site, and that there are no feasible alternatives for the specific crop or site. The formal request shall include a study protocol(s) that is acceptable to the Director to develop feasible alternatives or alternate mitigation measures. The study protocol shall include a description of the objective, personnel, study plan, sampling methods including number of samples to be analyzed, data analysis, chemical analytical methods including appropriate quality control, timetable, and references, if any. The requester shall submit a written progress report every six months. If the progress report does not support the submitted study protocol(s), or if a report is not submitted, the Director may rescind the determination to allow the use of the pesticide within a ground water protection area.

(3) The Director will issue a public notice stating the reasons interim use has been approved under (1) or (2). The notice will be posted on the Department's Web site.

NOTE: Authority cited: Sections 11456, 12976, 13145, and 14102, Food and Agricultural Code. Reference: Sections 13145, 13150, and 14102, Food and Agricultural Code.

6487.5. Leaching Ground Water Protection Areas.

Except as provided in sections 6487.1, 6487.2, and 6487.3, use of pesticides registered for agricultural, outdoor industrial, and outdoor institutional use containing chemicals listed in section 6800(a) shall be prohibited in leaching ground water protection areas unless any one of the following management practices can be met and is designated by the commissioner on the permit:

(a) The permittee shall not apply any irrigation water for six months following application of the pesticide; or

(b) The permittee shall apply the pesticide to the planting bed or the berm above the level of irrigation water in the furrow or basin and the water level shall remain at or below that level for six months following application of the pesticide; or

(c) Irrigation shall be managed so that the ratio of the amount of irrigation water applied divided by the net irrigation requirement is 1.33 or less for six months following application of the pesticide; or

(d) An alternative management practice or pesticide approved by the Director as follows:

(1) Upon written request, the Director may evaluate and approve use of alternative management practices that are based on scientific data demonstrating their effectiveness in reducing movement of pesticides to ground water; or

(2) Upon written request, the Director may make a determination to allow the interim use of a pesticide containing a chemical listed in section 6800(a) within a leaching ground water protection area, for a period not to exceed three years. The Director's determination shall be based on evidence that the available management practices are not feasible for a specific crop or site, and that there are no feasible alternatives for the specific crop or site. The formal request shall include a study protocol(s) that is acceptable to the Director to develop feasible alternatives or alternate management practices. The study protocol shall include a description of the objective, personnel, study plan, sampling methods including number of samples to be analyzed, data analysis, chemical analytical methods including appropriate quality control, timetable, and references, if any. The requester shall submit a written progress report every six months. If the progress report does not support the submitted study protocol(s), or if a report is not submitted, the Director may rescind the determination to allow the use of the pesticide within a ground water protection area.

(3) The Director will issue a public notice stating the reasons interim use has been approved under (1) or (2). The notice will be posted on the Department's Web site.

NOTE: Authority cited: Sections 11456, 12976, 13145, and 14102, Food and Agricultural Code. Reference: Sections 13145, 13150, and 14102, Food and Agricultural Code.

CHAPTER 3. PEST CONTROL OPERATIONS
SUBCHAPTER 2. WORK REQUIREMENTS
ARTICLE 1. PEST CONTROL OPERATIONS GENERALLY

6609. Wellhead Protection.

(a) Except as provided in subsection (b), the following activities shall be prohibited within 100 feet of a well (including domestic, municipal, agricultural, dry or drainage, monitoring, or abandoned wells):

(1) mixing, loading, and storage of pesticides.

(2) rinsing of spray equipment or pesticide containers.

(3) maintenance of spray equipment that could result in spillage of pesticide residues on the soil.

(4) application of preemergent herbicides.

(b) Wells shall not be subject to the requirements in (a) if they are:

(1) sited so that runoff water from irrigation or rainfall does not move from the perimeter of the wellhead toward the wellhead and contact or collect around any part of the wellhead including the concrete pad or foundation; or

(2) protected by a berm constructed of any material sufficient to prevent movement of surface runoff water from the perimeter of the wellhead to the wellhead.

(c) Application of preemergent herbicides shall be prohibited between the berm and the wellhead.

NOTE: Authority cited: Sections 11456, 12976, and 14102, Food and Agricultural Code. Reference: Sections 11501 and 14102, Food and Agricultural Code.

CHAPTER 4. ENVIRONMENTAL PROTECTION
SUBCHAPTER 1. GROUNDWATER
ARTICLE 1. PESTICIDE CONTAMINATION PREVENTION

6800. Groundwater Protection List.

Pesticides labeled for agricultural, outdoor institutional or outdoor industrial use that contain any of the following chemicals are designated as having the potential to pollute ground water:

(a) The following chemicals detected in ground water or soil pursuant to section 13149 of the Food and Agricultural Code:

(1) Atrazine
(2) Simazine
(3) Bromacil
(4) Diuron, except for products with less than 7% diuron that are applied to foliage
(5) Prometon
(6) Bentazon (Basagran®)
(7) Norflurazon

. . .

NOTE: Authority cited: Sections 11456, ~~12976~~, 13145, Food and Agricultural Code. Reference: Sections 13144, 13145, and 13149, Food and Agricultural Code.

Public Comments & Responses Specific to the Butte County Groundwater Management Plan (AB 3030 Plan) – April 2004

Public Hearing – September 28, 2004 at 10:30 AM
Butte County Board of Supervisors Chambers
25 County Center Drive
Oroville, CA

Responses to these comments were prepared by Ed Craddock, Director, Eric Miller, Manager – Program Development, and Lara Memmott, Engineering Technician, of the Butte County Department of Water and Resource Conservation (DW&RC).

From: Bruce Smith, Chico, CA (received via email, 6/24/04)

Comment #1) Section 1.3 Area Covered by Plan

Comment: Under the Vina and West Butte Inventory Units (Table 1-1, page 1-3) the inventory sub-unit Chico Urban Area is excluded. The Basin Management Objectives (BMO) ordinance includes the Chico Urban Area as an inventory sub-unit. Shouldn't the inventory sub-units be the same in each document?

DW&RC Response: The AB 3030 Plan (Table 1-1) will be amended to state that the Chico Urban Area, or that portions of that BMO sub-unit that are not presently covered by an AB 3030 Plan by the local water purveyor, are addressed in the Butte County Groundwater Management Plan. We will address the correction above and include the Chico Urban Area sub-unit.

Note also that areas overlying the groundwater basin that are regulated by the Public Utilities Commission (CWC Section 10750.7(a)), including the area served by California Water Service Company – Chico, are managed under an Urban Water Management Plan and are not included under the County's AB 3030 Groundwater Management Plan.

Comment #2) Section 1.4 Plan Development Process

Comment: Step 5 of this section describes some relationship between protests and 50% of the assessed value. What does this section mean? It is difficult to understand.

DW&RC Response: We will insert language to address this concern. Section 10753.6 of the California Water Code (Re: written protest: content; majority protest) states that in order for a majority protest to exist to the adoption of the plan, written protests covering

over 50% of the assessed value of the land area (shown in Section 1, Figure 1-2) must be filed and not withdrawn before the conclusion of the second public hearing.

Comment #3) Section 2.5 Hydrogeology

Comment: This section indicates the approximate depth at the deepest portion of the aquifer to the base of fresh water within each of the inventory units. Is data available to the public to support this and where is the data?

Figure 2-7 (page 2-3) shows Recharge Areas but does not specify to which aquifer. Is data available to make those links?

DW&RC Response: Language will be changed to clarify this concern. The Butte County Water Inventory and Analysis (2001) provides more information regarding the hydrogeology and fresh water bearing units of the groundwater in Butte County (see Section 3 of the Butte County Water Inventory and Analysis, which is available for review in local public libraries and also at www.buttecounty.net/waterandresource. Click on "Reports" and then on "Inventory Analysis") but the basic reference to the statement here is DWR Bulletin 118-3.

Comment #4) Section 2.6 Groundwater Well Infrastructure

Comment: Table 2.1 (page 2-9) shows Cal Water Service as an inventory sub-unit. The BMO ordinance describes this as the Chico Urban Area. Please explain the difference.

DW&RC Response: Referring to comment #1 above, we will insert language to address a necessary edit. Also note that, for water use projections in the Chico Urban Area, the California Water Service utilized data compiled in the Butte County Water Inventory & Analysis (2001). By statute, private utilities such as California Water Service are not covered by the legislation that supports AB 3030. However, California Water Service has actively participated in the development of draft water resource planning documents prepared by Butte County.

From: Suellen Rowlison, retired nurse, Chico (received via e-mail, 8/12/04)

Comment #5) General Input

Comment: Ms. Rowlison expresses concern that the Groundwater Management Plan (GMP) will be considered without it being considered in the context of the Integrated Water Plan, which also incorporates BMOs. There is general agreement with the purposes of the GWP except for "facilitate groundwater replenishment and cooperative management projects." Actions to carry out this purpose are found throughout the GMP recommendations. The author generally states that environmental policies should drive

our care for water to keep it pure, not economic policies. Even with precautions, there is opportunity to contaminate our groundwater. Some enhanced natural recharge might be acceptable but even this must be monitored carefully. The most economical and easiest way to protect groundwater quality and quantity is to pump less groundwater and allow more surface water to naturally enter the aquifer. Californians will conserve if it is an economic decision, i.e. water rates and pumping costs increase.

DW&RC Response: The California Groundwater Management Act, or AB 3030, was adopted by the California legislature in 1992, which created provisions in the California Water Code Section 10750 et.seq. to manage the safe production, quality, and proper storage of groundwater. Though adoption of a Groundwater Management Plan is not required by law, it is encouraged. AB 3030 is applicable to local agencies, including counties, to develop a county-wide groundwater management plan for portions of the groundwater basin not presently covered by a another groundwater management plan. In August 2003 the Butte County Board of Supervisors approved Resolution 03-134 (located in Appendix A of the document) directing the Butte County Department of Water and Resource Conservation to proceed with the development of a county-wide AB 3030 Plan.

Per Water Code Section 10750 etseq., the County's AB 3030 Plan is a stand alone document. According to the State Department of Water Resources (DWR), 149 agencies have adopted AB 3030 plans and others have begun the process. In some basins groundwater is managed by statutory or judicial authority.

One benefit to the County's adoption of its AB 3030 Plan is to meet objectives of grant funding opportunities available under the Groundwater Management Assistance Program (AB 303). Last January 2004, Butte County applied for an AB 303 grant in the amount of $236,000 to support the development of a Basin Management Objective (BMO) Information Center. The County's grant proposal was outscored by competing proposals primarily because the County did not have an AB 3030 Plan in place.

DW&RC staff agrees with the concern that the AB 3030 Plan, and its related groundwater policies, should remain in context with the Draft Integrated Water Resources Plan. Regarding the creation of a "groundwater replenishment district," this would only occur if the Board of Supervisors adopted that action.

It is the DW&RC's position to perform and evaluate the scientific studies that will be necessary in the future to assist local policy makers. We will ensure that language corrections will be made in the draft text to reiterate that evaluation is a precursor to facilitation.

DW&RC staff notes that additional responses to comments regarding the Integrated Water Management Plan (IWRP) will be addressed separately (when the IWRP is presented to the Board of Supervisors later this autumn/winter).

From: Linda Cole, Valley Water Protection Association (received via e-mail, 8/20/04)

Comment #6) Page 2-2

Comment: Additionally, surface water managed for agricultural use contributes to (some shallow) groundwater recharge (as well as horizontal transmission of water to stream flows.

On the bottom of the page it is stated that "the approximate depth at the deepest portion of the aquifer to the base of the fresh water within each of the inventory units is…." This is very misleading as the units are tilted and "zero out" toward the foot hills providing 2/3 to only half of the implied depth mentioned when calculating the volume.

DW&RC Response: The hydrogeologic analysis of the Northern Sacramento Valley, and extent and properties of the Tuscan formation, are still exploratory and under evaluation. As noted above in the response to comment #3, Section 3 of the Butte County Water Inventory and Analysis describes the hydrogeology and geologic setting of the area. Generally speaking, alluvial units tend to pinch out, or become thinner, at the edge of the basins.

Comment #7) Figures 2-3, 2-4, 2-5 and 2-8

Comment: I could not find Figures 2-3, 2-4, 2-5 and 2-8 in the copy I reviewed.

DW&RC Response: These figures are included within electronic versions and hard copy versions of the public review drafts. Electronic downloading of several of these maps may be dependent on the user's existing internet service provider, hardware, and/or software. Hard copies of these figures may be viewed in either the DW&RC's office library in Oroville, or the Butte Environmental Council's library in Chico, or at county libraries located in Chico, Durham, Paradise, Oroville and Gridley.

Figure 2-3 includes a fold-out (8.5" x 14") geologic map of Butte County; Figure 2-4 includes a fold-out diagram Geologic Legend; Figure 2-5 includes a fold-out diagram of Butte County Geologic Map with cross-sections; Figure 2-8 includes Butte County Groundwater Elevations, Spring 1997.

Comment #8) Section 2.5.1 – Groundwater Levels

Comment: Referring to the last paragraph, in the Cherokee area it took 2 years to recover water levels after the water sales of the drought water bank in 1994. The winter of 1994 and 1995 were wet years which may have helped the recover to only take 2 years. The correction should also be placed in the next to the last paragraph on page 2-7.

DW&RC Response: We will clarify the language in the text. This paragraph refers to long term historical data that shows that groundwater well levels seasonally and annually fluctuate, but that there is no significant difference in the well levels over the long term.

Comment #9) Page 2-9, Table 2-1

Comment: Are these wells reflecting the estimated wells before the requirement to report wells which came into effect in the 1970's?

DW&RC Response: The number and type of well included within Table 2-1 include those wells on file at DWR. Wells on file include those for which a Well Completion Report has been filed, as required under California Water Code since the late 1940s, and any additional well logs on file prior to enactment of the requirement. Well data is available for review at DWR's Northern District Planning and Local Assistance Branch Office, or at the following website: http://well.water.ca.gov/gw/admin/main menugw.asp.

Comment #10) Page 2-11, Section 2.7.2 – Water Supply

Comment: In the first bullet, the comment regarding East Butte is wrong. There is sufficient land which is dependent on groundwater in East Butte. This area is also quickly growing for housing…there you will find groundwater dependency as well.

Last bullet: Surface water distribution in East Butte is facing limitations due to lack of infrastructure…again creating a greater dependence on stable groundwater levels.

DW&RC Response: Relative to the amount of total applied water (last column of Table 2-3, page 2-11), the East Butte and Foothill inventory units do primarily use surface water and the remainder of Butte County uses groundwater.

Comment #11) Page 2-12, Table 2-4 Normal Year Water Supplies

Comment: Under Table 2-4 in the last sentence of the first paragraph it says, "This increases to more than 640 TAF in drought years, primarily due to a reduction in surface water availability from the Feather River (CDM, 2001)."

The availability is still there, their settlement contracts protect them from no more than 100% reduction in any one year but users opt for selling the water and using groundwater replacement so availability is the wrong word to use.

DW&RC Response: We will edit the sentence to read: "This increases to more than 640 TAF in drought years, primarily due to a reduction in surface water ~~availability~~ use from the Feather River.

Comment #12) page 2-12, 2nd paragraph

Comment: Regarding net groundwater extraction…..please account for the confining layers which Toccoy Dudley (DWR) shows in his cross-sections and identify the deep percolation contributing to shallow aquifers and to stream contributions with a very small percentage going into the deeper aquifers.

DW&RC Response: The hydrogeologic properties of the Sacramento Valley aquifer system is still under evaluation. The hydrogeologic character of the aquifers and interaction with streams, confining layers, and recharge is not well understood. Further evaluation is necessary to make any additional statements beyond estimations that have been put forth here.

Comment #13) page 2-12, Section 2.7.3 Water Demand and Supply Findings

Comment: 3rd bullet - Change "not by total water supply" to include economic availability and access to lower water levels becomes the problem though native habitats cannot adapt.

DW&RC Response: We will delete text and edit the sentence to read as follows: "Shortages are defined by lack of supply, which in most cases is limited by the groundwater infrastructure available ~~not by total water supply~~."

Comment #14) page 2-13, 1st bullet and 4th bullet

Comment: In the sentence "Long term trends…..not in a state of decline," add "when looking at normal and wet year contributions. However, operation during summer levels show a decline."

In the 4th bullet state that "Environmental water use (for rice decomposition) constitutes a substantial part of…..

DW&RC Response: Seasonal fluctuations of groundwater well levels are determined by the amount of use and climatic conditions. Evaluation of the historical data suggests there is not a significant difference in the annual elevation of groundwater well levels in Butte County.

Comment #15) page 2-14, 1st bullet

Comment: Regarding….. "foreseeable changes evaluated would not result in significant long-term changes in agricultural water demand in Butte County" (this may not be the case if ag support businesses are destabilized by fallowing recessions. Profit margins sometimes depend on having ag handlers available for processing.

DW&RC Response: We will address agricultural water demand forecasting in the next Water & Inventory Analysis (the proposed 5-year update is in 2006). Any new data will be welcomed in that process.

Comment #16) Page 2-15, Table 2-5, Summary of Ag Demand Forecast Scenarios

Comment: Regarding the Land Conversion column…. There is a calculated decrease in irrigated land in Vina, East and West Butte sub-units. Is that land developed for other purposes (i.e. for housing)? Densities could come close to the same or more water usage.

DW&RC Response: Land conversion includes both conversions to urban use and conservation easements. Additional water demand following conversion to urban use is addressed in the County's recent Urban Water Demand Forecast document (October 2003). The Butte County Urban Water Demand Forecast may be viewed at www.buttecounty.net/waterandresource. Click on "Demand Forecast" and link to "Urban Water Demand." This document is also available for public review at local libraries.

Comment #17) Page 2-17, Figure 2-14, Urban Water Demand Forecast Results

Comment: The low growth in the unincorporated areas shown in Figure 2-14 does not anticipate any "new Town" which is a very real alternative discussed in development circles….that and industrial parks or Indian casinos all could trigger greater growth in water demand in unincorporated areas than shown on your chart.

DW&RC Response: We will address this in the next Water & Inventory Analysis as per comments #15 and #16.

Comment #18) page 3-1, last bullet, re: groundwater replenishment….

Comment: The meetings I've attended stressed the need to protect the existing groundwater and aquifer system, not recharge it given the current knowledge. There was no public discussion nor support for a recharge district.

DW&RC Response: We will clarify this language by striking the word "facilitate" and replace it with "evaluate." We propose to evaluate the geology of the aquifer and consider the science, economics, environmental impacts, and other benefits/impacts, of recharging the aquifer.

Comment #19) RE: Carrying capacity of aquifer…contamination plumes….

Comment: The carrying capacity of the shared aquifer under Butte County needs to be studied, map contamination plumes and their movement with seasonal water extractions.

DW&RC Response: As per above, we propose to evaluate the aquifer's properties. Regarding the mapping of contamination plumes and their movement with respect to seasonal water extractions, we defer to the Butte County Division of Environmental Health.

On a further note, without an AB 3030 Plan in place, Butte County is more susceptible to groundwater management by the State of California. By implementing this plan we also provide ourselves the opportunity to apply for grant funding to further our understanding of the hydrogeologic character of Butte County.

From: Alan Gair, no address provided (received via e-mail, 8/6/04)

Comment #20) General Comments re: water pricing, rice & alternative crops

Comment: "I was looking for the price/demand forecasts for rice and the effect the WTO subsidy restrictions will have on the whole scenario. Such a heavily subsidized crop as rice, which is so capital intensive, and such a heavy user of water, is due for heavy cut backs.

I could not see that you had addressed the basic absurdity of promoting and subsidizing the water price for a tropical crop, grown in a partial desert, with 75% of it sold at subsidized prices abroad when other third world nations so urgently need this crop to survive.

I believe it is in the taxpayer's interest to continue to support more profitable (to the US) alternative crops and I support you in your endeavors. Reducing the billions of dollars in rice subsidies which go to the top 10% of big farmers will do the economic nothing but good."

DW&RC Response: A committee of local agricultural experts developed a range of potential future scenarios that may result in changes to agricultural water demand, with crop price changes being one of the potential scenarios. A change in agricultural water use was then based on this scenario. Our agricultural demands were based on models developed at UC Davis in cooperation with state and federal water agencies. Specific spreadsheets were devised for Butte County as described in our Technical Memorandum, Agricultural Demand Forecast" which was prepared in October 2003 Readers may view this document at www.buttecounty.net/waterandresource (click on "Demand Forecasts" and link to "Ag Water Demand." The document is also available for review in local public libraries). The model requires data on crop price and yield, fixed and variable costs, water costs, irrigated acreage, irrigation water requirements and acreage elasticity's. We need to use the current information to develop the baseline. If there are any significant changes we will pick those up in our 2006 update of our Butte County Water and Inventory Analysis. Please provide us any input you have to assist us in the production of that document.

From: Tim Stroshane, Butte Environmental Council (received via e-mail 8/19/04)

Comment #21) General Input - Several comments posed inter-relate to the Integrated Water Plan. Those shown below can also be addressed in the AB 3030 Plan responses to comments.

Comment: A conjunctive use program is a distinct and specific kind of "coordinated management program" that puts the County's water up for sale and which could have quick and permanent environmental and economic effects. It should be called out as a definite County proposal and named for what it is: a strategy to put the County's water up for sale. What is the policy basis for such a program? Is it driven by the County's fiscal condition?

DW&RC Response: If a conjunctive use program were to be established within Butte County, a preliminary evaluation must first occur to address and explore the hydro-geology of our region. Economic, engineering, and environmental issues must be determined to assist local decision makers with policy making. Such work would likely involve CEQA and the process would be clear and transparent. The County's fiscal condition is always a concern to policy makers. If possible, and if it is environmentally, economically, technically, and socially sound, it is the interest of the County to minimize financial impacts on its General Fund, which in turn preserves the use of tax payer dollars to other vital County functions.

Additional responses referring to the Policy Recommendations in the draft Integrated Water Resources Plan, such as conjunctive use, will be developed separately.

Comment #22) General comment re: groundwater ordinance

Comment: Regarding the proposed County groundwater ordinance, for policies protecting natural recharge areas – which in the long run will be more energy efficient for County residents and property owners – it must be a priority to protect the natural recharge areas by ensuring that the zoning and General Plan designations that are applied to these areas achieve consistency and ensure adequate protection. Implementation of these policies through zoning and planning powers is key to the success of the proposed groundwater ordinance.

DW&RC Response: Agreed. Before such policies (i.e. General Plan zoning designations) are considered by the Board of Supervisors, one of our top priorities is to conduct evaluations of the local hydrogeology and understand the science that would support such zoning policy recommendations.

Comment #23) General comment re: climatic conditions

Comment: The analysis of the ordinance does not take account of the extraordinary climate conditions of the past 150 years (warmer and wetter than normal, Sierra Nevada Ecosystem Project climate studies) showing century long droughts during the past 1300 years. Climate change models predict less rain, higher snow elevations, earlier spring runoff…….A recent study of global climate change by UC Berkeley is also predicting later in this century that climate warming triggered by industrial and corporate capitalist production and transportation sectors could raise snow levels, shift rainfall patterns, and create tremendous strain on California's water and hydrologic systems.

DW&RC Response: A priority of the DW&RC is developing a sophisticated watershed model for the upper watersheds that contribute to Butte County's groundwater system. The DW&RC has contracted with Dr. Lev Kavvas, at UC Davis, for assistance.

Comment #24) General comment re: artificial recharge

Comment: Artificial aquifer recharge must be rejected as an option to "manage" water in the Butte Basin. The aquifer should not be used as a bank for export with artificial recharge, which would increase the likelihood of contaminating the aquifer, causing the land to subside, and transferring ownership of groundwater. Moreover, approaches to artificial aquifer recharge (e.g. injection of groundwater) is likely to be more energy intensive than maintaining and protecting natural recharge areas. Programs and practices that increase use of energy should be avoided.

DW&RC Response: Such programs, if feasible, must be backed up by scientific evaluation. If the proposed AB 3030 Plan is adopted and approved by the Board, it would allow the DW&RC to apply for grant funds available under AB 303 to conduct preliminary and necessary research.

Further evaluation of the groundwater of Butte County is necessary. Existing conditions are not completely understood. Potential action such as the implementation of a recharge district or conjunctive use program will be addressed by the Board of Supervisors when more options are evaluated.

Comment #25) General comment re: public outreach

Comment: Public outreach to non-professional members of the public with little knowledge of the hydrology and politics that define water policy is no substitute for state and county efforts to defend the public trust from privately owned resource transfer entities with professional policy staff. State and local government should follow the precautionary Principle: "When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically." We recommend that the County create a position for a public trust advocate whose charge, similar to the ratepayer advocate in California Public Utilities Commissions proceedings, identifies and

advocates for the public interest and public trust resources in County water policy proceedings and decisions, and to provide some county balance to the expertise readily obtained on behalf of water districts and municipal water utilities.

DW&RC Response: In the absence of such a position, the County will work closely with the Water Advisory Committee (WAC), Technical Advisory Committee (TAC), and environmental community that could assist us in meeting public outreach needs. The WAC and TAC are provided for in Chapter 33A of the Butte County Code (included as Appendix B of the document), which addresses the Basin Management Objective (BMO) ordinance adopted by the Board in February 2004.

Comment #26) General comment re: water district and municipal well restrictions

Comment: Water district and municipal well exemptions should be rejected by the County. Butte County, as the trust agency for Butte County citizens, must retain regulatory authority over existing districts with AB 3030 Plans and municipal entities.

DW&RC Response: AB 3030 legislation is not available to municipal utilities that are under control of the Public Utilities Commission. AB 3030 is available to local agencies, including counties and special districts such as water districts, which are recognized as political subdivisions of the State. By statute, under AB 3030, Butte County has no authority over these districts that already have their own authorities under existing legislation.

It is the desire of the DW&RC to conservatively manage groundwater resources in Butte County. The implementation of the AB 3030 Plan will ensure that there is a management strategy to deal with groundwater resource issues.

From: Defenders of Wildlife, Butte Environmental Council, Friends of the River, Lassen Forest Preservation Group, Sacramento Valley Environmental Water Caucus (received via FAX, 8/20/04)

Comment #27) Section 1.2 Plan Objectives

Comment: "Minimize the long term drawdown of groundwater levels." Common sense suggests that extreme fluctuations of ground water levels could have a detrimental effect on water quality and aquifer stability. The Water Commission should consider minimizing significant level fluctuations in both the short and long terms.

DW&RC Response: Agreed. As part of the BMO ordinance (Chapter 33A in the Butte County Code, attached as Appendix B of this document), a Water Advisory Committee (WAC) and Technical Advisory Committee (TAC) will be set up to address BMO

standards and applications, which include the monitoring of groundwater levels and aquifer performance.

To date, the DW&RC has conducted an introductory meeting to educate the public of the BMO process (held in Durham on June 16, 2004) which was attended by more than 80 persons. At this time we also have several individuals and organizations from the Chico Urban Area, Vina, Western Canal, Esquon, M & T, and North Yuba sub-units that have expressed interest to participate in the BMO process. DW&RC staff will convene meetings with these representatives throughout the autumn and winter of 2004.

Further evaluation of the hydrogeologic character of Butte County will allow management direction and regulatory efforts to be scientifically based. At this time it is unknown what "safe" levels of fluctuations may be.

Comment #28) Section 1.2… Plan Objectives (continued)

Comment: "Facilitate groundwater replenishment and cooperative management projects." Before planning to artificially facilitate groundwater replenishment, the Water Commission must conduct comprehensive CEQA review to identify all potential impacts such as water quality, subsidence, agricultural productivity, and habitat values.

DW&RC Response: Agreed. In addition to CEQA, the BMO ordinance will trigger analysis by the WAC and TAC and environmental community. Much preliminary scientific evaluation of the local hydrogeology is necessary before replenishment and cooperative management programs is considered. Further, we will strike the word "facilitate" and replace it with "evaluate"and ensure that similar text within the document reflects the same language (evaluate instead of facilitate).

Comment #29) Section 1.3 Area covered by Plan

Comment: "…the foothill and mountain areas of the County do not overlie groundwater basins as defined in DWR Bulletin 118-2003, and are therefore not included under this GMP."

It is illogical to disassociate the areas where the Tuscan formation intersects the surface recharge areas for the major aquifers) from the groundwater basin. The Water Commission must extend its jurisdiction to the foothills to adequately analyze and protect aquifers.

DW&RC Response: We concur. As noted in comment #23 above, the DW&RC is working with scientists at UC Davis to develop a watershed model whereby some data may be utilized to be incorporated into an existing groundwater model currently being calibrated to update the IGSM-2 groundwater model. In short, we will address this concern as part of groundwater modeling efforts. By statute, the AB 3030 Plan is limited in jurisdiction as defined by the State of California to groundwater basins identified in

DWR Bulletin 118-3. The implementation of this AB 3030 Plan is designed to be another step in conserving and managing groundwater resources in Butte County.

Comment #30) Pp 1-3, Table 1-1 Butte County AB 3030 GMP Included Areas

Comment: What does the number "4" indicate in column 4?

DW&RC Response: The number "4" inadvertently was included. In the final report the number "4" will be replaced with a "", "Yes," which denotes an area included within this AB 3030 Plan. The other blank boxes will indicate "No."*

Comment #31) Pp 1-6, Table 1-2 Butte County AB 3030 GMP Components

Comment: Questions on components of AB 3030 law:

a) Are mandatory, voluntary, and suggested components enforceable under California's Water Code?
b) What is the difference between monitoring "groundwater elevation" (a mandatory component) and "groundwater levels" (a voluntary component)?

DW&RC Response: Refer to the following:

a) The California Water Code, Section 10753.9, states that a groundwater management plan must have the mandatory elements addressed in Table 1-2, and the voluntary components not required but that we propose in the county's AB 3030 Plan, are indicated. We will footnote the table accordingly.

The mandatory elements are required by DWR to enable the County to qualify for State grants available under AB 303.

b) "Groundwater level" and "groundwater elevation" refer to the same concept which is defined as "water under positive pore pressure in the saturated zone."

Comment #32) Pp 1-6, More on Table 1-2

Comment: In Table 1-2, we advocate establishing the following voluntary components as *required* elements: 8. Control of saline intrusion; 9. Identification and management of wellhead protection areas and recharge areas [high priority]; 10. Regulation and mitigation of contaminated groundwater; 11. Administration of well abandonment and well destruction program; 14. Monitoring of groundwater levels and storage; 16. Identification of well construction policies; 17. Construction and operation by local agency of groundwater contamination cleanup….conservation…; 19. Review of land use plans and coordination with land use planning agencies to assess activities that create reasonable risk of groundwater contamination.

DW&RC Response: The "Mandatory" and "Voluntary" are in reference to California State Water Code, Section 10753.9, guidance, as discussed in response to the previous comment #31. These designations do not necessarily reflect the Department's level of interest in each plan component. Please refer to the Groundwater Management Plan section indicated for a description of current and proposed activities.

Comment #33) Pp 1-6, More on Table 1-2

Comment: We support with qualifications the following *voluntary* components: 12. Mitigation of conditions of overdraft [not by using artificial recharge.]; 18. Development of relationships with state and federal regulatory agencies [local stakeholders must be cautious not to sign away local quality/quantity issues to mitigate problems occurring in more politically influential districts].

DW&RC Response: Please also see the previous two comment responses. Regarding overdraft, the County addresses groundwater overdraft in Chapter 33 of the Butte County Code (which we will insert as Appendix D to the document). Regarding the development of relationships with other entities, the County continues to develop relationships with state, federal and other local agencies and will continue to evaluate and learn more about our groundwater system to gain knowledge of our existing situation.

Comment #34) Pp 1-6, More on Table 1-2

Comment: We are likely to oppose the following *voluntary* components: 13. Replenishment of groundwater extracted by water producers [Replenishment by artificial recharge carries the potential to contaminate otherwise pure aquifers and to damage terrestrial habitats]; 15. Facilitating conjunctive use operations [Demands on groundwater during drought years and private financial enhancement to water sellers at the expense of the public trust are two problems]; 17. Construction and operation by local agency of groundwater …..storage…and extraction projects [that lead to exports of water].

DW&RC Response: Please see the previous comment responses. These components would be part of the evaluation process that would move forward if directed by the Board of Supervisors (reiterating the need to do environmental, engineering, geologic, and economic evaluations). Further, such evaluation could consider proposed projects such as conjunctive use programs, conservation efforts, water quality analysis, and water recycling efforts. These evaluations will occur prior to the implementation of any proposed projects.

Comment #35) Section 2.3 Climate

Comment: There is no mention of climate change, of the extraordinary climate conditions of the past 150 years…….

DW&RC Response: We agree that the climate may be changing (refer also comment #23) but we are not sure if climatic changes are extraordinary. The groundwater management plan attempts to manage groundwater under likely conditions. How the groundwater dynamics responded to climate conditions over a thousand years ago is unknown as historical well data does not go beyond the 1940's. This groundwater management plan will allow us to address current conditions and reasonably foreseeable actions. We can incorporate current data, and analysis, in future modeling efforts. We do plan to run some climate change scenarios after the calibration of our updated groundwater model this fall.

Comment #36) Pp 2-2 Section 2.5 Hydrology

Comment: "The approximate depth at the deepest portion of the aquifer to the base of fresh water within each of the inventory units…." An illustration would be helpful in explaining what this is describing. The definition of aquifer depth is unclear.

DW&RC Response: Referring to Section 3 of the Butte County Water and Inventory Analysis (2001, and available for review at www.buttecounty.net/waterandresource, click on "Reports" then link to "Inventory Analysis") more thoroughly describes the hydrogeologic character of the fresh-water bearing units in Butte County. Water found in geologic units of a marine depositional environment are thought to contain saline water that may not be appropriate for human use. Depth to fresh water refers to the depth from the surface of the earth.

Comment #37) Pp 2-3 more on Hydrology, 1st paragraph

Comment: "Ninety percent of the agriculture and municipal wells are completed in the upper 600 feet and 750 feet of the aquifer, respectively." An illustration would be helpful in explaining what this is describing. The definition of aquifer and "upper 600 feet and 750 feet" is unclear. Also, the model implies that there is an aquifer that is shaped and filled like a water vessel. How uniform is the aquifer? Are there variations in mineral density that disallow for water volume estimations?

DW&RC Response: It is estimated that the lower portion of the fresh water bearing units extend to approximately a 1450 feet depth below the ground surface. However, evaluation of the hydrogeologic character of the fresh water bearing formations in Butte County is necessary to further understand the aquifer boundaries, uniformity, and lithology. The upper 600 feet refers to 600 feet measured from the ground surface.

Comment #38) Pp 2-3, Figure 2-7 Tuscan Formation Recharge Areas

Comment: "Figure 2-7 shows the areas where the Tuscan Formation outcrops in Butte County; groundwater recharge of the Tuscan Formation occur in these areas." There is an obvious need to include these natural recharge areas in all Butte County groundwater management strategies. Zoning to protect open space land use is needed to recharge the

Tuscan aquifer with abundant clean water. Failure to do so will reduce infiltration and inject contamination into the aquifer.

DW&RC Response: County zoning policies are formulated by the Butte County Planning Commission, adopted by the Board of Supervisors, and implemented by the County Department of Development Services. It is our intent to provide the public and governing agencies with the best information possible to make responsible decisions regarding water and resource conservation issues. AB 3030 is only applicable to lands overlying groundwater basins identified in DWR Bulletin 118.

Comment #39) Pp 2-6 Section Groundwater Movement

Comment: "There is a groundwater depression under the City of Chico…." This is the first of several comments pointing to the impacts of pumping on groundwater structure. Changes in groundwater dynamics are inevitable as demand (local and out-of-area) increases "Colusa Dome…impedes groundwater movement to the south in this area…resulting in a shallow groundwater table and the formation of wetlands." This area must have enhanced monitoring to prevent wetland destruction as demands on groundwater accelerate. This area is a unique regional ecosystem.

DW&RC Response: We recognize that there are areas of special concern such as cones of depression. It is our intent to implement this groundwater plan to promote a strategy that will proactively address these types of issues. In addition, we are proposing an Environmental Monitoring Program to deal with ecosystem evaluation.

Comment #40) Pp 2-6, Section 2.5.3 Groundwater in Storage

Comment: "Groundwater in storage typically increases during the winter…". Language is a critical factor in describing groundwater dynamics and reality. "Storage" assumes human utility. Another way to define it would use the word, "flowage" or simply, "volume."

DW&RC Response: Groundwater storage is standard hydrologic terminology referring to water in the saturated zone under positive pore pressure.

Comment #41) Pp 2-7 Sections 2.5.1 and 2.5.3

Comment: Sections 2.5.1 and 2.5.3 discuss significant groundwater "storage" fluctuations during the droughts of 1976-77 and 1986-94. Given the minor severity of these droughts compared to other droughts in the geological history, it is important to consider the effects that may be extrapolated from decades-long periods of drought.

DW&RC Response: We agree that it is important to attempt to manage groundwater resources for reasonably foreseeable conditions. Our intent is to implement this

groundwater management plan to effectively manage groundwater resources for the benefit of the citizens of Butte County.

Comment #42) Pp 2-9 Section 2.6 Groundwater Well Infrastructure, Table 2-1

Comment: Why are there no monitoring wells on California Water Service and Western Canal units in the west Butte area? Why do the Esquon and Cherokee units in east Butte have so few monitoring wells?

DW&RC Response: Groundwater well monitoring is determined by two factors, accessibility and knowledge of well drilling logs. Our access is based on voluntary cooperation of landowners to monitor their wells and it is greatly appreciated. It is also important to understand the well casing and the lithology that the well resides in so that we know what fresh water bearing units (i.e. aquifers) the well is extracting water from. We appreciate any additional access comments or information that can be supplied to our department regarding locations of potential well monitoring locations at any time. As a side note, we may accrue additional well monitoring information as we progress with the development of BMO's within the regions described above.

Comment #43) Pp 2-11 Section 2.7.1 Water Demand

Comment: "Some conveyance losses (evaporation and evapotranspiration) are not available to the system for future use, but deep percolation and spillage are available for future use." We are concerned that this is a policy statement that will be used to give water conveyers opportunities to extract groundwater to export conveyance systems. According to agricultural experts, much of the conveyance leakage is unlikely to penetrate into deep aquifers.

DW&RC Response: This statement refers to the fact that water that is no longer in a liquid state enters an entirely different facet (the atmosphere) of the hydrologic cycle and is therefore unavailable for future use (until it becomes a droplet of precipitation and potentially enters the liquid state again). As water moves through a conveyance system (whether it's an open canal, river or stream course) some of that water is lost to surrounding shallow aquifers, the unsaturated (vadose) zone and to vegetation. This statement does not promote or intend to justify groundwater extraction.

Comment #44) Pp 2-12 Section 2.7.2 Water Supply

Comment: "the total volume of extracted groundwater in the County is approximately 440 thousand acre-feet in normal years…to more than 640 TAF in drought years…" This statement should be in the Water Demand section of the document. The assumption that a "normal" year is a predictive measure of future climate conditions is contradicted by the climate science mentioned above. Still, this is a perfect example of how human demand, backed by political will power, will inevitably accelerate water extraction when dry conditions prevail. Extending Butte County groundwater as a resource to other areas will certainly increase the pressure to use groundwater to meet demands even though

groundwater recharge and quantity is naturally decreased during drier periods. It is during dry years that the environment and the aquifer are in need of decreased rather than increased groundwater drafting.

DW&RC Response: The indicated groundwater volumes are extracted as a water supply to meet the water demands described in Section 2.7.1.

Comment #45) Pp 2-12 Section 2.7.3 Water Demand and Supply Findings

Comment: "Shortages are defined by lack of supply, which in most cases is limited by the groundwater infrastructure available, not by total water supply." This statement implies that there is plenty of water in the cup, even in dry years. It further implies that increasing the intensity of plumbing (deeper wells, more pipes) will ameliorate water supply shortages. This implication is not supported by science and ignores significant fluctuations in aquifer levels that have occurred during relatively mild droughts in the past few decades. Plumbing development may delay, but will not prevent, water shortages during severe droughts.

DW&RC Response: We will strike "not by total water supply" from the document. Refer also to comment #13.

Comment #46) Pp 2-13 Section 2.7.3 (continued)
Comment: "Future increases in demand will be associated with population growth and environmental regulatory requirements, both within and outside of the county." This statement implies that groundwater enhanced exports will be used to meet environmental demands such as the Environmental Water Account (EWA). We oppose manipulation of EWA flows to enhance Delta pumping.

DW&RC Response: This statement, "Future increases in demand will be associated with population growth and environmental regulatory requirements, both within and outside of the county" is made in reference to the overall demand on water resources in the area of Butte County. The minimum flow requirements that are currently being addressed by teams of scientists in the Sacramento River Valley is one example of how environmental regulatory requirements may increase the demand on water resources. This statement does not imply that groundwater pumping may be used in Butte County to ameliorate water resource issues in the Delta.

Comment #47) Pp 2-16, Pp 2-17 Urban Water Demand Forecast, Table 2-7 & Figure 2-14

Comment: Table 2-7 uses the 2000 census of population in the legal City of Chico area (59,444) rather than the more scientifically appropriate Chico Urban Area population (over 100,000 people). Figure 2-14 charts the urban water demand forecast using faulty baseline estimates. The Chico Urban Area has a population of over 100,000 rather than the 59,444 that are documented in the GMP. The Chico baseline is already more than the projected demand of 2030. Are these estimates based only on California Water Service

drafting volume records without the addition of individual well volume estimates? What are California Water Company volume records for 2000?

DW&RC Response: The Urban Water Demand Forecast dataset was collected using the best available information compiled from the US Census and the California Water Service Company. The California Water Service Company is the primary water provider for the City of Chico and provides water to approximately 80,000 residents located within its service area, which includes portions of the unincorporated territory of the Chico Urban Area. The data utilized represents a known, volumetric value, of water delivered to California Water Service Company's customers within their service area. The methodology is best explained in the Butte County Urban Water Demand Forecast which is available for review at local public libraries and also at www.buttecounty.net/waterandresource (click on "Demand Forecasts" then link to "Urban Water Demand"). Specifically, Table A-2 in Appendix A of that document summarizes the methodology and projections for the type of dwelling unit, type of water use (i.e. customer class), and demographics. Note that in Table 2-7 of the draft AB 3030 Plan, the sixth row identifies populations for the unincorporated area within Butte County, which includes the geographic regions of the unincorporated areas for the Chico Urban Area, the Oroville Urban Area, and other outlying areas. Several water purveyors serve these urban areas along with those parcels that use private wells. As tallied in Table A-2, the total population of Butte County is approximately 203,000.

A great deal of technical analysis has been given to address urban water demand projections. We will update these tables and figures in our next Urban Water Demand Forecast, and the next Water Inventory and Analysis, and adjust the incorporated areas' populations as necessary to reflect annexation activities implemented by our cities.

Comment #48) Pp 3-1 Section 3.2 Groundwater Management Objectives

Comment: "To accomplish the stated plan goal…Facilitate groundwater replenishment and cooperative management projects." This statement opens the way to artificial recharge schemes associated with projects that may benefit out-of-county interests while stressing the local groundwater, environment, and agriculture.

DW&RC Response: We will change the statement, "Facilitate groundwater replenishment and cooperative management projects" to "Evaluate how to effectively and efficiently manage groundwater resources and recharge in Butte County."

Comment #49) Pp 3-7 Section 3.5.1 Groundwater Well Ordinances

Comment: Re: Butte County Code, Chapter 23B5a, Pumping capacity and parcel size. "The pumping capacity of the well's pump shall not be greater than 50 gallons per minute per acre….(excepting wells which are exempt under section 23B-5c(1) and section 23B-5c(4)…. The limitation on pumping capacity applies to all wells required to have a permit under this chapter and that are installed after July 25, 1996." Where are the exempt wells? Who owns them? Are they able to negatively impact the aquifer by

creating cones of depression with impunity? Should the local government amend the ordinance to include these wells in the capacity limitations to protect the public trust? The citizens of Butte County must be clearly informed about entities that are exempt from regulatory oversight.

DW&RC Response: This question will be referred to the Butte County Division of Environmental Health. We will also attach Chapter 23B of the Butte County Code as Appendix E to the document.

Comment #50) Pp 3-10 Section 3.5.4 Groundwater Conservation Ordinance

Comment: Re: Transfer pumping permits. "The ordinance bars the extraction of groundwater for use outside the County without first obtaining a permit. Permits are also required for groundwater pumping for use on land within the county in lieu of surface water, if the surface water which would have otherwise been used on the land is proposed to be transferred outside the County." This is the first overt mention of the intention to use groundwater to facilitate water exports (sales) out of county. The public needs to be informed of the intention. People in southern California seem to be more aware of the potential groundwater exports than residents of the county. A more candid discussion of the likelihood that water exports/sales are looming would arouse more public concern and participation. When will Butte County attempt to educate its citizens in this manner?

DW&RC Response: This statement refers to the Groundwater Conservation Ordinance passed by the voters in 1996 (i.e. refer to Butte County Code, Chapter 33). Also in the previous section of the document (Pp 3-9, Section 3.5.3, third bullet) there is language that says, "The County does not hereby intend to regulate, outside of Chapter 33 [BCC], the use of groundwater; unless established BMO's are exceeded." The purpose of the Transfer Pumping Permits is to regulate the extraction of groundwater that is pumped directly or in lieu of surface water use and transferred out of the county. We will insert Chapter 33 of the Butte County Code as Appendix D to the document.

Comment #51) Pp 3-10 Wellhead and Recharge Area Protection Measures

Comment: "Butte County has not formally adopted wellhead or recharge area protection measures. The Butte County Water Commission and Board of Supervisors will consider implementation of policy recommendations for [sic] during the plan review and approval process." Preserving foothill open space from speculative land development may be a politically challenging goal, but it must be the first priority in establishing groundwater management policy. This plan should not proceed without implementing, not just considering, zoning and General Plan revisions to preserve recharge areas from land uses that are detrimental to the water capacity and quality of the aquifer.

DW&RC Response: We fully agree that Wellhead Protection Area (WHPA) are a priority and are identified on page 3-11, fourth and fifth bullets, under the section: Groundwater Resource Protection Action: The Department (Butte County DW&RC) will work with other county departments, such as the Agricultural Commissioner, who is

already mandated to deal with wellhead protection under Title 3 of the California Code of Regulations. We will attach these regulations as Appendix F to the document.

Comment #52) Pp 3-11 Safe Drinking Water Act Amendments of 1986

Comment: "A Wellhead Protection Area (WHPA) may also be the recharge area that provides the water to a well or wellfield." The county would be unwise to fall back on federal law to overcome local government inertia in preparing and implementing a recharge area protection ordinance with strict land use guidelines. What is the timeline for the Department to take action on implementation of DIWRP policies, programs, and projects approved by the BOS, including recommendations addressing protection of groundwater recharge areas?

DW&RC Response: Again, this is an issue that will be referred to the Butte County Division of Environmental Health. Refer also to Chapter 23B of the Butte County Code (note: to be attached as Appendix E to the document).

Comment #53) Pp 3-13 Section 3.6.2 Groundwater Modeling

Comment: "Once the groundwater model has been reviewed, updated and re-calibrated, it can be used to: Evaluate water transfer applications….". This statement clearly links groundwater to export marketing. This public document needs a thorough discussion of who profits from water sales, whether publicly funded conveyances are being used to transfer the wealth, and who owns the water prior to conveyance. The bullet stating that the groundwater model can be used to, "Study short-, medium-, and long-term drought impacts to groundwater," should include out-of-area demands and legal rights. The bullet that states, "Evaluate recharge benefits and impacts," should include the word "artificial" if that is what is being considered.

DW&RC Response: The Department (DW&RC) feels it is important to have scientific analytical tools to evaluate the cultural and environmental dynamics of water resources in Butte County. We plan to use knowledge gained to evaluate water transfers under Chapter 33 (BCC) if and when they occur. Chapter 33 will trigger hydrogeologic studies (prepared by the applicant) as well as CEQA documentation.

Comment #54) Pp 3-13 Section 3.6.3 Construction and operation of Groundwater Management Facilities

Comment: "Ensuring the long-term sustainable use of the groundwater resources…may require the planning and construction of projects that:

- Evaluate the need and potential for enhanced groundwater recharge;
- Enhance groundwater recharge;
- Facilitate cooperative management projects through improvements to recharge…infrastructure;"
- Protect groundwater quality, or remediate, contaminated sites."

The repetitive drumbeat of enhanced (artificial) groundwater recharge is a bold attempt to insert this controversial plan into the groundwater management plan and is based solely on the availability of a county allocation of Lake Oroville water and the dream of converting this allocation into money. The alternative of running the water down existing conveyance infrastructure is common sense. There is great concern that major public works projects, which would be required to facilitate this scheme, would be detrimental to the health and vitality of the local economy and environment.

DW&RC Response: The DW&RC also agrees that large scale construction of a groundwater recharge facility needs evaluation. Our position is that we must understand, through thorough scientific evaluation, the pros and cons of various groundwater management activities.

Comment #55) Pp 3-14 Stakeholder Involvement

Comment: "Public outreach and education is a primary function of the Butte County Department of Water and Resource Conservation." Public outreach to non-professional members of the public with little knowledge of the hydrology and politics that define water policy is no substitute for local legislation to defend the public trust from privately owned entities controlling natural resources. While public meetings may create an illusion of transparency and semblance for lay citizen input, resource policy meetings are dominated by paid representatives of the very companies that benefit from resource extraction and transfer. The solution would be public ownership of major resources such as groundwater and surface water. Users should pay a fee based on usage that would fund sustainable public trust asset management.

DW&RC Response: The DW&RC has promoted public involvement as the key mechanism for local management of groundwater resources. Section 1.5 of the document (Pp 1-4) outlines the public involvement process and a more thorough discussion of the local management of groundwater resources that has been facilitated by this process found in Appendix B of the groundwater management plan, which addresses the Groundwater Management (BMO Ordinance) process.

We agree that public education is essential and staff is committed in this endeavor. In addition to regularly scheduled public meetings, staff is available to visit with local community groups, environmental organizations, and other interested civic organizations that are concerned about water resources. We also provide the local media with press releases and general information updates. Department personnel can be reached at (530) 538-4343. Or we encourage interested parties to visit our department's web address at http://www.buttecounnty/waterandresource for information on Department resources, planning documents, newsletters, and upcoming meetings.

Comment #56) Pp 3-15 Section 3.7.1 Interagency and District Cooperation

Comment: "In Butte County the following agencies have AB 3030 Plans: Biggs-West Gridley Water District, Butte Water District, Richvale Irrigation District, and Western

Canal Water District." The term "agency" is perceived by the public as an administrative government division. Listing these water districts that serve the interests of a few private entities along with the State Department of Water Resources, the State Water Resources Control Board, Bureau of Reclamation and California Bay-Delta Authority adds to the notion that water districts can be held accountable by a regional citizenry. The reality is that these water districts are able to coordinate their economic advantage with state agencies that are charged with balancing the interests of the entire state against the interests of rural districts. Our local government must prioritize defending local public trust assets from the powerful drive to quench the thirst of a rapidly expanding California that is driven by the interests of land developers. We are at risk of having our economy and our environment sacrificed during dry decades as our water wealth is "cooperatively" transferred to more politically powerful regions.

DW&RC Response: The implementation of AB 3030 by the California legislature allows the citizens of Butte County to effectively and efficiently manage groundwater resources in Butte County. Areas that have established Groundwater Management Plans are not subject to the County's AB 3030 Plan. However, special districts must be cooperated with as they are considered as subdivisions of the state just as counties are.

Comment #57) Figure 3-5 Integrated Water Resource Planning Objectives

Comment: Figure 3-6 mentions a goal of protecting water rights. We are concerned that water transfer contracts to urban users and agricultural interests will result in durable claims to Butte County surface and groundwater. This AB 3030 Plan must identify the risks of legal water rights that may be established by water transfers and the strategies that will be employed to prevent the sacrifice of our local economy, environment, and quality of life to serve the "greater good" of an expanding California.

DW&RC Response: The implementation of the AB 3030 Groundwater Management Plan does not authorize Butte County to act as a regulatory entity regarding water rights. Pursuant to California Water Code Section 10753.9 (b), nothing in this report shall be construed as authorizing the local agency to make a binding determination of the water rights of any person or entity.

From: Sharon Fritsch, address not provided (via e-mail 8/20/04)

Comment #58) General supportive comment

Comment: I am impressed by the technical quality of the work that the DW&RC has been doing. I am very glad that you recognize the importance of maintaining aquifer recharge zones, including the vegetation above these areas. I am also very glad that you are committed to maintaining local control of water resources.

DW&RC Response: We appreciate this input as a great deal of staff and monetary resources have been utilized to prepare local water resource planning documents for

Butte County. The AB 3030 Plan, and the proposed components of the draft Integrated Water Resources Plan which will be presented to the Board of Supervisors throughout the autumn of 2004, should not only provide sound technical guidance to assist local policy makers, but also viewed as a "self-defense" mechanism for the citizens of Butte County. The more we know about local hydrogeology and the interlinks with recharge areas and our upper watersheds, the better off we are to demonstrate local water needs for agricultural, urban, and environmental water demands.

It is our intent that the citizens of Butte County understand that the AB 3030 Plan is a supporting document that links with other water resource planning documents. Much work remains to analyze the science and to evaluate opportunities that benefit the local community. Understanding of the local hydrology and geology will continue to be a "work in progress" for many years.

From: Pat Zwicker, Paradise (provided verbally at the 9/7/04 meeting of the Butte County Water Commission)

Comment #59) General input re: fund to compensate injured parties

Comment: In the draft AB 3030 Plan, or the BMO ordinance, these do not address the mitigation or the tax burden to establish a fund to compensate persons who are injured as a result of groundwater pumping. We need to compensate for damages, maybe set up a fund from the sales of water through transfers?

DW&RC Response: We appreciate this input as the subject matter was not previously raised. Language in Chapter 33 of the Butte County Code, Section 33-8(i), addresses third party impacts. In the context of an applicant's application for a permit, the language reads as follows: "A description of the proposed mitigation program for any third party impacts, which may specify a dollar amount held in a trust account to satisfy potential third party claims."

This requirement is one of several the applicant must undergo, in addition to other elements of Chapter 33-8 which require the applicant to provide the amount of surface water available to the land and the amount proposed to be transferred, the transfer period, the physical source of the surface water to be transferred, the applicable surface water right held by the applicant, a list of parcels of land where surface water deliveries are to be reduced, a list of wells (including the maximum pumping capacity of each well's pump and motor, which are proposed to participate in the groundwater substitute pumping program and their location), a list of wells within the well spacing requirements (per Chapter 23B of the Butte County Code) of the wells identified along with certification that the owners of such wells have received notice of the application, a map showing the location of all parcels and wells identified under the permit application, a groundwater hydrology report provided by the applicant, and a description of the proposed monitoring program and the pumping curtailment.

In general, the best mitigation is through the preventive strategies identified in Chapter 33 and Chapter 33A (BMO ordinance), and by implementing the AB 3030 Plan. We intend to use an adaptive management strategy as situations occur.

End of comments and responses to draft AB 3030 Plan