FINAL

CITY OF UKIAH
2005 URBAN WATER MANAGEMENT PLAN

Prepared for
City of Ukiah, California
November 26, 2007

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Walnut Creek, California 94596

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BROWN AND CALDWELL

December 4, 2007

Ms. Ann Burck
City of Ukiah
411 Clay Street
Ukiah, California 95482

11/128619-001.5

Subject: City of Ukiah
Urban Water Management Plan

Dear Ms. Burck:

Brown and Caldwell is please to submit this Urban Water Management Plan, which was adopted by the Ukiah City Council on November 26, 2007. Please do not hesitate to contact me if you have any questions or comments at (925) 210-2432

Very truly yours,

BROWN AND CALDWELL

Timothy R. Banyai
Project Manager

cc: File

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LIST OF ACRONYMS

Act	Urban Water Management Planning Act
ADWF	average dry weather flow
AF	acre-feet
AFY	acre-feet per year
AWT	advanced wastewater treatment
AWWA	American Water Works Association
Basin Plan	Water Quality Control Plan for North Coast Region
cfs	cubic feet per second
CII	commercial, industrial, and institutional
CIMIS	California Irrigation Management Information System
City	City of Ukiah, California
County	Mendocino County
CUWCC	California Urban Water Conservation Council
CWD	County Water District
DHS	California Department of Health Services
CDPH	California Department of Public Health
EBRR	East Branch Russian River
FERC	Federal Energy Regulatory Commission
Flood Control District or District	Mendocino County Russian River Flood Control and Water Conservation Improvement District
FWR	Filtered Water Reservoir
DMM	Demand Management Measure
Dr	Drive
DWR	California Department of Water Resources
e.g.	for example
EIR	Environmental Impact Report
Etc.	ecetera
ETo	evapotranspiration
Forks	West and East Forks of the Russian River
gpm	gallons per minute
HSP	High Service Pumps
k	thousand
Lake	Lake Mendocino
lb/day	pounds per day
MCL	maximum contaminant levels
mg	million gallons
mgd	million gallons per day
MOU	Memorandum of Understanding
MSL	mean sea level
N/A	Not Applicable
Notification Plan	Water Quality Emergency Notification Plan
NPDES	National Pollutant Discharge Elimination System
No.	Number
PG&E	Pacific Gas and Electric
Plan	Urban Water Management Plan
ponds	evaporation / percolation ponds

Proj.	Project
Regional Water Board	North Coast Regional Water Quality Control Board
river	Russian River
Sta.	Station
SCADA	Supervisory Control and Data Acquisition
SOI	Sphere of Influence
State	State of California
State Water Board or SWRCB	State Water Resources Control Board
ULFT	Ultra Low Flush Toilets
UVSD	Ukiah Valley Sanitation District
UWMP	Urban Water Management Plan
WTP	water treatment plant
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

This 2005 Urban Water Management Plan (UWMP) for the City of Ukiah (City), California is an update to the UWMP adopted by the City Council in 2002. The UWMP is prepared in compliance with the Urban Water Management Planning Act (California Water Code Division 6, Part 2.6, Sections 10610 through 10657). This act requires that all urban water suppliers providing water for municipal purposes to more than 3000 customers or supplying more than 3000 acre-feet annually prepare an UWMP update every five years.

The goal of the UWMP is to assure that every effort is made to provide the appropriate level of reliability in water service to meet the needs of the various customers during normal, dry, and multiple dry years. The UWMP documents the City's planning activities for the next 25-years to ensure that this goal is met. The UWMP is submitted to the California Department of Water Resources (DWR) for general compliance with the Urban Water Management Planning Act.

The following sections provide a summary of this UWMP.

Water System

Chapters 2 and 3 of the UWMP present a description of the City's existing water supply and treatment facilities, water rights, and distribution system. Water supply is defined as the amount of water available from a source or combination of sources (e.g., streams, rivers, ponds, lakes, groundwater, etc.) for use by a water purveyor. Water supplies from the Russian River and its underflow are subject to the State Water Resources Control Board (SWRCB or State Water Board) requirements outlined in the City's water right permit. A water right permit or license provides the legal entitlement to divert water from a defined channel by a user from a specified source (water supply) for a beneficial, non-wasteful, use. The permit or license spells out the point of diversion, place of use, purpose of use, the amount or rate of water that can be diverted, and the time allowed for putting water diverted under the permit to beneficial use. Sources, such as percolating groundwater, that are not from the Russian River or its underflow, do not require a permit or license issued by the State Water Board.

In this plan, references to "groundwater" will include both percolating groundwater, which does not require an appropriative water rights permit from the State Water Board and groundwater flowing in a definite channel, which does require a permit. References to "percolating groundwater" will only refer to groundwater not requiring a permit. References to "underflow" will refer to groundwater flowing in a definite channel that does require a permit. Just as a water right permit or license restricts the amount of water available for use, pumping and treatment capacity can also limit the amount of water that can be diverted from a water supply. Pumping capacity is the amount of water the City can physically divert using its diversion works (wells, pumps, storage tanks, etc.) under its water right permit or from non-permitted sources such as percolating groundwater or water subject to pre-1914 water rights. The pumping capacity is dependent on the pump flow rating and aquifer yield. The water treatment and its capacity are regulated by the strict requirements of the California Department of Health Services (DHS).

Water Supply. The City obtains its water supply from groundwater sources under the direct influence of the Russian River, which in this report are treated as surface water sources and one groundwater well which is recognized as percolating groundwater. The pumping sources for the distribution system consist of a Ranney collector and two wells (Wells 3 and 5), which are considered surface water diversions subject to the requirements of the City's water right permit, and one percolating groundwater well (Well 4).

Wells 1, 2, and 6 are no longer used by the City. Well 1 has been out of service since the 1970's. Wells 2 and 6 (Water from Well 6 was pumped into Well 2) were removed from the City's latest domestic water supply permit and may no longer be used as a source of supply. Wells 2 and 6 had to be taken out of service during construction of the new 1.5 million gallon clearwell for the Water Treatment Plant. If a water supply well is removed from service for more than a year, it must comply with current DHS standards. The cost to rehabilitate the wells to meet DHS standards, which would require installation of an annular seal and electrical upgrades make it economically infeasible to return these wells to service. The pumping capacity of Wells 2/6 is only 50 gallons per minute (gpm). Even though it is not cost effective to rehabilitate Wells 2/6 for the City's water supply, Well 6 could be used in its present condition to irrigate the adjacent softball complex fields, which would reduce the potable water used for irrigation.

The Ranney collector, which provides the source of water for the water treatment plant (WTP), has an existing pumping capacity of 3,400 gpm or 4.8 million gallons per day (mgd). The available capacity of the Ranney collector is significantly less than the designed capacity of 13 mgd, which is equal to the City's water right. The maximum capacity obtained from the Ranney collector was 9 mgd, well below its design capacity. The Ranney collector has steadily declined from 9 mgd to its current capacity of 4.8 mgd. The significant loss in capacity of the Ranney collector may be a result of changes in the Russian River channel moving away from Ranney collector and the compaction of clays and silts in the riverbed over the Ranney collector. Another concern is the Ranney collector can only be used approximately six months a year during the drier weather months. During the rainy months, the turbidity in the Russian River increases, which increases the turbidity of the water in the Ranney collector. The Microfloc contact clarification-filtration units located at the WTP cannot be operated efficiently under high turbidity conditions. It is not possible to rely on the Ranney collector as a water supply source during the winter when the turbidity of the Russian River is high.

Well 3 has a pumping capacity of 650 gpm. It is available for use throughout the year.

Well 4 has a pumping capacity of 800 gpm. It is available for use throughout the year.

Well 5 has a pumping capacity of 300 gpm. Well 5 is located near the Ranney collector. When the Ranney collector and Well 5 are used at the same time, the pumping capacity of Well 5 is reduced because it is within the cone of water draw down depression of the Ranney collector. Also, Well 5, like the Ranney collector, can be affected by high turbidity in the Russian River. Therefore, Well 5 is used during the winter when the Ranney collector is not used.

The total pumping capacity of the City's water system during the dry months is approximately 4,850 gpm or 6.98 mgd. Most of this water (3,400 gpm) is provided by the Ranney collector. The typical peak day water demand during the dry months is approximately 6 mgd and the peak water demand has been as high as 7.677 mgd (Summer 2000). If the Ranney collector was lost, Well 5 would be operated, but it only has a pumping capacity of 300 gpm. The City does not have the redundant pumping capacity to meet peak demands without the Ranney collector in service. During the rainy months, when the Ranney collector can not be used because of the high turbidity, the pumping capacity is approximately 1,750 gpm or 2.52 mgd. The typical peak day water demand during the rainy months is 2 mgd. The loss of any pumping capacity during the winter months puts the City in a difficult position to meet peak water demands.

Drought conditions also affect the pumping capacity of the water supply system, especially the surface water supplies. The City is evaluating the addition of two groundwater wells to increase the water supply and provide reliability and redundancy to the water supply system.

The Potter Valley Project diversion from the Eel River watershed to the Russian River watershed by Pacific Gas and Electrical (PG&E) has recently been reduced by an estimated 26 to 33 percent. This diversion has been ongoing for almost 100 years with agricultural, municipal, and commercial economies relying on this diversion. A preliminary analysis was conducted to determine the effect reductions in flow would have on

Lake Mendocino, the Russian River, and the City's water supply. The results of the preliminary analysis show that sufficient water supply is available to meet the City's current and projected water demand over the next twenty years and that increased diversions by the City will only have minor effects on Lake Mendocino. The City is exploring opportunities with other agencies to develop a more accurate computer model to predict the impact of reduced Eel River diversions on water users. As new information becomes available, the UWMP should be revised as necessary. The entire analysis for the Eel River diversions is located at the end of Chapter 3 and also Appendix H.

The analysis is based on a continuation of diversions from the Eel River at the reduced rate and continuing releases from Lake Mendocino that, at least, comply with the minimum flow requirements in Water Board Decision 1610. If the Eel River diversion is further curtailed in the future or if Decision 1610 and the operation of Lake Mendocino is significantly changed in the future, additional analysis of those changes would be required. The City's water supply could be significantly affected by such changes.

Water Treatment Facilities. In 1992, the City constructed a water treatment facility for water from the Ranney collector. The water treatment plant is regulated by the DHS. DHS promulgates regulations for public water supply systems, including primary drinking water standards. The water treatment facility has a capacity to treat up to 6 mgd. However, because the Ranney collector system capacity is only 4.8 mgd, the water treatment plant capacity is limited to 4.8 mgd. As mentioned earlier, the water treatment plant is only operated during the dry months when the turbidity is low. It is not feasible to operate the water treatment plant during periods of rainy weather when the turbidity of water in the Russian River is high.

Modifications to the water treatment facility were completed in 2006. The improvements included a 3 mgd Microfloc contact clarification-filtration unit. The purpose of the improvements was to increase reliability and provide redundancy at the water treatment plant. The water treatment plant is designed to expand to treat another 3 mgd with the addition of a fourth Microfloc unit.

Water Rights. Under its permit (Water Right Permit 12952), the City has the right to divert 20 cubic feet per second (cfs), which produces a theoretical maximum of approximately 14,480 AF of water annually, but see §3.10, page 3-17, where it is estimated that at the City's permitted diversion rate of 20 cfs and a peak water use in the month of July, the City would actually use approximately 8,400 AF annually, when it first puts its full permitted entitlement to beneficial use. Approximately 2,027 AF of water diverted by the City is recognized by the State Water Board as a Pre-1949 Appropriative Right. The water rights in the Russian River below Lake Mendocino are divided between pre- and post-1949 because that is the year that the California State Department of Finance filed an application to appropriate water from the East Fork of the Russian River for the Coyote Dam, Lake Mendocino Project.[1] When the State Water Board approved the permits for Lake Mendocino Project Water, it declared that those rights would be junior to water being used by other appropriators on and prior to 1949. The date when an application to appropriate water is filed with the State Water Board is important, because in a year when there is not enough water to satisfy the full amount of water authorized for appropriation, an earlier filing date has priority over a later filing date. There is also a preference for municipal uses over other uses.

The City's Water Right Permit has been assigned number 12952 and has a priority date of 1954. Each water rights permit issued by the State Water Board gives the permittee a set amount of time to actually use the water authorized for diversion under the permit. The City was originally issued the permit in 1961 and the City had 10 years to put the full amount of water to beneficial use. That time has been extended several times. The latest extension gave the City until December 31, 2000. Prior to that date, the City filed another

[1] The City or its predecessor in interest has been supplying water to its residents since the later 1800's. The City has pre-1914 water rights, the full extent of which has not been conclusively determined.

Petition for Extension of Time to put the water to beneficial use. The most recent request asks to extend the time to 2015. That petition is pending before the State Water Board. The City has also petitioned the State Water Board to include Well 5 in the permit. The City is legally entitled to continue putting water available under the permit to beneficial use, pending State Water Board's action on the City's petition for a time extension.

The City also has a contractual agreement with the Mendocino County Russian River Flood Control and Water Conservation Improvement District (Flood Control District) to purchase up to 800 AF of water annually. The Flood Control District can only terminate the contract with five years prior notice to the City.

Water Distribution System. The water distribution system consists of surface water well pumping, percolating groundwater well pumping, water treatment plant high service pumping station, storage reservoirs, and piping to and within the water distribution system. After chlorination, surface water Wells 3 and 5 are pumped directly into the distribution system. Well 4, following chlorination, also pumps directly into the water distribution system. The high service pumps are located at the water treatment plant and take stored treated water and pump it into the water distribution system.

The City has eight reservoirs. The combined storage capacity of the reservoirs is 6.1 million gallons (18.7 AF). The storage provides short term treated water storage to be used on a daily basis and for emergency situations such as fire fighting. It is not recognized as a water supply source.

Water Use. Based on the average water use from 2000 through 2006, the City uses approximately 4,000 AF of water annually.

Reliability. To evaluate the reliability of the system, a four-year drought that would yield 8,400 AFY of water supply on an annual basis or approximately 51% of normal was analyzed as the worst case scenario. This value is based on the analysis in Section 3.10. Depending on Russian River conditions, reduction from the Potter Valley Project diversions, and water releases from Lake Mendocino, and future groundwater pumping capacity added to the system, short term water pumping capacity is a concern. *Based on the analysis, the City has sufficient water rights and water supply but, at times, may not have sufficient pumping capacity to meet peak day demands.*

Recycled Water

Chapter 4 discusses recycled water opportunities for the City's Wastewater Treatment Plant (WWTP). The WWTP serves the City of Ukiah and the Ukiah Valley Sanitation District. The City has set a goal to develop a Water Recycling Master Plan to investigate the economic feasibility of recycled water in the City and Ukiah Valley. The potential quantity of recycled water from the WWTP could be 5,101 AF annually in 2030. Using all the recycled water from the WWTP would require both publicly and privately-owned facilities. However, barriers could limit the feasibility of a recycled water program for privately-owned facilities. Based on discussion with local farmers and the agricultural industry, the perception is that the following barriers exist in the Ukiah area:

1. Seasonal needs for water does not necessarily correspond with times when recycled water is most available, thus requiring additional storage facilities.
2. For organic farmers, the thought is that use of recycled water would remove the organic certification from their products.
3. Private water users who may believe they potentially could lose their existing water rights if they use recycled water.
4. Existing water supplies appear to be sufficient to meet their needs.
5. It is not cost effective to use recycled water without subsidizing the recycle water program.

To fully implement a water recycle program, these barriers will need to be addressed through public education programs.

Historical and Projected Water Use

Chapter 5 discusses the historical and projected water use for the City. Water demand projections provide the basis for future water facilities. Historically, the City has experienced slow population growth and this trend is expected to continue. An annual population growth rate of 1 percent was assumed for the City. Based on a 1 percent population growth rate, the City will reach a build-out population of 17,992 in 2015. This corresponds to a water use of 4,592 AF annually. Based on estimates provided by the City, a rough estimate of unaccounted for water (e.g., water in the system that is un-metered water use such as fire protection and training, system and street flushing, sewer cleaning, construction, system leaks, unauthorized connections, and meter inaccuracies) is 138 AF (three percent unaccounted for water loss). Therefore, the total projected water demand within the present City limits is 4,730 AF.

The City's currently approved sphere of influence includes the entire Ukiah Valley from Burke Hill Road on the south to Highway 20 on the north and ridge top to ridge top on the east and west. In 1995, the City General Plan included a section that designated a much smaller sphere of influence as depicted in purple on Figure 2.2. The City has not applied to the Local Agency Formation Commission (LAFCO) to approve this smaller sphere of influence, but it is the proposed sphere officially adopted in the 1995 General Plan (proposed 1995 SOI). The environmental impacts of including this area within the City's sphere of influence were considered in the environmental review completed and certified, when the 1995 General Plan was adopted.

The City may annex land within its sphere of influence within the next 20 years. For these reasons, the planning area for this plan includes the sphere of influence described in the City's General Plan, adopted in 1995.

For purposes of this Plan, population estimates do not include current water users but evaluate future demand based on projected population increases within the 1995 proposed SOI.

The population within the sphere of influence is expected to increase by 2,503, based on the assumption that the land uses in the 1995 General Plan will be applied to the areas served by the City's water system. This assumption arises from the fact that the City will not serve those areas unless they annex into the City. At that time, the City rather than the County land use designations will apply. Under the 1995 General Plan, for example, the land use designation for the Masonite property is industrial. The Lovers' Lane property is designated for mixed use, but for purposes of this Plan, the assumption was made that the mixed use would apply to agricultural uses only. At 2.86 people per connection, which is the average number of people per connection for the City, the total number of connections for a population of 2,503 is 875. The City's average water use per connection is 0.73 AFY. Using this same average water use for the additional connections within the 1995 proposed SOI, the total additional water use is 639 AFY. Including the 3 percent unaccounted for water loss, this value increases to 658 AFY.

The total water use for the City, including the City's 1995 SOI, is expected to be 5,388 acre-feet per year (AFY) by the year 2030. This projected demand falls below 8,400 AFY which the City expects to use when it puts its 20 cfs water right to beneficial use (See Water Right, p. ES-3.). However, at times, the City has a difficult time meeting demands, especially peak demands during extended periods of hot weather or drought conditions. The reason the City's water system cannot meet the peak water demands during these periods is because the pumping capacity of the existing Ranney collector, surface water wells, and groundwater well is limited. The City has increased storage capacity in the water distribution system that helps with short term emergency capacity. However, DHS does not classify the City's water storage capacity as a water supply. To increase the pumping capacity to provide a more reliable and redundant water supply, the City is conducting a groundwater well siting study to increase groundwater well production by 1,500 gpm. These improvements will help the City meet its peak demands.

The City's water right includes Pre-1949 and Post-1949 water rights. The Pre-1949 Appropriative water right of 2,027 AF annually is senior to Project Water (water stored in Lake Mendocino, see §2.3.3.3). This water right is recognized by the State Water Board.[2] The Post-1949 Appropriative Water Right has a 1954 priority date and is senior to subsequent appropriators.

Water Supply Versus Demand Comparison

Chapter 6 provides a comparison of projected water supplies versus demand. It also discusses water shortage expectations. The water use, including the City's sphere of influence, will be approximately 5,388 AFY compared to 8,400 AFY of water supply expected during a multi-year drought. The 8,400 AFY of water supply is based on the City's water right. This analysis shows that during severe drought conditions, the City has sufficient water supply based on its water right.

Although not likely, if the State Water Board denies the City's petition to extend the time to put water authorized by its permit to beneficial use, the City would have to find other methods to meet water demands. These methods could include use of recycled water, greater water conservation, and use of groundwater wells.

Demand Management Practices

Chapter 7 discusses water conservation and demand management practices. This chapter presents a description of the City's water conservation program. Included in the discussion is an economic analysis of water conservation Demand Management Measures (DMMs) for DMM 1, 2, 6, and 14.

It is likely that previous and ongoing conservation measures have resulted in water saving in the range of approximately 2 to 5 percent of total water production. The water savings already achieved by existing conservation measures will have some impact on the City's ability to further reduce demand. Nevertheless, the City anticipates achieving additional water savings by further implementation of DMMs in the future. Of the four DMMs analyzed, only three appear to be cost effective for the City. DMMs 1, 2, and 14 should be evaluated in the future to assess if the City has the capital to implement them. Table ES-1 summarizes the results from the economic analysis.

ES-1. Summary of Economic Analysis Results (DWR Table 16)

BMP No.	BMP Name	Total Discounted Cost ($)	Total Water Saved (acre-feet)	Benefit / Cost Ratio	Simple Payback Analysis (years)	Discounted Cost / Water Saved ($/acre-feet)	Net Present Value / Water Saved ($/acre-feet)
1	Water Survey Programs for Single-family Residential and Multi-family Residential Customers	27,924	104	1.3	10	268	88
2	Residential Plumbing Retrofit	47,887	229	3.4	4	209	455
6	High-efficiency Washing Machine Rebate Programs	32,557	24	0.4	47	1,356	-778
14	Residential ULFT Replacement Programs	409,099	1,932	2.9	7	212	407

[2] As previously noted, the City also has pre-1914 water rights that pre-dated the Water Commission Act. The full extent of these rights has not been conclusively determined.

1. INTRODUCTION

This chapter provides an overview of the Urban Water Management Plan (UWMP), discussion of previous reports, the City's policy on public participation, and coordination efforts with other agencies. Table 1-1 summarizes the coordination with other agencies.

1.1 Purpose

The purpose of this UWMP is to ensure efficient use and promote conservation of urban water supplies within the City of Ukiah (City), California. The UWMP describes the availability of water and discusses water use, reclamation, and water conservation activities.

1.2 Urban Water Management Planning Act

Brown and Caldwell prepared this plan for submission to the California Department of Water Resources (DWR) on behalf of the City as required by the Urban Water Management Planning Act (Act) (California Water Code Division 6, Part 2.6, Sections 10610 through 10657). Water Code Section 10620 requires any water supplier that provides water to 3,000 or more customers, or that provides over 3,000 acre-feet of water annually, to prepare an Urban Water Management Plan that complies with Water Code Sections 10630 and following. Urban water suppliers are required to develop water management plans to actively pursue the efficient use of available water supplies to meet the needs of its various categories of customers during normal, dry, and multiple dry years. The Act describes the contents of the UWMP as well as how urban water suppliers should adopt and implement the UWMP. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied. For ease of review, the DWR Review Sheets are located in Appendix A.

1.3 Previous Reports

Two reports and the City and Mendocino County (County) general plans were used in preparing this UWMP. Also, Bartle Wells and Wagner and Bonsignore were contacted. Bartle Wells is a consulting firm that specializes in financing and Wagner and Bonsignore specialize in water right issues. Included in this UWMP is a preliminary analysis completed by Wagner and Bonsignore on the reduction of flow in the Eel River. This analysis is located at the end of Chapter 3 and Appendix H. The reports and information obtained from the consulting firms address the water supply and demand for the City. An understanding of the results of these previous documents provides a broader context for preparing an updated water management plan. The following paragraphs provide a summary of the documents.

Water Rate Study and Preliminary Financing Plan, 2005. This financing plan reviews the existing rate structure and evaluates financing alternatives available to the City for water system capital improvements. This financing plan recommends updates to the water utility rate structure and connection fee.

Urban Water Management Plan 2002. The 2002 UWMP was prepared by Kennedy Jenks, an engineering consulting firm hired by the City to fulfill 2000 UWMP requirements. The main purpose of this plan is to analyze the City's water supply and demand for the following 25 years during normal and drought years. The Plan also summarizes the City's water shortage contingency plan and water conservation program.

City of Ukiah General Plan, 1995. The City's General Plan provides the long-term and comprehensive policy program for all aspects of development, growth, and land use in the City and Ukiah Valley. The General Plan addresses seven broad topics called elements that are required by law. The City's General Plan provides guidance to the Planning Commission and City Staff and is the foundation for development and building regulations. Completion of specific projects that have emanated from the goals, policies, and implementation measures contained in the City's General Plan, include the following items:

- Ukiah Airport Master Plan and Comprehensive Land Use Plan
- Landscaping and Streetscape Design Guidelines
- Bicycle and Pedestrian Master Plan
- Commercial Development Design Guidelines
- Riverside Park Master Plan and Phase 1 Development
- Stream and Creek Enhancement Plans for Gibson, Orr, and Doolan Creeks

County of Mendocino General Plan, 1981. The County's General Plan identifies current and future needs for Mendocino County in areas such as land use, housing, transportation, public services, environmental quality, and economic viability. The County's General Plan also is a policy document that embodies the community's goals and guides decisions about physical development over the long term, with a strong focus on sustainability. The County is currently updating its General Plan. The updated County of Mendocino General Plan is anticipated to be adopted in 2008.

1.4 Public Participation

The City encourages public participation in the development of its UWMP. Copies of the draft UWMP were made available for public review at the City offices, on the City's official web site, and the Public Library. Copies of the draft UWMP were sent to the Local Agency Formation Commission, Redwood Valley County Water District, Calpella County Water District, Millview County Water District, Mendocino County Russian River Flood Control and Water Conservation Improvement District, Willow County Water District, Rogina Water Company, Ukiah Chamber of Commerce, Mendocino Environmental Center, Sonoma County Water Agency, Mendocino County Planning Department, Mendocino County Water Agency, California Water Impact Network, Smart Growth Coalition, and Employers' Council of Mendocino County. The City held public meetings on August 15 and September 19 and, a workshop on October 3, 2007 to receive comments to the draft UWMP. In response to comments from the public, agencies, and the City Council, a revised UWMP was prepared. A Public Hearing was commenced on October 17, 2007 to provide for additional review of and comments on the revised draft UWMP prior to completion of the UWMP and adoption by the City Council. Following additional public, agency, and Council comment on October 17, the City Council directed staff to prepare an additional revised draft UWMP and continued the Public Hearing to November 7, 2007 for final review and adoption of the UWMP. At the November 7, continued public hearing, the City Council appointed Mayor Mari Rodin and Council member John McCowen to a subcommittee to work with staff on final revisions to the draft UWMP. The City Council continued the public hearing to a special City Council meeting on November 26, 2007, for adoption of the plan. Notification for the October 17, 2007. Public Hearting was given as required by law, including publication in the Ukiah Daily Journal. Each continuance of the public hearing was announced during the continued hearing.

1.5 Agency Coordination

Table 1-1 summarizes the efforts the City has taken to include additional agencies and citizens in its planning and preparation process of the UWMP. Copies of the draft UWMP were available for public review and comment at the City's offices, web site, and the Public Library. Copies of the draft UWMP were also sent to

the Local Agency Formation Commission, surrounding water districts, Ukiah Chamber of Commerce, Mendocino Environmental Center, Mendocino County Water Agency, and Sonoma County Water Agency. Legal public notices for City Council adoption hearings were published in the Ukiah Daily Journal newspaper and posted at related agencies and City facilities. A copy of the public hearing notice is included in Appendix B.

Table 1-1. Coordination with Appropriate Agencies (DWR Table 1)							
Check at least one box on each row	Participated in developing the plan	Commented on the draft	Attended public meetings	Was contacted for assistance	Was sent a copy of the draft plan	Was sent a notice of intention to adopt	Not Involved / No Information
DWR					x	x	
Ukiah Wastewater Treatment Plant (WWTP)				x	x		
General Public Civic Center Lobby Utilities Building Lobby City's Website Public Library		x	x		x		
Mendocino County Planning Department				x	x		
Ukiah Utilities	x	x	x		x		
Bartle Wells		x			x		
Wagner and Bonsignore	x	x	x		x		
Local Agency Formation Commission		x	x		x	x	
Redwood Valley County Water District					x		
Willow County Water District					x		
Millview County Water District					x		
Calpella County Water District					x		
Rogina Water Company					x		
Ukiah Chamber of Commerce					x		
Mendocino Environmental Center					x		
Mendocino County Russian River Flood Control and Water Conservation Improvement District		x	x		x	x	
Mendocino County Water Agency					x		
Sonoma County Water Agency		x			x	x	
California Water Impact Network					x	x	
Smart Growth Coalition					x		
Employers' Council of Mendocino County					x		

2. DESCRIPTION OF EXISTING WATER SYSTEM

This chapter describes the City's water system. It contains a description of the service area, its climate, and the water supply facilities including surface water supply system, groundwater wells, reservoirs, and piping system.

2.1 Description of Service Area

The City is a general law city incorporated in 1876. The City has been providing reliable, safe drinking water to Ukiah residents since 1880. The City was granted a water supply permit by the Division of Water Resources (a division of the Department of Public Works) in 1939 to supply domestic water to the City and vicinity. The permit was revised and reissued in 1953, and again in April 1962. In 1987, a temporary permit was issued to the City that expired on December 1, 1989. A requirement of the temporary permit was to submit a report demonstrating that the City's Ranney collector provided effective and reliable treatment for the removal and inactivation of enteric viruses and *Giardia Lamblia* organisms. The City decided not to complete the report, and instead, decided to construct a water treatment plant for use with the Ranney collector. Construction of the water treatment plant was completed in April 1992. The City currently operates the water treatment plant under DHS Water Supply Permit No. 09-93-007.

The service area for the water system is not conterminous with the City's boundaries. The City serves a small number of customers outside its limits and its place of use. A petition to include these areas, among others, in the City's place of use is pending before the State Water Board. A location map of the City is shown in Figure 2-1.

Three other water systems bound the City. Millview County Water District (CWD) is located to the north, Willow CWD is located to the south, and Rogina Water Company is located to the east. Of these four water systems, the City serves the largest population, with a population over 15,600. The total number of connections is approximately 5,700.

As previously discussed, for purposes of water planning, the City assumes that within the next 20 years, the City will annex and provide water services to land within its sphere of influence as described in the 1995 General Plan. The sphere of influence used for these planning purposes is shown in Figure 2-2.

2.2 Environmental Setting

The majority of the information in this chapter is from the Mendocino County General Plan, which is available online at http://www.co.mendocino.ca.us/planning/GenPlan/GPContents.htm and the City of Ukiah's website at http://www.cityofukiah.com/.

2.2.1 Geography

The City is located on U.S. Highway 101 approximately 100 miles north of San Francisco in the northern coastal region of California. The area is centrally located between San Francisco, Eureka, and Sacramento. The City is surrounded by coastal ranges in southern Mendocino County and situated in the fertile Yokayo Valley with rich vineyards and pear orchards. The valley is bordered on the west by the Mendocino Range and on the east by the Mayacamas Mountains. Elevations in the mountains are over 1,800 feet mean sea level

(MSL), while elevations in the valley range from about 670 feet MSL in the north near Calpella to about 560 feet MSL in the south near El Robles Ranch. The Russian River flows from north to south through the Ukiah area.

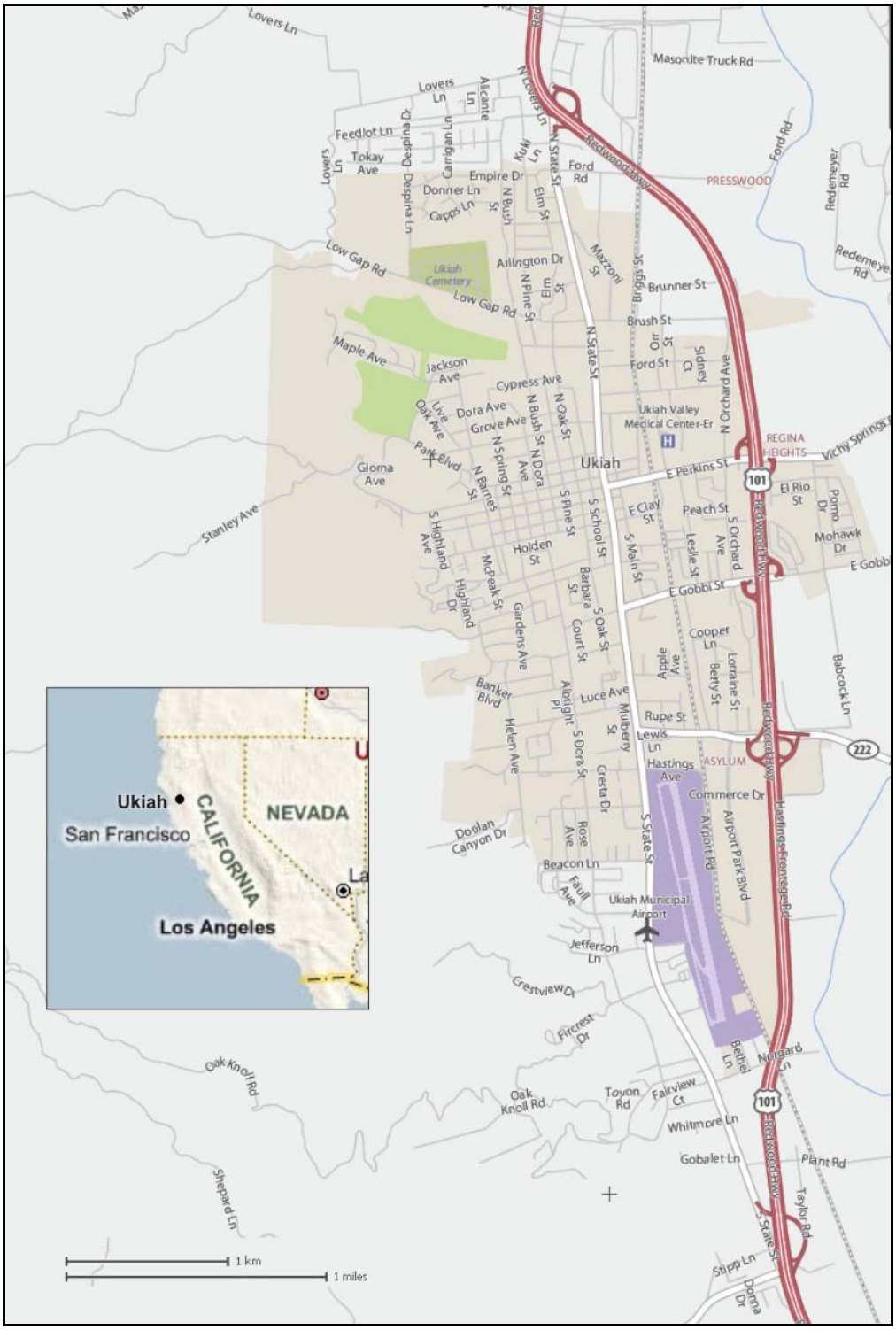


Figure 2-1. City of Ukiah Map

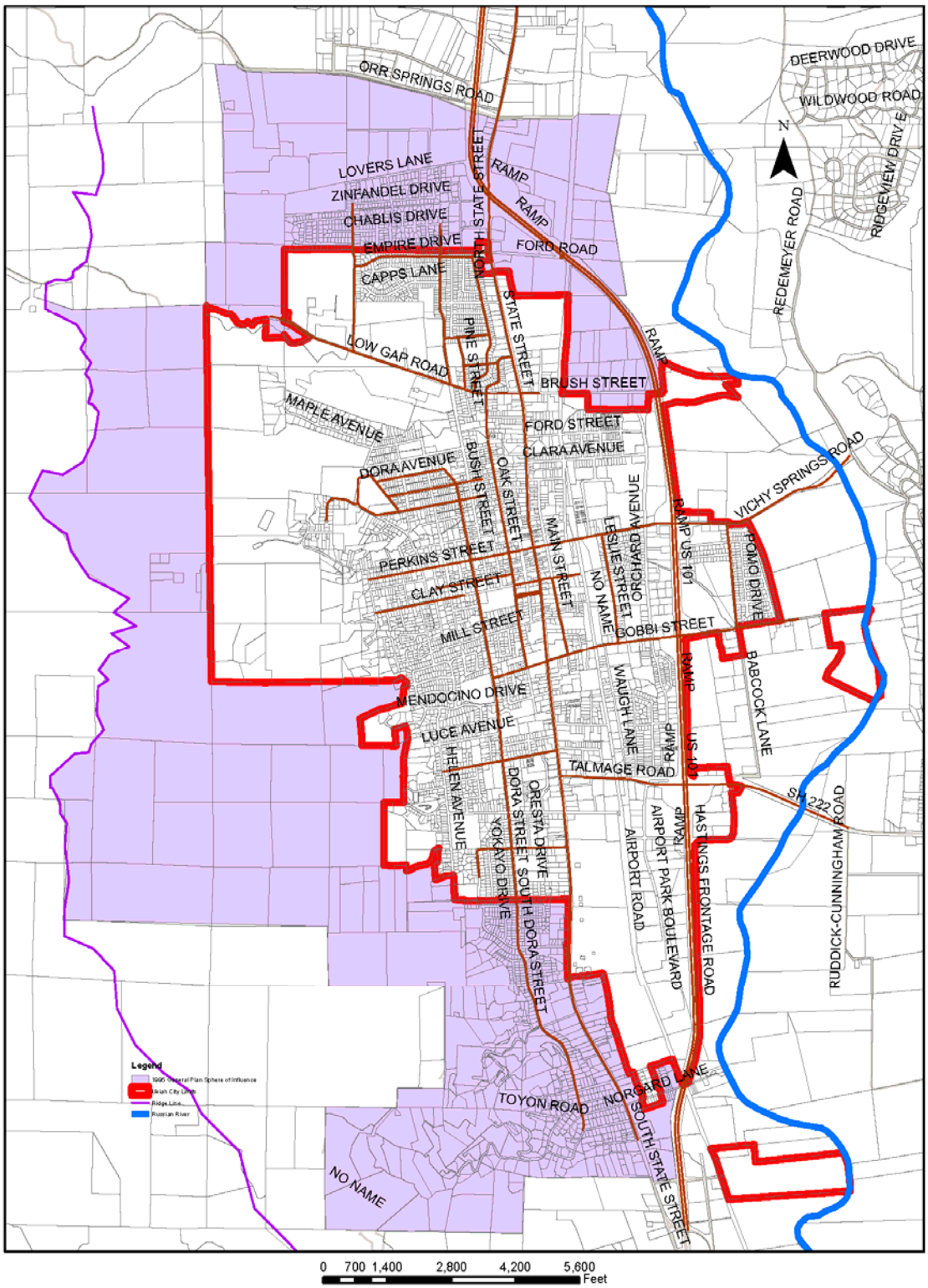


Figure 2-2. City of Ukiah Sphere of Influence Map

2.2.2 Climate

Unlike many other cities close to the coast, Ukiah is relatively fog-free. This fact, coupled with warm days and cool evenings, gives Ukiah a moderate range of temperatures. Annual rainfall in the City is about 35 inches. Most of the precipitation falls from December through April, and only at higher elevation is there substantial snowfall. Rainfall is often from intense rains caused by large storms that move in from the northwest. Virtually no rainfall occurs during the summer months. The average growing season is about 260 days on the coast, 210 days in the interior valleys including the Ukiah area, and 180 days in Round Valley (Mendocino County General Plan).

Table 2-1a and 2-1b summarizes monthly averages taken from 1989 to 2005. Data were obtained from the California Irrigation Management Information System (CIMIS) website for the Hopland Station in Mendocino County (Station Numbers 85 and 106). Information from CIMIS can be located at the following website: (http://wwwcimis.water.ca.gov/cimis/frontMonthlyReport.do). The table provides information on evapotranspiration (ETo), rainfall, and average temperature. ETo is the loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues). It is an indicator of how much water is used by crops, lawns, gardens, and trees need to sustain healthy growth and productivity.

Table 2-1a. Climate (DWR Table 3)*

	January	February	March	April	May	June
Standard Average ETo (in.)[a]	1.1	1.7	3.3	4.6	6.2	7.2
Average Rainfall (in.)	6.7	6.8	4.7	2.3	1.7	0.8
Average Temperature (°F)	45.6	47.2	50.8	52.9	59.4	65.2

** Source: CIMIS 1989 to 2005*

[a] The CIMIS ETo values are calculated using the modified Penman (also known as the CIMIS Penman) and the Penman-Monteith equations. Most CIMIS weather stations are located on actively growing grass. Hence, reference evapotranspiration is commonly referred to as ETo on the CIMIS web site.

Table 2-1b. Climate Continued (DWR Table 3)*

	July	August	September	October	November	December
Standard Average ETo (in.)[a]	8.0	7.1	5.3	3.5	1.5	1.0
Average Rainfall (in.)	0.1	0.2	0.3	1.1	3.8	7.3
Average Temperature (°F)	70.6	69.8	68.0	59.3	50.0	45.7

** Source: CIMIS*

[a] The CIMIS ETo values are calculated using the modified Penman (also known as the CIMIS Penman) and the Penman-Monteith equations. Most CIMIS weather stations are located on actively growing grass. Hence, reference evapotranspiration is commonly referred to as ETo on the CIMIS web site.

2.2.3 Hydrology

Surface runoff in the City's basin is derived almost entirely from rainfall, although snow does fall in the mountains of the eastern part of the Eel watershed, which is a watershed located north of the Russian River. Stream flow responds directly to the rainfall pattern; high flows will drop quickly without sustaining rainfall. During the dry summer months, stream flow consists of groundwater seepage, channel storage, or reservoir storage. In the Russian River Basin, 93 percent of the average seasonal runoff occurs in a five-month period beginning in December and ending in April (Mendocino County General Plan).

2.3 Water Supply Facilities and Sources

Water supply is defined as the amount of water available from a source or combination of sources (e.g., streams, rivers, ponds, lakes, groundwater, etc.) for use by a water purveyor. The City currently obtains all of its water supply from the underflow of the Russian River and one percolating groundwater well. The City is not a wholesaler. Pursuant to a Water Supply Contract, the City can purchase up to 800 acre feet annually of project water from the Mendocino County Russian River Flood Control and Water Conservation Improvement District. Additional details regarding sources of water are included in Chapter 3.

2.3.1 Surface Water (Ranney collector and Wells 3 and 5)

The City's surface water supply is obtained from a Ranney collector and Wells 3 and 5, which draw water from an alluvial zone (underflow from the Russian River) along the Russian River. Even though the City is not taking water directly from the Russian River, these water supplies have been determined by the California Department of Public Health (CDPH) as groundwater under the direct influence of surface water pursuant to 22 CCR §64651.10 of the California Water Works Standards, primarily because the turbidity in these sources fluctuates with the turbidity in the Russian River. Accordingly, they are classified as surface water sources in this UWMP, even though they divert water from Russian River underflow and may also be considered groundwater sources. The following paragraphs describe each of these surface water sources.

Ranney collector. The City collects underflow from the Russian River through its Ranney collector located along the river's banks. The Ranney collector was constructed in 1966 with a design capacity of 13 million gallons per day (mgd), which is equal to the City's water right. The maximum capacity obtained from the Ranney collector was 9 mgd, well below its design capacity. The Ranney collector has steadily declined from 9 mgd to its current capacity of 4.8 mgd. The significant loss in capacity of the Ranney collector may be a result of changes in the Russian River channel moving away from the Ranney collector and the compaction of clays and silts in the riverbed over the Ranney collector. Another concern is the Ranney can only be used approximately six months a year during the drier weather months. During the rainy months, the turbidity in the Russian River increases, which increases the turbidity of the water in the Ranney collector. The Microfloc contact clarification-filtration units located at the WTP cannot be operated efficiently under high turbidity conditions. Therefore, it is not possible to rely on the Ranney collector as a water supply source during the winter when the turbidity of the Russian River is high.

Well 3: This well has an estimated pumping capacity of 650 gpm. It is used throughout the year.

Well 5: The capacity of Well 5 is 300 gpm. This well can only be used when the Ranney collector is not in service. This well is equipped with a standby engine-driven pump.

Well 1, 2 and 6: Wells 1, 2, and 6 are no longer used by the City. Well 1 has been out of service since the 1970's. Wells 2 and 6 (Water from Well 6 was pumped into Well 2) were removed from the City's latest domestic water supply permit and may no longer be used as a source of supply. Wells 2 and 6 had to be taken out of service during construction of the new 1.5 million gallon clearwell for the Water Treatment Plant, because the power source for that well had to be disconnected during construction. The tank site was located in the path of the power line serving the pump house and it was not feasible to provide an alternate source of electrical power during construction. If a water supply well is removed from service for more than a year, it must comply with current DHS standards. The cost to rehabilitate the wells to meet DHS standards, which would require installation of an annular seal and electrical upgrades, made it economically infeasible to return these wells to service. The pumping capacity of Wells 2/6 is only 50 gallons per minute (gpm). Even though it is not cost effective to rehabilitate Wells 2/6 for the City's water supply, Well 6 could be used in its present condition to irrigate the adjacent softball complex fields, which would reduce the potable water used for irrigation.

Since 2003, the City has undertaken an aggressive rehabilitation program of the existing surface water wells. The capacity of the wells has increased as a result of the work but increased demands are pushing the water production capabilities beyond their pumping capacity.

Figure 2-3. Ranney Collector Site

2.3.2 Groundwater

The City currently diverts percolated groundwater at Well 4 and may add other groundwater sources in the future. Until those future wells are developed, the City does not know whether they will be considered percolating groundwater or groundwater flowing in a definite channel ("underflow"). If it is determined that the future wells are pumping percolating groundwater they will not be subject to the permitting authority of the State Water Board. However, it is possible that future wells in the areas being considered by the City will be considered underflow, in which case they would be subject to the permitting authority of the State Water Board. In that event, those wells would have to be added as points of diversion under the City's appropriative water rights permit and the water pumped from those wells would have to be reported as water diverted under the City's permit. Once the future wells are developed, the City will determine whether they are pumping percolated groundwater or underflow.

2.3.3 Water Rights

Prior to 1914, a right to use surface water could be established without filing for a permit from the State Water Board under the Water Commission Act. After 1914, a right to divert water from a surface water source or underground water flowing in a definite channel, requires a permit from the State Water Board. Water can be pumped from percolating groundwater without a state issued permit. A water right is the legal entitlement that authorizes water to be diverted by a user from a specified source (water supply) for a beneficial, non-wasteful, use. The water right under a state issued permit spells out the point of diversion, amount or rate of water that can be diverted, place of use, and the purpose of use.

Wagner and Bonsignore, an engineering firm specializing in water rights, was consulted to determine the details of the City's water rights. The following additional sources were consulted:

- State Water Resources Control Board files for City of Ukiah's Water Right Application 15704 (Appropriative Permit)
- City of Ukiah's water supply agreement with Mendocino County Russian River Flood Control and Water Conservation Improvement District (Contract or Project Water)
- Ann Burck, Public Utilities Project Engineer, City of Ukiah (Groundwater).

2.3.3.1 Appropriative Water Rights

Pre-1949 Appropriative Right. The City has Pre-1949 Appropriative Right for 2.8 cubic feet per second (cfs) for diversion from the Russian River for a maximum of 2,027 acre-feet (AF) annually. This water right is recognized in State Water Rights Board (predecessor to State Water Resources Control Board) Decision 1030.

Water Right Permit 12952 – Post-1949 Appropriative Right. Water Right Permit 12952 (Application 15704) provides for the diversion of Russian River underflow for municipal purposes. Under this Permit, water can be diverted at a rate not to exceed 20.0 cfs (9,000 gpm) from January 1 through December 31 (with no annual limit). The face value of the City's Pre-1949 and Post-1949 appropriative rights is approximately 14,480 AF annually (but see discussion in Section 3.10 and Appendix H, which assumes that the City will use approximately 8,400 acre-feet annually, when it first pumps 20 cfs at its peak usage time). The Permit is considered a Post-1949 water right, which is a right that was initiated subsequent to the authorization to construct Coyote Valley Dam in 1949. The Permit expired on December 31, 2000 and the City filed a Petition for Extension of Time with the SWRCB. The Permit is valid while the Petition for Extension of Time is processed. Currently, the Permit covers Wells 2 (no longer in use) and 3 and the Ranney collector. The City has filed a Petition with the SWRCB to add Well 5 and expand its place of use under Permit 12952. Section 3.2.1 provides a description of the Ukiah Valley groundwater basin.

2.3.3.2 Groundwater

See Section 2.3.2 for a description of the City's present and future groundwater sources and the rights to use water from these groundwater sources.

2.3.3.3 Project Water

Mendocino County Russian River Flood Control and Water Conservation Improvement District (District) holds Water Right Permit 12947B for storage and use of up to 8,000 AF annually of water stored in Lake Mendocino and/or directly diverted from the East Fork of the Russian River. The City has a water supply agreement with the District that allows the City to purchase up to 800 AF of water annually under the District's permit.

2.3.4 Transfers and Exchanges

Three water districts bound the City. The City uses the greatest amount of water and serves the largest population in the Ukiah Valley. While the City's water system is physically interconnected with Willow County Water District to the south and Millview County Water District to the north, and Millview is physically interconnected to Calpella County Water District, the interconnections between the City and the adjacent districts are used exclusively for emergencies. See Appendix C for Emergency Interconnection Agreement dated July 1, 2002. Moreover, the Millview and Willow County Water Districts do not have excess water to deliver to the City's distribution system, except in emergencies.

2.4 Distribution System

Eight distribution reservoirs, with a combined capacity of 6.1 million gallons (mg), provide short term treated water storage to be used on a daily basis and for emergency situations such as fire fighting. These include a 2.5 mg concrete tank, a 100,000 gallon steel tank, a 13,000 gallon redwood tank, a 30,000 gallon steel tank constructed in 1996, a 135,000 gallon concrete clearwell with transfer pump station, three new storage tanks completed in 2005 (two at 1.5 mg and one at 315,000 gallons), and a high service pump station.

The distribution system is divided into four pressure zones. The main zone, Zone 1, (approximately 97 percent of the system) is served by gravity from the 2.5 mg and 1.5 mg storage tanks. These tanks are supplied by all system resources via the main distribution system. There is also a 1.5 mg clearwell and high service pump station in Zone 1.

The remaining three smaller zones are supplied by booster pump stations via the main distribution zone. Zone 2 is served by gravity from the 100,000 gallon and 315,000 gallon storage tanks. This zone is supplied by the Golf Course Booster Pump Station at a rate of 350 gpm.

Zone 3, which has four service connections, is served by a 30,000 gallon bolted steel storage tank. This zone is supplied by a 100 gpm booster pump.

Zone 4 with three service connections is served by the 13,000 gallon redwood storage tank. This zone is supplied by the 40 gpm Lookout Drive Booster Pump Station.

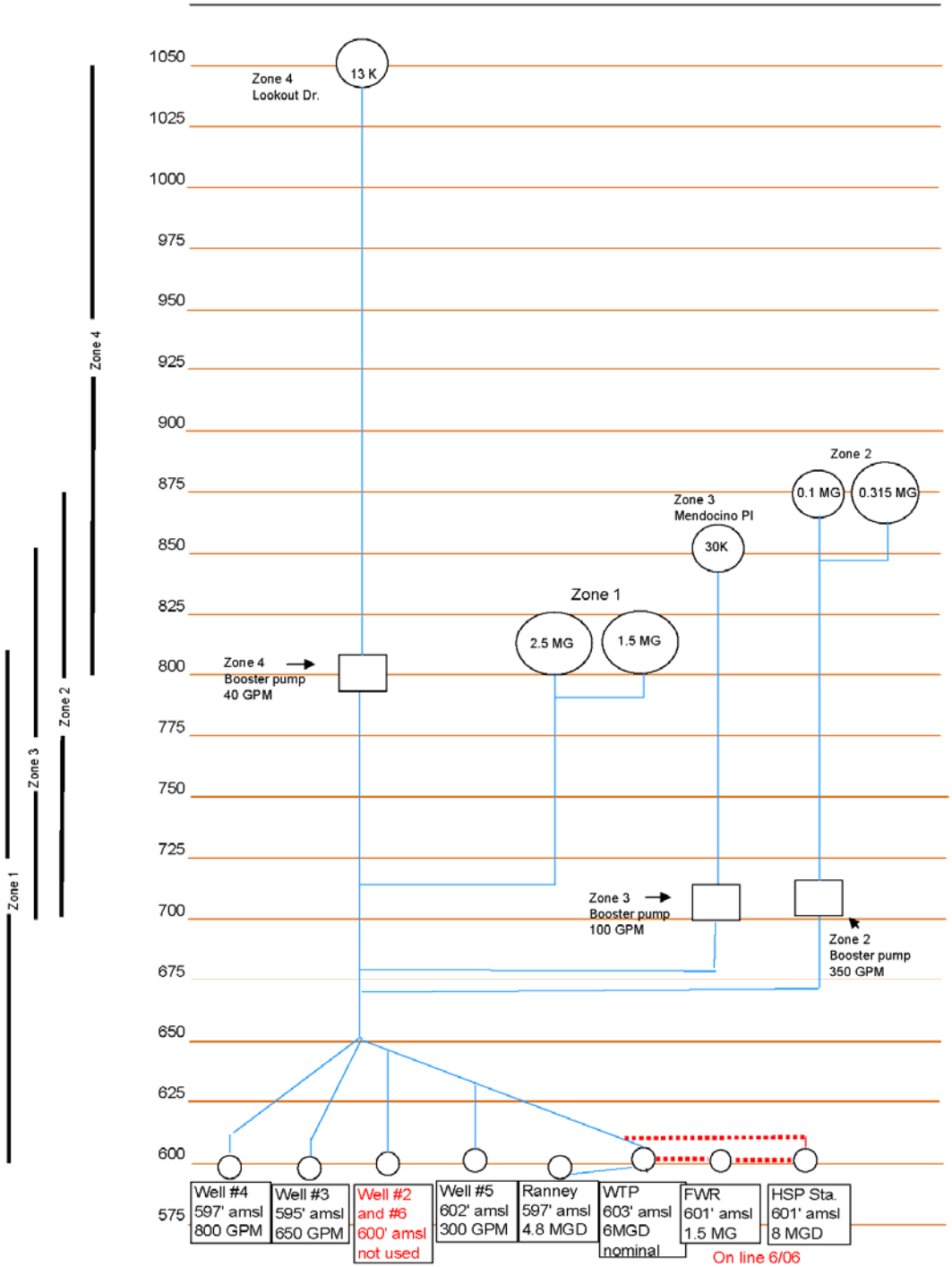


Figure 2-4. System Hydraulic Profile

3. WATER SUPPLY QUANTITY AND QUALITY

As noted in Chapter 2, the City uses both surface water and percolated groundwater as its supply sources. This chapter describes the surface water and percolated groundwater sources, quantities, supply constraints, and the water quality of the water supply sources. In addition, this chapter describes current and projected water supplies, water supply reliability and vulnerability, water shortage expectations, and water shortage revenue and expenditure impacts.

3.1 Surface Water

Section 3.1 provides a description of the City's surface water supply as well as the physical and legal constraints of this supply. Currently, the City uses surface water sources diverted from the underflow of the Russian River. The surface water sources consist of the Ranney collector and Wells 3 and 5. These surface water sources are located along the Russian River on the east side of the service area.

3.1.1 Description

Water Right Permit 12952 (Application 15704) provides for the diversion of Russian River underflow for municipal purposes. Under this Permit, water can be diverted at a rate not to exceed 20.0 cfs from January 1 through December 31. The City collects underflow from the Russian River through its Ranney collector and Wells 3 and 5, which are located along the river's banks, pursuant to its Permit 12952. The Ranney collector has an existing capacity of 3,400 gallons per minute (gpm) or approximately 4.8 million gallons per day (mgd). The available capacity of the Ranney collector is significantly less than the designed capacity of 13 mgd, which is equal to the City's water right. The maximum capacity obtained from the Ranney collector was 9 mgd, well below its design capacity. The Ranney collector has steadily declined from 9 mgd to its current capacity of 4.8 mgd. The significant loss in capacity of the Ranney collector may be a result of changes in the Russian River channel moving away from the Ranney collector and the compaction of clays and silts in the riverbed over the Ranney collector (See Appendix H, pp. 9-10). Another concern is the Ranney can only be used approximately six months a year during the drier weather months. During the rainy months, the turbidity in the Russian River increases, which increases the turbidity of the water in the Ranney collector. The Microfloc contact clarification-filtration units located at the water treatment plant (WTP) cannot be operated efficiently under high turbidity conditions. Therefore, it is not possible to rely on the Ranney collector as a water supply source during the winter when the turbidity of the Russian River is high.

The WTP was placed into service in April 1992. The source of water for the WTP is the Ranney collector. Water is pumped from the Ranney collector to the WTP. The WTP has a name plate capacity of 6.0 mgd and was designed to be expanded to 9 mgd. In 2006, a third filtration unit was added to provide reliability and redundancy as required by DHS. The third unit does not increase treatment capacity.

3.1.2 Physical Constraints

The Ranney collector was constructed in 1966 with nine laterals that extended beneath and along side the Russian River. One of the laterals, believed to be increasing water turbidity, was plugged and abandoned in April 1981. The Ranney collector currently produces about 4.8 mgd (approximately 3,400 gpm). The laterals

were cleaned in 2002 and four new laterals were constructed in 2003. Ranney capacity improved, but not nearly as much as expected. The reduction in Ranney collector capacity is believed to be due to two factors:

1. The river channel moving away from the Ranney collector impacting the flow of water to the laterals.
2. Compaction of clays and silts in the riverbed over the laterals reducing the permeability of the soil around the laterals and permanently lowering the pumping capacity in this area of the riverbed.

To address the impact of turbidity on the City's ability to use the Ranney collector in the winter, the City is exploring the possibility of using pre-filtration units with the existing Microfloc filtration units at the City's WTP. The City is exploring this option versus additional groundwater wells.

3.1.3 Regulatory and Legal Constraints

The City's Water Right Permit 12952 expired on December 31, 2000 and the City filed a Petition for Extension of Time with the State Water Board. The Permit is still valid while the Petition for Extension of Time is processed. The City has begun the process of preparing an environmental impact report (EIR) in support of its application for an extension of time and the City's pending Petitions to change its points of diversion and place of use. It has completed an initial study, conducted a scoping session and is currently evaluating its response to comments on the proposed scope of the EIR.

The City has steadily increased its use and has been diligent about maintaining its water right. The State Water Board is empowered to grant an extension of time to put water to beneficial use upon a showing to the State Water Board's satisfaction that due diligence has been exercised, that failure to comply with previous time requirements has been occasioned by obstacles that could not reasonably be avoided, and that satisfactory progress will be made if an extension of time is granted. (See 23 CCR §844.) According to City's Water Right Engineer, Robert C. Wagner, the City should be able to make the required showing of due diligence, since through no fault of the City, the demand for water has not developed as quickly as was anticipated when the City's permit was issued. The State Water Board wrote in WRO 2000-13, In the Matter of the Petition for Extension of Time of the City of San Luis Obispo, Permit 5882 (A10216)… "a municipality such as San Luis Obispo is to be afforded some latitude in putting water to beneficial use, because the municipality must be able to plan for, and meet, the needs of its existing and future citizens (Water Code section 106.5, 1203.)" In Mr. Wagner's opinion, it is reasonable to expect that similar latitude would be granted to the City of Ukiah to develop full beneficial use of its water rights. Water Board approvals of successive extensions of time for municipalities to allow for gradual development has been the norm. As a matter of statutory policy (Water Code, sec. 106.5), municipal water rights are to be "protected to the fullest extent necessary for existing and future uses…" The greater deference shown a municipality is counter balanced by the allowance of temporary permits for the use of excess municipal water by other parties pending the expansion of the municipality's use (Water Code, sec. 1203). There does not appear to be any obstacles to approval of the changes in points of diversion and place of use, subject to California Environmental Quality Act review. The City's request for an extension of time to make full beneficial use of water under its permit does not require a showing of water availability since such a finding was made by the predecessor to the State Water Board in Decision 1030. However, the City conducted and has included herein an analysis showing there is water available to meet its projected ultimate demands. The Water Board's declaration that this segment of the Russian River is fully appropriated takes into account the City's 20 cfs permit amount as well as other pre-existing rights (Water Right Order 98-08).

In order to grant the City's Petition to change points of diversion and place of use, the State Water Board will need to make a finding that "the change will not operate to the injury of any legal user of water involved" (Water Code, sec. 1702). In relation to junior appropriators, the City has a priority right to the beneficial use of water up to the full volume or rate authorized in its appropriative permit. Beneficial use within that volume and rate does not in itself equate to injury to juniors under the "non-injury" rule. The State Water Board has discretion under appropriate circumstances to condition change orders for the protection of other users. The

City knows of no reasonable basis for negative action by the State Water Board concerning the Petition change.

3.2 Groundwater

This section provides a description of the City's groundwater supply, including percolating groundwater, as well as the physical and legal constraints of this supply.

3.2.1 Description

The Ukiah Valley groundwater basin (Number 1-52 as described in California Department of Water Resources Bulletin 118) is located in southeastern Mendocino County and is the largest basin along the Russian River. It is approximately 22 miles long and 5 miles wide. The basin encompasses part of the Ukiah and Redwood Valleys to the north and their tributary valleys. This basin is not adjudicated.

A groundwater management plan has not been prepared for the Ukiah Valley or Mendocino County. Based on information currently available to the City, the groundwater supplies are adequate to meet existing and future demands. There is published data available providing information on the storage capacity and groundwater levels within the Ukiah Valley Groundwater Basins. United States Geological Survey (USGS) published Water Resources Investigation Report 85-4258, "Groundwater Resources in Mendocino County, California" states the following:

- Groundwater wells in the Ukiah Valley Groundwater Basin monitored over a 30 year period show no prominent long-term declines.
- Hydrograph analysis indicates the Basin is recharged fully each year except when precipitation falls below 60 percent of normal.
- During the drought of 1976/77 when rainfall was less than 60 percent of normal, the groundwater wells recovered to normal levels by the end of the 1978 rainfall season.

Further, California Department of Water Resources Bulletin 118 "California's Groundwater" states the following:

- Groundwater in storage in the upper 100 feet of the most productive area of the Ukiah Valley is estimated at 90,000 acre-feet.
- Groundwater storage located within the margins of the Ukiah Valley is estimated at an additional 45,000 acre-feet.
- Groundwater levels in the Ukiah Valley Groundwater Basin for the past 30 years have remained relatively stable.
- During drought conditions there is increased drawdown of groundwater levels, but the levels recover in post-drought conditions.

In general, the Ukiah Valley groundwater basin will experience seasonal and year to year variation in water levels due to climate and pumping stresses. However, these variations tend to be small. Water levels decline in the dry months and some wells may experience declines during successive dry years. But water levels in general have always recovered. There does not appear to be a long term decline that would suggest shortage or overdraft in the Ukiah Valley. The basin is not considered overdrafted and is not currently projected to be overdrafted. The preparation of a groundwater management plan is not merited at this time because of the modest increases in demand. At this time the City's access to these groundwater supplies and the ability to

use those supplies are subject to physical and legal constraints. Until new wells are developed, it is not known whether the City will have physical access to highly productive portions of the groundwater aquifer. If groundwater that is accessed is determined to flow in a definite channel underflow, the wells will have to be added as points of diversion under the City's permit and the water pumped from those wells will be reported as diversions under the City's permit.

The City will explore the development with other affected agencies of a groundwater monitoring program to develop more information about the Ukiah groundwater basin and as a first step toward developing a groundwater study.

Excluding its Ranney Collector and Well Nos. 3 and 5 (treated in this plan as surface water sources, see §2.3.1, p. 2-5), the City's groundwater supply consists of Well 4 with a capacity of 1,290 AFY. Table 3-1 lists groundwater pumping for the City. Since the Ukiah Valley has not been adjudicated, the table is not applicable as is indicated in the table. Table 3-2 states the amount of groundwater pumped by the City from 2000 through 2006. Table 3-3 states the total amount of groundwater to be pumped in future, excluding the Ranney collector and Well Nos. 3 and 5.

Table 3-1. Groundwater Pumping Rights – AFY (DWR Table 5)

Basin Name	Pumping Right - AFY
Ukiah Valley	not adjudicated
Total	N/A

Table 3-2. Amount of Groundwater Pumped – AFY (DWR Table 6)

Basin Name (s)	2000	2001	2002	2003	2004	2005	2006
Total Water Use	4,108	4,070	4,165	3,874	4,131	3,755	3,831
Percolating Groundwater (Well 4)	340	810	906	1,030	976	1,048	1,075
% of Total Water Use[a]	8.3	19.9	21.8	26.6	23.6	27.9	28.1

[a] *This represents the percentage of the City's total water use that has been derived from its groundwater source, excluding the Ranney Collector and Well Nos. 3 and 5, treated in this plan as surface water sources, because they are under the direct influence of the Russian river. Data provided by City's water treatment plant.*

The City began a well siting study in May 2006 to add two groundwater wells with a total projected capacity of 1,500 gpm. It is not known at this time if the new wells will be pumping percolated groundwater, groundwater subject to the State Water Board jurisdiction or underflow which is under the direct influence of the Russian River within the meaning of 22 CCR §64651.10. Table 3-3 lists the total amount of groundwater projected to be pumped from 2010 to 2030 and its relative percentage of total water supply based on the assumption of an additional 750 gpm pumped from groundwater wells of all types 180 days of the year (605 AFY) above the maximum amount of groundwater that can be pumped (1,290 AFY). If the City annexes land within its sphere of influence, additional groundwater wells will most likely be needed to meet the increased demands.

Table 3-3. Amount of Groundwater Projected to be Pumped - AFY (DWR Table 7)					
Basin Name(s)	2010	2015	2020	2025	2030
Total Water Supply[a]	17,175	17,175	17,175	17,175	17,175
Groundwater (Well 4 and two new wells)	1,895	1,895	1,895	1,895	1,895
% of Total Water Supply	11	11	11	11	11

[a] *Total Water Supply is equal to the City's theoretical maximum water rights and future groundwater pumping projections. The water availability analysis in Section 3.10 is based on 8,400 afy rather than this theoretical maximum. Well No. 4 pumps percolating groundwater at the rates shown in Table 3-2. Future groundwater wells may pump percolating groundwater or underflow. The groundwater figures in this Table do not distinguish between percolating groundwater and groundwater which is underflow subject to State Water Board jurisdiction. It should also be noted that the City does not have the pumping capacity to provide this total.*

3.2.2 Physical Constraints

The physical constraint on the groundwater supply available under the City's permit is the pumping capacity. The physical constraint on the percolated groundwater supply is that only Well No. 4 has been identified as a source of percolating grounded. The combined pumping capacity of the City's surface water and percolated groundwater well is not sufficient to supply the City's current peak demand.

3.2.3 Regulatory and Legal Constraints

Based on the available evidence, it is believed that Well 4 pumps percolating groundwater, which is not subject to the permitting authority of the SWRCB and, therefore, is not included in the City's Water Rights Permit. Future diversions by the City are likely to be from groundwater sources, either "percolating groundwater" or groundwater confined to a subterranean stream within a known and definite channel. Absent sufficient evidence to the contrary, groundwater is presumed to be percolating groundwater.

The 1999 State Water Resources Control Board Decision No. 1639 *In the Matter of Garrapata Water Company* in Monterey County set forth criteria regarding the legal classification of groundwater. According to the Garrapata decision, for groundwater to be classified as surface water subject to appropriation, the following conditions must exist:

1. A subsurface channel must be present;
2. The channel must have relatively impermeable bed and banks;
3. The course of the channel must be known or capable of being determined by reasonable inference; and
4. Groundwater must be flowing in the channel.

The Garrapata decision, interpreting section 1200 of the Water Code, was followed and applied in the 2006 opinion of the First District Court of Appeals in the case, *North Gualala Water Company v. State Water Resources Board* (139 Cal. App. 4th 1577). That decision was left standing by the California Supreme Court.

In the Ukiah Valley, increased interest in the issue of legal classification has arisen since the Division of Water Rights took the position that the groundwater pumped at the wells of the Hopland Public Utilities District (PUD) and the Willow County Water District is subject to SWRCB permitting authority. However, no formal decision has been rendered by the State Water Board itself.

As to the City of Ukiah, there has been no legal classification by the State of California on the ground water that might be pumped by the City in the future. The burden is on the party asserting that groundwater is flowing in a definite channel. The legal presumption is that well water is percolating groundwater. Using the applicable legal standards and the available data, the City will make a determination regarding whether future wells require an appropriative water rights permit from the SWRCB. There has been general acceptance by the Division of Water Rights staff that existing Well 4 pumps percolating groundwater.

3.3 Desalination

There are no reasonable opportunities for the development of desalinated water within the City's service area as a future water supply source because of the City's location relative to a source for desalination. Table 3-4 lists opportunities for desalinated water and reflects the fact that there are no opportunities for desalinated water.

Table 3-4. Opportunities for Desalinated Water (DWR Table 18)

Sources of Water	Yield AFY	Start Date	Type of Use	Other
Water purchased from:				
Ocean Water	0	0	0	0
Brackish Ocean Water	0	0	0	0
Brackish Groundwater	0	0	0	0
Other (such as impaired groundwater)	0	0	0	0
Total	0	0	0	0

3.4 Transfer and Exchange Opportunities

Currently, the City does not transfer or exchange water with any of the surrounding water suppliers. While there are connections between the City and Millview CWD and the City and Willow CWD, these connections are used only for emergencies and are not included in the City's supply totals.

Table 3-5. Transfer and Exchange Opportunities - AFY (DWR Table 11)

Transfer Agency	Transfer or Exchange	Short term	Proposed Quantities	Long term	Proposed Quantities
Millview County Water District	0	0	0	0	0
Willow County Water District	0	0	0	0	0
Rogina Water Company	0	0	0	0	0
Total	0	0	0	0	0

The City may purchase water, when adequate water supply is available, from the Mendocino County Russian River Flood Control and Water Conservation Improvement District (District). The City has a water supply agreement with the District that allows the City to purchase up to 800 AF of water annually under the District's permit. This water purchase is considered project water.

3.5 Water Rights

A detailed discussion on the water rights for the City is presented in Section 2.3.3.

3.6 Current and Projected Water Supplies

Even though the City has water rights and ample water supply to meet the water needs for its customers, the City does not have sufficient pumping capacity from its Ranney collector, surface water wells, and percolating

groundwater well during peak flow demands and drought periods. The City has completed or will complete in the near future several projects to help offset the lack of pumping capacity. The City began a well siting study in May 2006 to add two groundwater wells with a total capacity of 1,500 gpm. Those new groundwater wells will increase pumping capacity to reliably meet present peak demands and water demands during drought conditions. However, additional water supply will be needed to meet water demands within the City's sphere of influence. The City recently constructed three new storage tanks to meet DHS regulations. Improvements to the City's WTP were completed in September 2006. The WTP improvements comply with new California DHS regulations to ensure adequate reliability and redundancy. Table 3-6 lists water projects as they relate to the overall supply of the City.

Table 3-6. Future Water Supply Projects (DWR Table 17)

Project Name	Projected Start Date	Projected Completion Date	Normal-Year AF to City	Single-Dry-Year yield AF	Multiple-Dry-Year 1 AF	Multiple-Dry-Year 2 AF	Multiple-Dry-Year 3 AF
Two New Wells	5/06	2008	605[a]	605[a]	605[a]	605[a]	605[a]
WTP Improvements		9/06	Treatment improvements	N/A[b]	N/A[b]	N/A[b]	N/A[b]
High Service Pump Station		3/06	Increased reliability	N/A[b]	N/A[b]	N/A[b]	N/A[b]
TOTAL			605	605	605	605	605

[a] *Assumes 1,500 gpm pumped from two percolated groundwater wells at 50 percent capacity for 50 percent of the time.*

[b] *These projects do not offer additional supply.*

Table 3-7 lists the current and planned water supplies for the City for the years 2005 through 2030. Note that this table lists the water available to the City from its water rights and percolated groundwater. The City's pumping capacity from its Ranney collector, surface water wells, and percolated groundwater well is limited.

Table 3-7. Current and Planned Water Supplies - AFY (DWR Table 4)

Water Supply Sources	2005	2010	2015	2020	2025	2030
Supplier surface diversions (Water Right 12952)	14,480	14,480	14,480	14,480	14,480	14,480
Project Water (Mendocino County Russian River Flood Control and Water Conservation Improvement District)	800	800	800	800	800	800
Supplier produced groundwater (current & future wells)	1,290	1,895	1,895	1,895	1,895	1,895
Transfers in or out	0	0	0	0	0	0
Exchanges in or out	0	0	0	0	0	0
Recycled water (projected use)[a]	0	0	tbd[b]	tbd[b]	tbd[b]	tbd[b]
Desalination	0	0	0	0	0	0
TOTAL	16,570	17,175	17,175	17,175	17,175	17,175

[a] *Projected recycled water usage is calculated in Section 4.0*

[b] *tbd - to be determined after City completes its Recycled Water Master Plan.*

Table 3-8 lists the projected normal water supply in acre-feet per year.

Table 3-8. Projected Normal Water Supply – AFY (DWR Table 40)						
	2010	2015	2020	2025	2025	2030
Supply	17,175	17,175	17,175	17,175	17,175	17,175
% of year 2005[a]	104	104	104	104	104	104

[a] *from Table 3-9 base year for normal water year.*

3.7 Water Supply Reliability and Vulnerability

The City has completed various projects to increase reliability and reduce vulnerability to meet anticipated water demands. These projects have included the following: 1) cleaned existing Ranney collector laterals, 2) added four laterals in the Ranney collector to replace lost capacity, 3) improved water distribution system for reliability and redundancy, 4) added a High Service Pump Station to increase reliability, and 5) increased water storage for emergencies and fire fighting capability.

The City continues to explore various alternatives to improve reliability and reduce vulnerability. The City is currently investigating additional groundwater well sites. That investigation will include a determination as to whether the groundwater is percolating groundwater or groundwater flowing in a definite underground channel. To the extent the City is able to develop additional percolating groundwater wells, this would enable the City to rely more on percolated groundwater than it does at present.

3.7.1 Reliability Comparison

California has experienced two droughts over the past 30 years, one severe drought in 1976/1977 and a prolonged drought from 1987 to 1993. During both drought periods, the City did not experience any shortages in its water supply. Customers voluntarily cut back their water usage during this time to help the City meet demands and demonstrate their concern for the statewide drought conditions. In 1992, City water demands were less than the previous year even though the number of connections and population increased. Table 3-9 lists the basis of water year data for the following section.

Table 3-9. Basis of Water Year Data (DWR Table 9)	
Water Year Type	Base Year(s)
Average Water Year	1962
Single Dry Water Year	1976/1977
Multiple Dry Water Years	1990 through 1992

As noted above, the City did not experience any shortages in water supply during the two most recent drought periods. The City has developed a hypothetical four-year worst-case scenario to prepare for any conditions that may cause water supply shortages. From this scenario, a four-year drought has been analyzed. It was assumed that the severity of this hypothetical period would yield 8,400 AFY of water supply on an annual basis, approximately 51 percent of normal. This value is based on the analysis in Section 3.10. The estimated water supply and resulting water supply deficiencies caused by this extreme case are shown in Table 3-10. It can be seen from this example that deficiencies in overall water supplies would not create a shortage

for City customers based on approximately 4,000 AF normal water demand as might be expected to occur in 2005 – 2006.

However, the City's pumping capacity from its Ranney collector, surface water wells, and percolated groundwater well may be affected. During peak flow or drought periods, when the water table is lower, the pumping capacity may be limited even more than normal water years. The City has water rights to meet its demand, however, only the Pre-1949 2,027 AFY are considered senior rights. The City also has, on a contractual basis, 800 AFY from the Flood Control District. The remaining water right is Post 1949 and is not senior to project water for the East Fork of the Russian River and Russian River underflow. Demands are discussed in greater detail in Chapter 5.

Table 3-10. Supply Reliability - AFY (DWR Table 8)

		Multiple Dry Water Years			
Average / Normal Water Year	Single Dry Water Year 2006	Year 1 2007	Year 2 2008	Year 3 2009	Year 4 2010
16,490	8,400	8,400	8,400	8,400	8,400
% of Normal	51	51	51	51	51

Conditions resulting in inconsistency of water supply are summarized in Table 3-11. Water quality issues are not anticipated to have significant impact on water supply reliability. If applicable in the future, chemical contamination and the lowering of maximum contaminant levels (MCLs) for naturally occurring constituents can be mitigated by constructing new treatment facilities prior to water delivery into the water distribution system.

Table 3-11. Description of the Factors in Inconsistency of Supply (DWR Table 10)

Name of supply	Regulatory/Legal	Environmental	Water Quality	Climatic
Surface Water	Change in rights to Russian River water diversion	None	None	Drought that reduces the flow in the Russian and Eel River significantly
Groundwater	Change in pumping rights	None	None	Multiple dry years that lower groundwater table
Recycled water	None	None	None	None

The Potter Valley Project diversion from the Eel River watershed to the Russian River watershed by Pacific Gas and Electrical (PG&E) has recently been reduced by estimates ranging from 26 percent to 33 percent. (The City's preliminary analysis estimates 26 percent. See §3.10 for the preliminary analysis.) This diversion has been ongoing for almost 100 years with agricultural, municipal, and commercial economies relying on this diversion. A preliminary analysis was completed to determine the effect reductions in flow would have on Lake Mendocino and the Russian River. The results of the preliminary analysis show that sufficient water supply is available for the City and that increased diversions by the City will only have minor effects on Lake Mendocino. The analysis is based on a continuation of diversions from the Eel River at the reduced rate and continuing releases from Lake Mendocino that, at least, comply with the minimum flow requirements in Water Board Decision 1610. If the Eel River diversion is further curtailed in the future or if Decision 1610

and the operation of Lake Mendocino is significantly changed in the future, additional analysis of those changes would be required. The City's water supply could be significantly affected by such changes.

3.7.2 Wholesaler (Agency) Water Supply Projections

The City does not receive any of its supply from a wholesaler. For this reason, Tables 3-12 through 3-14 have been filled in with zeros and "N/A" for not applicable.

Table 3-12. Wholesaler Identified & Quantified the Existing and Planned Sources of Water- AFY (DWR Table 20)

Wholesaler sources	2010	2015	2020	2025	2030
N/A	0	0	0	0	0

Table 3-13. Wholesale Supply Reliability - Percent of Normal AFY (DWR Table 21)

	Multiple Dry Water Years				
Wholesale	Single Dry	Year 1	Year 2	Year 3	Year 4
Surface Water	0	0	0	0	0
Groundwater wells	0	0	0	0	0
Recycled water	0	0	0	0	0
% of Normal	0	0	0	0	0

Table 3-14. Factors Resulting in Inconsistency of Wholesaler's Supply (DWR Table 22)

Name of supply	Legal	Environment	Water Quality	Climatic
N/A	0	0	0	0
N/A	0	0	0	0

The City may purchase, on a contractual basis, water from the Mendocino County Russian River Flood Control and Water Conservation Improvement District (District). The City has a water supply agreement with the District that allows the City to purchase up to 800 AF of water annually under the District's permit. This water purchase is considered project water.

3.8 Water Quality

The WTP was placed into service in April 1992. The WTP was constructed to treat water collected in the Ranney collector. Water is pumped from the Ranney collector to the WTP, which is located approximately 300 feet west of the Ranney collector. The WTP uses the Microfloc contact clarification-filtration technology. This technology is classified as an alternative filtration technology under the State Surface Water

Treatment Regulations. Treatment processes include prechlorination, adsorption, clarification, mixed-media gravity filtration, and disinfection. Filter backwash water generated from the water treatment plant processes is discharged to two 216,000-gallon clarification reservoirs for recycling. Treated water is pumped to a new 1.5 mg clearwell /reservoir for post chlorination. From the clearwell, the water is pumped into the distribution system by vertical turbine high service pumps. Operation of the treatment plant is controlled through the use of a pressure transducer in the City's new 1.5 mg reservoir.

Surface water Wells 3 and 5, along with percolated groundwater Well 4, are equipped with gas chlorination facilities. In addition, Well 4 is equipped with a continuous reading turbidimeter. After chlorination, water from the surface water and percolated groundwater well is pumped directly into the distribution system.

Improvements to the WTP were completed in September 2006. The improvements include an additional Microfloc contact clarification-filtration unit for reliability and redundancy, new chlorine scrubber, new sodium hydroxide tank and dispensing system, new water distribution SCADA system, and high service pumps.

3.8.1 Water Quality of Existing Water Supply Sources

The quality of the City's water system is regulated by DHS, which requires regular collection and testing of water samples to ensure that the water quality meets regulatory standards and does not exceed MCLs. The City performs water quality testing, which has consistently met or exceeded regulatory standards.

The quality of existing surface water and percolated groundwater supply sources over the next 25 years is expected to be adequate. Surface water will continue to be treated to drinking water standards, and no surface water or groundwater quality deficiencies are foreseen to occur in the next 25 years. This plan will be subject to five year updates that can include new information concerning surface or groundwater contamination, if it becomes available. If new information becomes available in less than five years, the plan can be updated at that time to include that information and any revised water plans to address that information. Table 3-15 summarizes the current and projected water supply changes due to water quality.

Table 3-15. Current & Projected
Water Supply Changes due to Water Quality – Percentage (DWR Table 39)

Water Source	2005	2010	2015	2020	2025	2030
Russian River	0	0	0	0	0	0
Project Water	0	0	0	0	0	0
Groundwater	0	0	0	0	0	0
Recycled water	0	0	0	0	0	0

3.8.2 Water Quality Effects on Water Management Strategies

The City has a Water Quality Emergency Notification Plan (Notification Plan) for use when it is determined that an imminent danger to the health of the water users exists. Within the Notification Plan, City staff is directed to contact local authorities, radio stations, television stations, and newspapers. If necessary, City personnel are available to make door-to-door notifications during the hours that other media sources are not available to broadcast a warning.

The City also has developed a water treatment plant disinfection failure emergency plan, which describes the automatic shutdown of the chlorination system in the case of equipment malfunction. If the chlorination system cannot be rapidly repaired, the City has the following options:

1. Start a manual auxiliary chlorinator,
2. Prechlorinate at the Ranney collector and manually chlorinate at the clearwell if required
3. Start percolating groundwater Well 4 with an alternative dedicated chlorination system, and/or
4. Purchase water from the Millview CWD or the Willow CWD through the emergency intertie agreements.

Although the City does not have a formal emergency plan in place in the event that water cannot be pumped from the Ranney collector, surface water wells, or its percolated groundwater well, the City would initiate either Option 3 or Option 4 as described above, to provide water to its customers.

3.9 Water Shortage Contingency Plan

In 1977, the City of Ukiah adopted a Water Shortage Emergency Plan (see Appendix E), which recognized the possibility of long or short-term water shortages. The ordinance is intended to prohibit all nonessential water uses, and to allocate the available water supply during any water shortage emergency. The City has not needed to declare any water shortage emergencies due to lack of water supply.

Emergency situations that have been declared have been the result of problems with water treatment or distribution facilities. The City has been able to manage these emergency situations by restricting the watering of City parks and landscaped areas.

Notification of any water shortage emergency condition in the City will follow the guidelines set forth in the City's Water Shortage Emergency Plan. The City will first notify local authorities, radio, newspaper, and television media to inform them of the current status of the emergency. If needed, the City will contact neighboring water districts for mutual aid. If no other means is available, the City will notify customers on a house-to-house basis of the emergency and what voluntary or mandatory measures need to be implemented.

3.9.1 Estimate of Minimum Water Supply for Next Three Years

This section outlines the estimated three-year minimum water supply, the actions and stages described in the Ordinance that will be implemented in the event of a water supply shortage, and the emergency preparedness and plans for catastrophic events.

As was demonstrated by the hypothetical four-year minimum water supply scenario in Section 3.7.1, a reduction in the City's overall water supply does not require the City to declare voluntary or mandatory rationing of water because of a shortage of water supply. It should be noted that conditions that may produce reduction in water supply may lower the pumping capacity of the Ranney collector, surface water wells, and percolated groundwater well. Demands for the multiple dry water year scenarios were held constant because of the history of customers voluntarily reducing water use. Table 3-16 outlines the City's minimum supply for the next three years.

Table 3-16. Three-Year Estimated Minimum Water Supply - AF Year (DWR Table 24)				
Source	Normal 2005	Year 1 2006	Year 2 2007	Year 3 2008
Surface Water	14,480	7,355	7,355	7,355
Project Water	800	400	400	400
Groundwater	1,290	645	645	645
Recycled	0	0	0	0
Total	16,570	8,400	8,400	8,400

3.9.2 Stages of Actions

Per California Water Code Section 10632 (a), the Water Shortage Emergency Plan adopted by the City is divided into three stages. The three stages include both voluntary and mandatory rationing depending on the severity of the water supply shortage emergency. Table 3-17 shows the three stages and their representative shortages.

Table 3-17. Water Supply Shortage Stages and Conditions (DWR Table 23)		
Stage No.	Water Supply Conditions	Type of Program
I	Initiated when 15 percent water conservation needs to be met	Voluntary
II	For further conservation and/or stage I is not being met	Mandatory
III	Implemented if stage II is not achieving sufficient reduction	Mandatory

The City is responsible for supplying water for the health and safety needs of the community. If it appears the City may be unable to supply the normal demands and requirements of the water customers, the City Council may, by resolution, declare a water emergency. Based on the severity of the predicted shortage, the City will take the following actions:

Stage I: Voluntary Restrictions. When the City Council declares that a Stage I water shortage exists, the City will issue a proclamation urging citizens to institute water conservation measures on a voluntary basis.

Stage II: Nonessential Water Use. When the City Council declares that a Stage II water shortage exists, the City will institute mandatory water conservation measures. The City's Municipal Code includes prohibition on use such as: fire hydrant use restrictions; exterior irrigation restrictions; requirements for correction of leaks, breaks or malfunctions within a user's plumbing system; restrictions on washing cars, boats, buildings, and mobile homes; restrictions on washing of sidewalks, driveways, and other hard surfaced areas; restriction on filling swimming pools; and restrictions of potable water use for dust control purposes.

Stage III: Further Nonessential Water Use. All of the mandatory Stage II water use restrictions will continue to be enforced when the City Council declares a Stage III water shortage exists. In addition to the Stage II restrictions, the City will implement the following measures: daily usage allotment of 50 gallons per permanent resident for single family or duplex and 45 gallons per permanent resident for multi-residential units, all other uses will be limited to fifty percent of prior water use for a similar period, restriction on irrigation water, and restrictions for hand-watering.

California Water Code Section 10632 (e) requires the water supplier to provide consumption reduction methods in the most restrictive stages of a water shortage. Table 3-18 summarizes the consumption reduction methods and their projected reductions.

Table 3-18. Consumption Reduction Methods (DWR Table 27)

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (%)[a]
Voluntary Reductions	I	10
Prohibition of non-essential uses	II	15
Mandatory Allotments	III	25

[a] *As the City has never been in a critical situation, these values have been assumed based on reductions observed in other cities.*

3.9.3 Prohibitions, Penalties and Consumption Reduction Methods

California Water Code Section 10632 (d) requires mandatory prohibitions against specific water use practices that may be considered excessive during water shortages. The City's Municipal Code includes prohibition on various wasteful water uses during a declared water shortage emergency. These mandatory prohibitions are implemented during a Stage II or Stage III water shortage emergency and are listed in Table 3-19.

Table 3-19. Mandatory Prohibitions (DWR Table 26)

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Use of water from public hydrants for any other purpose than fire protection/prevention	II, III
Use of water through any meter when the consumer has been given 2 days notice to repair any leaks and has failed to complete repairs	II, III
Use of water by golf course to irrigate any grounds except those designated as tees and greens	II, III
Use of water to irrigate grass, lawns, ground cover, shrubbery, vegetable gardens, trees, or other outdoor vegetation	II, III
Use of water for the construction of any structure including such use in dust control	II, III
Use of water to wash sidewalk, driveway, street, parking lot, tennis court, or other hard surfaced area by hosing or by other direct use of water from faucets or other outlets	II, III
Use of water to fill or refill any swimming pool	II, III
Use of water to add to any swimming pool not equipped with and using a pool cover	II, III
Use of water in excess of the daily usage allotment set forth as: Single family or duplex – 50 gallons per permanent resident Multi-residential units – 45 gallons per permanent resident	III
All other uses not expressed above shall be limited to 50 percent of prior use for a similar period as determined by the City from its records	III
Water to irrigate	III
Use of water for hand-watering	III

Any customer violating the regulations and restrictions on water use receives a written warning from the City for the first violation. If the violation continues and the Director determines there has been a "willful failure to comply" with the regulations, the City may shut off a customer's water service. Table 3-20 lists the specifics of these charges and in what stages they may occur.

Table 3-20. Penalties and Charges (DWR Table 28)

Penalties or Charges	Stage When Penalty Takes Effect
Penalty for use beyond restrictions as described in Stages II and III[a]	II, III
Penalty for use of water for prohibited uses described in Table 3-18[a]	II, III

[a] *Both first and second violations of this ordinance within any one year period shall be infractions. Any violations that continue after notice shall be a separate offense and shall be punishable as such hereunder; further, each day such violation continues shall be considered a separate offense (Ordinance 691, §1, adopted 1977).*

3.9.4 Mechanisms for Determining Actual Reductions

California Water Code Section 10632 (i) requires the water supplier to develop a mechanism for determining actual reductions in water use in the course of carrying out the water supply shortage contingency analysis. Water meter monitoring will be used to determine the amount of water reductions achieved during droughts.

Table 3-21. Water Use Monitoring Mechanisms (DWR Table 31)

Mechanisms for determining actual reductions	Type data expected
Water meter readings	Frequent meter readings

3.9.5 Revenue and Expenditure Impacts during Shortages

Section 10632 (g) of the California Water Code requires an analysis of the impacts of each of the actions taken for conservation and water restriction on the revenues and expenditures of the water supplier. To date, the City has not experienced shortages where it has implemented restrictions or prohibitions. In the Association of Bay Area Governments 2005 Water and Wastewater Revenue Bonds, Series A (2005), a rate stabilization fund was establish to allow the City to use money within this fund during a period of decreased revenue or increased expenditures until the City can implement a rate increase. The City would increase its rates as a measure to overcome revenue impacts.

Table 3-22. Proposed Measures to Overcome Revenue Impacts (DWR Table 29)

Names of measures	Check if Discussed
Rate adjustment	✓
Development of reserves	✓

Table 3-23. Proposed Measures to Overcome Expenditure Impacts (DWR Table 30)	
Names of measures	Check if Discussed
Reserve Fund	✓

3.9.6 Catastrophic Supply Interruption Plan

California Water Code Section 10632 (c) requires actions to be undertaken by the water supplier to prepare for and implement adopted procedures during a catastrophic interruption of water supplies. The City has described its emergency response plan in Division 6, Chapter 2 – Emergency Services of the *City of Ukiah City Municipal Code*.

Table 3-24. Preparation Actions for a Catastrophe (DWR Table 25)	
Possible Catastrophe	Check if Discussed
Air pollution	✓
Fire	✓
Flood	✓
Storm	✓
Epidemic	✓
Earthquake	✓
Power Outages	
War	✓
Hazardous materials	✓
Environmental disaster	✓

3.10 Attachment (See Appendix H) - Effect of Reduced Eel River Imports on Future Water Supply for City of Ukiah Urban Water Management Plan – Prepared by Wagner and Bonsignore

4. RECYCLED WATER

This chapter discusses recycled water. Included in this chapter are discussions on agency coordination, existing wastewater facilities, current and projected recycled water use, agricultural irrigation, and recycled water optimization plan.

4.1 Agency Coordination

The City's Wastewater Treatment Plant (WWTP) treats residential and commercial wastewater from two entities, the City and the Ukiah Valley Sanitation District (UVSD). The UVSD serves Mendocino College, El Dorado Estates, Vichy Springs, 18 percent of the accounts within the City limits, and other areas contiguous to the City. Figure 4-1 shows the service area boundaries for the City and UVSD.

The City has set a goal to develop a Water Recycling Master Plan to investigate the economic feasibility of recycled water in the City and Ukiah Valley and to identify potential uses for recycled water to reduce the demand on its drinking water supplies. In 2005 and 2006, the City and UVSD submitted applications for state and federal grants to conduct a feasibility study and a Water Recycling Master Plan study. Although the specific roles in the study's development have not been determined, the agencies listed in Table 4-1 are assumed to play important roles.

Table 4-1. Participating Agencies (DWR Table 32)

Participating Agencies	Role in Development
City of Ukiah	to be determined
Ukiah Valley Sanitation District	to be determined

4.2 Wastewater Quantity, Quality, and Existing Uses

The City collects wastewater from approximately 82 percent of the area within the current City limits, while the UVSD collects wastewater from the remaining portion of the City and from most of the urbanized areas surrounding the City. The populations of the City and UVSD are approximately 15,600 and 5,000, respectively. Collected wastewater is transported by gravity through a main trunk sewer that is located along the west bank of the Russian River from the north end of the valley to the City's WWTP located on the south end of the City. The WWTP discharges advanced, tertiary treated water to the Russian River from October 1 through May 14 at a rate that does not exceed one percent of the Russian River flow. From May 15 through September 30, discharge is only to three evaporation/percolation ponds (ponds). The Water Quality Control Plan for the North Coast Region (Basin Plan) prohibits wastewater discharge to the Russian River between May 15 and September 30.

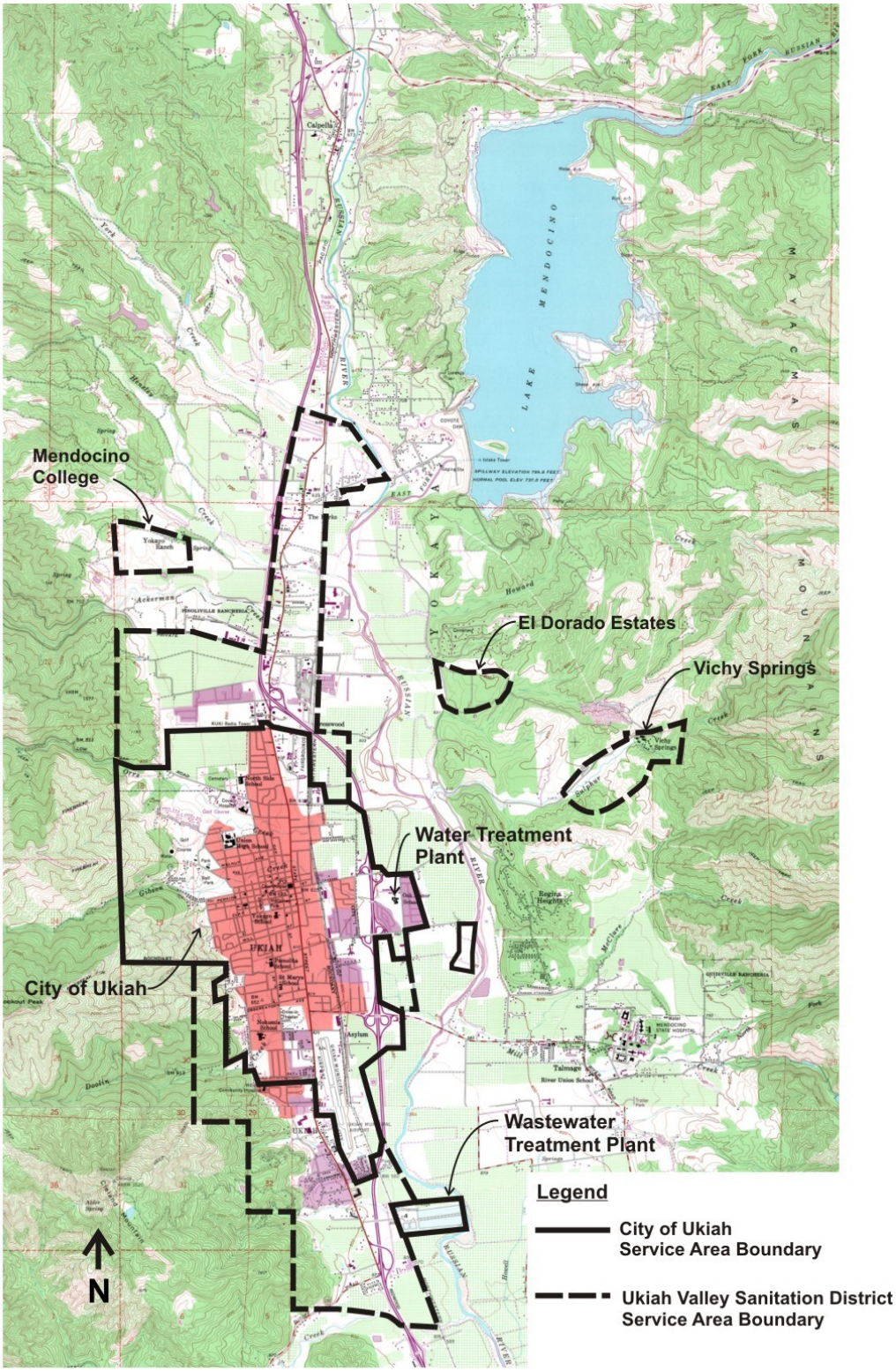


Figure 4-1. Ukiah Wastewater Treatment Plant Service Area

Wastewater Collection System. The collection system for the City and UVSD consists of gravity pipes that range from 6 inches to 42 inches in diameter. The total length of gravity pipe is approximately 67 miles. Most of the collection system is served by gravity; however, two areas on the east side of the City require pumping stations to convey the flow to the gravity sewers.

The age and condition of the City's sewer collection system varies by location. A portion of the collection system in the downtown area was installed in the 1890s. Approximately one-half of the City's collection system was installed before 1957 and 90 percent was installed before 1977.

Wastewater Treatment System. Construction of the original WWTP was completed in 1958. The original plant consisted of a headworks facility (one barminutor and four influent pumps), pre-aeration grit tanks, one primary clarifier, one trickling filter, one secondary clarifier, a chlorine contactor pipe, two anaerobic digesters, two oxidation ponds or evaporation/percolation ponds, and two sludge lagoons. The original plant capacity was 2.5 mgd average dry weather flow (ADWF) with a peak wet weather flow of 10.5 mgd. Discharge was to the Russian River. The design organic and solids loadings were 5,400 pounds per day (lb/day) and 5,400 lb/day, respectively.

The North Coast Regional Water Quality Control Board (Regional Water Board) of California modified discharge requirements in 1974 to allow only seasonal (October 1 through May 14) discharge to the Russian River at a discharge rate of one percent of the river flow. Flow above one percent of the Russian River flow between these dates and all flow from May 15 through September 30 is disposed of by a combination of evaporation and percolation from the ponds and by reuse of treated effluent onsite.

In 1983, the plant capacity was increased to 2.8 mgd ADWF with a maximum wet weather flow discharge to the Russian River of 7.0 mgd. The improvements included conversion of the secondary clarifier into a second primary clarifier, construction of a biological tower in addition to the trickling filter, three new secondary clarifiers, a new chlorine contactor pipe, new dechlorination facilities, addition of emergency generator facilities, and a new direct outfall. In addition, an earthen levee was constructed around the WWTP site and sludge lagoons at an elevation of 580 feet MSL to protect against the 100-year flood level.

In 1986, a third evaporation/percolation pond was constructed to the north of the two existing ponds, and in 1989, an effluent pumping station was constructed to transfer secondary effluent to the third pond. Also in 1989, the Regional Water Board revised the Basin Plan to require advanced wastewater treatment (AWT) of the effluent discharged to the Russian River. Secondary treatment was also required for discharge to the ponds. In 1995, the barminutors in the headworks were replaced with channel screen comminutors, and a fourth secondary clarifier, a new AWT system, and a new solids handling facility, including a belt filter press for processing solids, were constructed.

Currently, the City's WWTP discharges treated effluent under the National Pollutant Discharge Elimination System (NPDES) Permit No. CA0022888 issued by the Regional Water Board. Two discharge points are permitted as described above, one to the Russian River and the other to the three ponds. Figure 4-2 is an aerial view of the WWTP. Tables 4-2 and 4-3 summarize historical and projected wastewater flow from the collection, treatment, and disposal systems.

Figure 4-2. City of Ukiah Wastewater Treatment Plant

Table 4-2. Wastewater Collection and Treatment – AFY (DWR Table 33)							
Type of Wastewater	2000	2005	2010	2015	2020	2025	2030
Wastewater collected & treated in the service area	3,710[a]	4,483[a]	4,762[b]	5,295[b]	5,829[b]	6,362[c]	6,895[b]
Volume that meets recycled water standards	876[a]	441[a]	1,016[d]	1,129[d]	1,244[d]	1,357[d]	1,471[d]

[a] *Actual plant data.*

[b] *Interpolation of data between 2000 and 2030.*

[c] *2025 Design Criteria from TM 29, Technical Memoranda for the Wastewater Treatment Improvement Project, Volume 2, June 2003.*

[d] *Based on average recycled water produced for the period between 1997 and 2002.*

The City is constructing improvements to the WWTP facilities that will improve the effluent discharged. Completion of the improvements is expected in June 2009. The improvements to the WWTP will allow the AWT facilities to meet recycled water standards. The volume of recycled water for this UWMP was estimated based on plant data from the AWT facility discharge to the Russian River from 1997 through 2002. The WWTP discharged approximately 21.3 percent of its flow to the Russian River during that time period. Therefore, it was assumed that the WWTP would discharge 21.3 percent through 2030.

Table 4-3. Disposal of Wastewater (non-recycled) – AFY (DWR Table 34)							
Method of disposal	Current treatment level	2005	2010	2015	2020	2025	2030
Discharge to Russian River	Tertiary	441	1,016[a]	1,129[a]	1,244[a]	1,357[a]	1,471[a]
Evaporation/Percolation from Ponds	Secondary	4034	3,423[a]	3,843[b]	4,262[b]	4,682[b]	5,101[b]
Reuse within Plant	Secondary	8[c]	323[c]	323[c]	323[c]	323[c]	323[c]
Total		4,484	4,762	5,295	5,829	6,362	6,895

[a] *Based on average recycled water produced for the period between 1997 and 2002.*

[b] *Value of recycled water with no percolation from ponds. Assumes evaporation from ponds would be minimal.*

[c] *Estimated use of plant water within the WWTP property boundaries.*

4.3 Current and Projected Recycled Water Use

Only a small portion of the treated effluent is currently reused onsite at the WWTP. It is used for landscape irrigation, process washdown, and spray water. Because the flow that is reused is relatively small, it is not measured.

Potential publicly owned recycled water sites within and near the City include the Ukiah Municipal Airport, Highway 101 median, Ukiah Golf Course, city parks, schools, Anton Stadium, City's softball complex, City Civic Center, City and County Fairgrounds, and Mendocino College. Potential privately owned recycle water sites include vineyards and orchards.

The estimated acreage of land that could be irrigated from publicly owned sites is approximately 236 acres. There are not sufficient publicly owned facilities for use of all the recycle water and any recycled water program would require the participation of privately owned facilities. The Ukiah Municipal Airport and Highway 101 median are located close to the WWTP site and are the most feasible sites for recycled water. Most of the other sites are located in the northern part of the City, while the WWTP is located in the southern part of the City. This makes the cost to use recycled water significantly higher.

Privately owned facilities such as vineyards and orchards are the most likely users of recycled water. However, significant barriers were identified when local farmers and agricultural industry representatives were consulted. These barriers could limit the feasibility of a recycled water program for privately owned facilities. These barriers include the following: 1) seasonal need for water does not necessarily correspond with times when recycled water is most available, thus requiring additional storage facilities, 2) for organic farmers, the thought is that the use of recycled water would remove the organic certification from their products, 3) privately owned facilities fear the possibility of losing their existing water rights if recycled water is used, 4) existing water supplies appear to be sufficient to meet their needs, and 5) it is not cost effective to use recycled water without subsidizing the recycle water program. To fully implement a water recycle program, these barriers will need to be addressed through public education programs.

Tables 4-4, 4-5, and 4-6 list the actual, potential, and predicted recycled water use within the City.

Table 4-4. Recycled Water Uses – Actual and Potential (AFY) (DWR Table 35)

User type	Treatment Level	2005	2010	2015	2020	2025	2030
Agriculture	Tertiary	0	0	tbd[a]	tbd[a]	tbd[a]	tbd[a]
Landscape	Tertiary	0	0	tbd[a]	tbd[a]	tbd[a]	tbd[a]
Wildlife Habitat		0	0	0	0	0	0
Wetlands		0	0	0	0	0	0
Industrial		0	0	0	0	0	0
Groundwater Recharge		0	0	0	0	0	0
Consumptive Reuse within Plant	Tertiary	8[b]	323[b]	323[b]	323[b]	323[b]	323[b]
Golf Course Irrigation		0	0	tbd	tbd	tbd	tbd
	Total Potential Recycled Water	8	323	3,843	4,262	4,682	5,101

[a] *The uses for recycled water have not been determined. The total amount will be divided amongst these uses.*

[b] *This quantity of flow reused at the plant is not measured. It is a relatively small quantity. Estimated use of plant water within the WWTP property boundaries.*

Table 4-5. Projected Future Use of Recycled Water in Service Area – AF Year (DWR Table 36)					
	2010	2015	2020	2025	2030
Projected use of Recycled Water	0	tbd[a]	tbd[a]	tbd[a]	tbd[a]

[a] *The uses for recycled water have not been determined.*

Disposal of wastewater is a vital part of the overall water balance for the City. The first step to understanding the role that recycled water has in the water balance is to complete a Water Recycling Master Plan, which the City plans to complete in the future. One component of the Water Recycling Master Plan will evaluate the economic feasibility and financing options for a recycled water system.

Table 4-6. Recycled Water Use – 2000 Projection Compared with 2005 Actual – AFY (DWR Table 37)		
User type	2000 Projection for 2005	2005 Actual use
Agriculture	0	0
Landscape	0	0
Wildlife Habitat	0	0
Wetlands	0	0
Industrial	0	0
Groundwater Recharge	0	0
Other (user type)	0	0
Total	0	0

4.4 Recycled Water for Agricultural Irrigation

The Ukiah Valley around the City has extensive farming operations and potential candidate customers /end users for the City's recycled water. Two principal issues are important for potential reuse - effluent quality and implications for water rights.

Effluent Quality. Once the WWTP improvements are completed, the AWT effluent from the City's WWTP will meets DHS requirements for unrestricted reuse (Title 22, California Administrative Code), specifically effluent filtration and disinfection to achieve total coliform concentrations of less than 2 most probable number per 100 milliliters. Such effluent would generally be acceptable for most agricultural applications, e.g., irrigation of pasture lands or fields used to forage. However, because of the AWT treated effluent total nitrogen concentration, vineyard owners may have some reservations regarding such reuse. Also, the Ukiah Valley has a high percentage of organic farmers. At this time, organic farmers may fear losing their organic certification if they use recycled water.

Water Rights. Some farmers have expressed concern that use of recycled water in place of their current water supplies could jeopardize surface water rights. However, California Water Code Section 1010 provides that no claim of water right (riparian, pre-1914 appropriative, post-1914 appropriative) will be reduced or lost as a result of the use of recycled water, and that the use of recycled water in lieu of surface water is equivalent to maintaining that right and shall constitute beneficial use. Further, Water Code Section 13550 states that

certain conditions must be met before the SWRCB can require a right holder to accept recycled water. The source must be of adequate quality, furnished at a reasonable cost, and not be detrimental to public health, prior rights, or the environment. The SWRCB is responsible for making a determination on each of these conditions and cannot require such use until after proper notice and a hearing is held.

4.5 Optimization Plan with Incentives

The City will develop a Water Recycling Master Plan in the future that will address optimizing the use of recycled water. The City is also investigating the use of dual distribution systems to promote re-use. Methods to encourage recycled water use will be considered, but have not been determined yet. Table 4-7 cannot be completed until after the completion and adoption of a Water Recycling Master Plan.

Table 4-7. Methods to Encourage Recycled Water Use (DWR Table 38)

Actions	AF of use projected to result from this action				
	2010	2015	2020	2025	2030
To Be Determined	tbd[a]	tbd[a]	tbd[a]	tbd[a]	tbd[a]
Total	tbd[a]	tbd[a]	tbd[a]	tbd[a]	tbd[a]

[a] *These numbers cannot determined until completion and adoption of a Water Recycling Master Plan.*

5. HISTORICAL AND PROJECTED WATER USE

Water demand projections provide the basis for sizing and staging future water facilities. Water use and production records, combined with projections of population, employment, and urban development, provide the basis for estimating future water requirements. This chapter presents an analysis of available demographic and water use data, customer connections, historical groundwater and surface water production, unit water use, and the resulting projections for future water needs for the City.

5.1 Employment, Land Use, and Population

The following paragraphs discuss the employment characteristics, land use characteristics, and population projects.

Employment Characteristics. Employment in Ukiah and the surrounding area is provided largely by the local hospital, retail, and service businesses. Agriculture also is a major employer in Mendocino County, including wineries, vineyards, orchards, and wood products. The number of small non-agricultural types of manufacturers and service industries continue to rise, while timber industry activities are in decline. As with many rural communities, state, county, and local government agencies also constitute a significant part of local employment (Ukiah Chambers of Commerce http://www.ukiahchamber.com/demographics.html).

Land Use Characteristics. Land use within the City region is characterized as suburban. Additional land uses in the region and service area include agriculture, industrial, commercial, and recreational.

Land use within the Russian River watershed is primarily agricultural with the greatest emphasis on vineyards, livestock, and orchard crops. Major orchard crops consist of apples, pears, and prunes, while some production of other crops such as olives and walnuts also occurs. The Russian River watershed contains both dry and irrigated pastures, with both hay and grain production. (Ukiah Chambers of Commerce http://www.ukiahchamber.com/demographics.html).

Population Projections. Ukiah has experienced slow population growth with a 2.9 percent total increase between 2000 and 2004. In 1995, the General Plan estimated an average annual growth rate of 4.5 percent. More recent data from the California Department of Finance indicates an average annual growth rate of 0.77 percent from 1999 to 2003. For the future water production analysis, an annual growth rate of 1.0 percent was assumed in the population projections in the City. Build-out for the City is expected in 2015 at a population of 17,992. For water planning purposes, the City also assumes that it will annex the land within the 1995 sphere of influence depicted in Figure 2-2 within the next 20 years. The population within this sphere of influence is expected to increase by 2,503. Table 5-1 summarizes the current and projected growth for the City assuming the City will gradually annex land within the sphere of influence for a 20 year period starting in 2011. Table 5-1 shows the current and projected population within the current City limits plus only the projected population growth within the 1995 proposed SOI. It is assumed for planning purposes that the current population within the proposed SOI is already receiving water to meet its current needs.

Table 5-1. Population – Current and Projected (DWR Table 2)							
	2000[a]	2005[b]	2010[b]	2015[b,c]	2020[b,c]	2025[b,c]	2030[b,c]
Service Area Population	15,497	16,288	17,118	18,618	19,244	19,869	20,495

[a] *Data from California Department of Finance 2003.*

[b] *Population estimated from data provided by the City. City buildout expected to be reached in 2015.*

[c] *Projections include population estimates from within the 1995 General Plan sphere of influence depicted in Figure 2-2.*

5.2 Historical Water Use

Water production is the volume of water measured at the source, which includes all water delivered to residential, commercial, and public authority customers, as well as unaccounted-for water. Records of historical water production obtained from Bartle Wells Associates serve as the basis for developing unit water demands for the City. The City recently restructured its water rate schedule and is also updating its accounting system. Current data does not support an accurate basis for developing unit water demands by user type.

5.2.1 Water Use By Connections

In 2005, the City served about 15,600 residents through approximately 5,700 connections. Current City accounting practices do not identify separate account types such as single family residential, multi-family residential, industrial, institutional/commercial, or landscape. The number of connections was projected based on the average number of people per connection from years 2002 to 2004. It was assumed that the City would begin annexing land within its sphere of influence in 2011 and that this process would span 20 years. This is reflected in Table 5-2 through 5-4. The total number of connection is shown in Table 5-2.

Table 5-2. Average People Per Connection		
Year	Total connections	People/Connection
2002	5,511	2.87
2003	5,558	2.87
2004	5,684	2.84
2005*	5,718	2.85
2010*	5,985	2.86
2015*	6,510	2.86
2020*	6,728	2.86
2025*	6,947	2.86
2030*	7,166	2.86
AVERAGE	6,549	2.86

** indicates projected values*

Based on the projected number of connections, an average production per connection was calculated for future water production through 2030. Table 5-3 shows this data. Because of the limitations of the City's accounting system, the water demands for industrial and commercial accounts can not be accurately determined, and therefore, are factored into the 2.86 people per connection value. This is also reflected in

the 0.73 AFY per connection. If a large water user enters the City's system, the UWMP should be updated to reflect this.

Table 5-3. Average Demand Per Connection (AFY/connection)

Year	Total production [AFY]	Connections	AFY/Connection
2000	4,223.87	5,511	0.77
2001	4,068.67	---	---
2002	4,163.37	5,511	0.76
2003	3,872.56	5,558	0.70
2004	4,129.93	5,685	0.73
2005	3,756	5,718	0.66
2006	3,831	5,771	0.66
2010*	4,369	5,985	0.73
2015*	4,752	6,510	0.73
2020*	4,912	6,728	0.73
2025*	5,072	6,947	0.73
2030*	5,231	7,166	0.73
AVERAGE	4,781	6,549	0.73

** indicates projected values*

Based on the average number of people per connection and the average water use per connection, the City's per capita usage is about 228 gpd. Because the City does not have data available to divide the water production into categories, only the total water deliveries and accounts are shown in Table 5-4.

Table 5-4. Past, Current and Projected Water Deliveries (DWR Table 12)

Year		Water use sectors	Single family	Multi-family	Commercial	Industrial	Institutional / Gov	Landscape	Agriculture	Total
2000	meter	# of accounts	---[a]	---	---	---	---	---	---	5,511
		Deliveries AFY	---	---	---	---	---	---	---	4,224
2005	meter	# of accounts	---	---	---	---	---	---	---	5,718
		Deliveries AFY	---	---	---	---	---	---	---	3,756
2010	meter	# of accounts	---	---	---	---	---	---	---	5,985
		Deliveries AFY	---	---	---	---	---	---	---	4,369
2015	meter	# of accounts	---	---	---	---	---	---	---	6,510
		Deliveries AFY	---	---	---	---	---	---	---	4,752
2020	meter	# of accounts	---	---	---	---	---	---	---	6,728
		Deliveries AFY	---	---	---	---	---	---	---	4,912
2025	meter	# of accounts	---	---	---	---	---	---	---	6,947
		Deliveries AFY	---	---	---	---	---	---	---	5,072
2030	meter	# of accounts	---	---	---	---	---	---	---	7,166
		Deliveries AFY	---	---	---	---	---	---	---	5,231

[a] Because the City's accounting system did not differentiate among connection types, the number of connections have been left out of this table.

5.2.2 Water Sales to Other Agencies

As stated in Section 3.7.2, the City is not a wholesaler and does not sell water to any of the local county water districts or water companies, except in emergencies under emergency intertie agreements with Millview and Willow County Water Districts. Because the City is not a wholesaler, Tables 5-5 and 5-6 are filled in with zeros.

Table 5-5. Sales to Other Agencies - AF Year (DWR Table 13)

Water distributed	2000	2005	2010	2015	2020	2025	2030
Millview County Water District	0	0	0	0	0	0	0
Willow County Water District	0	0	0	0	0	0	0
Rogina Water Company	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

Table 5-6. Agency demand provided to wholesaler suppliers (DWR Table 19)

Wholesaler	2010	2015	2020	2025	2030
N/A	0	0	0	0	0

5.2.3 Unaccounted-for Water and Additional Water Use

Unaccounted-for water is un-metered water use such as fire protection and training, system and street flushing, sewer cleaning, construction, system leaks, and unauthorized connections. Unaccounted-for water can also result from meter inaccuracies. Based on estimates provided by the WTP, unaccounted-for water for this UWMP is assumed to be three percent of total water production.

Table 5-7 shows the results of unaccounted-for water and additional water use. The City does not use water as a saline barrier, groundwater recharge, or other conjunctive use. It also does not use its raw water for other purposes.

Table 5-7. Additional Water Uses and Losses – AFY (DWR Table 14)

Water Use	2000	2005	2010	2015	2020	2025	2030
Saline barriers	0	0	0	0	0	0	0
Groundwater recharge	0	0	0	0	0	0	0
Conjunctive use	0	0	0	0	0	0	0
Raw Water	0	0	0	0	0	0	0
Recycled[a]	0	0	0	tbd	tbd	tbd	tbd
Other (define)	0	0	0	0	0	0	0
Unaccounted-for system losses (~3%)	127	113	131	143	147	152	157
Total	127	113	131	143	147	152	157

[a] *Recycled water is not considered a loss and is not included in the total.*

5.2.4 Total Water Use

Table 5-8 shows the total combined water use from Tables 5-4, 5-5, and 5-7 (DWR Tables 12, 13, and 14).

Table 5-8. Total Water Use - AFY (DWR Table 15)

Water Use	2000	2005	2010	2015	2020	2025	2030
Total of DWR Tables 12, 13, 14	4,351[a]	3,869[a]	4,500	4,895	5,059	5,224	5,388

[a] *Data from WTP records*

5.3 Water Demand Summary

The City's demand is lower than its available water rights and water supply as discussed in Chapter 3. Based on the demand projections provided, the City's demand falls below its water supply up through 2030. The per capita demand of 228 gpd is relatively high but not out of line for similar communities given the warm summer climate and degree of landscaping.

However, at times, the City has a difficult time meeting demands, especially peak demands during extended periods of hot weather. The reason the City's water system cannot meet the peak water demands during these periods is because the pumping capacity of the existing Ranney collector, surface water wells, and percolated groundwater well is limited. Also, during drought conditions, the water table is lower, which reduces the yield of the wells. The City is conducting a groundwater well siting study to increase groundwater well production by 1,500 gpm to help the City meet its peak demands. However, additional pumping capacity will be needed to meet future growth within the 1995 General Plan sphere of influence depicted in Figure 2-2.

6. WATER SUPPLY VERSUS DEMAND COMPARISON

This chapter provides a comparison of projected water supplies and demand and water shortage expectations.

6.1 Current and Projected Water Supplies vs. Demand

This section provides a comparison of normal, single-dry, and multiple-dry water year supply and demand for the City. Water demands are addressed in Chapter 5, water supply is addressed in Chapter 3, and recycled water supply is addressed in Chapter 4 of this UWMP.

The projected normal water year supplies are compared to the current demand for the City in Table 6-1.

Table 6-1. Projected Normal Water Supply – AF Year (DWR Table 40)

(from Table 3-7)	2010	2015	2020	2025	2030
Supply (16,570 AF for 2005)	17,175	17,175	17,175	17,175	17,175
% of year 2005	104	104	104	104	104

The current and projected water demands are compared to the current demands for a single dry year for the City in Table 6-2.

Table 6-2. Projected Normal Water Demand – AF Year (DWR Table 41)

(from Table 5-8)	2010	2015	2020	2025	2030
Demand (3,869 AF for 2005)	4,500	4,895	5,059	5,224	5,388
% of year 2005	116	127	131	135	139

The projected water supply and demand are compared to the demands for a normal water year for the City in Tables 6-3. The projected demand goes up more between 2010 and 2015 than in future time periods, because it is anticipated that the City will begin serving a portion of the 1995 proposed SOI in 2010 and the City will have built out its existing City limits by 2015.

Table 6-3. Projected Supply and Demand Comparison – AF Year (DWR Table 42)

	2010	2015	2020	2025	2030
Supply totals	17,175	17,175	17,175	17,175	17,175
Demand totals	4,500	4,895	5,059	5,224	5,388
Difference	12,675	12,280	12,116	11,951	11,787
Difference as % of Supply	74	71	71	70	69
Difference as % of Demand	282	251	239	229	219

Based on Tables 6-1, 6-2, and 6-3, the City will have adequate water supply during normal years through 2030. Note that this comparison does not account for water saved as DMMs. Increased participation in DMMs could lower demand.

6.2 Water Shortage Expectations

The projected water supply and demand for normal, single dry year, and multiple dry years are shown in Tables 6-4 through 6-9. Even though the water supply totals exceed the water demand totals, it was assumed that water conservations within the City and the sphere of influence depicted in Figure 2-2 would occur with multiple dry years. This is a practice that the City has operated in the past because of the limited pumping capacity from the City's water supply sources. Also, during multiple dry years, the water levels drop, making it more difficult to pump. For Tables 6-5 through 6-9, the analysis assumed that after the first year of a drought, the City would reduce water use to 87.5 percent of normal use, the second year after a drought, the City would reduce its water use to 83.5 percent of normal use, and the third and fourth years, the City would reduce its water use to 75 percent of normal use.

Table 6-4. Projected Single Dry Year Water Demand – AF Year (DWR Table 45)

	2010	2015	2020	2025	2030
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	4,500	4,895	5,059	5,224	5,388
Difference	3,900	3,505	3,341	3,176	3,012
Difference as % of Supply	46	42	40	38	36
Difference as % of Demand	87	72	66	61	56

Table 6-5. Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2010 – AF Year (DWR Table 48)

	2006	2007	2008	2009	2010
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	3,946	3,822	3,684	3,342	3,375
Difference	4,454	4,578	4,716	5,058	5,025
Difference as % of Supply	53	54	56	60	60
Difference as % of Demand	113	120	128	151	149

Table 6-6. Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2015 – AF Year (DWR Table 51)

	2011	2012	2013	2014	2015
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	4,578	4,075	3,954	3,611	3,671
Difference	3,822	4,325	4,446	4,789	4,729
Difference as % of Supply	45	51	53	57	56
Difference as % of Demand	83	103	112	133	129

Table 6-7. Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2020 – AF Year (DWR Table 54)					
	2016	2017	2018	2019	2020
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	4,928	4,340	4,169	3,770	3,794
Difference	3,472	4,060	4,231	4,630	4,606
Difference as % of Supply	41	48	50	55	55
Difference as % of Demand	70	94	101	123	121

Table 6-8. Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2025 – AF Year (DWR Table 57)					
	2021	2022	2023	2024	2025
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	5,092	4,484	4,307	3,893	3,918
Difference	3,308	3,916	4,093	4,507	4,482
Difference as % of Supply	39	47	49	54	53
Difference as % of Demand	65	87	95	116	114

Table 6-9. Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2030 – AF Year (DWR Table 60)					
	2026	2027	2028	2029	2030
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	5,257	4,628	4,444	4,016	4,041
Difference	3,143	3,772	3,956	4,384	4,359
Difference as % of Supply	37	45	47	52	52
Difference as % of Demand	60	81	89	109	108

Based on the information shown in Tables 6-4 through 6-9, the City has adequate supply during multiple dry years. However, the City's pumping capacity is limited. The City plans on adding two groundwater wells in the near future and will need to add more wells as needed for connections within the 1995 General Plan sphere of influence depicted in Figure 2-2.

6.3 Water Shortage Summary

The City is not expected to have any water shortages in terms of water rights within the next 25 years. However, the City is currently limited by its pumping capacity, not its water supply. This analysis shows that even with a reduction in water supply, the City still has sufficient water supply to meet its forecasted demands without any water conservation.

7. DEMAND MANAGEMENT PRACTICES

Water conservation is a method available to reduce water demands, thereby reducing water supply needs for the City. This chapter presents a description of the City's water conservation program, an economic analysis of water conservation Demand Management Measures (DMMs) 1, 2, 6, and 14, and a description of the methods and assumptions used to conduct the analysis.

7.1 California Urban Water Conservation Council

The unpredictability of its water supplies and ever increasing demand on California's complex water resources have resulted in a coordinated effort by DWR, water utilities, environmental organizations, and other interested groups to develop a list of urban water conservation DMMs for conserving water. This consensus-building effort resulted in a Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California, as amended September 16, 1999, among parties, which formalizes an agreement to implement these DMMs and makes a cooperative effort to reduce the consumption of California's water resources. The DMMs as defined by the MOU are presented in Table 7-1. The MOU is administered by the California Urban Water Conservation Council (CUWCC). The City is not currently a MOU signatory.

The MOU requires that a water utility implement only the DMMs that are economically feasible. If a DMM is not economically feasible, the utility may request an economic exemption for that DMM. The DMMs as defined in the MOU are generally recognized as standard definitions of water conservation measures.

Table 7-1. Water Conservation Demand Management Measures

No.	DMM Name
1.	Water survey programs for single-family residential and multi-family residential connections.
2.	Residential plumbing retrofit.
3.	System water audits, leak detection, and repair.
4.	Metering with commodity rates for all new connections and retrofit of existing connections.
5.	Large landscape conservation programs and incentives.
6.	High-efficiency washing machine rebate programs.
7.	Public information programs.
8.	School education programs.
9.	Conservation programs for commercial, industrial, and institutional accounts.
10.	Wholesale agency assistance programs.
11.	Conservation pricing.
12.	Conservation coordinator.
13.	Water waste prohibition.
14.	Residential Ultra Low Flow Toilets (ULFT) replacement programs.

7.2 Methodology and Assumptions

An economic analysis is conducted for four of the 14 DMMs that are described in the MOU, DMMs 1, 2, 6, and 14. Economic analyses are not completed for DMMs 3, 7, 8, 12, and 13 because they are non-quantifiable, yet essential to the success of those DMMs that are quantifiable. Non-quantifiable DMMs are those that have no quantifiable amount of dollars that need to be spent to implement these programs. The amount of water saved from these DMMs is also not quantifiable. DMM 4, 7, 8, 11, and 12 are not analyzed because they are currently implemented; DMMs 5 and 9 are not analyzed because the City has very limited large landscape, commercial, industrial, and institutional customers. DMM 10 is not analyzed because the City is not a wholesaler.

Assumptions used in the economic analysis for each DMM analyzed are described in Appendix F. Directly beneath each assumption is a brief description of the rationale and/or supporting evidence for that assumption. Common assumptions for all DMMs are that the value of conserved water is $1,206/AF, the real discount rate is 6.15 percent, and the overhead rate is 13 percent. The real discount rate is calculated from the assumed real cost of money (8.67 percent) and the assumed long-term inflation rate (2.52 percent) using the precise conversion method (A&N Technical Services 2000, pg A-2).

The economic analysis was performed using Microsoft® Excel 2003, a spreadsheet program. A separate, customized worksheet for each DMM is presented in Appendix F. Each DMM economic analysis spreadsheet calculates, on an annual basis, the number of interventions and the dollar values of the benefits and costs that would result from implementing a particular DMM. Terms and formulas that are common to all the worksheets are defined in Table 7-2.

Table 7-2. Definition of Terms Used in the Economic Analysis

Term	Definition	Comments
BENEFITS		
Avoided Capital Costs	Capital costs that are avoided by implementing the DMM.	An example is the cost of a well that would not have to be installed due to implementation of the DMM.
Avoided Variable Costs	Variable costs that are avoided by implementing the DMM.	An example is the cost of electricity that would be saved if the DMM were implemented.
Avoided Purchase Costs	Purchase costs that are avoided by implementing the DMM.	An example is the cost of purchasing water that would not be needed due to implementation of the DMM.
Total Undiscounted Benefits	The sum of avoided capital costs, avoided variable costs, and avoided purchase costs.	
Total Discounted Benefits	The present value of the sum of avoided capital costs, avoided variable costs, and avoided purchase costs.	An annual percentage rate consisting of the cost of borrowing money minus the inflation rate.
COSTS		
Capital Costs	Capital costs incurred by implementing the DMM.	For example, the cost to purchase and install meters for DMM 4.
Financial Incentives	The cost of financial incentives paid to connections.	Co-pay or distribution for purchasing low-flow plumbing devices or washing machines are examples of financial incentives.
Operating Expenses	Operational expenses incurred during implementation of the DMM.	

Table 7-2. Definition of Terms Used in the Economic Analysis		
Term	Definition	Comments
Total Undiscounted Costs	The sum of capital costs, financial incentives, and operating expenses.	
Total Discounted Costs	The present value of the sum of capital costs, financial incentives, and operating expenses.	The discount rate is used to calculate discounted costs from undiscounted costs.
Net Present Value	Total discounted benefits minus total discounted costs.	A value greater than zero indicates an economically justifiable DMM.
RESULTS		
Benefit / Cost Ratio	The sum of the total discounted benefits divided by the sum of the total discounted costs.	A ratio greater than one indicates an economically justifiable DMM.
Simple Pay-Back Period	The number of years required for the benefits to pay back the costs of the DMM, calculated as the sum of the total discounted costs divided by the average annual total discounted benefits.	A low value is considered economically attractive.
Discounted Cost / Water Saved	The present-value cost to save one acre-foot of water, calculated as the sum of the total discounted costs divided by the total acre-feet of water saved over the study period.	A low value is considered economically attractive because it indicates a low implementation cost. Value must be less than the marginal cost of new water to be cost effective.
Net Present Value / Water Saved	The net value of saving one acre-foot of water, calculated as the sum of the net present value divided by the total acre-feet of water saved over the study period.	A high value is considered economically attractive.

7.2.1 Value of Conserved Water

The value of conserved water is based on the rate that the City charges its customers for water, plus the cost to treat the water at the wastewater treatment plant. The November 2008 rate of $1.29 per 748 gallons (see Table 7-3) was used plus $2,471 per million gallons to treat the water when it becomes wastewater. Because 80 percent of treatment costs are attributed to flow, only 80 percent of the cost to treat the wastewater was used. The remaining 20 percent of the wastewater treatment costs are associated with organic and solids loading. This equated to a total value of water of $1,206 per acre-foot.

This calculated value for conserved water does not include the capital cost for improvements to the wastewater treatment plant to recycle all of City's wastewater in the future if the City is not allowed to discharge into the Russian River. Based on the total annual water savings calculated, it is estimated that the City may be able to reduce the design flow for future wastewater treatment needs by 6 percent.

Table 7-3. City of Ukiah Water Utility – Proposed Water Rates 2004/05 – 2008/09				
Meter Size/Class Description	Proposed Monthly Service Charge Effective			
	November 2005	November 2006	November 2007	November 2008
¾"	14.36	14.64	14.94	15.24
1"	21.58	22.97	24.41	25.90
1 ½"	37.85	41.85	45.99	50.28
2"	58.10	65.38	72.93	80.75
3"	105.72	120.70	136.25	152.36
4"	173.40	199.43	226.44	254.45
6" & Up	341.13	394.53	449.92	507.37
Fire Service 2" & Under	11.62	13.08	14.59	16.15
Fire Service 3"	21.14	24.14	27.25	30.47
Fire Service 4"	34.68	39.89	45.29	50.89
Fire Service 6"	68.23	78.91	89.98	101.47
Proposed Consumption Rate ($/unit; 1 unit is 748 gallons)	0.91	1.07	1.20	1.29

7.3 Current Water Conservation Program

The City conducts an ongoing water conservation program. A description of each DMM that is currently being implemented or scheduled for implementation, a schedule of implementation, and a method to evaluate effectiveness is provided in this section. The existing conservation savings is also discussed.

DMM 1. Water survey programs for single-family residential and multi-family residential connections.

Description: Water survey programs for single-family residential and multi-family residential connections consist of annual water audits, water use reviews, and surveys of past program participants. Audits will be conducted by trained auditors and may include low flow device installation. Audits will identify water-use problems, recommend repairs, instruction in landscape principles, irrigation timer use and, when appropriate, meter reading.

Schedule: The City offers to test customer meters upon request. The City does not track the number of tests performed annually.

Evaluation of DMM Effectiveness: Effectiveness of this DMM will be evaluated by program penetration and by comparison of prior audited customer water use to future water use. Table 7-4 summarizes the economic analysis for this DMM. The benefit to cost ratio is 1.3. See Appendix F for full economic results for this DMM.

DMM 2. Residential plumbing retrofit.

Description: Plumbing retrofit of existing residential accounts consists of providing low flow showerheads, faucet aerators, and toilet leak detection tablets to customers. This includes working with local programs and businesses to offer free water conservation information and materials to residents.

Schedule: The City has offered water savings kits in the past. However, due to lack of interest by customers, the City has discontinued this program.

Evaluation of DMM Effectiveness: The City offers retrofit kits if requested by the public, but has not seen significant savings as a result from these kits. Table 7-4 summarizes the economic analysis for this DMM. The benefit to cost ratio is 3.4. See Appendix F for full economic results for this DMM.

DMM 3. System water audits, leak detection, and repair.

Description: A system water audit, leak detection and repair program consists of ongoing leak detection and repair within the system, focused on the high probability leak areas. This also includes an ongoing meter calibration and replacement program for all production and distribution meters.

Schedule: The City performs leak detection and repair on an ongoing basis. The City, also, calculates system water losses annually and reports this information to DWR. In addition to calculating system losses, the City is currently replacing old meters in the system. The new meters will provide a more accurate reading of water use within the City.

Evaluation of DMM Effectiveness: The City's annual report to DWR tracks the unaccounted for water losses in the system. Any reductions in water loss due to the replacement of old meters and water leak detection and repairs will be reflected in the annual report. The City does not record the number of miles of distribution lines surveyed, nor the expenditures. This DMM is non-quantifiable and therefore, no results are provided in the economic analysis.

DMM 4. Metering with commodity rates for all new connections and retrofit of existing connections.

Description: The City water distribution system is fully metered. The City is currently replacing old meters in the system in an effort to provide more accurate readings of water use within its service area.

Schedule: The City will continue to install and read meters on all new services and replace aging meters.

Evaluation of DMM Effectiveness: Effectiveness of this DMM will be evaluated by comparison of prior water use to future water use. However, the City does not record the number of meter retrofits, metered and un-metered accounts, or the number of accounts without commodity rates. The City recently went through a rate re-structuring that is believed will reduce water uses in the future.

DMM 5. Large landscape conservation programs and incentives.

Description: The large landscape conservation program will consist of identifying all irrigation accounts and commercial, industrial, and institutional (CII) accounts with landscape of one acre and larger, and recording this information into a database.

Schedule: The City's Planning Department reviews all landscape plans proposed for new developments. Included in the City's Municipal Code is a requirement for all landscape planting to be "those which grow well in Ukiah's climate without extensive irrigation."

Evaluation of DMM Effectiveness: No economic analysis is performed on this DMM as the City has very few CII accounts. The City does not track the water use by large landscape customers, and can not evaluate the effectiveness of this DMM.

DMM 6. High-efficiency washing machine rebate programs.

Description: The high-efficiency washing machine rebate program would consist of distributing rebates to those customers who purchase a water conserving washing machine.

Schedule: The City does not currently have a high efficiency washing machine rebate program.

Evaluation of DMM Effectiveness: Effectiveness of this DMM is not evaluated because the City does not track the number of rebates. Table 7-4 summarizes the economic analysis for this DMM. The benefit to cost ratio is 0.4. See Appendix F for full economic results for this DMM.

DMM 7. Public information programs.

Description: Public information programs would consist of conservation news articles, fliers, media coverage, community events, etc.

Schedule: The City believes public awareness of water conservation issues is an important factor in ensuring a reliable water supply. The City promotes public awareness of water conservation through occasional bill stuffers, distribution of the Consumer Confidence Report, radio broadcasts, and the City web-site. In addition, City employees discuss with customers how they can conserve water.

Evaluation of DMM Effectiveness: Savings from this program cannot be directly quantified.

The activities performed in this program fall under the conservation budget for the City. The conservation budget is $2,000.

DMM 8. School education programs.

Description: The City would prepare water conservation programs to target children at school.

Schedule: The City offers local schools tours of its water treatment plant and also provides educational materials. Four science classes on public water supply at the high school are offered once a year. The cost of this program comes out of the City's conservation budget.

Evaluation of DMM Effectiveness: Savings from this program cannot be directly quantified.

DMM 9. Conservation programs for commercial, industrial, and institutional accounts.

Description: The City would develop a conservation program for CII accounts that includes water audits targeted to the top water users. This program would include surveys of past program participants to determine if audit recommendations were implemented. This program would also include incentives related to the use of efficient water-use technologies.

Schedule: The City has only two industrial customers: Maverick Industries and Red Tail Ale Brewery. The City surveys the water usage of these industries. Any new commercial, industrial, or institutional developments will be reviewed by the City Planning Department and must meet all requirements of the Municipal Code. Due to the lack of CII accounts, this DMM has not been economically analyzed.

DMM 10. Wholesale agency assistance programs.

Description: Wholesaler water suppliers would provide financial incentives, or equivalent resources, as appropriate, beneficial, and mutually agreeable to their retail water agency customers to advance water conservation efforts and effectiveness.

Schedule: This DMM is not applicable to the City since it is not a wholesale agency.

DMM 11. Conservation pricing.

Description: Conservation pricing requires that water rates encourage conservative water use by all customers.

Schedule: The City recently increased and re-structured its water rates to encourage more conservation, see Table 7-3. The City has simplified its rate structure by eliminating rate codes and classifying customers according to their meter size. The new rate structure incorporates the American Water Works Association (AWWA) demand capacity guidelines so that price increases across meter size in proportion to the potential demand a customer can place on the water system.

Evaluation of DMM Effectiveness: Effectiveness of this DMM will be evaluated by comparison of City water use prior to and following the implementation of conservation pricing. Because the City has just implemented a new rate schedule, the effectiveness can not be evaluated.

DMM 12. Conservation coordinator.

Description: A conservation coordinator is an ongoing component of a City's water conservation program. The conservation coordinator would be responsible for implementing and monitoring a City's water conservation activities.

Schedule: In practice, all staff members encourage water conservation implementation. Water conservation coordination for the City is established by the policies determined by the City Council and includes answering questions of the public by maintenance and meter readers while in the field.

Evaluation of DMM Effectiveness: Water savings from this DMM cannot be directly quantified. Effectiveness of this DMM will be evaluated by the success of the City's water conservation program.

DMM 13. Water waste prohibition.

Description: Water waste prohibition will require the City to adopt its own set of water conservation regulations.

Schedule: The City has adopted regulations that state in part: "Where negligent or wasteful use of water exists on a customer's premises…the City may discontinue the service…" (City Municipal Code Article 7, Section 3571). The City first sends customers a letter calling their attention to the wasteful practice and asking for correction. If the condition is not corrected within five days after the written notice, service may be discontinued if necessary.

Evaluation of DMM Effectiveness: Water savings from this program cannot be directly quantified.

DMM 14. Residential ULFT replacement programs.

Description: Since October 1992, the sale of toilets using more than 1.6 gallons per flush has been prohibited by State and Federal regulations. The residential ULFT replacement program will require the City to hand out rebates to those who buy an ULFT toilet.

Schedule: These regulations are enforced in the City.

Evaluation of DMM Effectiveness: Effectiveness of this DMM has not been evaluated as the City does not track the number of rebates or expenditures. Table 7-4 summarizes the economic analysis for this DMM. The benefit to cost ratio is 2.9. See Appendix F for full economic results for this DMM.

7.4 Economic Analysis Results

An estimate of existing conservation savings is not available. It is likely that previous and ongoing conservation measures have resulted in water savings of approximately 2 to 5 percent of total water production. The water savings already achieved by existing conservation measures will have some impact on the City's ability to further reduce demand. Nevertheless, the City anticipates achieving additional water savings by further implementation of DMMs in the future. Of the four DMMs analyzed, three appear to be cost effective for the City. DMMs 1, 2, and 14 should be evaluated in the future to assess if the City has the capital to implement them. Table 7-4 summarizes the economic analysis results.

Table 7-4. Summary of Economic Analysis Results (DWR Table 16)

BMP No.	BMP Name	Total Discounted Cost ($)	Total Water Saved (acre-feet)	Benefit / Cost Ratio	Simple Payback Analysis (years)	Discounted Cost / Water Saved ($/acre-feet)	Net Present Value / Water Saved ($/acre-feet)
1	Water Survey Programs for Single-family Residential and Multi-family Residential Customers	27,924	104	1.3	10	268	88
2	Residential Plumbing Retrofit	47,887	229	3.4	4	209	455
6	High-efficiency Washing Machine Rebate Programs	32,557	24	0.4	47	1,356	-778
14	Residential ULFT Replacement Programs	409,099	1,932	2.9	7	212	407

With implementation of DMM 1, 2, and 14, the City could save an average of 130 AF per year at a cost of about $38,000 per year for the next 20 years. These costs do not account for recycled water pumping, which could add savings of about $5,250 per year on energy if energy costs $0.14 per kilowatt/hour. The City may also choose to run these programs on a less aggressive schedule to reduce the capital costs during the first few years. The ULFT toilet replacement program saves the City the most water. Due to natural attrition, many toilets will be replaced in the future even without a rebate program. The results of this economic analysis are similar to the results of other economic analyses conducted for cities of similar population.

7.5 Non-quantifiable DMMs

Because the water savings from DMMs 3, 7, 8, 11, 12, and 13 are not quantifiable, an economic analysis was not completed. The schedules and implementation strategies must be determined by the City based on information provided in the MOU to determine the best water conservation practices. The MOU provides examples of implementation strategies for these DMMs along with implementation schedules, coverage requirements, criteria to determine DMM implementation status, and requirements for documenting DMM implementation.

7.6 Additional Issues

Non-economic factors, including environmental, social, health, customer impacts, and technological are not thought to be significant in deciding which DMMs to implement. The City has the legal authority to implement the DMMs.

APPENDIX A

California Department of Water Resources Review Sheets

2005 Urban Water Management Plan "Review for Completeness" Form

For DWR Review Staff Use

Coordination with Appropriate Agencies **(Water Code § 10620 (d)(1)(2))**

Yes

[ ] Participated in area, regional, watershed or basin wide plan _____ Reference & Page Number

Name of plan _____ Lead Agency _____ _____ Reference & Page Number

[X] Describe the coordination of the plan preparation and anticipated benefits. _____ Reference & Page Number

Table 1
Coordination with Appropriate Agencies

Check at least one box on each row	Participated in developing the plan	Commented on the draft	Attended public meetings	Was contacted for assistance	Was sent a copy of the draft plan	Was sent a notice of intention to adopt	Not Involved / No Information
DWR					x	x	
Ukiah Wastewater Treatment Plant (WWTP)				x	x		
General Public Civic Center Lobby Utilities Building Lobby City's Website Public Library		x	x		x		
Mendocino County Planning Department				x	x		
Ukiah Utilities	x	x	x		x		
Bartel Wells		x			x		
Wagner and Bonsignore		x	x		x	x	
Local Agency Formation Commission					x		
Redwood Valley County Water District					x		
Willow County Water District					x		
Millview County Water District					x		
Calpella County Water District					x		
Rogina Water Company					x		
Ukiah Chamber of Commerce					x		
Mendocino Environmental Center					x		
Mendocino County Russian River Flood Control and Water Conservation Improvement District		x	x		x	x	

Mendocino County Water Agency					x		
Sonoma County Water Agency		x			x	x	
California Water Impact Network					x	x	
Smart Growth Coalition					x		
Employers' Council of Mendocino					x		

Describe resource maximization / import minimization plan **(Water Code §10620 (f))**

[X] Describe how water management tools / options maximize resources & minimize need to import water _____ Reference & Page Number

Plan Updated in Years Ending in Five and Zero **(Water Code § 10621(a))**

[ ] Date updated and adopted plan received _____ (enter date) _____ Reference & Page Number

[ ] _____

City and County Notification and Participation **(Water Code § 10621(b))**

[ ] Notify any city or county within service area of UWMP of plan review & revision _____ Reference & Page Number

[ ] Consult and obtain comments from cities and counties within service area _____ Reference & Page Number

Service Area Information **Water Code § 10631 (a))**

[X] Include current and projected population _____ Reference & Page Number

[X] Population projections were based on data from state, regional or local agency _____ Reference & Page Number

Table 2
Population - Current and Projected

	2000	2005	2010	2015	2020	2025	2030
Service Area Population	15,497	16,288	17,118	18,618	19,244	19,869	20,495

[ ] Describe climate characteristics that affect water management _____ Reference & Page Number

[ ] Describe other demographic factors affecting water management _____ Reference & Page Number

Table 3 Climate						
	January	**February**	**March**	**April**	**May**	**June**
Standard Average ETo	1.1	1.7	3.3	4.6	6.2	7.2
Average Rainfall	6.7	6.8	4.7	2.3	1.7	0.8
Average Temperature	45.6	47.2	50.8	52.9	59.4	65.2

Table 3 (continued) Climate							
	July	**August**	**September**	**October**	**November**	**December**	**Annual**
Average ETo	8.0	7.1	5.3	3.5	1.5	1.0	**50.5**
Average Rainfall	0.1	0.2	0.3	1.1	3.8	7.3	**35.8**
Average Temperature	70.6	69.8	68.0	59.3	50.0	45.7	**60.8**

Water Sources **(Water Code § 10631 (b))**

X	Identify existing and planned water supply sour	_____	Reference & Page Number
X	Provide current water supply quantities	_____	Reference & Page Number
X	Provide planned water supply quantities	_____	Reference & Page Number

Table 4 Current and Planned Water Supplies - AFY						
Water Supply Sources	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Supplier surface diversions (Water Right 12952)	14,480	14,480	14,480	14,480	14,480	14,480
Project Water	800	800	800	800	800	800
Supplier produced groundwater	1,290	1,895	1,895	1,895	1,895	1,895
Transfers in or out	0	0	0	0	0	0
Exchanges in or out	0	0	0	0	0	0
Recycled water (projected use)	0	0	tbd	tbd	tbd	tbd
Desalination	0	0	0	0	0	0
Total	**16,570**	**17,175**	**17,175**	**17,175**	**17,175**	**17,175**

If Groundwater identified as existing or planned source		(Water Code §10631 (b)(1-4))	
	Has management plan		Reference & Page Number
	Attached management plan (b)(1)		Reference & Page Number
X	Description of basin(s) (b)(2)	Chapter 3.2.1	Reference & Page Number
	Basin is adjudicated		Reference & Page Number
	If adjudicated, attached order or decree (b)(2)		Reference & Page Number
	Quantified amount of legal pumping right (b)(2)		Reference & Page Number

Table 5
Groundwater Pumping Rights - AFY

Basin Name	Pumping Right - AFY
Ukiah Valley	not adjudicated
Total	n/a

	DWR identified, or projected to be, in overdraft (b)(2)		Reference & Page Number
	Plan to eliminate overdraft (b)(2)		Reference & Page Number
	Analysis of location, amount & sufficiency, last five years (b)(3)		Reference & Page Number
	Analysis of location & amount projected, 20 years (b)(4)		Reference & Page Number

Table 6
Amount of Groundwater Pumped - AFY

Basin Name (s)	2000	2001	2002	2003	2004	2005	2006
Total Water Use	4,108	4,070	4,165	3,874	4,131	3,755	3,831
Percolating Groundwater (Well 4)	340	810	906	1,030	976	1048	1075
% of Total Water Supply	8.3	19.9	21.8	26.6	23.6	27.9	28.1

Table 7
Amount of Groundwater Projected to be Pumped - AFY

Basin Name(s)	2010	2015	2020	2025	2030 - opt
Total Water Supply	17,175	17,175	17,175	17,175	17,175
Percolating Groundwater (Well 4 and two new wells)	1,895	1,895	1,895	1,895	1,895
% of Total Water Supply	11	11	11	11	11

Reliability of Supply (Water Code §10631 (c) (1-3)

[X] Describes the reliability of the water supply and vulnerability to seasonal or climatic shortage — Chapter 3.7.1 Reference & Page Number

Table 8
Supply Reliability - AFY

		Multiple Dry Water Years			
Average / Normal Water Year	Single Dry Water Year	Year 1	Year 2	Year 3	Year 4
16,490	8,400	8,400	8,400	8,400	8,400
% of Normal	51	51	51	51	51

Table 9
Basis of Water Year Data

Water Year Type	Year	Source name	Source name	
Average Water Year	1962			Chapter 3.7.1 Reference & Page Number
Single-Dry Water Year	1967-1977			Chapter 3.7.1 Reference & Page Number
Multiple-Dry Water Years	1990 through 1992			Chapter 3.7.1 Reference & Page Number

Water Sources Not Available on a Consistent Basis (Water Code §10631 (c))

[X] Describe the reliability of the water supply due to seasonal or climatic shortages — Section 3.7.1 Reference & Page Number

[X] Describe the vulnerability of the water supply to seasonal or climatic shortages — Section 3.7.1 Reference & Page Number

[ ] No unreliable sources — Reference & Page Number

Table 10
Factors Resulting in Inconsistency of Supply

Name of supply	Legal	Environ-mental	Water Quality	Climatic
Surface Water	Change in rights to Russian River water	none	none	Drought that reduces the flow in the Russian and Eel River significantly
Groundwater	Change in pumping rights	none	none	Multiple dry years that lower groundwater table
Recycled Water	none	none	none	none

[X] Describe plans to supplement or replace inconsistent sources with alternative sources or — Section 3.7.1 Reference & Page Number

[ ] No inconsistent sources — Reference & Page Number

Transfer or Exchange Opportunities **(Water Code §10631 (d))**

	Describe short term and long term exchange or transfer opportunities		Reference & Page Number
X	No transfer opportunities	Section 3.4	Reference & Page Number

Table 11
Transfer and Exchange Opportunities - AF Year

Transfer Agency	Transfer or Exchange	Short term	Proposed Quantities	Long term	Proposed Quantities
Millview County Water District	0	0	0	0	0
Willow County Water District	0	0	0	0	0
Rogina Water Company	0	0	0	0	0
Total	0	0	0	0	0

Water Use Provisions	(Water Code §10631 (e)(1)(2))	
☐ Quantify past water use by sector	n/a	Reference & Page Number
☐ Quantify current water use by sector	n/a	Reference & Page Number
☐ Project future water use by sector	n/a	Reference & Page Number

Table 12
Past, Current and Projected Water Deliveries

	2000				2005				2010			
	metered		unmetered		metered		unmetered		metered		unmetered	
Water Use Sectors	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY
Single family												
Multi-family												
Commercial												
Industrial												
Institutional/gov												
Landscape												
Agriculture												
other	5,511	4,224			5,718	3,756			5,985	4,369		
Total	5,511	4,224	0	0	5,718	3,756	0	0	5,985	4,369	0	0

Table12 (continued)
Past, Current and Projected Water Deliveries

	2015				2020				2025				2030 - opt			
	metered		unmetered		metered		unmetered		metered		unmetered		metered		unmetered	
Water Use Sectors	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY
Single family																
Multi-family																
Commercial																
Industrial																
Institutional/gov																
Landscape																
Agriculture																
other	6,510	4,752			6,728	4,912			6,947	5,072			7,166	5,231		
Total	6,510	4,752	0	0	6,728	4,912	0	0	6,947	5,072	0	0	7,166	5,231	0	0

	Identify and quantify sales to other agencies		Reference & Page Number
X	No sales to other agencies	Sections 3.4, 5.2.3	Reference & Page Number

Table 13 Sales to Other Agencies - AF Year							
Water Distributed	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Millview County Water District	0	0	0	0	0	0	0
Willow County Water District	0	0	0	0	0	0	0
Rogina Water Company	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

X	Identify and quantify additional water uses	Section 5.2.4	Reference & Page Number

Table 14 Additional Water Uses and Losses - AF Year							
Water Use	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Saline barriers							
Groundwater recharge							
Conjunctive use							
raw water							
recycled							
other (define)							
Unaccounted-for system losses	127	113	131	143	147	152	157
Total	127	113	131	143	147	152	157

Table 15 Total Water Use - AF Year							
Water Use	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Total of Tables 12, 13, 14	4,351	3,869	4,500	4,895	5,059	5,224	5,388

2005 Urban Water Management Plan "Review of DMMs for Completeness" Form **(Water Code §10631 (f)**

(Water Code §10631 (f) & (g), the 2005 Urban Water Management Plan "Review of DMMs for Completeness" Form is found on Sheet 2

Planned Water Supply Projects and Programs, including non-implemented DMMs **(Water Code §10631 (g))**

	No non-implemented / not scheduled DMMs		Reference & Page Number
	Cost-Benefit includes economic and non-economic factors (environmental, social, health, customer impact, and technological factors)		Reference & Page Number
X	Cost-Benefit analysis includes total benefits and total costs	Section 7.4	Reference & Page Number
	Identifies funding available for Projects with higher per-unit-cost than DMMs		Reference & Page Number
X	Identifies Suppliers' legal authority to implement DMMs, efforts to implement the measures and efforts to identify cost share partners	Section 7.0	Reference & Page Number

Table 16 Evaluation of Unit Cost of Water Resulting from Non-implemented / Non-scheduled DMMs and Planned Water Supply Project and Programs	
Non-implemented & Not Scheduled DMM / Planned Water Supply Projects (Name)	**Per-AF Cost ($)**
1-Water Survey Programs for Single-family Residential and Multi-family Residential Customers	268
2-Residential Plumbing Retrofit	209
6-High-efficiency Washing Machine Rebate Programs	1,356
14-Residential ULFT Replacement Programs	212

Planned Water Supply Projects and Programs **(Water Code §10631 (h))**

	No future water supply projects or programs		
X	Detailed description of expected future supply projects & programs	Section 3.0	Reference & Page Number
X	Timeline for each proposed project	Section 3.6	Reference & Page Number
X	Quantification of each projects normal yield (AFY)	Section 3.6	Reference & Page Number
X	Quantification of each projects single dry-year yield (AFY)	Section 3.6	Reference & Page Number
X	Quantification of each projects multiple dry-year yield (AFY)	Section 3.6	Reference & Page Number

Table 17 Future Water Supply Projects							
Project Name	**Projected Start Date**	**Projected Completion Date**	**Normal-year AF to agency**	**Single-dry year yield AF**	**Multiple-Dry-Year 1 AF**	**Multiple-Dry-Year 2 AF**	**Multiple-Dry-Year 3 AF**
Two New Wells	5/06	2008	605	605	605	605	605
WTP Improvements		9/06	Treatment Improvements	n/a	n/a	n/a	n/a
High Service Pump Station		3/06	Increased reliability	n/a	n/a	n/a	n/a
Total			605	605	605	605	605

Opportunities for development of desalinated water **(Water Code §10631 (i))**

	Describes opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply
X	No opportunities for development of desalinated water

Table 18 Opportunities for Desalinated Water	
Sources of Water	**Check if yes**
Ocean Water	
Brackish ocean water	
Brackish groundwater	
other	
other	

City is not a CUWCC signatory **(Water Code § 10631 (j))**

Urban suppliers that are California Urban Water Conservation Council members may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g). The supplier's CUWCC Best Management Practices Report should be attached to the UWMP.

- ☐ Agency is a CUWCC member _____ Reference & Page Number
- ☐ 2003-04 annual updates are attached to plan _____ Reference & Page Number
- ☐ Both annual updates are considered completed by CUWCC website _____ Reference & Page Number

If Supplier receives or projects receiving water from a wholesale supplier **(Water Code §10631 (k))**

No

- ☐ Agency receives, or projects receiving, wholesale water _____ Reference & Page Number
- ☐ Agency provided written demand projections to wholesaler, 20 years _____ Reference & Page Number

Table 19
Agency Demand Projections Provided to Wholesale Suppliers - AFY

Wholesaler	2010	2015	2020	2025	2030
n/a	0	0	0	0	0

☐ Wholesaler provided written water availability projections, by source, to agency, 20 years _____ Reference & Page Number
(if agency served by more than one wholesaler, duplicate this table and provide the source availability for each wholesaler)

Table 20
Wholesaler Identified & Quantified the Existing and Planned Sources of Water- AFY

Wholesaler sources	2010	2015	2020	2025	2030
n/a	0	0	0	0	0

☐ Reliability of wholesale supply provided in writing by wholesale agency _____ Reference & Page Number
(if agency served by more than one wholesaler, duplicate this table and provide the source availability for each wholesaler)

Table 21 Wholesale Supply Reliability - % of normal AFY					
	Multiple Dry Water Years				
Wholesaler sources	Single Dry	Year 1	Year 2	Year 3	Year 4
Surface Water	0	0	0	0	0
Groundwater wells	0	0	0	0	0
Recycled water	0	0	0	0	0
% of Normal	0	0	0	0	0

Table 22 Factors Resulting in Inconsistency of Wholesaler's Supply				
Name of supply	Legal	Environment	Water Quality	Climatic
n/a	0	0	0	0
n/a	0	0	0	0

Water Shortage Contingency Plan Section **(Water Code § 10632)**

Stages of Action **(Water Code § 10632 (a))**

X	Provide stages of action	Section 3.9.2	Reference & Page Number
X	Provide the water supply conditions for each stage	Section 3.9.2	Reference & Page Number
X	Includes plan for 50 percent supply shortage	Section 3.9	Reference & Page Number

Table 23 Water Supply Shortage Stages and Conditions RATIONING STAGES		
Stage No.	Water Supply Conditions	% Shortage
I	Initiated when 15 percent water conservation needs to be met	Voluntary
II	For further conservation and/or stage I is not being met	Mandatory
III	Implemented if stage II is not achieving sufficient reduction	Mandatory

Three-Year Minimum Water Supply (Water Code §10632 (b))

X	Identifies driest 3-year period	Section 3.9.1 Reference & Page Number
X	Minimum water supply available by source for the next three years	Section 3.9.1 Reference & Page Number

Table 24
Three-Year Estimated Minimum Water Supply - AF Year

Source*	Normal	Year 1	Year 2	Year 3
Surface Water	14,480	7,355	7,355	7,355
Project Water	800	400	400	400
Groundwater	1,290	645	645	645
Recycled	0	0	0	0
Total	16,570	8,400	8,400	8,400

*Note: If reporting after 2005, please change the column headers (Year 1, 2, & 3) to the appropriate years

Preparation for catastrophic water supply interruption (Water Code §10632 (c))

X	Provided catastrophic supply interruption plan	Section 3.9.6 Reference & Page Number

Table 25
Preparation Actions for a Catastrophe

Possible Catastrophe	Check if Discussed
Air pollution	✓
Fire	✓
Flood	✓
Storm	✓
Epidemic	✓
Earthquake	✓
Power Outages	
War	✓
Hazardous materials	✓
Environmental disaster	✓

Prohibitions **(Water Code § 10632 (d))**

X List the mandatory prohibitions against specific water use practices during water shortages Section 3.9.3 Reference & Page Number

Table 26 Mandatory Prohibitions	
Examples of Prohibitions	**Stage When Prohibition Becomes Mandatory**
Use of water from public hydrants for any other purpose than fire protection/prevention	II, III
Use of water through any meter when the consumer has been given 2 days notice to repair any leaks and has failed to complete repairs	II, III
Use of water by golf course to irrigate any grounds except those designated as tees and greens	II, III
Use of water to irrigate grass, lawns, ground cover, shrubbery, vegetable gardens, trees, or other outdoor vegetation	II, III
Use of water for the construction of any structure including such use in dust control	II, III
Use of water to wash sidewalk, driveway, street, parking lot, tennis court, or other hard surfaced area by hosing or by otherwise direct use of water from faucets or other outlets	II, III
Use of water to fill or refill any swimming pool	II, III
Use of water to add to any swimming pool not equipped with and using a pool cover	II, III
Use of water in excess of the daily usage allotment set forth as: Single family or duplex – 50 gallons per permanent resident Multi-residential units – 45 gallons per permanent resident	III
All other uses not expressed above shall be limited to 50 percent of prior use for a similar period as determined by the City from its records	III
Water to irrigate	III
Use of water for hand-watering	III

Consumption Reduction Methods **(Water Code § 10632 (e))**

X List the consumption reduction methods the water supplier will use to reduce water use in the most restrictive stages with up to a 50% reduction.

Section 3.9.2 Reference & Page Number

Table 27 Consumption Reduction Methods		
Consumption Reduction Methods	**Stage When Method Takes Effect**	**Projected Reduction (%)**
Voluntary Reductions	I	10
Prohibition of non-essential uses	II	15
Mandatory Allotments	III	25

Penalties **(Water Code § 10632 (f))**

X List excessive use penalties or charges for excessive use

Section 3.9.3 Reference & Page Number

Table 28 Penalties and Charges	
Penalties or Charges	**Stage When Penalty Takes Effect**
Penalty for use beyond restrictions as described in Stages II and III	II, III
Penalty for use of water for prohibited uses described in Table 3-18	II, III

Revenue and Expenditure Impacts		(Water Code § 10632 (g))
☐	Describe how actions and conditions impact revenues	Reference & Page Number
☐	Describe how actions and conditions impact expenditures	Reference & Page Number
X	Describe measures to overcome the revenue and expenditure impacts	Section 3.9.5 Reference & Page Number

Table 29
Proposed Measures to Overcome Revenue Impacts

Names of measures	Check if Discussed
Rate adjustment	✓
Development of reserves	✓

Table 30
Proposed Measures to Overcome Expenditure Impacts

Names of measures	Check if Discussed
Reserve Fund	✓

Water Shortage Contingency Ordinance/Resolution		(Water Code § 10632 (h))
☐	Attach a copy of the draft water shortage contingency resolution or ordinance.	Appendix E Reference & Page Number

Reduction Measuring Mechanism		(Water Code § 10632 (i))
X	Provided mechanisms for determining actual reductions	Section 3.9.4 Reference & Page Number

Table 31
Water Use Monitoring Mechanisms

Mechanisms for determining actual reductions	Type data expected (pop-up?)
Water meter readings	Frequent meter readings

Recycling Plan Agency Coordination

Water Code § 10633

X Describe the coordination of the recycling plan preparation information to the extent available..

Section 4.1 Reference & Page Number

Table 32 Participating Agencies	
	Role in Development
City of Ukiah	to be determined
Ukiah Valley Sanitation District	to be determined

Wastewater System Description

(Water Code § 10633 (a))

X Describe the wastewater collection and treatment systems in the supplier's service area

Section 4.2 Reference & Page Number

X Quantify the volume of wastewater collected and treated

Section 4.2 Reference & Page Number

Table 33
Wastewater Collection and Treatment - AFY

Type of Wastewater	2000	2005	2010	2015	2020	2025	2030
Wastewater collected & treated in service area	3,710	4,483	4,762	5,295	5,829	6,362	6,895
Volume that meets recycled water standard	876	441	1,016	1,129	1,244	1,357	1,471

Wastewater Disposal and Recycled Water Uses		(Water Code § 10633 (a - d))	
X	Describes methods of wastewater disposal	Section 4.2	Reference & Page Number
X	Describe the current type, place and use of recycled water	Section 4.3	Reference & Page Number
	None		Reference & Page Number
X	Describe and quantify potential uses of recycled water	Section 4.3	Reference & Page Number

Table 34
Disposal of Wastewater (Non-recycled) AFY

Method of disposal	Treatment Level	2005	2010	2015	2020	2025	2030
Discharge to River	Tertiary	441	1,016	1,129	1,244	1,357	1,471
Percolation Ponds	Secondary	4,034	3,423	3,843	4,262	4,682	5,101
Reuse within Plant	Secondary	8	323	323	323	323	323
	Total	4,488	4,762	5,295	5,829	6,362	6,895

Table 35
Recycled Water Uses - Actual and Potential (AFY)

User type	Treatment Level	2005	2010	2015	2020	2025	2030
Agriculture	Tertiary	0	0	tbd	tbd	tbd	tbd
Landscape	Tertiary	0	0	tbd	tbd	tbd	tbd
Wildlife Habitat		0	0	0	0	0	0
Wetlands		0	0	0	0	0	0
Industrial		0	0	0	0	0	0
Groundwater Recharge		0	0	0	0	0	0
Consumptive Reuse within Plant	Tertiary	8	323	323	323	323	323
Golf Course Irrigation		0	0	tbd	tbd	tbd	tbd
	Total	8	323	3,843	4,262	4,682	5,101

	Determination of technical and economic feasibility of serving the potential uses		Reference & Page Number

Projected Uses of Recycled Water **(Water Code § 10633 (e))**

[X] Projected use of recycled water, 20 years — Section 4.3 Reference & Page Number

Table 36 Projected Future Use of Recycled Water in Service Area - AFY					
	2010	2015	2020	2025	2030
Projected use of Recycled Water	0	tbd	tbd	tbd	tbd

[X] Compare UWMP 2000 projections with UWMP 2005 actual (§ 10633 (e)) — Section 4.3 Reference & Page Number

[ ] None — Reference & Page Number

[ ]

Table 37 Recycled Water Uses - 2000 Projection Compared with 2005 Actual - AFY		
User type	2000 Projection for 2005	2005 actual use
Agriculture	0	0
Landscape	0	0
Wildlife Habitat	0	0
Wetlands	0	0
Industrial	0	0
Groundwater Recharge	0	0
Other (user type)	0	0
Other (user type)	0	0
Total	0	0

Plan to Optimize Use of Recycled Water		(Water Code § 10633 (f))	
X	Describe actions that might be taken to encourage recycled water uses	Section 4.5	Reference & Page Number
	Describe projected results of these actions in terms of acre-feet of recycled water used per		Reference & Page Number

Table 38
Methods to Encourage Recycled Water Use

Actions	AF of use projected to result from this action				
	2010	2015	2020	2025	2030
To Be Determined	tbd	tbd	tbd	tbd	tbd
Total	tbd	tbd	tbd	tbd	tbd

	Provide a recycled water use optimization plan which includes actions to facilitate the use of recycled water (dual distribution systems, promote recirculating uses)		Reference & Page Number

Water quality impacts on availability of supply		(Water Code §10634)	
X	Discusses water quality impacts (by source) upon water management strategies and supply reliability	Section 3.8	Reference & Page Number
X	No water quality impacts projected	Section 3.8	

Table 39
Current & Projected Water Supply Changes Due to Water Quality - Percentage

water source	2005	2010	2015	2020	2025	2030
Russian River	0	0	0	0	0	0
Project Water	0	0	0	0	0	0
Groundwater	0	0	0	0	0	0
Recycled water	0	0	0	0	0	0

Supply and Demand Comparison to 20 Years **(Water Code § 10635 (a))**

X Compare the projected normal water supply to projected normal water use over the next 20 years, in 5-year increments.

Section 6.1 Reference & Page Number

Table 40 Projected Normal Water Supply - AFY					
(from table 4)	**2010**	**2015**	**2020**	**2025**	**2030**
Supply	17,175	17,175	17,175	17,175	17,175
% of year 2005	104	104	104	104	104

Table 41 Projected Normal Water Demand - AFY					
(from table 15)	**2010**	**2015**	**2020**	**2025**	**2030**
Demand	4,500	4,895	5,059	5,224	5,388
% of year 2005	116	127	131	135	139

Table 42 Projected Supply and Demand Comparison - AFY					
	2010	**2015**	**2020**	**2025**	**2030**
Supply totals	17,175	17,175	17,175	17,175	17,175
Demand totals	4,500	4,895	5,059	5,224	5,388
Difference	12,675	12,280	12,116	11,951	11,787
Difference as % of Supply	74	71	71	70	69
Difference as % of Demand	282	251	239	229	219

Supply and Demand Comparison: Single-dry Year Scenario **(Water Code § 10635 (a))**

X Compare the projected single-dry year water supply to projected single-dry year water use over the next 20 years, in 5-year increments.

Section 6.2 Reference & Page Number

Table 43 Projected Single Dry Year Water Supply - AFY					
	2010	2015	2020	2025	2030
Supply	8,400	8,400	8,400	8,400	8,400
% of year 2005	51	51	51	51	51

Table 44 Projected Single Dry Year Water Demand - AFY					
	2010	2015	2020	2025	2030
Demand	4,500	4,895	5,059	5,224	5,388
% of year 2005	116	127	131	135	139

Table 45 Projected Single Dry Year Supply and Demand Comparison - AFY					
	2010	2015	2020	2025	2030
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	4,500	4,895	5,059	5,224	5,388
Difference	3,900	3,505	3,341	3,176	3,012
Difference as % of Supply	46	42	40	38	36
Difference as % of Demand	87	72	66	61	56

Supply and Demand Comparison: Multiple-dry Year Scenario **(Water Code § 10635 (a))**

X Project a multiple-dry year period (as identified in Table 9) occurring between 2006-2010 and compare projected supply and demand during those years — Section 6.2 Reference & Page Number

Table 46 Projected Supply During Multiple Dry Year Period Ending in 2010 - AFY					
	2006	2007	2008	2009	2010
Supply	8,400	8,400	8,400	8,400	8,400
% of projected normal	51	51	51	51	51

Table 47 Projected Demand Multiple Dry Year Period Ending in 2010 - AFY					
	2006	2007	2008	2009	2010
Demand	3,946	3,822	3,684	3,342	3,375
% of projected normal	100	88	84	75	75

Table 48 Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2010 - AFY					
	2006	2007	2008	2009	2010
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	3,946	3,822	3,684	3,342	3,375
Difference	4,454	4,578	4,716	5,058	5,025
Difference as % of Supply	53	55	56	60	60
Difference as % of Demand	113	120	128	151	149

X Project a multiple-dry year period (as identified in Table 9) occurring between 2011-2015 and compare projected supply and demand during those years — Section 6.2 Reference & Page Number

Table 49 Projected Supply During Multiple Dry Year Period Ending in 2015 - AFY					
	2011	2012	2013	2014	2015
Supply	8,400	8,400	8,400	8,400	8,400
% of projected normal	49	49	49	49	49

Table 50 Projected Demand During Multiple Dry Year Period Ending in 2015 - AFY					
	2011	2012	2013	2014	2015
Demand	4,578	4,075	3,954	3,611	3,671
% of projected normal	100	88	84	75	75

Table 51 Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2015 - AFY					
	2011	2012	2013	2014	2015
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	4,578	4,075	3,954	3,611	3,671
Difference	3,822	4,325	4,446	4,789	4,729
Difference as % of Supply	46	51	53	57	56
Difference as % of Demand	83	106	112	133	129

[X] Project a multiple-dry year period (as identified in Table 9) occurring between 2016-2020 and compare projected supply and demand during those years

Section 6.2 Reference & Page Number

Table 52 Projected Supply During Multiple Dry Year Period Ending in 2020 - AFY					
	2016	2017	2018	2019	2020
Supply	8,400	8,400	8,400	8,400	8,400
% of projected normal	49	49	49	49	49

Table 53 Projected Demand Multiple Dry Year Period Ending in 2020 - AFY					
	2016	2017	2018	2019	2020
Demand	4,928	4,340	4,169	3,770	3,794
% of projected normal	100	88	84	75	75

Table 54 Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2020 - AFY					
	2016	**2017**	**2018**	**2019**	**2020**
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	4,928	4,340	4,169	3,770	3,794
Difference	3,472	4,060	4,231	4,630	4,606
Difference as % of Supply	41	48	50	55	55
Difference as % of Demand	70	94	101	123	121

X Project a multiple-dry year period (as identified in Table 9) occurring between 2021-2025 and compare projected supply and demand during those years

Section 6.2 Reference & Page Number

Table 55 Projected Supply During Multiple Dry Year Period Ending in 2025 - AFY					
	2021	**2022**	**2023**	**2024**	**2025**
Supply	8,400	8,400	8,400	8,400	8,400
% of projected normal	49	49	49	49	49

Table 56 Projected Demand Multiple Dry Year Period Ending in 2025 - AFY					
	2021	**2022**	**2023**	**2024**	**2025**
Demand	5,092	4,484	4,307	3,893	3,918
% of projected normal	100	88	84	75	75

Table 57 Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2025- AFY					
	2021	**2022**	**2023**	**2024**	**2025**
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	5,092	4,484	4,307	3,893	3,918
Difference	3,308	3,916	4,093	4,507	4,482
Difference as % of Supply	39	47	49	54	53
Difference as % of Demand	65	87	95	116	114

Table 58 Projected Supply During Multiple Dry Year Period Ending in 2030 - AFY					
	2026	2027	2028	2029	2030
Supply	8,400	8,400	8,400	8,400	8,400
% of projected normal	49	49	49	49	49

Table 59 Projected Demand Multiple Dry Year Period Ending in 2030 - AFY					
	2026	2027	2028	2029	2030
Demand	5,257	4,628	4,444	4,016	4,041
% of projected normal	100	88	84	75	75

Table 60 Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2030 - AFY					
	2026	2027	2028	2029	2030
Supply totals	8,400	8,400	8,400	8,400	8,400
Demand totals	5,257	4,628	4,444	4,016	4,041
Difference	3,143	3,772	3,956	4,384	4,359
Difference as % of Supply	37	45	47	52	52
Difference as % of Demand	60	82	89	109	108

Provision of Water Service Reliability section to cities/counties within service area	**(Water Code § 10635(b))**
☐ Provided Water Service Reliability section of UWMP to cities and counties within which it provides water supplies within 60 days of UWMP submission to DWR	_____ Reference & Page Number

Does the Plan Include Public Participation and Plan Adoption	**(Water Code § 10642)**
☐ Attach a copy of adoption resolution	_____ Reference & Page Number
☐ Encourage involvement of social, cultural & economic community groups	_____ Reference & Page Number
☐ Plan available for public inspection	_____ Reference & Page Number
☐ Provide proof of public hearing	_____ Reference & Page Number
☐ Provided meeting notice to local governments	_____ Reference & Page Number

Review of implementation of 2000 UWMP		(Water Code § 10643)
☐	Reviewed implementation plan and schedule of 2000 UWMP	_____ Reference & Page Number
☐	Implemented in accordance with the schedule set forth in plan	_____ Reference & Page Number
☐	2000 UWMP not required	_____ Reference & Page Number

Provision of 2005 UWMP to local governments		(Water Code § 10644 (a))
☐	Provide 2005 UWMP to DWR, and cities and counties within 30 days of adoption	_____ Reference & Page Number

Does the plan or correspondence accompanying it show where it is available for public review		(Water Code § 10645)
☐	Does UWMP or correspondence accompanying it show where it is available for public review	_____ Reference & Page Number

APPENDIX B

Public Hearing Notices

NOTICE OF HEARING ON CITY OF UKIAH
URBAN WATER MANAGEMENT PLAN UPDATE

PLEASE TAKE **NOTICE** that the City Council of the City of Ukiah will hold a public hearing on a proposed update of its Urban Water Management Plan. The hearing will be held on October 17, 2007, beginning at 6:15 p.m. or as soon thereafter as the matter may be heard. The hearing will be held at the City Council Chambers, Ukiah Civic Center, 300 Seminary Avenue, Ukiah.

Copies of the proposed updated plan are available for public inspection in the Civic Center foyer and in the Civic Center Annex, located at 411 W. Clay Street, Ukiah. The plan is also available at the Mendocino County Public Library and on the City's website: http://www.cityofukiah.com.

Please let anyone you know who may be interested in the update of the City's Urban Water Management Plan know about this hearing. If you have any comments about or objections to the proposed plan, you must make those comments or objections known to the City Council by submitting them in writing before the hearing or making them orally at the public hearing. Please be advised that if you challenge the plan in court, you may be prevented from raising issues or presenting evidence that was not presented to the City Council by you or someone else at or prior to the hearing.

Dated: September 27, 2007 Linda Brown, Acting City Clerk

Publish: 10/3/07; 10/9/07

APPENDIX C

Emergency Interconnection Agreement (July 1, 2002)

EMERGENCY INTERCONNECTION AGREEMENT

This Agreement is made and entered in Ukiah, California, on July 1 2002, by and between the City of Ukiah ("Ukiah"), a general law municipal corporation and Millview County Water District ("Millview"), a county water district formed under the provisions of Water Code sections 30000 et seq.

RECITALS:

1. Millview and Ukiah operate water systems that serve contiguous territory. Water mains belonging to the two agencies lie in close proximity to each other.

2. Urgent or emergency conditions can from time to time interrupt the water service Millview and Ukiah provide their customers. "Urgent or emergency conditions" in this Agreement means a sudden or unexpected occurrence or combination of occurrences causing the domestic water supply to be temporarily interrupted or lessened, and does not include inadequate water rights to meet peak demand.

3. It would improve the reliability of water service Millview and Ukiah provide to their customers, if the water mains of both systems were physically connected but separated by valves that could be opened during urgent or emergency conditions.

4. The purpose of this agreement is to establish the terms and conditions under which the systems can be physically connected and the water made available to the neighboring system during urgent or emergency conditions; *provided, however, that none of the quantity of water provided by Ukiah to Millview under the agreement is to be delivered by Millview to the Calpella County Water District.*

AGREEMENT:

Wherefore, in consideration of the above-recited facts and on the terms and conditions as further stated herein the parties hereby agree as follows.

1. **Interconnection.** On and after the effective date of this Agreement the Ukiah and Millview water systems interconnections are in operation using lockable valves that can only be operated by Millview and Ukiah and a water meter of sufficient capacity for the connection size.

2. **Ukiah's Provision of water service to Millview.** Upon written or verbal request from Millview's General Manager or his duly authorized delegate, including a representation that urgent or emergency conditions exist, Ukiah's City Manager or his duly authorized delegate shall open the valve allowing water to flow from Ukiah's water system to Millview's water system under the following terms and conditions:

a. If practicable, Millview shall give Ukiah at least 24 hours advance notice to open the valve. In its request for service Millview shall indicate the time when it wants the temporary service to begin and the time when it wants that service to end. Unless earlier notified of a different termination date, Ukiah shall end service on the date

indicated in the notice from Millview. In any event, Ukiah may, but need not, end service when the limits of service imposed by subparagraph b have been reached.

b. Ukiah shall not be required to furnish water service for longer than fourteen continuous calendar days or for more than twenty total calendar days in any calendar quarter (Jan. 1 to March 31, April 1 to June 30, July 1 to September 30, October 1 to December 31).

c. Ukiah shall only be required to furnish water service to Millview for the following reasons:

(1) An emergency and/or equipment failure affecting Millview's capacity to deliver water to its customers;

(2) To combat a fire within or without the Millview service area;

(3) To allow for necessary maintenance or repair of Millview equipment not practicably achievable without that water service; or

(4) Contamination of Millview's water source.

3. **Payment for service provided by Ukiah.** Millview shall pay Ukiah $1.00 per 1000 gallons for water furnished under this Agreement. Ukiah shall bill Millview for requested service within fifteen days after said service ends, or within 30 days of beginning service, whichever comes first, and each 30 days thereafter until the charges for service have been paid in full. Payment of each bill shall be due no later than thirty days from the billing date. The parties shall confer in good faith at least once every two years after the effective date of this Agreement to negotiate rate adjustments, taking into consideration changes in the cost of operations and other factors affecting the cost of supplying water under the terms of this Agreement. In the event of future mutually agreed upon changes in the rate, Millview understands that Ukiah may charge a higher rate for water service outside city limits than it charges for water service within city limits. If it agrees to such higher charges, it shall also release and waive any legal or other objections it might otherwise have to paying such higher rates and agrees to fully defend, indemnify and hold Ukiah harmless from and against any claim by any Millview customer against Ukiah or its officers, agents or employees arising out of such rate differences, if any.

4. **Provision of water service to Ukiah from Millview**. Upon written or verbal request from Ukiah's City Manager or his duly authorized delegate, including a representation that urgent or emergency conditions exist, Millview's General Manager or his duly authorized delegate shall open the valve allowing water to flow from Millview water system to Ukiah's water system under the following terms and conditions:

a. If practicable, Ukiah shall give Millview at least 24 hours advance notice to open the valve. In its request for service Ukiah shall indicate the time when it wants the

temporary service to begin and the time it wants that service to end. Unless earlier notified of a different end date, Millview shall end service on the date indicated in the notice from Ukiah. In any event, Millview may, but need not, end service when the limits of service imposed by subparagraph b have been reached.

b. Millview shall not be required to furnish water service for longer than fourteen continuous calendar days or for more than twenty total calendar days in any calendar quarter (Jan. 1 to March 31, April 1 to June 30, July 1 to September 30, October 1 to December 31).

c. Millview shall only be required to furnish water service to Ukiah for the following reasons:

(1) An emergency and/or equipment failure affecting Ukiah's capacity to deliver water to its customers;

(2) To combat a fire within or without the Ukiah service area;

(3) To allow for necessary maintenance or repair of Ukiah equipment not practicably achievable without that water service; or

(4) Contamination of Ukiah's water source.

5. **Payment for service provided by Millview**. Ukiah shall pay Millview $1.00 per 1000 gallons for water furnished under this Agreement. Millview shall bill Ukiah for each requested service within fifteen days after said service ends, or within 30 days of beginning service whichever occurs first, and each 30 days thereafter until all charges are paid in full. Payment of each bill shall be due no later than thirty days from the billing date. The parties shall confer in good faith at least once every two years after the effective date of this Agreement to negotiate rate adjustments, taking into consideration changes in the cost of operations and other factors affecting the cost of supplying water under the terms of this Agreement. In the event of future mutually agreed upon changes in the rate for water service under this Agreement, Ukiah understands that Millview may charge a higher rate for water service outside its district boundaries than it charges for water service within those boundaries. If it agrees to such higher charges, it shall release and waive any legal or other objections it might otherwise have to paying such higher rates and agrees to fully defend, indemnify and hold Millview harmless from and against any claim by any Ukiah customer against Millview or its officers, agents or employees arising out of such rate differences, if any.

6. **Waiver.** Failure to enforce any breach of a provision of this Agreement shall not be deemed a waiver of any subsequent breach of the same or a different provision of the Agreement.

7. **Compliance with law.** This Agreement shall not obligate either party to furnish water to the other, if the provision of such water would violate any provision of state or federal law or any term or condition of any permit, license or other approval

held by either party in connection with its public water system. As of the date this Agreement was executed Ukiah and Millview had each been informed by the State Water Resources Control Board that relevant places of use would have to have been approved by the Board before interconnected water service could be provided under this Agreement.

8. **Limits on flow.** Ukiah and Millview mutually agree to limit the transfer of water under this Agreement to a rate of flow that will not adversely affect the distribution system or customer service levels of either system. If the City Manager of Ukiah or the General Manager of Millview determines that such an adverse impact will occur, the manager or authorized representative of the affected system may without prior notice discontinue or reduce flow to the other system.

10. **Entire agreement.** This Agreement contains the entire agreement between the parties concerning its subject matter and supersedes any prior statements, agreements or understandings between the parties concerning the same subject matter. Any such prior statements, agreements or understandings are hereby declared null and void and of no further force or effect. The parties may amend this Agreement or enter new or additional agreements to, among other things, transfer or sell water to each other, provided any such amendments or agreements are contained in a writing approved by the legislative bodies and executed by duly authorized officials of both parties.

11. **Notice.** Whenever written notice is required or allowed under the terms of this Agreement it shall be deemed given when personally delivered or when received by certified mail, return receipt requested, and addressed as follows:

City Manager
City of Ukiah
300 Seminary Avenue
Ukiah, California 95482

General Manager
Millview Water District
3081 North State Street
Ukiah, California 95482

13. **Term.** The term of this Agreement shall be five (5) years from its effective date. The term may be extended on such terms as the parties shall agree. No such extension shall be binding unless contained in a writing signed by both parties.

14. **Third party beneficiaries.** This Agreement is for the exclusive benefit of Ukiah and Millview and confers no rights or benefits on any persons or entities not a signatory to this Agreement. No third party beneficiaries are intended or established by this Agreement.

15. **Duplicate originals.** This Agreement may be executed in one or more duplicate originals and when so executed each duplicate original bearing the original

signatures of the parties shall be admissible in any administrative or legal proceeding as evidence of the terms of this Agreement.

WHEREFORE, the parties have entered this Agreement on the date first written above.

CITY OF UKIAH

By: _____
Mayor

ATTEST:

_____
City Clerk

MILLVIEW COUNTY WATER DISTRICT

By: _____ for
Chairman of the Board

ATTEST:

_____
Secretary

s:\u\agrmts02\millview
June 26, 2002

EMERGENCY INTERCONNECTION AGREEMENT

This Agreement is made and entered in Ukiah, California, on 6/27, 2002, by and between the City of Ukiah ("Ukiah"), a general law municipal corporation and Willow County Water District ("Willow"), a county water district formed under the provisions of Water Code sections 30000 et seq.

RECITALS:

1. Willow and Ukiah operate water systems that serve contiguous territory. Water mains belonging to the two agencies lie in close proximity to each other.

2. Urgent or emergency conditions can from time to time interrupt the water service Willow and Ukiah provide their customers. "Urgent or emergency conditions" in this Agreement means a sudden or unexpected occurrence or combination of occurrences causing the domestic water supply to be temporarily interrupted or lessened, and does not include inadequate water rights to meet peak demand.

3. It would improve the reliability of water service Willow and Ukiah provide to their customers, if the water mains of both systems were physically connected but separated by valves that could be opened during urgent or emergency conditions.

4. The purpose of this agreement is to establish the terms and conditions under which the systems can be physically connected and the water made available to the neighboring system during urgent or emergency conditions.

AGREEMENT:

Wherefore, in consideration of the above-recited facts and on the terms and conditions as further stated herein the parties hereby agree as follows.

1. **Interconnection.** On and after the effective date of this Agreement the Ukiah and Willow water systems interconnections are in operation using lockable valves that can only be operated by Willow and Ukiah and a water meter of sufficient capacity for the connection size.

2. **Ukiah's Provision of water service to Willow.** Upon written or verbal request from Willow's General Manager or his duly authorized delegate, including a representation that urgent or emergency conditions exist, Ukiah's City Manager or his duly authorized delegate shall open the valve allowing water to flow from Ukiah's water system to Willow's water system under the following terms and conditions:

a. If practicable, Willow shall give Ukiah at least 24 hours advance notice to open the valve. In its request for service Willow shall indicate the time when it wants the temporary service to begin and the time when it wants that service to end. Unless earlier notified of a different termination date, Ukiah shall end service on the date indicated in the notice from Willow. In any event, Ukiah may, but need not, end service when the limits of service imposed by subparagraph b have been reached.

b. Ukiah shall not be required to furnish water service for longer than fourteen continuous calendar days or for more than twenty total calendar days in any calendar quarter (Jan. 1 to March 31, April 1 to June 30, July 1 to September 30, October 1 to December 31).

c. Ukiah shall only be required to furnish water service to Willow for the following reasons:

(1) An emergency and/or equipment failure affecting Willow's capacity to deliver water to its customers;

(2) To combat a fire within or without the Willow service area;

(3) To allow for necessary maintenance or repair of Willow equipment not practicably achievable without that water service; or

(4) Contamination of Willow's water source.

3. **Payment for service provided by Ukiah.** Willow shall pay Ukiah $1.00 per 1000 gallons for water furnished under this Agreement. Ukiah shall bill Willow for requested service within fifteen days after said service ends, or within 30 days of beginning service, whichever comes first, and each 30 days thereafter until the charges for service have been paid in full. Payment of each bill shall be due no later than thirty days from the billing date. The parties shall confer in good faith at least once every two years after the effective date of this Agreement to negotiate rate adjustments, taking into consideration changes in the cost of operations and other factors affecting the cost of supplying water under the terms of this Agreement. In the event of future mutually agreed upon changes in the rate, Willow understands that Ukiah may charge a higher rate for water service outside city limits than it charges for water service within city limits. If it agrees to such higher charges, it shall also release and waive any legal or other objections it might otherwise have to paying such higher rates and agrees to fully defend, indemnify and hold Ukiah harmless from and against any claim by any Willow customer against Ukiah or its officers, agents or employees arising out of such rate differences, if any.

4. **Provision of water service to Ukiah from Willow.** Upon written or verbal request from Ukiah's City Manager or his duly authorized delegate, including a representation that urgent or emergency conditions exist, Willow's General Manager or his duly authorized delegate shall open the valve allowing water to flow from Willow water system to Ukiah's water system under the following terms and conditions:

a. If practicable, Ukiah shall give Willow at least 24 hours advance notice to open the valve. In its request for service Ukiah shall indicate the time when it wants the temporary service to begin and the time it wants that service to end. Unless earlier notified of a different end date, Willow shall end service on the date indicated in the notice from Ukiah. In any event, Willow may, but need not, end service when the limits of service imposed by subparagraph b have been reached.

b. Willow shall not be required to furnish water service for longer than fourteen continuous calendar days or for more than twenty total calendar days in any calendar quarter (Jan. 1 to March 31, April 1 to June 30, July 1 to September 30, October 1 to December 31).

c. Willow shall only be required to furnish water service to Ukiah for the following reasons:

(1) An emergency and/or equipment failure affecting Ukiah's capacity to deliver water to its customers;

(2) To combat a fire within or without the Ukiah service area;

(3) To allow for necessary maintenance or repair of Ukiah equipment not practicably achievable without that water service; or

(4) Contamination of Ukiah's water source.

5. **Payment for service provided by Willow.** Ukiah shall pay Willow $1.00 per 1000 gallons for water furnished under this Agreement. Willow shall bill Ukiah for each requested service within fifteen days after said service ends, or within 30 days of beginning service whichever occurs first, and each 30 days thereafter until all charges are paid in full. Payment of each bill shall be due no later than thirty days from the billing date. The parties shall confer in good faith at least once every two years after the effective date of this Agreement to negotiate rate adjustments, taking into consideration changes in the cost of operations and other factors affecting the cost of supplying water under the terms of this Agreement. In the event of future mutually agreed upon changes in the rate for water service under this Agreement, Ukiah understands that Willow may charge a higher rate for water service outside its district boundaries than it charges for water service within those boundaries. If it agrees to such higher charges, it shall release and waive any legal or other objections it might otherwise have to paying such higher rates and agrees to fully defend, indemnify and hold Willow harmless from and against any claim by any Ukiah customer against Willow or its officers, agents or employees arising out of such rate differences, if any.

6. **Waiver.** Failure to enforce any breach of a provision of this Agreement shall not be deemed a waiver of any subsequent breach of the same or a different provision of the Agreement.

7. **Compliance with law.** This Agreement shall not obligate either party to furnish water to the other, if the provision of such water would violate any provision of state or federal law or any term or condition of any permit, license or other approval held by either party in connection with its public water system. As of the date this Agreement was executed Ukiah and Willow had each been informed by the State Water Resources Control Board that relevant places of use would have to have been approved by the Board before interconnected water service could be provided under this Agreement.

8. **Limits on flow.** Ukiah and Willow mutually agree to limit the transfer of water under this Agreement to a rate of flow that will not adversely affect the distribution system or customer service levels of either system. If the City Manager of Ukiah or the General Manager of Willow determines that such an adverse impact will occur, the manager or authorized representative of the affected system may without prior notice discontinue or reduce flow to the other system.

10. **Entire agreement.** This Agreement contains the entire agreement between the parties concerning its subject matter and supersedes any prior statements, agreements or understandings between the parties concerning the same subject matter. Any such prior statements, agreements or understandings are hereby declared null and void and of no further force or effect. The parties may amend this Agreement or enter new or additional agreements to, among other things, transfer or sell water to each other, provided any such amendments or agreements are contained in a writing approved by the legislative bodies and executed by duly authorized officials of both parties.

11. **Notice.** Whenever written notice is required or allowed under the terms of this Agreement it shall be deemed given when personally delivered or when received by certified mail, return receipt requested, and addressed as follows:

City Manager
City of Ukiah
300 Seminary Avenue
Ukiah, California 95482

General Manager
Willow Water District
151 Laws Avenue
Ukiah, California 95482

13. **Term.** The term of this Agreement shall be five (5) years from its effective date. The term may be extended on such terms as the parties shall agree. No such extension shall be binding unless contained in a writing signed by both parties.

14. **Third party beneficiaries.** This Agreement is for the exclusive benefit of Ukiah and Willow and confers no rights or benefits on any persons or entities not a signatory to this Agreement. No third party beneficiaries are intended or established by this Agreement.

15. **Duplicate originals.** This Agreement may be executed in one or more duplicate originals and when so executed each duplicate original bearing the original signatures of the parties shall be admissible in any administrative or legal proceeding as evidence of the terms of this Agreement.

WHEREFORE, the parties have entered this Agreement on the date first written above.

CITY OF UKIAH

By: _____
Mayor

ATTEST:

_____
City Clerk

WILLOW COUNTY WATER DISTRICT

By: _____
Chairman of the Board

ATTEST:

_____
Secretary

s:\u\agrmts02\willow
June 26, 2002

APPENDIX D

California Department of Water Resources Bulletin 118

Ukiah Valley Groundwater Basin

- Groundwater Basin Number: 1-52
- County: Mendocino
- Surface Area: 37,500 acres (59 square miles)

Basin Boundaries and Hydrology

The Ukiah Valley groundwater basin, located in southeastern Mendocino County, is approximately 22 miles long and 5 miles wide at the widest point, and is the largest of several groundwater basins along the Russian River. The basin is part of the Ukiah and the Redwood Valleys to the north, and their tributary valleys. The low-lying regions of the Ukiah and Redwood Valleys as well as those sloping areas along the valley edges that include Quaternary- and Tertiary-age sediments define the areal extent of this north-south trending basin. The basin surface elevation varies from approximately 1,000 feet in the upper portions of the Redwood Valley, to approximately 500 feet in the lower, southern areas of the Ukiah Valley.

The Russian River traverses the entire length of the Ukiah Valley groundwater basin and is met by many tributaries from both the east and west sides of Redwood and Ukiah Valleys. The main tributaries include Forsythe Creek, which joins with the Russian River north of the city of Calpella, and the East Fork of the Russian River, which joins the main branch of the Russian River north of Ukiah. Lake Mendocino, a reservoir created from the East Fork of the Russian River located between Redwood Valley and Ukiah Valley, is also an important feature of the surface hydrology of the region. Precipitation in the basin ranges from approximately 45 inches in the north to about 35 inches in the south.

Ukiah is the largest city within the valley and is located on its southwest side. Other cities include Talmage, east of Ukiah, and Calpella on the south end of Redwood Valley. Highway 101 travels the length of the Ukiah Valley from the south and veers west away from Redwood Valley, paralleling Forsythe Creek. Highway 20 enters the valley from the east and intersects with Highway 101 at Calpella.

Hydrogeologic Information

Water Bearing Formations

Groundwater-bearing units of primary importance within the Ukiah Valley Groundwater Basin include Recent alluvium, as well as alluvium of Pliocene and Pleistocene age. The terrace deposits and dissected alluvium of Pleistocene age are of lesser importance with regard to groundwater production. Underlying these deposits is moderately to highly fractured basement rock consisting of the Franciscan and Knoxville Formations. Even when highly fractured these formations have limited permeability, and are considered to yield only small quantities of water locally (Cardwell 1965). Information on water-bearing formations, hydrogeology, and storage capacity is available from Cardwell (1965), DWR, (1965), and Farrar (1986).

Recent Alluvium. Alluvium within the basin is considered a principal source of groundwater and consists of unconsolidated gravel, sand, silt, and

minor amounts of clay deposited in channels and on floodplains of the Russian River and its tributaries, on alluvial fans, and as colluvium on interfan slopes. A subdivision of Recent alluvium includes river-channel deposits defined by those areas where gravely stream channel deposits are currently being deposited. River-channel deposits are generally very high yielding loose gravels and sands; in some cases these deposits contain boulders. Recent alluvium is thickest in the central portion of the basin and extends from the surface to depths of 50 to 80 feet (Cardwell 1965). An average specific yield of 20 percent was used for the alluvium in two separate studies (Cardwell 1965, DWR 1965). Groundwater in the alluvium generally occurs under unconfined conditions.

Pleistocene Terrace Deposits. Terrace deposits are characterized as alluvial deposits of primarily Pleistocene age, ranging from a thin veneer of red gravelly clay soil, to deposits of sandy or silty gravel up to 200 feet thick. Terrace deposits generally overly the Pliocene- and Pleistocene-age alluvium and occur discontinuously along the flanks of the Ukiah Valley and more continuously within the Redwood Valley on both sides of the Russian River. Groundwater in the terrace deposits is unconfined to locally confined (Cardwell 1965).

Production from the terrace deposits is variable based on sediment thickness, depth to water, and percentage of fine grained material; however, these deposits generally yield enough water for domestic purposes if an appreciable thickness of the deposit occurs below the water table (Cardwell 1965).

Pliocene/Pleistocene Alluvium. These deposits are described as continental deposits comprised of poorly consolidated and poorly sorted clayey and sandy gravel, clayey sand, and sandy clay. In general, thick lenses of moderately indurated gravel interfinger with large bodies of blue sandy silt and clay (Cardwell 1965). Overall, this alluvium has low permeability due to the relatively high percentage of fine sediments; however, wells can produce moderate amounts of water from these sediments if long sections of perforated (or screened) intervals are used. Bed thickness is variable, with the maximum thickness considered to be about 2,000 feet. Outcrops of this formation can be seen along the entire east side of the Ukiah Valley, as well as the southeast side of the Redwood Valley (Cardwell 1965). It is possible that current groundwater use relies more heavily on Pleistocene- and Pliocene-age alluvium than reflected in this basin description due to ongoing trends in improved well construction techniques and deeper well seal requirements. Groundwater in the older alluvium deposits is generally confined (Cardwell 1965).

Dissected Alluvium. Dissected alluvium is gravelly sediment cemented by carbonate precipitation located along Sulfur Creek below Vichy Springs and along McNab Creek. These sediments yield only very limited quantities of water (Cardwell 1965).

Groundwater Level Trends

Based on hydrographs from DWR monitored wells, groundwater levels in the past 30 years have remained relatively stable. During drought conditions there is increased drawdown during summer months and less recovery in winter months. Post-drought conditions rebound to approximately the same levels as pre-drought conditions.

Groundwater Storage

Groundwater Storage Capacity. It is estimated that approximately 324,000 af of storage exists in the older continental deposits; however, it is probably not usable for short-term storage purposes due to the low-permeability nature of these deposits (DWR 1965).

Groundwater in Storage. Groundwater in storage within the alluvium and younger terrace deposits is estimated to be about 75,000 to 100,000 af (Cardwell 1965). Groundwater in storage within the river-channel deposits between 10 and 50 foot depths is estimated to be 35,000 af based on an average specific yield of 20 percent (Cardwell 1965, DWR 1965). Farrar (1986) estimated that the quantity of groundwater stored in the upper 100 feet of the most productive area of valley fill (Type I) to be about 90,000 af using an average specific yield of 8 percent and an area of 20 square miles. Farrar (1986) also estimated the quantity of groundwater stored along the margins of the valley (Type II area) and underlain by terrace deposits or thin alluvium at 45,000 af. This estimate is based on the upper 100 feet of Type II aquifer materials, an area of 19 square miles, and an average specific yield of 5 percent.

Groundwater Budget (Type C)

There is not enough data available to provide an estimate of the basin's water budget.

Groundwater Quality

Characterization. Water quality is good in general, especially water derived from Recent alluvium deposits; however, locally the content of chemical constituents varies widely. Overall, water is moderately hard to hard bicarbonate. Based on limited data, calcium-bicarbonate groundwater occurs in the southern portion of the basin and magnesium-bicarbonate water occurs in the east-central portion of the basin (Cardwell 1965). Quality in the Recent formations is similar to Russian River water, with slightly higher TDS and chloride levels. Pliocene- and Pleistocene-age formations yield water with higher TDS and sodium than Recent-age formations. Water from springs ranges from highly mineralized to good in quality (Cardwell 1965). TDS values range from 108 to 401 mg/L and average 224 mg/L based on four wells (Cardwell 1965). Electrical conductivity ranges from 450 to 759 µmhos/cm and average 605 µmhos/cm based on two wells (Cardwell 1965). Based on analyses of 22 water supply wells in the Ukiah Valley, TDS ranges from 87 to 301 mg/L and averages about 166 mg/L.

Impairments. Wells with high boron concentrations are located in several areas along the Ukiah Valley edges and in the north end of the Redwood

Valley. Verbal reports indicate that (in general) poor quality water occurs on the west side of the basin. Flammable gas was reported in at least one well. Pressurized carbon dioxide gas was detected in two wells which probably penetrate bedrock (Cardwell 1965). Most poor quality water is believed to migrate into basin sediments from basement rock through fractures or faults.

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	23	0
Radiological	21	0
Nitrates	28	0
Pesticides	23	0
VOCs and SVOCs	22	0
Inorganics – Secondary	23	6

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.
[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Characteristics

Well yields (gal/min)

Up to 1,200 gal/min from Recent Alluvium and less than 50 gal/min from undifferentiated older formations (DWR 1965)

Total depths (ft)

Domestic	Range: 15 - 600	Average: 220 (155 Well Completion Reports)
Municipal/Irrigation	Range: 36 - 115	Average: 115 (36 Well Completion Reports)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR	Groundwater levels	5 wells/semi-annually
Mendocino County Water Agency	Groundwater levels	23 well/annually
DWR	Mineral, nutrient, & minor element.	7 wells/ biennially
Department of Health Services	Coliform, nitrates, mineral, organic chemicals, and radiological.	25 wells as required in Title 22, Calif. Code of Regulations

Basin Management

Groundwater management:	No groundwater management plans were identified
Water agencies	
Public	Mendocino County Water Agency, Hopland PUD, Millview County WD, Redwood County WD, Willow County WD.
Private	

References Cited

California Department of Water Resources (DWR). 1965. Water Resources and Future Water Requirements – North Coastal Hydrographic Area, Volume 1: Southern Portion (Preliminary Edition) – Bulletin No. 142-1.

Cardwell, G.T. 1965. Geology and Ground Water in Russian River Valley Areas and in Round, Laytonville and Little Lake Valleys, Sonoma and Mendocino Counties, California. USGS Water Supply Paper 1548.

Farrar, C.D. 1986. Ground-Water Resources in Mendocino County, California. USGS Water-Resources Investigations Report 85-4258.

Errata

Changes made to the basin description will be noted here.

North Coast Hydrologic Region

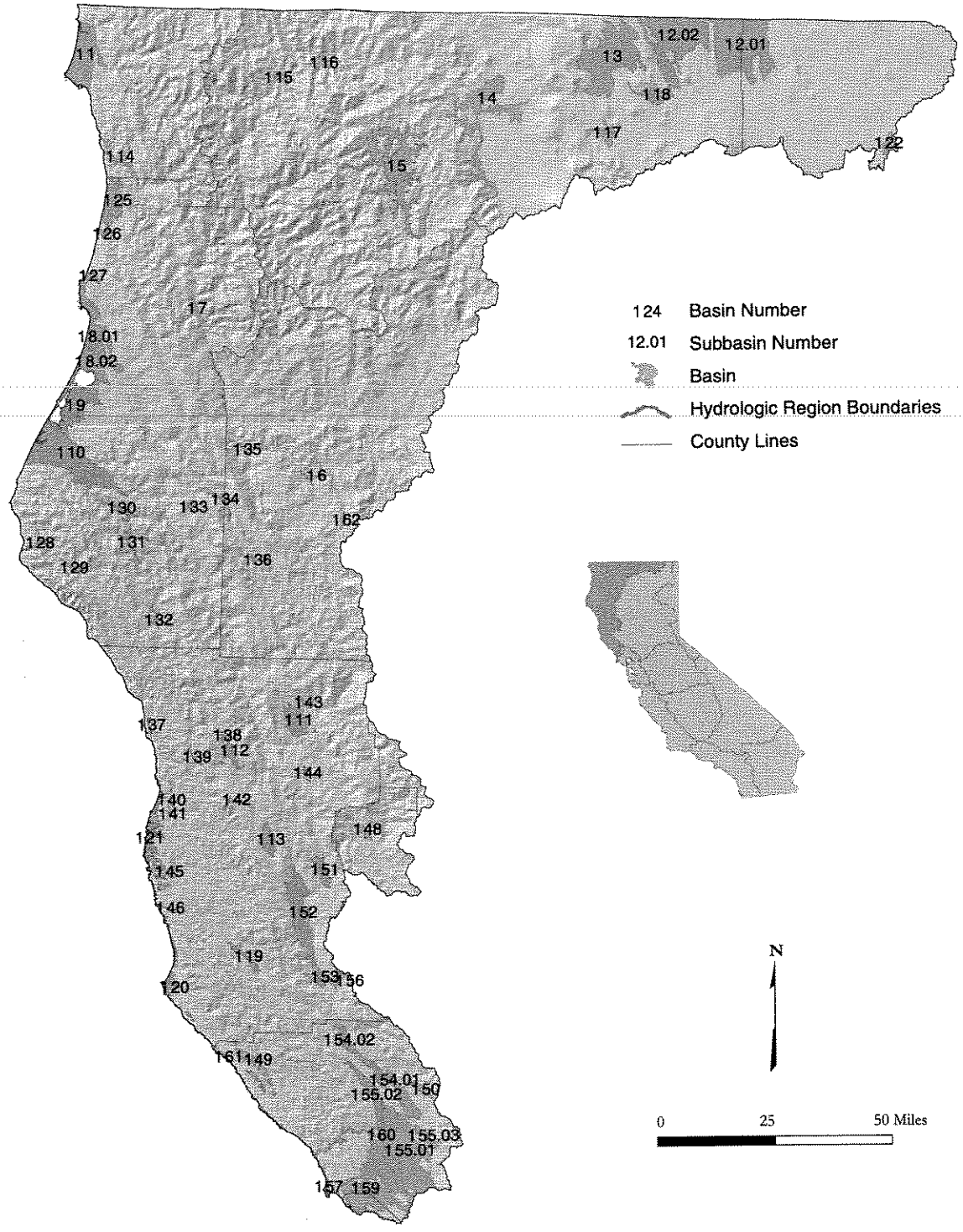


Figure 25 North Coast Hydrologic Region

Basins and Subbasins of the North Coast Hydrologic Region

Basin/subbasin	Basin name
1-1	Smith River Plain
1-2	Klamath River Valley
1-2.01	Tule Lake
1-2.02	Lower Klamath
1-3	Butte Valley
1-4	Shasta Valley
1-5	Scott River Valley
1-6	Hayfork Valley
1-7	Hoopa Valley
1-8	Mad River Valley
1-8.01	Mad River Lowland
1-8.02	Dows Prairie School Area
1-9	Eureka Plain
1-10	Eel River Valley
1-11	Covelo Round Valley
1-12	Laytonville Valley
1-13	Little Lake Valley
1-14	Lower Klamath River Valley
1-15	Happy Camp Town Area
1-16	Seiad Valley
1-17	Bray Town Area
1-18	Red Rock Valley
1-19	Anderson Valley
1-20	Garcia River Valley
1-21	Fort Bragg Terrace Area
1-22	Fairchild Swamp Valley
1-25	Prairie Creek Area
1-26	Redwood Creek Area
1-27	Big Lagoon Area
1-28	Mattole River Valley
1-29	Honeydew Town Area
1-30	Pepperwood Town Area
1-31	Weott Town Area
1-32	Garberville Town Area
1-33	Larabee Valley
1-34	Dinsmores Town Area
1-35	Hyampom Valley
1-36	Hettenshaw Valley
1-37	Cottoneva Creek Valley
1-38	Lower Laytonville Valley
1-39	Branscomb Town Area
1-40	Ten Mile River Valley
1-41	Little Valley

Basin/subbasin	Basin name
1-42	Sherwood Valley
1-43	Williams Valley
1-44	Eden Valley
1-45	Big River Valley
1-46	Navarro River Valley
1-48	Gravelley Valley
1-49	Annapolis Ohlson Ranch Formation Highlands
1-50	Knights Valley
1-51	Potter Valley
1-52	Ukiah Valley
1-53	Sanel Valley
1-54	Alexander Valley
1-54.01	Alexander Area
1-54.02	Cloverdale Area
1-55	Santa Rosa Valley
1-55.01	Santa Rosa Plain
1-55.02	Healdsburg Area
1-55.03	Rincon Valley
1-56	McDowell Valley
1-57	Bodega Bay Area
1-59	Wilson Grove Formation Highlands
1-60	Lower Russian River Valley
1-61	Fort Ross Terrace Deposits
1-62	Wilson Point Area

Description of the Region

The North Coast HR covers approximately 12.46 million acres (19,470 square miles) and includes all or portions of Modoc, Siskiyou, Del Norte, Trinity, Humboldt, Mendocino, Lake, and Sonoma counties (Figure 25). Small areas of Shasta, Tehama, Glenn, Colusa, and Marin counties are also within the region. Extending from the Oregon border south to Tomales Bay, the region includes portions of four geomorphic provinces. The northern Coast Range forms the portion of the region extending from the southern boundary north to the Mad River drainage and the fault contact with the metamorphic rocks of the Klamath Mountains, which continue north into Oregon. East of the Klamath terrane along the State border are the volcanic terranes of the Cascades and the Modoc Plateau. In the coastal mountains, most of the basins are along the narrow coastal strip between the Pacific Ocean and the rugged Coast Range and Klamath Mountains and along inland river valleys; alluviated basin areas are very sparse in the steep Klamath Mountains. In the volcanic terrane to the east, most of the basins are in block faulted valleys that once held Pleistocene-age lakes. The North Coast HR corresponds to the boundary of RWQCB 1. Significant geographic features include basin areas such as the Klamath River Basin, the Eureka/Arcata area, Hoopa Valley, Anderson Valley, and the Santa Rosa Plain. Other significant features include Mount Shasta, forming the southern border of Shasta Valley, and the rugged north coastal shoreline. The 1995 population of the entire region was about 606,000, with most being centered along the Pacific Coast and in the inland valleys north of the San Francisco Bay Area.

The northern mountainous portion of the region is rural and sparsely populated, primarily because of the rugged terrain. Most of the area is heavily forested. Some irrigated agriculture occurs in the narrow river valleys, but most occurs in the broader valleys on the Modoc Plateau where pasture, grain and alfalfa predominate. In the southern portion of the region, closer to urban centers, crops like wine grapes, nursery stock, orchards, and truck crops are common.

A majority of the surface water in the North Coast HR goes to environmental uses because of the "wild and scenic" designation of most of the region's rivers. Average annual precipitation ranges from 100 inches in the Smith River drainage to 29 inches in the Santa Rosa area and about 10 inches in the Klamath drainage; as a result, drought is likely to affect the Klamath Basin more than other portions of the region. Communities that are not served by the area's surface water projects also tend to experience shortages. Surface water development in the region includes the U.S. Bureau of Reclamation (USBR) Klamath Project, Humboldt Bay Municipal Water District's Ruth Lake, and U.S. Army Corps of Engineer's Russian River Project. An important factor concerning water demand in the Klamath Project area is water allocation for endangered fish species in the upper and lower basin. Surface water deliveries for agriculture in 2001, a severe drought year, were only about 20 percent of normal.

Groundwater Development

Groundwater development in the North Coast HR occurs along the coast, near the mouths of some of the region's major rivers, on the adjacent narrow marine terraces, or in the inland river valleys and basins. Reliability of these supplies varies significantly from area to area. There are 63 groundwater basins/subbasins delineated in the region, two of which are shared with Oregon. These basins underlie approximately 1.022 million acres (1,600 square miles).

Along the coast, most groundwater is developed from shallow wells installed in the sand and gravel beds of several of the region's rivers. Under California law, the water produced in these areas is considered surface water underflow. Water from Ranney collectors installed in the Klamath River, Rowdy Creek, the Smith

River, and the Mad River supply the towns of Klamath, Smith River and Crescent City in Del Norte County and most of the Humboldt Bay area in Humboldt County. Except on the Mad River, which has continuous supply via releases from Ruth Reservoir, these supplies are dependent on adequate precipitation and flows throughout the season. In drought years when streamflows are low, seawater intrusion can occur causing brackish or saline water to enter these systems. This has been a problem in the town of Klamath, which in 1995 had to obtain community water from a private well source. Toward the southern portion of the region, along the Mendocino coast, the Town of Mendocino typifies the problems related to groundwater development in the shallow marine terrace aquifers. Groundwater supply is limited by the aquifer storage capacity, and surveys done in the Town of Mendocino in the mid-1980s indicate that about 10 percent of wells go dry every year and up to 40 percent go dry during drought years.

Groundwater development in the inland coastal valleys north of the divide between the Russian and Eel Rivers is generally of limited extent. Most problems stemming from reliance on groundwater in these areas is a lack of alluvial aquifer storage capacity. Many groundwater wells rely on hydrologic connection to the rivers and streams of the valleys. The City of Rio Dell has experienced water supply problems in community wells and, as a result, recently developed plans to install a Ranney collector near the Eel River. South of the divide, in the Russian River drainage, a significant amount of groundwater development has occurred on the Santa Rosa Plain and surrounding areas. The groundwater supplies augment surface supplies from the Russian River Project.

In the north-central part of the North Coast HR, the major groundwater basins include the Klamath River Valley, Shasta Valley, Scott River Valley, and Butte Valley. The Klamath River Valley is shared with Oregon. Of these groundwater basins, Butte Valley has the most stable water supply conditions. The historical annual agricultural surface water supply has been about 20,000 acre-feet. As farming in the valley expanded from the early 1950s to the early 1990s, bringing nearly all the arable land in the valley into production, groundwater was developed to farm the additional acres. It has been estimated that current, fully developed demands are only about 80 percent of the available groundwater supply. By contrast, water supply issues in the other three basins are contingent upon pending management decisions regarding restoration of fish populations in the Klamath River and the Upper Klamath Basin system. The Endangered Species Act (ESA) fishery issues include lake level requirements for two sucker fish species and in-stream flow requirements for coho salmon and steelhead trout. Since about 1905, the Klamath Project has provided surface water to the agricultural community, which in turn has provided water to the wildlife refuges. Since the early 1990s, it has been recognized that surface water in the Klamath Project is over-allocated, but very little groundwater development had occurred. In 2001, which was a severe drought year, USBR delivered a total of about 75,000 acre-feet of water to agriculture in California, about 20 percent of normal. In the Klamath River Groundwater Basin this translated to a drought disaster, both for agriculture and the wildlife refuges. In addition, there were significant impacts for both coho salmon and sucker fisheries in the Klamath River watershed. As a result of the reduced surface water deliveries, significant groundwater development occurred, and groundwater extraction increased from an estimated 6,000 acre-feet in 1997 to roughly 60,000 acre-feet in 2001. Because of the complexity of the basin's water issues, a long-term Klamath Project Operation plan has not yet been finalized. Since 1995, USBR has issued an annual operation plan based on estimates of available supply. The Scott River Valley and Shasta Valley rely to a significant extent on surface water diversions. In most years, surface water supplies the majority of demand, and groundwater extraction supplements supply as needed depending on wet or dry conditions. Discussions are under way to develop strategies to conjunctively use surface water and groundwater to meet environmental, agricultural, and other demands.

Groundwater Quality

Groundwater quality characteristics and specific local impairments vary with regional setting within the North Coast HR. In general, seawater intrusion and nitrates in shallow aquifers are problems in the coastal groundwater basins; high total dissolved solids (TDS) content and general alkalinity are problems in the lake sediments of the Modoc Plateau basins; and iron, boron, and manganese can be problems in the inland basins of Mendocino and Sonoma counties.

Water Quality in Public Supply Wells

From 1994 through 2000, 584 public supply water wells were sampled in 32 of the 63 basins and subbasins in the North Coast HR. Analyzed samples indicate that 553 wells, or 95%, met the state primary Maximum Contaminant Levels (MCL) for drinking water. Thirty-one wells, or 5%, sampled have constituents that exceed one or more MCL. Figure 26 shows the percentage of each contaminant group that exceeded MCLs in the 31 wells.

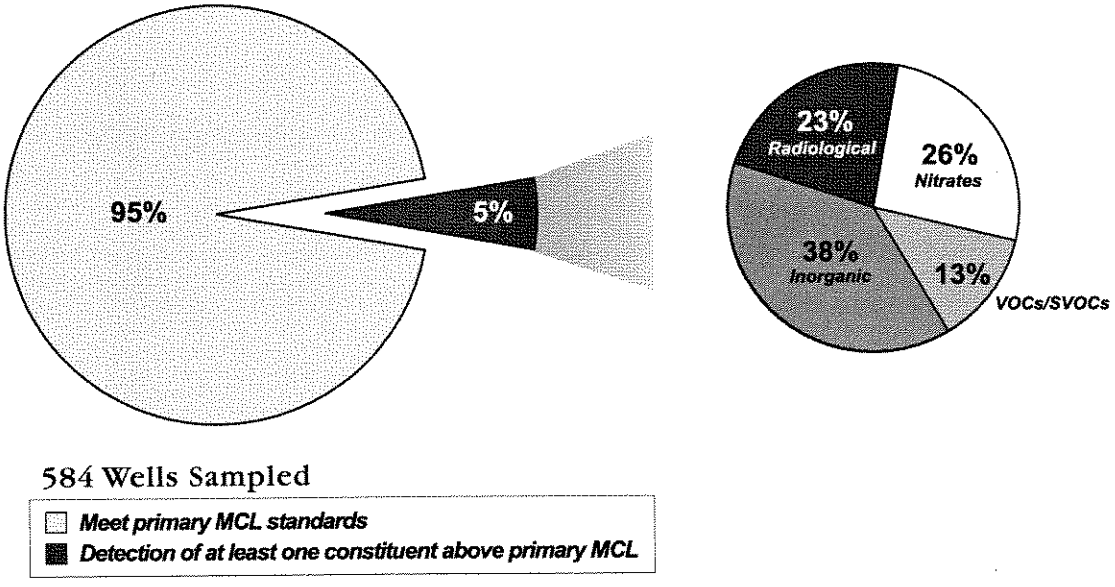


Figure 26 MCL exceedances in public supply wells in the North Coast Hydrologic Region

Table 13 lists the three most frequently occurring individual contaminants in each of the five contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 13 Most frequently occurring contaminants by contaminant group in the North Coast Hydrologic Region

Contaminant group wellsInorganics – Primary exceedance	Contaminant - # of wells Aluminum – 4	Contaminant - # of wells Arsenic – 4	Contaminant - # of 4 tied at 1
Inorganics – Secondary	Manganese – 150	Iron – 108	Copper – 2
Radiological	Radium 228 – 3	Combined RA226 + RA228 – 3	Radium 226 – 1
Nitrates	Nitrate(as NO_3) – 7	Nitrite(as N) – 1	
VOCs/SVOCs	TCE – 2	3 tied at 1 exceedance	

TCE = Trichloroethylene
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound

Changes from Bulletin 118-80

Since Bulletin 118-80 was published, RWQCB 2 boundary has been modified. This resulted in several basins being reassigned to RWQCB 1. These are listed in Table 14, along with other modifications to North Coast HR.

Table 14 Modifications since Bulletin 118-80 of groundwater basins in North Coast Hydrologic Region

Basin name	New number	Old number
McDowell Valley	1-56	2-12
Knights Valley	1-50	2-13
Potter Valley	1-51	2-14
Ukiah Valley	1-52	2-15
Sanel Valley	1-53	2-16
Alexander Valley	1-54	2-17
Santa Rosa Valley	1-55	2-18
Lower Russian River Valley	1-60	2-20
Bodega Bay Area	1-57	2-21
Modoc Plateau Recent Volcanic Area	deleted	1-23
Modoc Plateau Pleistocene Volcanic Area	deleted	1-24
Gualala River Valley	deleted	1-47
Wilson Grove Formation Highlands	1-59	2-25
Fort Ross Terrace Deposits	1-61	
Wilson Point Area	1-62	

Fort Ross Terrace Deposits (1-61) and Wilson Point Area (1-62) have been defined since B118-80 and are included in this update. Mad River Valley Groundwater Basin (1-8) has been subdivided into two subbasins. Sebastopol Merced Formation (2-25) merged into Basin 1-59 and was renamed Wilson Grove Formation Highlands.

There are a couple of deletions of groundwater basins from Bulletin 118-80. The Modoc Plateau Recent Volcanic Area (1-23) and the Modoc Plateau Pleistocene Volcanic Area (1-24) are volcanic aquifers and were not assigned basin numbers in this bulletin. These are considered to be groundwater source areas as discussed in Chapter 6. Gualala River Valley (1-47) was deleted because the State Water Resources Control Board determined the water being extracted in this area as surface water within a subterranean stream.

Table 15 North Coast Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
1-1	SMITH RIVER PLAIN	40,450	B	500	50	7	10	33	164	32 - 496
1-2	KLAMATH RIVER VALLEY									
1-2.01	UPPER KLAMATH LAKE BASIN - Tule Lake	85,930	B	3,380	1,208	40	8	5	721	140 - 2,200
1-2.02	UPPER KLAMATH LAKE BASIN - Lower Klamath	73,330	B	2,600	1,550	4	-	-	-	-
1-3	BUTTE VALLEY	79,700	B	5,000	2,358	28	13	9	310	55 - 1,110
1-4	SHASTA VALLEY	52,640	B	1,200	273	9	15	24	-	-
1-5	SCOTT RIVER VALLEY	63,900	B	3,000	794	6	10	5	258	47 - 1,510
1-6	HAYFORK VALLEY	3,300	B	200	-	-	5	-	-	-
1-7	HOOPA VALLEY	3,900	B	300	-	-	4	-	125	95 - 159
1-8	MAD RIVER VALLEY									
1-8.01	MAD RIVER VALLEY LOWLAND	25,600	B	120	72	4	9	2	184	55 - 280
1-8.02	DOWS PRAIRIE SCHOOL AREA	14,000	B	-	-	-	3	-	-	-
1-9	EUREKA PLAIN	37,400	B	1,200	-	4	4	6	177	97 - 460
1-10	EEL RIVER VALLEY	73,700	B	1,200	-	8	11	29	237	110 - 340
1-11	COVELO ROUND VALLEY	16,400	C	850	193	9	5	29	239	116 - 381
1-12	LAYTONVILLE VALLEY	5,020	A	700	7	4	3	-	149	53 - 251
1-13	LITTLE LAKE VALLEY	10,000	A	1,000	45	7	7	-	340	97 - 1,710
1-14	LOWER KLAMATH RIVER VALLEY	7,030	B	-	-	-	-	-	-	43 - 150
1-15	HAPPY CAMP TOWN AREA	2,770	B	-	-	-	-	17	-	-
1-16	SEIAD VALLEY	2,250	B	-	-	-	2	2	-	-
1-17	BRAY TOWN AREA	8,030	B	-	-	-	-	-	-	-
1-18	RED ROCK VALLEY	9,000	B	-	-	-	-	-	-	-
1-19	ANDERSON VALLEY	4,970	C	300	30	7	5	7	-	80 - 400
1-20	GARCIA RIVER VALLEY	2,240	C	-	-	-	-	-	-	-
1-21	FORT BRAGG TERRACE AREA	24,100	C	75	14	-	-	51	185	26 - 650
1-22	FAIRCHILD SWAMP VALLEY	3,300	B	-	-	-	-	-	-	-
1-25	PRAIRIE CREEK AREA	20,000	B	-	-	-	-	1	106	-
1-26	REDWOOD CREEK AREA	2,000	B	-	-	1	0	4	-	102 - 332
1-27	BIG LAGOON AREA	13,400	B	-	-	1	0	31	174	-
1-28	MATTOLE RIVER VALLEY	3,150	B	-	-	-	-	2	-	-
1-29	HONEYDEW TOWN AREA	2,370	B	-	-	-	-	1	-	-
1-30	PEPPERWOOD TOWN AREA	6,290	B	-	-	-	-	1	-	-
1-31	WEOTT TOWN AREA	3,650	B	-	-	-	-	2	-	-
1-32	GARBERVILLE TOWN AREA	2,100	B	-	-	-	-	5	-	-
1-33	LARABEE VALLEY	970	B	-	-	-	-	-	-	-
1-34	DINSMORES TOWN AREA	2,300	B	-	-	-	-	3	-	-
1-35	HYAMPOM VALLEY	1,350	B	-	-	-	-	1	-	-
1-36	HETTENSHAW VALLEY	850	B	-	-	-	-	-	-	-
1-37	COTTONEVA CREEK VALLEY	760	C	-	-	-	-	-	118	118
1-38	LOWER LAYTONVILLE VALLEY	2,150	C	-	-	-	-	-	-	-
1-39	BRANSCOMB TOWN AREA	1,320	C	-	-	-	-	-	130	80 - 179
1-40	TEN MILE RIVER VALLEY	1,490	C	-	-	-	-	-	-	-
1-41	LITTLE VALLEY	810	C	-	-	-	-	-	-	-

Table 15 North Coast Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
1-42	SHERWOOD VALLEY	1,150	C	-	-	-	-	-	-	-
1-43	WILLIAMS VALLEY	1,640	C	-	-	-	-	-	-	-
1-44	EDEN VALLEY	1,380	C	-	-	-	-	-	140	140
1-45	BIG RIVER VALLEY	1,690	C	-	-	-	-	2	-	-
1-46	NAVARRO RIVER VALLEY	770	C	-	-	-	-	-	-	-
1-48	GRAVELLEY VALLEY	3,000	C	-	-	-	-	3	-	-
1-49	ANAPOLIS OHLSON RANCH FOR. HIGHLANDS	8,650	C	36	-	-	0	1	260	260
1-50	KNIGHTS VALLEY	4,090	C	-	-	-	-	-	-	-
1-51	POTTER VALLEY	8,240	C	100	-	2	0	1	-	140 - 395
1-52	UKIAH VALLEY									
1-53	SANEL VALLEY	5,570	C	1,250	-	5	8	6	-	174 - 306
1-54	ALEXANDER VALLEY									
1-54.01	ALEXANDER AREA									
1-54.02	CLOVERDALE AREA	6,500	C	-	500	3	-	13	-	130 - 304
1-55	SANTA ROSA VALLEY									
1-55.01	SANTA ROSA PLAIN	80,000	A	1,500	-	43	-	155	-	-
1-55.02	HEALDSBURG AREA	15,400	C	500	-	8	-	28	-	90 - 500
1-55.03	RINCON VALLEY	5,600	C	-	-	2	-	12	-	-
1-56	McDOWELL VALLEY	1,500	C	1,200	-	-	-	-	145	143 - 146
1-57	BODEGA BAY AREA	2,680	A	150	-	-	-	6	-	-
1-59	WILSON GROVE FORMATION HIGHLANDS	81,500	C	-	-	14	-	68	-	-
1-60	LOWER RUSSIAN RIVER VALLEY	6,600	C	500 +	-	1	-	32	-	120 - 210
1-61	FORT ROSS TERRACE DEPOSITS	8,490	C	75	27	-	-	13	320	230 - 380
1-62	WILSON POINT AREA	700	B	-	-	-	-	-	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS = total dissolved solids

APPENDIX E

Water Shortage Emergency Plan

Ukiah, California
City Code

This code was last updated by ordinance 1080 passed June 14, 2006.

ARTICLE 11. WATER SHORTAGE EMERGENCY

3600: FINDINGS:

The City Council hereby finds and determines that the ordinary demands and requirements for water customers of the City may not, from time to time, be satisfied without depleting the water supply to the extent that there would be insufficient water for human consumption, sanitation, and fire protection. This ordinance is intended to prohibit any additional demands on the existing water supply, to prohibit all nonessential uses as defined herein, and to allocate the available water supply during any water shortage emergency to the end that sufficient water will be and remain available for human consumption, sanitation, and fire protection. (Ord. 691, §1, adopted 1977)

3601: DEFINITIONS:

For the purpose of this Article the following terms, phrases, words, and their derivations shall have the meaning given herein: The word "shall" is always mandatory and never directory.

A. Customer: The person using water supplied by the City.

B. Director: The Director of Public Works of the City or his designated representative.

C. Department: The Water Utilities Division of the Department of Public Works.

D. Hand-Watering: Water supplied to a customer through a hose connected to the customer's piping system while such hose is hand held and such water used for exterior purposes.

E. Irrigate: To water land, whether by channels, by flooding, by sprinkling, or any other means whatsoever except hand-watering.

F. Water: Only water supplied by the City unless expressly provided otherwise or required by the context. (Ord. 691, §1, adopted 1977)

3602: DECLARATION OF WATER EMERGENCY:

When it appears that the City may be unable to supply the normal demands and requirements of water customers, the City Council may, by resolution declare a water emergency. The resolution shall specify the degree of emergency existing and shall place into effect the appropriate provisions of this ordinance. (Ord. 691, §1, adopted 1977)

3603: REQUESTS FOR VOLUNTARY RESTRICTIONS OF WATER USE STAGE I:

Whenever the City Council, by resolution, declares Stage I water emergency to exist, the Mayor shall issue a proclamation urging citizens to institute such water conservation measures on a voluntary basis as may be required to reduce water demand to coincide with available supply. (Ord. 691, §1, adopted 1977)

3604: PROHIBITION OF NONESSENTIAL WATER USE STAGE II:

It is unlawful for any person to use water for any nonessential use as hereinafter defined, whenever the City Council determines by resolution that a Stage II water emergency exists. (Ord. 691, §1, adopted 1977)

3605: NONESSENTIAL USES DEFINED:

The following uses of water are nonessential:

A. Use of water from public hydrants for any purpose other than fire protection and/or prevention.

B. Use of water through any meter when the consumer had been given two (2) days notice to repair one or more leaks and has failed to complete such repairs.

C. Use of water by a golf course to irrigate any portion of its grounds except those areas designated as tees and greens; except where the Director shall have determined that any such use is nonessential and written notice of such determination shall have been provided.

D. Use of water to irrigate grass, lawns, ground cover, shrubbery, vegetable gardens, trees, or other outdoor vegetation.

E. Use of water for the construction of any structure, including such use in dust control.

F. Use of water to wash any sidewalk, walkways, driveway, street, parking lot, tennis court, or other hard surfaced area by hosing or by otherwise direct use of water from faucets or other outlets.

G. Use of water to wash any motor vehicle, trailer, airplane, or boat by hosing or otherwise using water directly from a faucet or other outlet.

H. Use of water to fill or refill any swimming pool.

I. Use of water to add to any swimming pool not equipped with and using a pool cover. (Ord. 691, §1, adopted 1977)

3606: FURTHER NONESSENTIAL USES DEFINED STAGE III:

In addition to the nonessential uses set forth in §3605, the following additional uses are determined to be nonessential when the Council has, by resolution declared a State III emergency.

A. Use of water in excess of the daily usage allotment hereinafter set forth:

Single family or duplex (100 cu. ft. per month)	50 gallons - per permanent resident
Multi-residential units (180 cu. ft. per month)	45 gallons - per permanent resident

B. All other uses not expressly set forth in §3605 shall be limited to fifty percent (50%) of the prior water use for a similar period as determined by the Department from its records. Where no such records exist, prior water use shall be deemed to be the average prior water use of similar existing services as shall be determined by the Department from its records.

C. Use of water to irrigate, the provisions of §3605 above to the contrary, notwithstanding.

D. Use of water for hand-watering. (Ord. 691, §1, adopted 1977)

3607: NUMBER OF PERMANENT RESIDENTS:

Each customer in whose name water is supplied to a residence shall upon request of the Director advise him under penalty of perjury the number of permanent residents using water supplied to that residence. If such a residential customer shall fail to so advise the Director, such residence shall be permitted the water allocation herein provided for one permanent resident. (Ord. 691, §1, adopted 1977)

3608: TAMPERING WITH WATER METERS PROHIBITED:

It is unlawful for any person to remove, replace, alter, damage, or otherwise tamper with any water meter or components thereof, including but not limited to the meter face, dials, or other water usage indicators, and any flow-restricting device installed thereon. (Ord. 691, §1, adopted 1977)

3609: VARIANCES:

The Director may:

A. Grant temporary variances for uses of water otherwise prohibited; or

B. Adjust temporarily any or all consumer's allotment if he finds and determines that due to unusual circumstances to fail to grant such a variance would cause an emergency condition affecting health, sanitation, or fire protection of the applicant or the public; further, he may grant such adjustment in the case of a mixed residential/nonresidential use if he finds that such adjustment is necessary to place an equivalent allotment burden on said applicant. The City Council shall ratify or revoke any such variance or adjustment at its next scheduled meeting.

No such variance or adjustment shall be retroactive or otherwise justify any violations of this ordinance occurring prior to issuance of said temporary variance or adjustment. (Ord. 691, §1, adopted 1977)

3610: VIOLATION OF WATER USE RESTRICTIONS; PUNISHMENT:

It is a misdemeanor for any person to use or apply water received from the City contrary to or in violation of any restriction or prohibition specified in the Article, except both the first and second violations of this ordinance within any one year period shall be infractions. Said punishment may be in lieu of or in addition to any other penalty or method of enforcement provided by law. Any violation of this ordinance permitted to continue after notice, shall be a separate offense and shall be punishable as such hereunder; further, each day such violation continues shall be considered a separate offense. (Ord. 691, §1, adopted 1977)

3611: PURPOSE AND INTENT; STATUTORY CONSTRUCTION:

It is the purpose and intent of this ordinance to prohibit an increase in the water demand on the City's water supply, to eliminate all nonessential water usage, and to provide for allocation of existing water resources to insure sufficient water for human consumption, sanitation, and fire protection. This ordinance shall be

liberally construed to effectuate such purpose and intent. (Ord. 691, §1, adopted 1977)

3612: REPAIR; REPLACEMENT:

Notwithstanding any other provisions of this ordinance, no restriction or prohibition is imposed upon the repair or replacement of existing water service facilities in a manner which the Director determines will not materially increase the consumption of water. (Ord. 691, §1, adopted 1977)

3613: ORDINANCE CONTROLLING:

The provisions of this ordinance shall prevail and control in the event of any inconsistency between this ordinance and any other rule, regulation, ordinance, or code of the City. (Ord. 691, §1, adopted 1977)

3614: WATER SERVICES TO BE DISCONNECTED:

Water may be shut off by the Department with appropriate notice whenever the Director determines there has been a willful failure to comply with the provisions of this ordinance, any other provisions of this code to the contrary, notwithstanding. Charges for reconnection or restoration of service which has been terminated pursuant to this Section shall be at the rates and on the conditions set by resolution. (Ord. 691, §1, adopted 1977)

3615: ENFORCEMENT; DESIGNATED PERSONS:

A. Each police officer of the City shall in connection with his duties imposed by law diligently enforce the provisions of this ordinance.

B. The Director and his designated employees shall have the duty and are hereby authorized to enforce the provisions of this ordinance. (Ord. 691, §1, adopted 1977)

3616: SEVERABILITY CLAUSE:

If any section, subsection, sentence, clause, or phrase of this ordinance is for any reason held to be unconstitutional, such decision shall not affect the remaining portions of this ordinance. The City Council declares that it would have passed this ordinance and each section, subsection, sentence, clause, and phrase thereof irrespective of the fact that any one or more such provisions be declared unconstitutional. (Ord. 691, §1, adopted 1977)

Urgency Ordinance

This ordinance is hereby declared to be necessary for the immediate preservation of the public peace, health, and safety and will take effect and be in force upon its adoption by a fourth-fifths (4/5) vote of the members of the Ukiah City Council. Due to severe drought conditions existing in the area from which the City draws its water supply, it is imperative that this ordinance become effective immediately to protect existing water supplies for human consumption, sanitation, and fire protection. The City Council of the City further declares that if normal water usage were permitted to continue, the available water supply would be depleted below the safe level for human consumption, sanitation, and fire protection. This ordinance shall be published in accordance with law within ten days after its adoption. (Ord. 691, §2, adopted 1977)

APPENDIX F

Demand Management Measure Economic Analysis

DMM 1 – Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers

Description: Conduct water surveys that include both indoor and outdoor components. Provide recommendations and install plumbing retrofit devices where needed.

Assumptions:

1. The implementation schedule is assumed to be as defined for agencies signing the MOU in the year 2005.

2. Number of surveys necessary to complete is 15% of the baseline number of housing units in 2005. 15% of single-family units and 15% of multi-family units will be surveyed within 10 years of the date implementation is to commence. Surveys will be conducted according to the following schedule: 1.5% by end of the first reporting period, 3.6% by end of second reporting period, 6.3% by end of third reporting period, 9.6% by end of fourth reporting period, and 15% by end of the fifth reporting period.

MOU, page 16 and page 17 Section E.d. California legislation requires that plumbing fixtures manufactured, sold or installed after early 1992 be low-water-use fixtures. Therefore, the greatest water savings can be achieved in pre-1992 homes.

3. Single-family water usage = 391 gpd/unit (60% is outdoor use)

Single-family water usage was calculated based on historical water use per connection, and the projected number of ¾" connections in 2005 (based on Rate Study report that 87% of connections are ¾"). It was assumed that the ¾" connections were primarily single and multi-family units. Based on the General Plan for the City, 64% of the ¾" connections were assumed to be single-family and 36% multi-family. The single and multi-family water usages were based on the assumption that the multi-family units use 40% of the water that the single family units use. Outdoor use is based on engineering judgment.

4. Multi-family water usage = 156 gpd/unit (40% is outdoor use)

See assumptions for single-family water usage.

5. Water savings from indoor leak detection, not including toilet leaks = 0.5 gpd per residence

A & N Technical Services report (2000, page 2-20) (12.4 gpd per household repair; 4 percent of households audited have leaks).

6. Water surveys decrease outdoor water use by 10%

MOU estimate is 10% (page 18, Section F).

7. Each water survey costs $55.00

This cost estimate is based on the Southern California Water Company (SCWC) pilot exemption request filed with the CUWCC and dated June 29, 1999. The estimate includes marketing, contract labor, SCWC labor, overhead and materials. It is assumed that the City's cost would be similar to SCWC's. It is assumed that this DMM is done in conjunction with DMM 2.

8. The life span of a water survey is four years.

A & N Technical Services report (2000, page 2-20) gives life spans for various components of a water survey. Four years was selected as a reasonable average value based on that information.

9. Water savings from indoor plumbing retrofits are tracked under DMM 2. Only water savings from a decrease in outdoor water use and water savings from indoor leak detection are tracked in DMM 1 to avoid double counting of water savings.

DMM 2 – Residential Plumbing Retrofit

Description: Install plumbing retrofit devices in single- and multi- family residences.

Assumptions:

1. Plumbing retrofit devices will be installed at a minimum of 10% of residences per reporting period until it can be demonstrated that 75% of pre-1992 single-family residences and 75% of pre-1992 multi-family residences have low flow showerheads (LFSHs). Based on the low growth rate, it is assumed that the current residences were all built prior to 1992.

MOU, page 19.

2. 22.5% of residences have low-water-use fixtures.

We estimate, based on professional judgement, that 45% of plumbing fixtures in pre-1992 residences have been replaced with low-water-use fixtures due to natural attrition. Assuming that one-half of these plumbing fixtures have replaced all fixtures in some pre-1992 residences and one-half of these plumbing fixtures are spread out, replacing only a portion of the fixtures in some pre-1992 residences, then 22.5 percent of pre-1992 residences already have low-water-use fixtures.

3. It will take approximately 15 years to demonstrate that 75% of residences have LFSHs.

We are assuming that two LFSHs in a residence must be replaced to meet MOU requirements. If 22.5% of the residences have low-water-use fixtures, then 52.5% of the pre-1992 residences must still be replaced. At 5% of the residences replaced per year (10% replaced per reporting period) it would take 15 years to demonstrate that a total of 75% of residences have LFSHs.

4. There are an average of 1.1 showers, 1.6 toilets, and 2.4 faucets (1 kitchen faucet and 1.4 other faucets) per residence.

For DMM 14, we determined that there is an average of 1.6 toilets per residence (see DMM 14 for details). Based on professional judgement, we assumed there are two-thirds the number of showers as toilets, and 1.5 times the number of faucets as toilets. This assumption will be modified based upon updated data gathered in the future.

5. Water savings from one low-flow showerhead = 5.5 gpd

A & N Technical Services report (2000, page 2-16).

6. Water savings from one faucet aerator = 1.5 gpd

A & N Technical Services report (2000, page 2-16).

7. Water savings from one toilet flapper = 8 gpd; assume 20 percent of toilets leak.

A & N Technical Services report (2000, page 2-16). Percentage of toilets with leaks based on SCWC data.

8. Water savings from kitchen "flip" faucet aerator = 3.0 gpd.

Based on SCWC data. Kitchen faucet water savings are due to the intermittent use of the flip feature during the rinse cycle.

9. Indoor water savings = 13.7 gpd/unit.

We used the following equation to calculate indoor water savings, based on assumptions 4 through 8:

$$[(1.1*5.5) + (1.0*3.0+1.4*1.5) + (1.6*8*0.20)]$$

10. The DMM will cost an average of $20.00 per residence.

We based this cost estimate on information provided by SCWC. It is assumed that this DMM is done in conjunction with DMM 1.

11. The life span of the retrofit devices is four years.

A & N Technical Services report (2000, page 2-16) gives life spans for various components of a water survey. We selected four years as a reasonable average value based on that information.

DMM 6 – High-Efficiency Washing Machine Rebate Programs
Description: Provide rebates to single-family residences for high-efficiency washing machines.
Assumptions 1. Each rebate will cost $75. *The MOU does not require implementation of this DMM if the maximum cost-effective rebate is less than $50 (MOU, page 31). A $50 rebate plus an additional $25 per rebate for program administration and overhead was assumed.* 2. Each high efficiency washing machine will reduce water usage by 1,170 gallons per year. *MOU, Section F, page 38.* 3. Rebates will be accepted by one percent of single-family residences per year for 20 years. *Estimate based on professional judgment.* 4. The life span of a high efficiency washing machine is 12 years. *Pekelney, D.M., T.W. Chesnutt, and W.M. Hanemann. 1996. Guidelines for Preparing Cost Effective Analysis of Urban Water Conservation Best Management Practices. Prepared for the California Urban Water Conservation Council. September 1996.*

DMM 14 – Residential ULFT Replacement Programs
Description: Implement a program to replace existing high-water-using toilets with ultra-low-flush toilets (ULFT) in single- and multi-family residences.

Assumptions:

1. There are an average of 2.5 people per single-family residence and 2.5 people per multi-family residence.

Based on information in the General Plan for the City.

2. There are an average of 1.6 toilets per single-family residence and 1.5 toilets per multi-family residence.

Based on professional judgment, it was assumed a one bedroom unit has 1 toilet, a two bedroom unit has 1.5 toilets, a three bedroom unit has 2 toilets, a four bedroom unit has 2.5 toilets and a five bedroom unit has 3 toilets. Because multi-family units tend to have fewer toilets on average than single-family units, it was assumed 1.5 toilets per multi-family residence and calculated that the single-family units would need to have 1.6 toilets per unit to achieve an overall average of 1.58 toilets per dwelling unit.

3. Water savings from ULFTs are 36.5 gpd/unit for single-family residences and 49.0 gpd/unit for multi-family residences.

MOU, Exhibit 6, Table 1 and Table 2.

4. Homes constructed after 1991 already have ULFTs. Based on the low growth rate, it is assumed that no residences were built after 1991.

As of January 1992, California legislation requires that ULFTs be installed in all newly constructed homes.

5. The life span of the new ULFTs is 20 years.

MOU, page 70.

6. Natural toilet replacement rate is 4% per year.

MOU, page 70.

7. Average resale rate for single-family units in Mendocino County is 2.56%

Assumption based on the 1996 single-family average resale rate for Mendocino County. This rate was obtained from the CUWCC Website, www.cuwcc.org, December 2005.

8. Average resale rate for multi-family units in Mendocino County is 1.2%

Assumption based on the 1998 multi-family average resale rate for Mendocino County. This rate was obtained from the CUWCC Website, www.cuwcc.org, December 2005.

9. The cost of toilets, advertising, administration, overhead, and toilet recycling is $150 per ULFT. The cost does not include installation, which will be covered by the customer.

City of Ukiah
Economic Analysis Worksheets
BMP 1. Water Survey Programs for Single-Family and Multi-Family Residential Customers

													Benefits ($)					Costs ($)					
Calendar Year	**Single Family Interventions**	**Multi Family Interventions**	**Percent Units Surveyed[a]**	**Single-Family Outdoor Savings (AF/yr)**	**Multi-Family Outdoor Savings (AF/yr)**	**Total Outdoor Savings (AF/yr)**	**Total Indoor Savings (AF/yr)**	**Annual Water Savings (AF/yr)**	**1**	**2**	**3**	**4**	**Avoided Capital Costs**	**Avoided Variable Costs**	**Avoided Purchase Costs**	**Total Undiscounted Benefits**	**Total Discounted Benefits**	**Capital Costs**	**Financial Incentives**	**Operating Expenses**	**Total Undiscounted Costs**	**Total Discounted Costs**	**Net Present Value ($)**
Pre-2006	0	0	0.0%	0	0.0	0	0.00	0	0.0				0	0	0	0	0	0	0	0	0	0	0
2006	24	13	0.8%	1.05	0.2	1.28	0.02	1.30	1.3	0.0			0	744	0	744	701	0	0	2,054	2,054	1,935	-1,234
2007	24	13	0.8%	1.05	0.2	1.28	0.02	2.61	1.3	1.3	0.0		0	1,487	0	1,487	1,320	0	0	2,054	2,054	1,823	-503
2008	33	19	1.1%	1.47	0.3	1.79	0.03	4.43	1.8	1.3	1.3	0.0	0	2,529	0	2,529	2,114	0	0	2,875	2,875	2,404	-290
2009	33	19	1.1%	1.47	0.3	1.79	0.03	6.25	1.8	1.8	1.3	1.3	0	3,570	0	3,570	2,812	0	0	2,875	2,875	2,265	547
2010	43	24	1.4%	1.88	0.4	2.31	0.04	7.30	2.3	1.8	1.8	1.3	0	4,165	0	4,165	3,090	0	0	3,697	3,697	2,743	347
2011	43	24	1.4%	1.88	0.4	2.31	0.04	8.34	2.3	2.3	1.8	1.8	0	4,760	0	4,760	3,327	0	0	3,697	3,697	2,584	743
2012	53	30	1.7%	2.30	0.5	2.82	0.05	9.38	2.9	2.3	2.3	1.8	0	5,355	0	5,355	3,526	0	0	4,518	4,518	2,975	551
2013	53	30	1.7%	2.30	0.5	2.82	0.05	10.42	2.9	2.9	2.3	2.3	0	5,950	0	5,950	3,691	0	0	4,518	4,518	2,803	888
2014	86	48	2.7%	3.77	0.8	4.61	0.08	12.77	4.7	2.9	2.9	2.3	0	7,289	0	7,289	4,260	0	0	7,394	7,394	4,321	-61
2015	86	48	2.7%	3.77	0.8	4.61	0.08	15.11	4.7	4.7	2.9	2.9	0	8,627	0	8,627	4,750	0	0	7,394	7,394	4,071	679
2016								12.25		4.7	4.7	2.9	0	6,991	0	6,991	3,626						3,626
2017								9.38			4.7	4.7	0	5,355	0	5,355	2,616						2,616
2018								4.69				4.7	0	2,677	0	2,677	1,232						1,232
2019																							
2020																							
2021																							
2022																							
2023																							
2024																							
2025																							
Totals:	478	269	15%	--	--	--	--	104					0	59,499	0	59,499	37,066	0	0	41,077	41,077	27,924	9,142

Note: Economic analysis performed in 2005 dollars.

[a]Percent surveyed from MOU, Exhibit 1,1.E(d)

Value of conserved water ($/AF) =	$1,206
Discount rate (real) =	6.15%
Indoor water savings (gpd/unit) =	0.50
Outdoor water savings =	10%
Single-family outdoor water usage (gpd/unit) =	391
Multi-family outdoor water usage (gpd/unit) =	156
Conservation measure unit cost ($) =	55.00
2005 single family units =	3,187
2005 multi-family units =	1,792
Year signed MOU =	2005
Year implement BMP =	2006

Benefit to cost ratio:	**1.33**
Simple pay-back period (years):	**9.8**
Discounted cost / water saved ($/acre-feet):	**268**
NPV / water saved ($/acre-feet):	**88**

Credit Table for Previously Performed Surveys

Year	Single family units surveys	Multi-family units surveys	% Credit	Single family credits	Multi-family credits
Pre-1990			0.0%	0	0
1990			12.5%	0	0
1991			25.0%	0	0
1992			37.5%	0	0
1993			50.0%	0	0
1994			62.5%	0	0
1995			75.0%	0	0
1996			87.5%	0	0
1997			100.0%	0	0
1998			100.0%	0	0
1999			100.0%	0	0
2000			100.0%	0	0
2001			100.0%	0	0
2002			100.0%	0	0
2003			100.0%	0	0
2004			100.0%	0	0
2005			100.0%	0	0
				0	0

Implementation schedule (MOU Exhibit 1.E.d, page 17)

On track if the percent of single family and multi-family accounts receiving surveys equals or exceeds:

1.5%	by end of first reporting period
3.6%	by end of second reporting period
6.3%	by end of third reporting period
9.6%	by end of fourth reporting period
13.5%	by end of fifth reporting period
15%	Single family surveys within 10 years
15%	Single family surveys within 10 years

City of Ukiah
Economic Analysis Worksheets
BMP 2. ***Residential Plumbing Retrofit***

						Benefits ($)					Costs ($)					
Calendar Year	**Single Family Interventions**	**Multi Family Interventions**	**Percent Units Receiving Retrofits**	**Incremental Water Savings (AF/yr)**	**Annual Water Savings (AF/yr)**	**Avoided Capital Costs**	**Avoided Variable Costs**	**Avoided Purchase Costs**	**Total Undiscounted Benefits**	**Total Discounted Benefits**	**Capital Costs**	**Financial Incentives**	**Operating Expenses**	**Total Undiscounted Costs**	**Total Discounted Costs**	**Net Present Value ($)**
2006	159	90	5.0%	3.8	4	0	4,608	0	4,608	4,341	0	0	4,979	4,979	4,691	-350
2007	159	90	5.0%	3.8	8	0	9,215	0	9,215	8,178	0	0	4,979	4,979	4,419	3,759
2008	159	90	5.0%	3.8	11	0	13,823	0	13,823	11,557	0	0	4,979	4,979	4,163	7,394
2009	159	90	5.0%	3.8	15	0	18,430	0	18,430	14,516	0	0	4,979	4,979	3,922	10,595
2010	159	90	5.0%	3.8	15	0	18,430	0	18,430	13,675	0	0	4,979	4,979	3,694	9,981
2011	159	90	5.0%	3.8	15	0	18,430	0	18,430	12,883	0	0	4,979	4,979	3,480	9,402
2012	159	90	5.0%	3.8	15	0	18,430	0	18,430	12,136	0	0	4,979	4,979	3,279	8,858
2013	159	90	5.0%	3.8	15	0	18,430	0	18,430	11,433	0	0	4,979	4,979	3,089	8,345
2014	159	90	5.0%	3.8	15	0	18,430	0	18,430	10,771	0	0	4,979	4,979	2,910	7,861
2015	159	90	5.0%	3.8	15	0	18,430	0	18,430	10,147	0	0	4,979	4,979	2,741	7,406
2016	159	90	5.0%	3.8	15	0	18,430	0	18,430	9,559	0	0	4,979	4,979	2,582	6,977
2017	159	90	5.0%	3.8	15	0	18,430	0	18,430	9,005	0	0	4,979	4,979	2,433	6,572
2018	159	90	5.0%	3.8	15	0	18,430	0	18,430	8,483	0	0	4,979	4,979	2,292	6,192
2019	159	90	5.0%	3.8	15	0	18,430	0	18,430	7,992	0	0	4,979	4,979	2,159	5,833
2020	159	90	5.0%	3.8	15	1	18,430	1	18,432	7,530	0	0	4,979	4,979	2,034	5,496
2021				0	11	2	13,823	2	13,827	5,321						
2022				0	8	3	9,215	3	9,221	3,343						
2023				0	4	4	4,608	4	4,616	1,576						
2024																
2025																
Totals:	2,390	1,344	--	--	229	10	276,453	10	276,473	162,446	0	0	74,685	74,685	47,887	104,319

Note: Economic analysis performed in 2005 dollars.	Value of conserved water ($/AF) =	$1,206	Benefit to cost ratio: **3.4**
	Discount rate (real) =	6.15%	Simple pay-back period (years): **4**
	Water savings (gpd/unit) =	13.7	Discounted cost / water saved ($/acre-feet): **209**
	Conservation measure unit cost ($) =	20.00	NPV / water saved ($/acre-feet): **455**
	Percent units receiving retrofits =	5%	
	1991 single family units =	3,187	
	1991 multi-family units =	1,792	
	Year signed MOU =	2005	
	Year implement BMP =	2006	

City of Ukiah
Economic Analysis Worksheets
BMP 6. High-Efficiency Washing Machine Rebate Programs

					Benefits ($)					Costs ($)					
Calendar Year	**Total Single-Family Units**	**Number of Units Accepting Rebates**	**Incremental Water Savings (AF/yr)**	**Annual Water Savings (AF/yr)**	**Avoided Capital Costs**	**Avoided Variable Costs**	**Avoided Purchase Costs**	**Total Undiscounted Benefits**	**Total Discounted Benefits**	**Capital Costs**	**Financial Incentives**	**Operating Expenses**	**Total Undiscounted Costs**	**Total Discounted Costs**	**Net Present Value ($)**
2006	3316	33	0.1	0	0	144	0	144	135	0	1,658	829	2,487	2,343	-2,207
2007	3445	34	0.1	0	0	293	0	293	260	0	1,722	861	2,583	2,293	-2,033
2008	3574	36	0.1	0	0	447	0	447	374	0	1,787	893	2,680	2,241	-1,867
2009	3703	37	0.1	1	0	608	0	608	479	0	1,851	926	2,777	2,187	-1,708
2010	3832	38	0.1	1	0	774	0	774	574	0	1,916	958	2,874	2,132	-1,558
2011	3871	39	0.1	1	0	941	0	941	658	0	1,935	968	2,903	2,029	-1,371
2012	3910	39	0.1	1	0	1,111	0	1,111	731	0	1,955	977	2,932	1,931	-1,200
2013	3949	39	0.1	1	0	1,282	0	1,282	795	0	1,974	987	2,962	1,837	-1,042
2014	3988	40	0.1	1	0	1,454	0	1,454	850	0	1,994	997	2,991	1,748	-898
2015	4027	40	0.1	1	0	1,629	0	1,629	897	0	2,014	1,007	3,020	1,663	-766
2016	4027	40	0.1	1	0	1,803	0	1,803	935	0	2,014	1,007	3,020	1,567	-631
2017	4027	40	0.1	2	0	1,978	0	1,978	966	0	2,014	1,007	3,020	1,476	-510
2018	4027	40	0.1	2	0	2,008	0	2,008	924	0	2,014	1,007	3,020	1,390	-466
2019	4027	40	0.1	2	0	2,034	0	2,034	882	0	2,014	1,007	3,020	1,310	-428
2020	4027	40	0.1	2	0	2,053	0	2,053	839	0	2,014	1,007	3,020	1,234	-395
2021	4027	40	0.1	2	0	2,067	0	2,067	796	0	2,014	1,007	3,020	1,162	-367
2022	4027	40	0.1	2	0	2,076	0	2,076	753	0	2,014	1,007	3,020	1,095	-342
2023	4027	40	0.1	2	0	2,083	0	2,083	711	0	2,014	1,007	3,020	1,032	-320
2024	4027	40	0.1	2	0	2,088	0	2,088	672	0	2,014	1,007	3,020	972	-300
2025	4027	40	0.1	2	0	2,091	0	2,091	634	0	2,014	1,007	3,020	916	-282
Totals:		779	--	24	0	28,963	0	28,963	13,865	38,942	38,942	19,471	58,413	32,557	-18,692

Note: Economic analysis performed in 2005 dollars.	Value of conserved water ($/AF) =	$1,206	Benefit to cost ratio: **0.4**
	Discount rate (real) =	6.15%	Simple pay-back period (years): **47**
	Water savings (gpy/unit) =	1,170	Discounted cost / water saved ($/acre-feet): **1356**
	Amount of rebate ($) =	50	NPV / water saved ($/acre-feet): **-778**
	Cost to administer rebate ($) =	25	
	Percent accepting rebates =	1.0%	
	Single family units in 2005 =	3,187	
	Single family units in 2010 =	3,832	
	Single family units in 2015 =	4,027	
	Single family units in 2020 =	4,027	
	Single family units in 2025 =	4,027	
	Year signed MOU =	2005	
	Year implement BMP =	2006	

City of Ukiah
Economic Analysis Worksheets (3 pages)
BMP 14. Residential ULFT Replacement Programs

	Determination of Water Conservation Goal: Single-Family Units										
Calendar Year	**Single-Family Units**	**SF Units Naturally Retrofitted**	**SF Toilets Naturally Retrofitted**	**Water Savings from Natural Replacement SF (AF/yr)**	**Single-Family Units**	**SF Units Naturally Retrofitted**	**Single-Family Turnover**	**Combined SF Homes Retrofitted**	**Combined SF Toilets Retrofitted**	**Water Savings from Natural Replacement and Turnover SF (AF/yr)**	**Water Savings from Turnover SF (AF/yr)**
First year program is implemented.											
2006	1,728	69	111	3	1,728	69	44	113	181	5	2
2007	1,659	66	106	3	1,614	65	41	106	169	4	2
2008	1,592	64	102	3	1,508	60	39	99	158	4	1
2009	1,528	61	98	2	1,409	56	36	92	148	4	1
2010	1,467	59	94	2	1,317	53	34	86	138	4	1
2011	1,409	56	90	2	1,231	49	32	81	129	3	1
2012	1,352	54	87	2	1,150	46	29	75	121	3	1
2013	1,298	52	83	2	1,074	43	28	70	113	3	1
2014	1,246	50	80	2	1,004	40	26	66	105	3	1
2015	1,196	48	77	2	938	38	24	62	98	3	1
2016	1,149	46	74	2	877	35	22	58	92	2	0
2017	1,103	44	71	2	819	33	21	54	86	2	0
2018	1,059	42	68	2	765	31	20	50	80	2	0
2019	1,016	41	65	2	715	29	18	47	75	2	0
2020	976	39	62	2	668	27	17	44	70	2	0
2021	937	37	60	2	624	25	16	41	66	2	0
2022	899	36	58	1	583	23	15	38	61	2	0
2023	863	35	55	1	545	22	14	36	57	1	0
2024	829	33	53	1	509	20	13	33	53	1	0
2025	795	32	51	1	476	19	12	31	50	1	0
Totals:		**964**	**1,542**	**39**	**19,556**	**782**	**501**	**1,283**	**2,053**	**52**	**13**

Credit Table for Previously Installed ULF Toilets

Year	Avg. # of Installed Toilets: Single Family	Avg. # of Installed Toilets: Multi-family	Incremental Water Savings (Ac-ft/yr)	Annual Water Savings (Ac-ft/yr)
1991			0	0
1992			0	0
1993			0	0
1994			0	0
1995			0	0
1996			0	0
1997			0	0
1998			0	0
1999			0	0
2000			0	0
	0	0		0

City of Ukiah
Economic Analysis Worksheets (3 pages)
BMP 14. Residential ULFT Replacement Programs

	Determination of Water Conservation Goal: Multi-Family Units											Conservation Goal - Combined	
Calendar Year	Multi-Family Units	MF Units Naturally Retrofitted	MF Toilets Naturally Retrofitted	Water Savings from Natural Replacement MF (AF/yr)	Multi-Family Units	MF Units Naturally Retrofitted	Multi-Family Turnover	Combined MF Homes Retrofitted	Combined MF Toilets Retrofitted	Water Savings from Natural Replacement and Turnover MF (AF/yr)	Water Savings from Turnover MF (AF/yr)	Annual Water Savings from Turnover (AF/yr)	Cumulative Water Savings from Turnover (AF/yr)
2006	971	39	58	2.1	971	39	12	51	76	3	1	2	2
2007	933	37	56	2.0	921	37	11	48	72	3	1	5	7
2008	895	36	54	2.0	873	35	10	45	68	2	1	7	14
2009	859	34	52	1.9	828	33	10	43	65	2	0	8	22
2010	825	33	50	1.8	785	31	9	41	61	2	0	10	32
2011	792	32	48	1.7	744	30	9	39	58	2	0	11	43
2012	760	30	46	1.7	705	28	8	37	55	2	0	13	56
2013	730	29	44	1.6	668	27	8	35	52	2	0	14	69
2014	701	28	42	1.5	634	25	8	33	49	2	0	15	84
2015	673	27	40	1.5	601	24	7	31	47	2	0	15	99
2016	646	26	39	1.4	569	23	7	30	44	2	0	16	115
2017	620	25	37	1.4	540	22	6	28	42	2	0	17	132
2018	595	24	36	1.3	512	20	6	27	40	1	0	17	149
2019	571	23	34	1.3	485	19	6	25	38	1	0	17	166
2020	549	22	33	1.2	460	18	6	24	36	1	0	18	184
2021	527	21	32	1.2	436	17	5	23	34	1	0	18	202
2022	506	20	30	1.1	413	17	5	21	32	1	0	18	220
2023	485	19	29	1.1	392	16	5	20	31	1	0	18	238
2024	466	19	28	1.0	371	15	4	19	29	1	0	18	257
2025	447	18	27	1.0	352	14	4	18	27	1	0	18	275
	13,551	**542**	**813**	**30**	**12,261**	**490**	**147**	**638**	**956**	**35**	**5**	**275**	

Value of conserved water ($/AF) =	$1,206
Discount rate (real) =	6.15%
Natural toilet replacement rate =	4.0%
Annual single-family housing turnover rate =	2.56%
Annual multi-family housing turnover rate =	1.20%
Water savings due to toilet replacement at SF homes (gal/dwelling unit/day) =	36.5
Water savings due to toilet replacement at MF homes (gal/dwelling unit/day) =	49.0
Number of toilets per SF home =	1.6
Number of toilets per MF home =	1.5
Cost of conservation measure ($) =	140
1991 single family units =	3,187
1991 multi-family units =	1,792
Year signed MOU =	2005
Year implement BMP =	2006

City of Ukiah
Economic Analysis Worksheets (3 pages)
BMP 14. Residential ULFT Replacement Programs

	Water Savings from ULFT Replacement Program						Benefits ($)					Costs ($)					
Calendar Year	No. of SF Toilets Required to be Replaced	Incremental[a] Water Savings SF (AF/yr)	No. of MF Toilets Required to be Replaced	Incremental[a] Water Savings MF (AF/yr)	Annual[b] Water Savings (AF/yr)	Cummulative[c] Water Savings (AF/yr)	Avoided Capital Costs	Avoided Variable Costs	Avoided Purchase Costs	Total Undiscounted Benefits	Total Discounted Benefits	Capital Costs	Financial Incentives	Operating Expenses	Total Undiscounted Costs	Total Discounted Costs	Net Present Value ($)
10-year toilet replacement program.																	
Pre-2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	320	8	320	12	20	20	0	23,984	0	23,984	22,594	0	0	89,600	89,600	84,409	-61,815
2007	280	7	280	10	37	57	0	44,970	0	44,970	39,910	0	0	78,400	78,400	69,579	-29,669
2008	270	7	270	10	54	111	0	65,206	0	65,206	54,516	0	0	75,600	75,600	63,207	-8,690
2009	200	5	200	7	66	178	0	80,196	0	80,196	63,164	0	0	56,000	56,000	44,107	19,057
2010	175	4	175	6	77	255	0	93,312	0	93,312	69,237	0	0	49,000	49,000	36,358	32,879
2011	170	4	170	6	88	343	0	106,053	0	106,053	74,132	0	0	47,600	47,600	33,273	40,859
2012	130	3	130	5	96	439	0	115,797	0	115,797	76,253	0	0	36,400	36,400	23,970	52,283
2013	100	3	100	4	102	541	0	123,291	0	123,291	76,484	0	0	28,000	28,000	17,370	59,114
2014	120	3	120	4	110	651	0	132,285	0	132,285	77,309	0	0	33,600	33,600	19,636	57,673
2015	55	1	55	2	113	764	0	136,408	0	136,408	75,100	0	0	15,400	15,400	8,479	66,621
2016	60	2	60	2	117	881	0	140,904	0	140,904	73,081	0	0	16,800	16,800	8,713	64,368
2017					117	998	0	140,904	0	140,904	68,847	0	0	0	0	0	68,847
2018					117	1,115	0	140,904	0	140,904	64,858	0	0	0	0	0	64,858
2019					117	1,231	0	140,904	0	140,904	61,101	0	0	0	0	0	61,101
2020					117	1,348	0	140,904	0	140,904	57,561	0	0	0	0	0	57,561
2021					117	1,465	0	140,904	0	140,904	54,226	0	0	0	0	0	54,226
2022					117	1,582	0	140,904	0	140,904	51,084	0	0	0	0	0	51,084
2023					117	1,699	0	140,904	0	140,904	48,124	0	0	0	0	0	48,124
2024					117	1,816	0	140,904	0	140,904	45,336	0	0	0	0	0	45,336
2025					117	1,932	0	140,904	0	140,904	42,710	0	0	0	0	0	42,710
	1,880		**1,880**		**1,932**		**0**	**2,330,545**	**0**	**2,330,545**	**1,195,626**	**0**	**0**	**526,400**	**526,400**	**409,099**	**786,527**

[a]Incremental Water Savings is water savings from replaced toilets during corresponding year only.

[b]Annual Water Savings is water savings from all replaced toilets through corresponding year.

[c]Cummulative Water Savings is running total of water saved through corresponding year. "Cummulative Water Savings" must match "Cummulative Water Savings from Turnover" within 10% each reporting period through 2008.

Note: Economic analysis performed in 2005 dollars.

Benefit to cost ratio: **2.9**

Simple pay-back period (years): **7**

Discounted cost / water saved ($/acre-feet): **212**

NPV / water saved ($/acre-feet): **407**

APPENDIX G

Resolution to Adopt the Urban Water Management Plan

RESOLUTION NO. 2007-43

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH ADOPTING UPDATED URBAN WATER MANAGEMENT PLAN

WHEREAS,

1. The City last updated its Urban Water Management Plan ("UWMP") on October 13, 2002; and

2. Water Code Section 10621 the City is required to update its plan every five years in years ending in 0 and 5; and

3. The City has circulated the draft among diverse agencies, persons and organizations within and without the City of Ukiah; and

4. The City has considered and responded to all comments received on the draft plan; and

5. The City published in a newspaper of general circulation notice of the hearing and mailed notice of the hearing to Mendocino County all as required by law; and

6. The City Council conducted a hearing on the proposed UWMP update and considered the proposed plan and all comments received prior to and at the hearing;

NOW, THEREFORE, BE IT RESOLVED that:

1. the City Council of the City of Ukiah hereby adopts the updated Urban Water Management Plan as proposed and revised prior to the adoption of this resolution, which final document is attached hereto as Exhibit A; and

2. The City Clerk is directed to submit to the Department of Water Resources, the California State Library, and Mendocino County a copy of the UWMP attached hereto as Exhibit A within 30 days of the adoption of this resolution.

PASSED AND ADOPTED on November 26, 2007, by the following roll call vote:

AYES: Councilmember Thomas, Crane, McCowen, and Mayor Rodin
NOES: Councilmember Baldwin
ABSENT: None

Mari Rodin, Mayor

ATTEST:

Linda Brown, City Clerk

APPENDIX H

Effect of Reduced Eel River Imports on Future Water Supply for City of Ukiah Urban Water Management Plan – Prepared by Wagner and Bonsignore

Effect of Reduced Eel River Imports on Future Water Supply for City of Ukiah Urban Water Management Plan

This report documents analyses conducted to evaluate water supply reliability for the City of Ukiah Urban Water Management Plan. The City holds, among other water rights, a 1954 appropriative water right permit for 20 cfs from Russian River Underflow. This amount corresponds to approximately double the current water use. Physical water availability is expected to be affected by significant reductions in Eel River imports to the Russian River basin. Analyses were conducted to assess impacts to Lake Mendocino operations in response to reduced Eel River imports and to determine the effect on future water supply downstream of Lake Mendocino. The results show sufficient water supply available for the City and that increased diversions by the City will have only minor effects on Lake Mendocino operations.

The City does not control Lake Mendocino and can not cause changes to the release requirements or the amount of Eel River imports. Those decisions are controlled by other agencies. The following analysis shows that under a given set of assumptions there is sufficient water to mimic past releases during the summer months with the result that the reduced imports from the Eel River that are expected will not substantially affect the flow in the River. Lake Mendocino may experience significant changes in seasonal water surface due to reductions in imports, but since the City does not take water out of the lake directly it does not directly affect water levels or storage.

It is important to note that the source of the City's water right is Russian River Underflow which has several components including, Russian River (West Fork), ungauged tributary inflow, groundwater accretion, return flow, percolation of direct precipitation and natural flow from the East Fork Russian River and Eel River imports. In addition the City pumps percolating groundwater from at least one of its wells. The following analyses treats all water supplies and all water diversions as having an equal effect on the system. This particular assumption as explained in more detail below is a simplifying and conservative assumption; the actual impacts are very likely to be less than the modeled impacts attributable to the City.

The first part of the analysis estimates the rate and timing of increased depletions to the Russian River attributable to future City of Ukiah diversions. This is described in Section 1. The second part of the analysis establishes a future baseline condition for Lake Mendocino and the Russian River. This was necessary because hydrological conditions in the Russian River basin have changed over time; future water supply and management will not be the same as historical. Two future baseline scenarios were developed because of uncertainty regarding future water resource management. Because the City has no control over the water supply to Lake Mendocino or Lake operations, the City cannot predict how the system will be operated. Section 2 describes the future baseline scenarios. The third part of the analysis applied the estimated increased City of Ukiah river depletions onto the baseline scenarios to see how streamflows and/or reservoir operations may be affected. This is presented in Section 3.

SECTION 1 – Projected Increased Diversions by City of Ukiah

City of Ukiah annual treated water production has increased from about 2,200 acre-feet in 1960 to about 4,000 acre-feet in recent years, as shown in Figure 1. Peak water use in the City typically occurs in July. The recent monthly water use pattern by the City was used to project annual water use corresponding to 20 cfs in July. State Water Right's Board (predecessor to the State Water Board) issued a permit pursuant to Application 15704 to the City's to divert up to 20 cfs. Based on 20 cfs use in July and the average monthly water use pattern, the annual use would be 8,394 acre-feet. Though the City has a pre-1949 water right for 2.8 cfs and also pumps percolating groundwater, the analysis conducted assumed an ultimate demand of 20 cfs.

Historical water use by the City of Ukiah is already reflected in historical Russian River flows. To evaluate future conditions with the City of Ukiah diverting 8,394 acre-feet per year, it was necessary to model an increase in water use corresponding to the difference between the historical use and the projected level of 8,394 acre-feet.

A portion of the water diverted by the City for municipal use returns to the groundwater system directly via percolation ponds at the wastewater treatment plant. Essentially all of the water used indoors returns to the groundwater system within the same month as diverted. It was estimated that 15 percent of the outdoor water use returns to the river system (also assumed to be within the same month as diverted). Water use during the winter months was taken to be a good estimate of indoor water use during the rest of the year. For each month, an estimate was made of the fraction of diversion that resulted in depletion to the River system. Figure 2 shows the average monthly water diversion and depletion corresponding to a 20 cfs peak diversion.

The annual increase in water use from historical levels up to 8,394 acre-feet per year (corresponding to 20 cfs in the peak month) was distributed by the average monthly pattern of water use and then multiplied by the depletion fraction of diversion for that respective month to estimate the increased draft on the river system corresponding to full use of the City's appropriative right. This increased draft (depletion) was then imposed on the model of Lake Mendocino and the Russian River to evaluate releases or streamflow.

SECTION 2 – Future Baseline Scenarios for Russian River

In this part of the analysis, models of Potter Valley imports, Lake Mendocino operations and Russian River flows were developed and used to establish a future baseline condition upon which the City's diversions were evaluated. The historical hydrology was used to establish a baseline condition. However, historical events will not be repeated because of two significant resource management changes. In 1986, State Water Resources Control Board Decision 1610 (D-1610) was issued setting forth minimum required streamflows on the Russian River below Lake Mendocino. Operations prior to that time did not need to meet D-1610 requirements. Then in 2004, the Federal Energy Regulatory Commission (FERC) amended the hydroelectric license for the Potter Valley Project. The amended license is expected to significantly reduce imports from the Eel River.

In the analysis of future baseline conditions, future Eel River imports were projected by applying the amended FERC license to the hydrology of 1961 through 2006. This resulted in less imports than occurred historically. Lake Mendocino operations were modeled to reflect flood control operations and release of water to meet downstream demands. Downstream demands were projected in two different fashions, creating a Scenario A and Scenario B. In both scenarios, the downstream demand was based on historical irrigation and municipal use and included a projection of the D-1610 requirements to the full 1961 through 2006 study period.

Eel River Imports

The East Fork of the Russian River receives significant imports from the Eel River via the Potter Valley Project operated by PG&E. The historical imports, excluding the portion delivered to the East and West canals of the Potter Valley Irrigation District, averaged about 141,500 acre-feet per year, as shown in Table 1. This represented about 57 percent of the inflow to Lake Mendocino. Table 2 summarizes the monthly inflow to Lake Mendocino as reported by the US Army Corps of Engineers (USACE) and shows that it averaged about 250,100 acre-feet per year.

On January 28, 2004, FERC amended the license for the Potter Valley Project (Proj. 77-110). This license specifies minimum flows for both the Eel River and diversions to the East Fork of the Russian River. The minimum diversion to the East Fork of the Russian River is conditioned on time of year and hydrological classification, as follows.

Minimum Diversion to the East Fork Russian River				
Period		Classification		
From	Through	Normal	Dry	Critical
Sep 16	Apr 14	35 cfs	35 cfs	5 cfs
Apr 15	May 14	35 cfs	25 cfs	5 cfs
May 15	Sep 15	75 cfs	25 cfs	5 cfs

The hydrological classification is determined from unimpaired inflow to Lake Pillsbury (located in the Eel River basin). Table 3 summarizes the classification determined in this analysis.

The FERC license also includes a condition (paragraph E5 on page 63) that disallows diversions to the East Fork Russian River in excess of the specified minimum flows, whenever the storage in Lake Pillsbury is less than Target Storage Curves included in the license. Figure 3 shows the Target Storage Curves. Figure 3 also shows the maximum storage in Lake Pillsbury corresponding to the Certificate of Approval (attached) issued by Division of Safety of Dams on December 4, 1978. The Certificate states that water may be impounded to elevation 1910.0 but the spillway gates must be open from November 1 to April 1. The capacity table for Lake Pillsbury (attached), made by PG&E and dated October 2006, shows the top of spillway gates at 1910.0 feet, which corresponds to 74,993 acre-feet of storage. The spill gates are 10 feet tall. The 2006 capacity table shows the spill crest at 1900.0 feet which corresponds to 54,338 acre-feet of storage. These capacities, 54,338 acre-feet from November through March, and 74,993 acre-feet from April through October, are shown as Maximum Storage in Figure 3.

Because the Target Storage Curves are above the Maximum Storage levels, Condition E5 results in a severe restriction on imports of water through the Potter Valley Project from March 5 to July 17.

In an October 16, 2006, letter (attached) from John Keenan, Sr. Vice President, PG&E to Magalie Salas, Secretary, FERC, Mr. Keenan explained that computer modeling conducted in development of the flow proposal incorporated in the FERC license allowed maximum diversions through the Potter Valley Project tunnel during times of spill at Cape Horn Dam (located on the Eel River immediately downstream of the tunnel diversion). Mr. Keenan further explains that the final language of the license did not incorporate that allowance. We do not know why that allowance was not included in the final language. The diversions to the Russian River through the Potter Valley Project during the spring months will be severely restricted by the existing language unless the condition is modified.

An estimate was made of future inflows to Lake Mendocino based on Eel River imports being restricted to the specified minimum diversion from March 5 to July 17. While the E5 condition would not affect the balance of the year, other requirements of the amended FERC license could affect Potter Valley Project diversions during the balance of the water year. Considerable additional computer modeling would be required to simulate operations in the Eel River basin and even with such a tool, considerable discretion for diversions remains to PG&E.[1] Based on the assumption that PG&E would be able and willing to maximize flow through the Potter Valley Project tunnel for power generation, it was decided that using historical imports for the July 18 through March 4 period would be a reasonable assumption in this analysis.

Table 4 summarizes the Potter Valley Project import to East Fork Russian River as affected by the E5 license condition. Note that (between Table 1 and Table 4) average annual imports drop 37,300 acre-feet or 26 percent. It was assumed for this analysis that an acre-foot less import translated into an acre-foot less inflow to Lake Mendocino on the same day.

Downstream Demands on Russian River

The historical record of outflow from Lake Mendocino provides an indication of water demand from Lake Mendocino downstream on the Russian River from the East Fork Russian River to Dry Creek. A USACE database provided a daily record of outflow from the lake for water years 1961 through 2006. A monthly summary of Lake Mendocino historical outflow is provided in Table 5. Note that releases from the lake were much higher in the wet season of December through April. These high flows were not intended to meet downstream demand but rather resulted from flood control operations in Lake Mendocino. Downstream demands on the Russian River to Dry Creek during the wet season of December through April were estimated

[1] In a June 8, 2007, letter (attached) from Randy Poole (General Manager, SCWA) to David Moller (Manager of Relicensing, PG&E), Mr. Poole states, "The Agency and the County still do not know how PG&E is operating the Project, or whether operating the project using other criterion that is also consistent with the existing Federal Energy Regulatory Commission (FERC) license could have resulted in higher Lake Mendocino storage." Mr. Moller responded to Mr. Poole in a June 22, 2007 letter (attached) and acknowledged that "the reduction in diversions from the Eel River into the EBRR [East Branch Russian River] required by the license amendment was considerably greater than what had been anticipated during the amendment proceeding" but did not provide an explanation of how PG&E is operating the Potter Valley Project.

based on application of the D-1610 minimum streamflow requirements to the period of record, 1961 through 2006.

Downstream demands on the Russian River to Dry Creek for instream flow, recreation, agricultural use and municipal use during the dry season of May through November were estimated in two different ways, leading to two Scenarios. In both scenarios, historical Lake releases during the dry season were used as a guide. Table 5 shows historical lake releases in the period May through November were typically in the range of 12,000 to 18,000 acre-feet per month. That corresponds to a rate of 200 to 250 cfs. Figure 4 shows the distribution of historical daily releases from Lake Mendocino during the months of May through November. This figure shows the percent of days during May through November that the Lake release exceeded the given value. The median flow was 230 cfs. Only 27 percent of the daily releases were greater than 275 cfs. The higher release rates suggest that there were surplus releases and thus were not considered to represent demands on the Russian River.

Scenario A estimated downstream demands on the Russian River for release from Lake Mendocino as the historical daily release capped at 275 cfs. In other words, historical daily releases less than 275 cfs during the dry season of May through November were assumed to be the measure of downstream demand for fisheries, recreation, agricultural and municipal uses. On days when the May though November release exceeded 275 cfs, the downstream demand was assumed to be 275 cfs.

D-1610 specifies a minimum instream flow from the East Fork Russian River to Dry Creek for all months of the year. If any of the historical Lake releases during May through November were insufficient to meet the D-1610 minimum requirement, the downstream demand in Scenario A was adjusted to satisfy the D-1610 requirement.

The D-1610 minimum streamflow requirement was instrumental in estimating downstream demands in Scenario B. Review of historical gage records on the Russian River between Lake Mendocino and Dry Creek show river flow in excess of the D-1610 requirement. Scenario B downstream demand for release from Lake Mendocino was estimated as the historical Lake release minus the amount that the minimum gaged flow in the river exceeded the D-1610 requirement.

Both estimates (Scenarios) of downstream demand on the Russian River were based on historical Lake releases rather than a cataloguing of water rights or water diversions on the Russian River. In Scenario A, the assumption was that historical Lake releases (up to 275 cfs) were necessary to meet demands. In Scenario B, the assumption was that if the historical Lake release, after providing for all diversions and river channel losses, resulted in river flow in excess of the D-1610 requirement, then the Lake release could be scaled back. Scenario B is an inquiry into whether or not there had been historical releases greater than needed. A further inquiry into the actual historical demand would be necessary to confirm this assumption.

Lake Mendocino Operational Analysis

A spreadsheet model was constructed to simulate Lake Mendocino operations. A daily time step over the 46-year period of record (water years 1961 through 2006) was modeled. A daily record of historical storage content in Lake Mendocino was provided from a US Army Corps of Engineers database.

In the operational analysis during the wet season of December through April, releases were made for flood control and to maintain the D-1610 minimum streamflow. Rather than trying to incorporate in the model all the factors involved in flood routing, including discretionary encroachments into the flood reservation, the modeled reservoir content was required to be no greater than the historical content during the months of December through April.

During the May through November dry season, the downstream demand corresponding to the respective Scenario (A or B) was released from the reservoir. Also, to reflect the flood rule curve, releases were made during the dry season as necessary to keep the Lake below 91,000 acre-feet of storage.

Future Baseline Operations

Figure 5 shows the average monthly outflow from Lake Mendocino under historical and projected future conditions. Outflows during the dry season are greater in Scenario A than in Scenario B. In Scenario A, outflows replicated historical releases up to 275 cfs. In Scenario B, outflows were reduced to the minimum rate needed to satisfy the D-1610 required flow down to Dry Creek. The lesser Lake release during the dry season in Scenario B supports higher Lake levels, shown in Figure 6. Compared to average historical Lake levels, Scenario A Lake levels in July and August are approximately 11 feet lower and Scenario B Lake levels are approximately 6 feet lower.

SECTION 3 – Modeling of Increased City of Ukiah Diversions in Russian River Future Baseline

The effect of the City of Ukiah's increased diversions was then modeled as a change to Future Baseline Scenarios A and B. In Scenario A, it was assumed that the increased depletion to the river system attributable to Ukiah's diversion would necessitate an increased release from Lake Mendocino. In Scenario B, it was assumed that Ukiah's increased depletion to the river would necessitate an increased release from Lake Mendocino whenever that depletion would cause the river flow to drop below the D-1610 minimum flow requirement. Because the City's depletion would affect the river below the confluence of the West and East Forks, there would be times when the increased depletion would not necessitate increased Lake release. If the minimum historical gage flow was at Hopland, Cloverdale or Healdsburg, the increased depletion by Ukiah would necessitate additional release from Lake Mendocino. If the minimum gauged flow occurred at the confluence of the Forks, no additional release would be required. Note that the minimum flow requirement in D-1610 affects the river from the Forks to Dry Creek and is assumed to apply along this entire reach. It would be possible that the flow could be below the

minimum at the Forks, and higher than the minimum at Hopland, Cloverdale and Healdsburg, in which case a release of stored water to maintain the minimum flow would not be required.

Figure 7 shows the average outflows modeled for Scenario A, with and without the increased diversion by City of Ukiah. Figure 8 shows the effect on Lake levels due to Ukiah's increased diversion under Scenario A. Slightly greater outflows are required in the dry season, resulting in slightly lower Lake levels. During the wet season, outflows for flood control are reduced, allowing the Lake levels to rebound to baseline conditions.

Figure 9 shows the modeled Lake outflows for Scenario B, with and without Ukiah's increased diversion. Figure 10 shows the effect on Lake levels due to Ukiah's increased diversions in Scenario B. Again, slightly greater outflows are required in the dry season, resulting in slightly lower Lake levels, which then rebound to baseline levels during the wet season.

Ukiah Valley Groundwater Basin

The Ukiah Valley groundwater basin (aquifer) underlies Ukiah Valley and Redwood Valley. Geologic and groundwater characteristics underlying Sanel Valley are similar, however, bedrock effectively separates the Sanel aquifer from the Ukiah aquifer.

The Ukiah Valley is the largest of several interior valleys in Mendocino County that fall along the north-northwest trending Maacama Fault Zone. The basement rock is of the Franciscan Complex, of variable but minor water yielding capacity. The valley is filled up to 2000 feet deep with unconsolidated or loosely cemented gravel, sand, silt, and clay deposited through eons of erosion, transport and sedimentation.

The valley fill is categorized as three separate deposits. The oldest and lowest unit is the continental basin deposits. It is estimated to be up to 2000 feet in depth near the axis of the valley. Wells completed in the continental basin deposits produce water slowly because of consolidated, fine-grained material and low permeability. Well yield ranges from 1 – 50 gallons per minute (gpm).

The second unit is the continental terrace deposits, situated mostly on the periphery of the valley. These deposits are relatively thin (up to 25 feet), have a low permeability and are not a significant groundwater source.

The third valley fill unit is the Holocene alluvium, consisting of uncemented gravel, sand, silt and clay deposited in the last 10,000 years. The Holocene alluvium covers approximately 30 square miles throughout broad areas of the flood plain and more narrow bands along the Russian River north of the Forks and along tributary streams. It is generally less than 100 feet thick but extends up to 200 feet in depth. Consisting of coarse and uncemented sediments, the alluvium exhibits high porosity and permeability, thereby holding a significant quantity of water and transmitting water rapidly. Well yields range from 100 to 1000 gpm.

The volume of water available from pumping from upper 100 feet of the most productive portion of the aquifer is estimated at 90,000 acre-feet.

Groundwater in the alluvium is hydraulically connected to and interacts with surface flows. The principal source of groundwater is infiltration of precipitation. Other sources contributing to Ukiah valley groundwater are streamflow leakage, deep percolation from irrigation and treated effluent discharged via the City of Ukiah percolation ponds.

Water Level in the Ukiah Valley

The groundwater table (the underground water surface) fluctuates seasonally, being at its highest level in March or April at the end of the wet season, and at its lowest in October, at the end of the dry season. Seasonal fluctuations range on the order of 5 to 20 feet.

Measurements have been taken and recorded over a long time period at a few wells in the valley. Measurements were generally taken twice a year, at the end of the wet season and at the end of the dry season. The groundwater measurements show the water table rebounds during the wet season to about the same elevation in all but abnormally dry years such as 1977. The water table rebounded completely in one year of normal precipitation. Water surface measurements over the long-term show no trend in groundwater levels.

A 1986 USGS investigation of groundwater levels in the Ukiah Valley (Ground-water Resources in Mendocino County, California; U.S. Geological Survey Water-Resources Investigations Report 85-4258; July 1986) found that, "None of the hydrographs show any prominent long-term declines. Water levels measured during the 1980's are remarkably similar to those measured during the 1960's and 1970's." Bulletin 118 of the California Department of Water Resources, updated 2/27/04, in its section on the Ukiah Valley Groundwater Basin (referenced below and attached) states, "Based on hydrographs from DWR monitored wells, groundwater levels in the past 30 years have remained relatively stable. During drought conditions there is increased drawdown during summer months and less recovery in winter months. Post-drought conditions rebound to approximately the same levels as pre-drought conditions." (A third reference regarding Ukiah valley groundwater is: Cardwell, G. T.; Geology and Ground Water in Russian River Valley Areas and in Round, Laytonville and Little Lake Valleys Sonoma and Mendocino Counties, California; Geological Survey Water Supply Paper 1548; 1965.)

Wagner & Bonsignore prepared Figures 11 through 14 which show water table hydrographs through 2007 from the available record of long-term monitoring of wells in Ukiah Valley. Figure 15 shows the location of those wells. The hydrographs show the seasonal fluctuation due to the precipitation, the effect of drought in 1977, and the absence of a long-term trend in water surface elevation.

Because the alluvium contains and transmits water easily, there is significant interaction between the Ukiah basin aquifer and the Russian River. Water level measurements show that in most years in spring the aquifer is full and spills to the river. At the southern end of the Ukiah groundwater basin, the bedrock rises toward the surface and groundwater must move to the surface stream (Russian River) to move downstream. The predominant movement of water is

from the Ukiah groundwater basin to the Russian River. However, conditions fluctuate and occasionally result in some water moving from the river to the aquifer.

When the river stage is high, water moves from the river into bank storage, where it is temporarily held until the river stage falls and water drains back to the river. When the aquifer water table is low, as happens toward the end of the dry season, water moves from the river to the aquifer. This is compounded by the effect of phreatophytes (water-loving plants) drawing water from the aquifer. Finally, pumping of wells may cause a localized drawdown of the water table, which may result in flow moving from the river to the aquifer.

CONCLUSIONS

The foregoing analysis demonstrated that there is sufficient water supply in the Russian River system for City of Ukiah water diversions to approximately double from current levels up to 20 cfs in July. This water supply was projected to be available despite an estimated 26 percent decline in Eel River imports. Impacts on Lake Mendocino water elevations due to increased City of Ukiah diversions were estimated, on average, to be about one foot in September. (Figures 8 and 10).

It is likely that the simplifying assumptions made have overstated the potential impact of increased City diversions. The model assumes that an increase in diversion by the City, less an allowance for return flow, necessarily results in an effect on the Russian River. This is not the case. The future diversions are likely to be groundwater extractions with a corresponding lag time between extraction and the resulting streamflow depletion. The timing is important because if the actual depletion takes place in the winter, sufficient water will be available from sources other than lake releases to replace the extracted groundwater. While there will still be a stream depletion it will be less than the already small impact predicted by the model.

The foregoing analysis also evaluated how Lake Mendocino and Russian River operations may be affected by the reduced Eel River imports. The analysis showed that demands downstream in the Russian River basin can be satisfied at historical rates (Scenario A), but at the expense of lower levels in Lake Mendocino during the dry season. Alternatively, it may be that historical Lake releases during the dry season were greater than necessary and can be reduced (Scenario B), resulting in less dry season impact to Lake levels. Figures 5 and 6 summarize the change from historical conditions attributable to reduced imports. This impact is the result of regulatory changes and is not the result of any action by the City.

This report identified the assumptions necessary to predict the impact of changes in Eel River imports. These are preliminary determinations for planning purposes based on the best information and analysis currently available. As additional, more accurate information becomes available, this report as well as the Urban Water Management plan it supports may be revised. The City has formally requested Sonoma County Water Agency to assist the City in developing computer models that will more accurately predict the impact of reduced Eel River diversions on the City's water supply and the water supply of upstream and downstream water users. It will take time to develop this additional analysis. The UWMP will be revised as additional and more accurate information becomes available.

TABLE 1

Eel River Imports to East Fork Russian River (acre-feet)

Excluding Imports to Potter Valley Irrigation District Canals

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1961	15,126	17,843	18,471	18,110	16,274	18,402	17,514	16,886	10,048	5,998	6,074	15,430	176,176
1962	17,646	13,349	18,362	18,801	16,628	18,402	16,376	7,533	8,331	10,421	10,600	9,333	165,781
1963	16,168	18,155	18,319	18,330	16,693	16,024	17,211	16,657	10,689	9,684	10,298	10,233	178,462
1964	12,439	16,051	17,930	18,500	17,034	14,699	3,926	3,665	3,120	6,363	6,928	8,532	129,186
1965	15,760	17,985	15,472	18,429	16,811	9,366	16,997	16,995	10,129	10,392	10,746	14,049	173,133
1966	16,590	10,740	13,571	18,439	16,746	17,736	17,642	12,918	6,276	9,678	10,497	14,440	165,273
1967	17,902	17,171	18,693	18,755	16,841	17,739	17,405	17,211	14,729	14,455	14,702	15,484	201,088
1968	15,045	10,391	17,744	18,553	17,351	18,410	11,005	4,146	5,421	10,010	10,092	10,470	148,637
1969	15,907	17,487	17,817	17,683	15,959	17,712	16,526	16,826	12,256	10,057	10,249	14,273	182,751
1970	16,976	14,798	12,907	17,780	16,300	17,627	6,124	5,163	6,490	6,391	6,848	13,174	140,577
1971	16,084	15,834	18,671	18,618	17,042	18,673	16,290	17,207	12,325	4,867	3,095	6,680	165,386
1972	9,356	10,480	15,122	18,411	13,179	17,910	15,295	13,541	4,628	11,640	8,634	14,186	152,382
1973	15,971	17,633	12,242	16,757	16,731	16,820	17,817	13,415	6,897	7,042	6,958	13,401	161,684
1974	6,315	1,580	18,728	15,655	13,558	17,661	17,533	17,187	13,294	4,983	4,253	12,309	143,057
1975	16,444	17,015	16,246	15,486	14,201	17,048	16,029	15,667	10,613	6,758	6,367	14,299	166,172
1976	18,113	17,627	17,604	8,255	5,588	7,242	6,555	2,339	2,991	4,050	4,685	10,919	105,968
1977	15,945	15,654	7,270	3,285	512	1,436	253	838	1,201	1,583	1,450	577	50,005
1978	804	2,233	9,402	17,147	16,138	17,717	17,752	18,482	16,328	8,896	8,813	11,859	145,572
1979	14,530	17,423	7,186	12,210	16,626	18,240	17,112	18,538	9,418	8,466	8,432	16,415	164,595
1980	16,897	16,763	18,443	18,062	17,379	18,286	17,957	16,009	10,987	6,056	3,348	15,154	175,339
1981	17,421	13,184	14,273	11,379	16,636	17,653	11,703	7,962	7,835	6,700	5,169	11,342	141,257
1982	19,579	16,548	19,117	19,434	18,052	19,698	19,270	19,593	18,456	8,281	8,791	15,039	201,859
1983	9,616	13,018	17,354	19,282	17,649	19,482	18,806	18,667	15,931	15,374	14,876	3,420	183,474
1984	4,641	10,940	16,207	19,133	18,115	19,373	15,041	6,293	3,828	5,087	8,992	7,110	134,760
1985	17,854	17,966	18,340	18,791	17,158	19,341	12,014	3,377	5,964	8,417	7,309	14,990	161,520
1986	17,596	9,656	15,591	14,258	13,901	19,168	10,568	6,040	6,166	6,004	5,723	8,571	133,245
1987	17,933	7,591	5,248	5,383	12,044	17,929	6,952	5,568	4,800	5,578	4,544	4,017	97,586
1988	6,064	5,359	15,759	17,500	17,020	8,392	4,854	5,966	5,891	5,389	5,009	4,883	102,087
1989	4,877	8,333	17,933	17,867	12,758	17,963	17,971	11,964	5,401	6,030	5,893	6,311	133,301
1990	16,144	11,492	9,142	16,390	16,644	16,685	3,193	6,788	13,151	4,594	6,060	16,786	137,068
1991	19,123	14,587	4,897	2,202	2,497	16,203	18,248	15,069	8,382	8,210	5,667	7,363	122,447
1992	15,743	11,681	5,002	8,366	12,879	19,772	15,192	11,193	6,024	7,075	6,284	5,816	125,026
1993	8,406	8,589	13,734	16,806	16,423	19,835	19,055	19,420	17,322	9,812	6,897	14,658	170,958
1994	18,335	12,049	10,885	8,513	11,546	13,990	5,597	5,978	3,513	3,695	7,168	3,949	105,220
1995	5,092	5,568	3,721	3,557	5,308	3,160	5,770	6,460	5,320	5,336	5,135	5,486	59,913
1996	5,439	7,672	12,522	16,070	18,333	19,569	19,295	18,601	11,929	8,571	9,285	17,036	164,323
1997	17,201	11,621	16,465	13,113	11,429	9,969	6,936	6,357	6,676	6,308	8,118	9,648	123,842
1998	9,557	17,338	16,263	18,084	14,737	20,236	19,464	18,157	18,292	8,303	7,293	12,012	179,735
1999	17,746	17,058	17,433	11,586	9,894	18,000	12,072	12,054	7,496	6,601	6,631	8,113	144,683
2000	10,127	12,750	11,711	13,002	16,657	17,877	10,441	10,251	6,867	6,857	6,986	7,807	131,333
2001	9,527	11,054	2,862	3,933	3,293	7,094	11,582	6,250	4,717	3,106	2,916	3,437	69,770
2002	5,486	11,709	18,183	17,128	17,276	18,335	6,990	5,371	4,199	4,227	4,425	4,292	117,622
2003	5,159	6,189	7,917	7,914	13,960	16,225	15,297	17,405	9,318	7,686	7,946	13,331	128,347
2004	10,292	9,352	16,828	18,250	14,620	16,860	10,401	6,454	5,227	5,256	5,540	5,879	124,961
2005	6,292	6,827	11,766	16,092	14,420	14,419	12,972	9,555	8,688	7,337	6,952	6,738	122,058
2006	6,770	5,590	3,464	11,006	12,333	9,156	12,240	13,337	7,045	6,861	6,690	7,097	101,590
Average	**12,870**	**12,390**	**13,757**	**14,615**	**14,199**	**15,946**	**13,157**	**11,421**	**8,578**	**7,271**	**7,160**	**10,138**	**141,505**
(cfs)	209	208	224	238	256	259	221	186	144	118	116	170	195

Source: 1976-83 & 1987-2006: per USGS gage #11471099;
1961-75, 1984-86: USGS gage #11471000 reduced to reflect portion to PVID.

TABLE 2
Lake Mendocino Historical Inflows (acre-feet)

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1961	15,291	19,353	35,969	21,350	41,842	42,435	22,203	20,265	9,826	4,320	4,985	16,132	253,971
1962	17,572	14,573	26,744	23,752	47,408	43,770	20,896	7,835	7,942	10,217	10,630	8,803	240,140
1963	22,237	19,067	30,506	23,463	37,885	29,104	52,604	21,930	12,282	10,933	10,949	10,332	281,292
1964	12,984	26,918	19,950	37,988	20,182	17,477	5,252	3,437	1,478	4,538	5,865	8,172	164,242
1965	14,775	25,337	96,216	65,525	21,509	12,845	28,620	19,012	10,225	10,374	10,505	12,881	327,823
1966	15,652	15,517	19,055	53,211	32,595	24,258	19,752	12,554	5,106	10,253	11,421	15,894	235,267
1967	17,727	20,591	36,072	57,537	25,587	32,930	38,662	22,011	17,610	15,511	15,628	16,052	315,918
1968	14,920	10,306	19,006	38,010	36,419	29,417	14,027	4,923	3,354	10,824	12,266	11,782	205,255
1969	16,231	17,939	51,030	74,429	59,079	31,016	21,626	17,897	13,859	10,568	10,459	15,021	339,153
1970	17,677	15,279	35,955	110,638	33,783	27,946	9,350	5,778	5,816	5,651	6,651	14,093	288,615
1971	17,617	23,457	60,891	57,085	20,704	39,662	21,479	20,543	14,309	3,981	1,587	6,210	287,526
1972	9,243	11,687	23,838	28,255	23,586	26,599	19,936	14,519	3,677	10,780	9,755	14,694	196,569
1973	17,852	21,680	26,997	64,563	46,509	35,636	21,908	13,198	8,333	7,238	7,404	15,172	286,489
1974	7,525	21,212	51,285	58,690	30,369	58,767	43,072	22,183	16,003	5,960	4,259	15,079	334,404
1975	19,248	18,391	19,371	23,157	65,981	76,351	24,675	19,777	12,974	8,608	9,136	16,429	314,099
1976	18,938	19,262	19,958	10,469	14,061	16,023	11,157	3,586	2,660	3,447	5,709	11,171	136,441
1977	17,312	17,124	8,817	4,697	1,654	3,104	811	1,819	1,412	547	1,222	2,093	60,612
1978	1,785	4,659	25,052	84,933	57,155	44,674	36,534	22,035	16,386	7,625	7,988	11,738	320,563
1979	15,253	17,885	8,303	25,867	54,269	38,585	19,785	20,375	9,247	7,381	7,097	15,505	239,551
1980	19,688	29,925	34,350	67,522	55,677	38,063	24,560	19,200	12,312	7,684	5,417	16,082	330,481
1981	18,147	14,025	16,782	31,528	28,459	29,889	15,959	9,207	7,454	6,028	3,612	10,320	191,412
1982	19,482	47,749	61,721	52,842	50,875	43,841	67,869	20,926	17,913	8,398	8,797	15,781	416,194
1983	10,818	25,510	51,563	53,134	62,724	112,129	44,202	28,049	18,560	15,787	15,144	4,167	441,787
1984	6,042	36,889	64,059	25,595	31,587	30,199	20,140	8,583	8,053	4,637	9,634	6,843	252,262
1985	20,361	35,788	25,143	20,793	28,660	30,308	16,661	3,913	4,126	7,391	7,301	17,423	217,868
1986	19,488	13,266	22,340	33,747	107,186	56,230	15,327	6,968	5,590	5,375	4,871	9,529	299,917
1987	19,393	9,443	6,684	13,301	23,901	37,827	10,622	6,891	4,380	4,810	5,970	6,724	149,947
1988	9,021	7,859	36,899	51,859	20,886	9,503	7,295	8,426	7,260	6,357	5,808	5,314	176,486
1989	4,864	13,831	26,738	28,626	16,102	59,287	24,445	14,864	9,067	9,285	7,849	6,327	221,283
1990	17,756	12,302	10,148	26,232	28,398	23,824	3,719	8,287	13,644	2,860	4,314	16,465	167,949
1991	19,411	15,081	5,377	3,229	3,747	41,665	20,295	15,499	7,565	7,032	4,267	6,008	149,175
1992	15,912	13,387	5,937	10,407	37,181	29,397	17,415	13,091	6,895	8,301	7,099	6,835	171,856
1993	9,352	8,878	32,045	76,972	40,537	31,226	26,325	23,413	22,086	9,852	7,404	14,515	302,607
1994	17,483	11,377	12,708	13,240	24,540	15,761	6,891	6,661	3,382	3,765	7,170	3,642	126,619
1995	4,933	7,730	10,606	87,312	12,325	68,423	19,018	17,959	7,123	5,363	5,709	5,488	251,988
1996	6,672	8,868	27,981	56,439	43,506	38,539	26,529	22,209	13,238	10,419	10,084	16,866	281,352
1997	16,671	12,802	40,755	68,111	19,589	17,147	8,432	7,313	6,496	5,395	8,430	9,689	220,831
1998	9,560	20,743	27,412	77,942	112,566	41,776	38,403	27,251	24,105	12,803	13,117	12,921	418,600
1999	17,941	17,504	23,477	20,987	59,025	48,780	25,165	13,877	8,220	7,724	8,959	11,272	262,931
2000	13,496	13,922	10,929	22,784	56,849	35,179	13,567	12,442	8,575	7,851	8,789	7,115	211,499
2001	9,695	14,023	5,256	9,225	21,251	19,240	13,161	7,488	5,687	4,364	3,939	4,223	117,552
2002	2,231	19,670	53,382	43,203	27,640	25,024	8,957	6,795	5,794	5,209	5,635	5,427	208,968
2003	5,917	5,911	45,152	37,637	23,310	27,872	41,390	31,423	11,318	9,842	8,723	13,990	262,484
2004	11,084	9,069	44,426	38,623	62,514	25,807	12,944	8,715	8,414	8,210	6,200	4,899	240,906
2005	8,737	6,647	28,723	39,394	24,137	34,108	26,164	23,491	14,232	9,209	6,811	7,024	228,678
2006	7,736	8,662	76,141	63,188	35,447	59,848	53,910	20,434	10,261	6,938	6,343	6,803	355,711
Average	**13,733**	**16,980**	**30,908**	**42,119**	**37,591**	**36,119**	**22,646**	**14,501**	**9,657**	**7,601**	**7,628**	**10,629**	**250,115**
(cfs)	223	285	503	685	677	587	381	236	162	124	124	179	346

Source: USACE.

TABLE 3

Projected Hydrological Classification for Inflows to Lake Pillsbury
Potter Valley Project (FERC 77-110)

	JAN	FEB	MAR	APR	MAY	JUN - DEC
1961	Normal	Normal	Normal	Normal	Normal	Normal
1962	Normal	Normal	Normal	Normal	Normal	Normal
1963	Normal	Normal	Normal	Normal	Normal	Normal
1964	Normal	Normal	Normal	Normal	Normal	Normal
1965	Normal	Normal	Normal	Normal	Normal	Normal
1966	Normal	Normal	Normal	Normal	Normal	Normal
1967	Normal	Normal	Normal	Normal	Normal	Normal
1968	Normal	Normal	Normal	Normal	Normal	Normal
1969	Normal	Normal	Normal	Normal	Normal	Normal
1970	Normal	Normal	Normal	Normal	Normal	Normal
1971	Normal	Normal	Normal	Normal	Normal	Normal
1972	Normal	Normal	Normal	Normal	Normal	Normal
1973	Normal	Normal	Normal	Normal	Normal	Normal
1974	Normal	Normal	Normal	Normal	Normal	Normal
1975	Normal	Normal	Normal	Normal	Normal	Normal
1976	Dry	Critical	Dry	Dry	Dry	Dry
1977	Dry	Critical	Critical	Critical	Critical	Critical
1978	Normal	Normal	Normal	Normal	Normal	Normal
1979	Normal	Dry	Normal	Normal	Normal	Normal
1980	Normal	Normal	Normal	Normal	Normal	Normal
1981	Normal	Normal	Normal	Normal	Normal	Normal
1982	Normal	Normal	Normal	Normal	Normal	Normal
1983	Normal	Normal	Normal	Normal	Normal	Normal
1984	Normal	Normal	Normal	Normal	Normal	Normal
1985	Normal	Normal	Normal	Normal	Normal	Normal
1986	Normal	Normal	Normal	Normal	Normal	Normal
1987	Dry	Dry	Normal	Normal	Normal	Normal
1988	Normal	Normal	Normal	Normal	Normal	Normal
1989	Normal	Normal	Normal	Normal	Normal	Normal
1990	Normal	Normal	Normal	Normal	Dry	Dry
1991	Dry	Critical	Critical	Dry	Dry	Dry
1992	Critical	Dry	Normal	Normal	Normal	Normal
1993	Normal	Normal	Normal	Normal	Normal	Normal
1994	Normal	Normal	Normal	Dry	Dry	Dry
1995	Dry	Normal	Normal	Normal	Normal	Normal
1996	Normal	Normal	Normal	Normal	Normal	Normal
1997	Normal	Normal	Normal	Normal	Normal	Normal
1998	Normal	Normal	Normal	Normal	Normal	Normal
1999	Normal	Normal	Normal	Normal	Normal	Normal
2000	Normal	Normal	Normal	Normal	Normal	Normal
2001	Dry	Critical	Dry	Dry	Dry	Dry
2002	Normal	Normal	Normal	Normal	Normal	Normal
2003	Normal	Normal	Normal	Normal	Normal	Normal
2004	Normal	Normal	Normal	Normal	Normal	Normal
2005	Normal	Normal	Normal	Normal	Normal	Normal
2006	Normal	Normal	Normal	Normal	Normal	Normal

TABLE 4
Estimated Future Imports to East Fork Russian River (ac-ft)

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1961	15,126	17,843	18,471	18,110	16,274	4,788	2,083	3,501	4,463	5,169	6,074	15,430	127,332
1962	17,646	13,349	18,362	18,801	16,628	4,796	2,083	3,501	4,463	7,462	10,600	9,333	127,024
1963	16,168	18,155	18,319	18,330	16,693	4,768	2,083	3,501	4,463	6,909	10,298	10,233	129,920
1964	12,439	16,051	17,930	18,500	17,034	4,763	2,083	3,501	2,380	4,610	6,928	8,532	114,750
1965	15,760	17,985	15,472	18,429	16,811	4,320	2,083	3,501	4,463	7,528	10,746	14,049	131,149
1966	16,590	10,740	13,571	18,439	16,746	4,782	2,083	3,501	4,463	7,346	10,497	14,440	123,198
1967	17,902	17,171	18,693	18,755	16,841	4,639	2,083	3,501	4,463	9,383	14,702	15,484	143,616
1968	15,045	10,391	17,744	18,553	17,351	4,788	2,083	3,501	4,463	7,308	10,092	10,470	121,788
1969	15,907	17,487	17,817	17,683	15,959	4,702	2,083	3,501	4,463	7,230	10,249	14,273	131,351
1970	16,976	14,798	12,907	17,780	16,300	4,686	2,083	3,501	2,380	4,373	6,848	13,174	115,805
1971	16,084	15,834	18,671	18,618	17,042	4,857	2,083	3,501	4,463	4,943	3,095	6,680	115,871
1972	9,356	10,480	15,122	18,411	13,179	4,248	2,083	3,501	4,463	9,721	8,634	14,186	113,383
1973	15,971	17,633	12,242	16,757	16,731	4,183	2,083	3,501	4,463	5,713	6,958	13,401	119,634
1974	6,315	1,580	18,728	15,655	13,558	4,763	2,083	3,501	4,463	4,453	4,253	12,309	91,661
1975	16,444	17,015	16,246	15,486	14,201	4,584	2,083	3,501	4,463	5,663	6,367	14,299	120,351
1976	18,113	17,627	17,604	8,255	5,588	4,467	1,765	1,537	1,488	2,700	4,685	10,919	94,748
1977	15,945	15,654	7,270	3,285	512	321	298	307	298	964	1,450	577	46,881
1978	804	2,233	9,402	17,147	16,138	4,616	2,083	3,501	4,463	6,605	8,813	11,859	87,663
1979	14,530	17,423	7,186	12,210	16,626	4,723	2,083	3,501	4,463	6,478	8,432	16,415	114,070
1980	16,897	16,763	18,443	18,062	17,379	4,786	2,083	3,501	4,463	5,151	3,348	15,154	126,030
1981	17,421	13,184	14,273	11,379	16,636	4,770	2,083	3,501	4,463	5,000	5,169	11,342	109,221
1982	19,579	16,548	19,117	19,434	18,052	5,004	2,083	3,501	4,463	6,385	8,791	15,039	137,996
1983	9,616	13,018	17,354	19,282	17,649	4,893	2,083	3,501	4,463	10,905	14,876	3,420	121,059
1984	4,641	10,940	16,207	19,133	18,115	4,930	2,083	3,501	4,463	5,606	8,992	7,110	105,721
1985	17,854	17,966	18,340	18,791	17,158	4,898	2,083	3,501	4,463	6,825	7,309	14,990	134,177
1986	17,596	9,656	15,591	14,258	13,901	4,873	2,083	3,501	4,463	5,284	5,723	8,571	105,501
1987	17,933	7,591	5,248	5,383	12,044	4,745	2,083	3,501	2,380	4,015	4,544	4,017	73,483
1988	6,064	5,359	15,759	17,500	17,020	4,717	2,083	3,501	2,380	4,058	5,009	4,883	88,334
1989	4,877	8,333	17,933	17,867	12,758	4,344	2,083	3,501	4,463	5,328	5,893	6,311	93,691
1990	16,144	11,492	9,142	16,390	16,644	4,879	2,083	1,537	1,488	2,452	6,060	16,786	105,096
1991	19,123	14,587	4,897	2,202	2,497	2,083	1,765	1,537	1,488	4,596	5,667	7,363	67,804
1992	15,743	11,681	5,002	8,366	12,879	4,990	2,083	3,501	4,463	5,601	6,284	5,816	86,409
1993	8,406	8,589	13,734	16,806	16,423	4,994	2,083	3,501	4,463	5,897	6,897	14,658	106,450
1994	18,335	12,049	10,885	8,513	11,546	4,897	1,765	1,537	1,488	2,761	7,168	3,949	84,895
1995	5,092	5,568	3,721	3,557	5,308	2,765	2,083	3,501	4,463	4,842	5,135	5,486	51,521
1996	5,439	7,672	12,522	16,070	18,333	5,006	2,083	3,501	4,463	6,712	9,285	17,036	108,122
1997	17,201	11,621	16,465	13,113	11,429	3,491	2,083	3,501	4,463	5,369	8,118	9,648	106,502
1998	9,557	17,338	16,263	18,084	14,737	5,056	2,083	3,501	4,463	5,885	7,293	12,012	116,271
1999	17,746	17,058	17,433	11,586	9,894	3,084	2,083	3,501	4,463	5,627	6,631	8,113	107,219
2000	10,127	12,750	11,711	13,002	16,657	4,875	2,083	3,501	4,463	5,544	6,986	7,807	99,505
2001	9,527	11,054	2,862	3,933	3,293	1,806	1,765	1,537	1,488	2,241	2,916	3,437	45,859
2002	5,486	11,709	18,183	17,128	17,276	4,897	2,083	3,501	4,463	4,461	4,425	4,292	97,904
2003	5,159	6,189	7,917	7,914	13,960	4,556	2,083	3,501	4,463	6,171	7,946	13,331	83,189
2004	10,292	9,352	16,828	18,250	14,620	4,760	2,083	3,501	4,463	4,994	5,540	5,879	100,563
2005	6,292	6,827	11,766	16,092	14,420	4,374	2,083	3,501	4,463	5,603	6,952	6,738	89,111
2006	6,770	5,590	3,464	11,006	12,333	4,005	2,083	3,501	4,463	5,588	6,690	7,097	72,589
Average	**12,870**	**12,390**	**13,757**	**14,615**	**14,199**	**4,397**	**2,016**	**3,218**	**3,868**	**5,597**	**7,160**	**10,138**	**104,226**
Avg (cfs)	209	208	224	238	256	72	34	52	65	91	116	170	

TABLE 5
Lake Mendocino Historical Outflows (acre-feet)

WY	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1961	15,081	17,844	3,638	19,496	42,941	41,479	21,049	15,309	14,269	19,988	22,828	22,183	256,104
1962	17,786	8,773	3,736	17,824	46,440	40,140	15,239	6,555	7,869	11,560	12,494	11,705	200,120
1963	9,265	22,900	34,326	15,408	44,944	22,667	49,104	21,186	10,846	9,878	10,574	13,432	264,529
1964	13,246	37,859	13,198	42,423	13,597	13,115	6,918	5,171	8,706	14,140	13,637	12,204	194,214
1965	12,341	6,482	61,137	88,416	18,518	10,275	22,854	15,188	9,100	12,228	14,287	13,577	284,404
1966	15,850	26,123	14,105	42,738	32,460	27,561	10,618	12,758	9,404	14,718	15,202	14,876	236,411
1967	17,171	28,201	28,666	32,860	44,861	27,844	35,538	14,827	16,039	13,912	17,725	19,637	297,280
1968	19,895	13,065	13,845	35,661	37,673	29,193	5,484	4,122	11,260	16,699	15,061	11,639	213,597
1969	11,475	11,217	46,535	83,654	51,839	31,861	9,918	16,704	14,043	16,164	16,628	12,982	323,018
1970	13,789	15,134	37,802	111,624	29,021	25,924	4,985	4,754	13,166	17,245	17,800	13,875	305,119
1971	10,786	5,355	62,160	69,020	11,048	15,075	21,438	17,986	15,539	14,993	17,855	14,206	275,462
1972	12,058	8,626	6,377	21,902	22,725	17,453	12,149	13,964	12,732	17,250	18,125	15,854	179,215
1973	16,909	16,592	22,051	67,617	52,657	20,896	8,581	10,659	15,388	19,934	19,101	14,589	284,974
1974	18,716	3,045	49,586	58,850	17,320	28,061	57,924	21,180	15,287	15,602	20,513	24,621	330,705
1975	23,499	13,097	8,198	13,789	64,999	64,751	17,014	20,210	16,261	15,666	19,065	19,397	295,946
1976	19,666	11,558	16,507	9,800	8,285	16,374	3,370	9,939	15,723	18,397	15,640	13,434	158,694
1977	10,717	9,971	5,687	1,330	994	819	2,884	5,332	9,689	11,845	10,526	5,758	75,553
1978	2,552	865	431	52,658	57,642	37,994	26,333	17,598	16,806	16,086	18,197	12,508	259,670
1979	12,070	14,737	10,981	22,652	52,854	28,549	11,402	19,901	12,006	16,385	17,978	15,397	234,911
1980	12,125	27,778	32,186	69,538	56,064	29,873	15,195	17,043	13,567	16,329	17,993	14,331	322,022
1981	14,255	11,445	15,457	22,254	36,508	25,903	9,500	8,720	13,386	20,869	17,295	13,781	209,371
1982	9,789	20,947	61,537	54,171	52,806	32,310	61,495	18,700	17,209	13,832	19,306	14,402	376,504
1983	9,624	19,553	58,148	42,189	63,799	109,936	40,199	25,603	15,715	15,745	14,299	14,100	428,912
1984	13,983	36,469	54,448	34,235	31,065	15,327	18,109	7,123	11,321	17,571	12,689	12,291	264,630
1985	10,347	32,931	25,120	20,492	33,058	6,956	15,099	8,949	15,705	16,895	13,764	12,379	211,696
1986	10,402	9,311	20,716	32,093	107,801	45,782	10,436	10,617	13,760	17,419	16,497	14,931	309,765
1987	10,805	9,121	9,270	8,413	1,570	26,540	8,218	11,379	12,005	15,759	15,236	14,503	142,818
1988	14,037	9,021	3,370	47,614	17,705	7,976	10,453	11,486	6,934	11,845	10,237	9,818	160,497
1989	9,080	5,121	8,599	28,746	12,732	44,692	22,780	13,259	15,309	18,902	18,780	11,881	209,880
1990	9,870	9,133	9,501	18,628	25,655	11,314	3,675	6,708	9,824	13,417	14,891	11,668	144,284
1991	16,954	15,728	5,149	5,242	2,053	21,232	19,291	14,474	8,770	13,027	13,589	12,819	148,326
1992	12,987	7,163	5,449	11,032	33,322	13,338	15,471	13,514	14,551	15,938	17,323	14,371	174,461
1993	12,927	8,757	8,945	77,647	39,154	15,773	23,002	22,843	20,790	15,721	15,864	13,224	274,646
1994	24,413	11,566	9,441	11,138	23,596	10,259	5,048	4,791	9,623	13,287	12,807	14,048	150,016
1995	7,952	5,125	4,466	58,684	19,770	49,103	17,542	19,545	10,322	13,348	15,999	13,643	235,499
1996	14,006	11,963	7,825	42,751	46,647	26,548	22,115	22,345	13,945	17,927	18,190	14,024	258,284
1997	15,588	13,450	33,169	75,790	19,201	11,155	10,520	12,664	11,778	15,526	15,334	13,625	247,801
1998	11,435	9,739	5,804	74,536	112,459	26,870	35,156	25,021	24,274	15,827	19,619	19,710	380,451
1999	16,105	17,113	23,611	21,063	59,628	28,115	24,507	13,647	12,543	18,685	20,950	19,167	275,133
2000	17,515	12,091	10,107	6,282	43,389	26,345	10,724	12,519	15,432	17,865	19,879	14,221	206,368
2001	13,087	9,539	10,415	7,812	2,199	2,117	4,454	7,542	10,683	11,564	11,504	13,132	104,048
2002	11,295	5,351	43,581	47,783	23,782	7,954	11,761	11,905	14,465	17,089	16,049	15,165	226,181
2003	14,195	6,633	3,286	36,621	22,906	12,775	33,117	34,298	14,903	17,913	17,166	15,492	229,305
2004	14,288	10,579	25,009	45,416	56,932	16,569	11,395	12,619	16,218	17,728	12,909	11,937	251,599
2005	10,755	9,921	10,059	24,638	24,366	18,062	24,272	23,045	13,352	15,664	15,412	13,948	203,493
2006	14,031	10,828	21,835	98,191	31,273	49,240	53,165	19,267	13,252	14,883	15,059	12,492	353,516
Average	**13,581**	**13,648**	**20,988**	**39,798**	**35,875**	**25,915**	**19,120**	**14,412**	**13,343**	**15,723**	**16,128**	**14,282**	**242,814**
(cfs)	221	229	341	647	646	421	321	234	224	256	262	240	336

Source: USACE.

Figure 1 - City of Ukiah Water Use

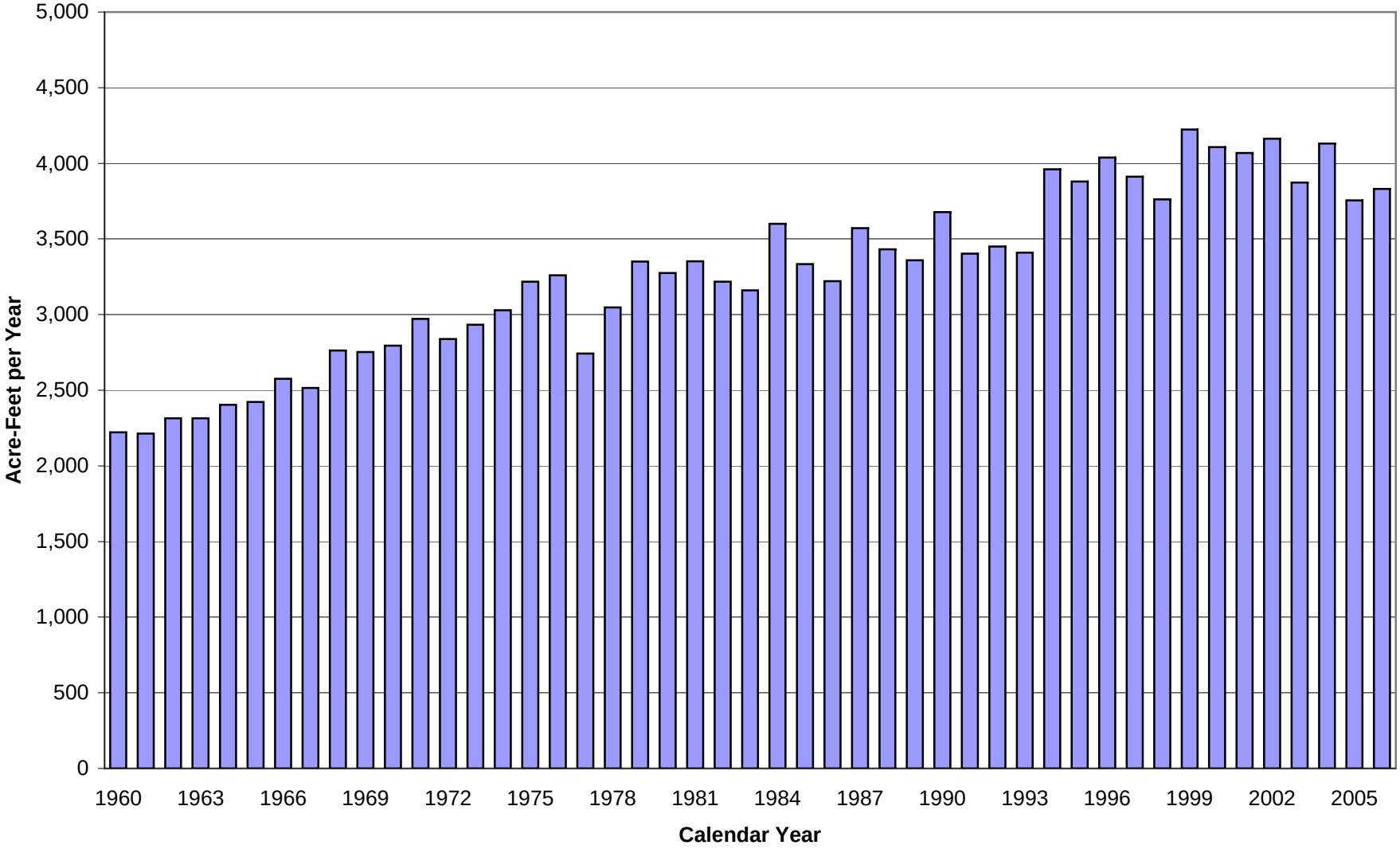


Figure 2 - City of Ukiah Average Water Diversion and Depletion Projected at 20 cfs Peak Use

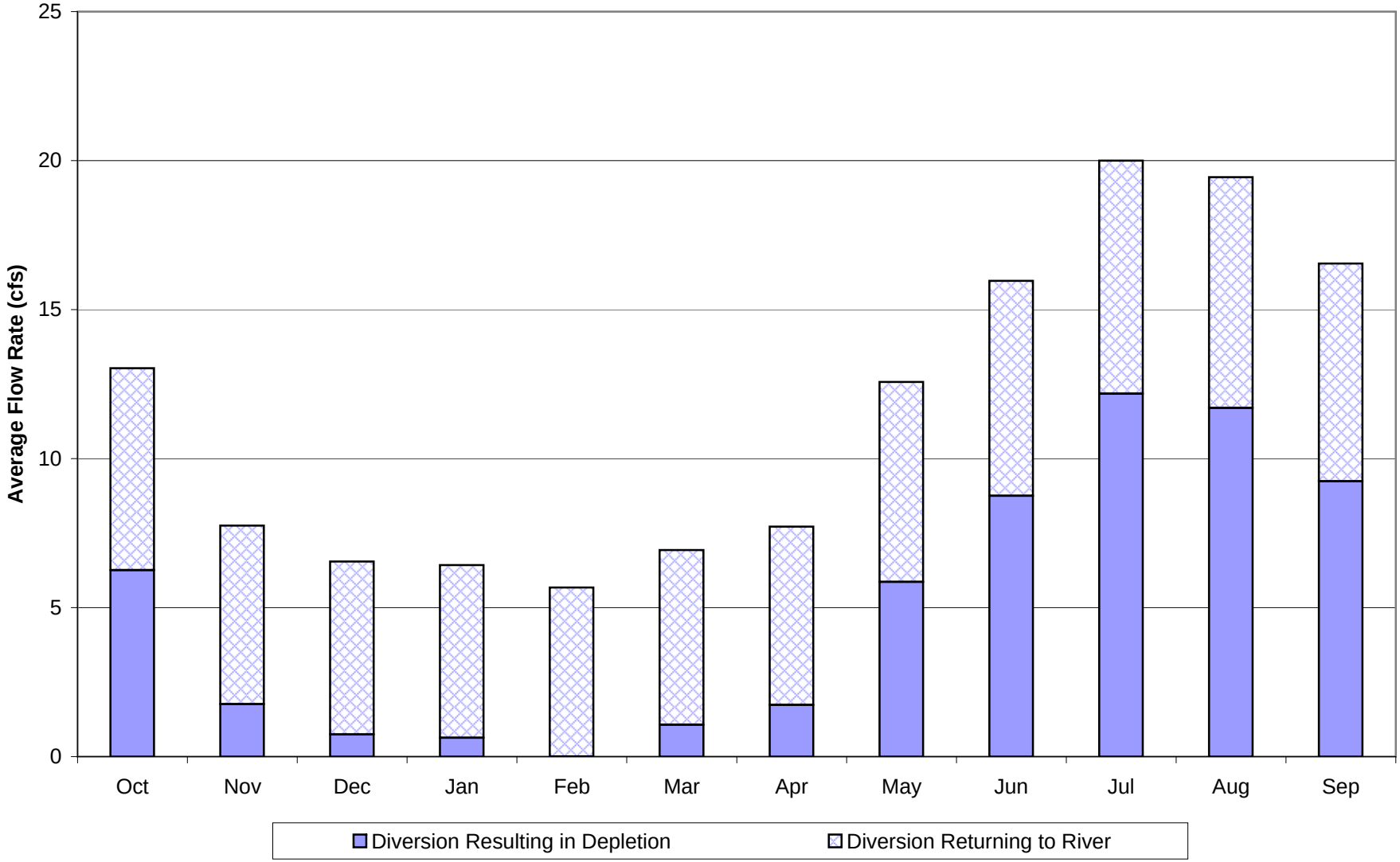


Figure 3 - Lake Pillsbury Target and Maximum Storage

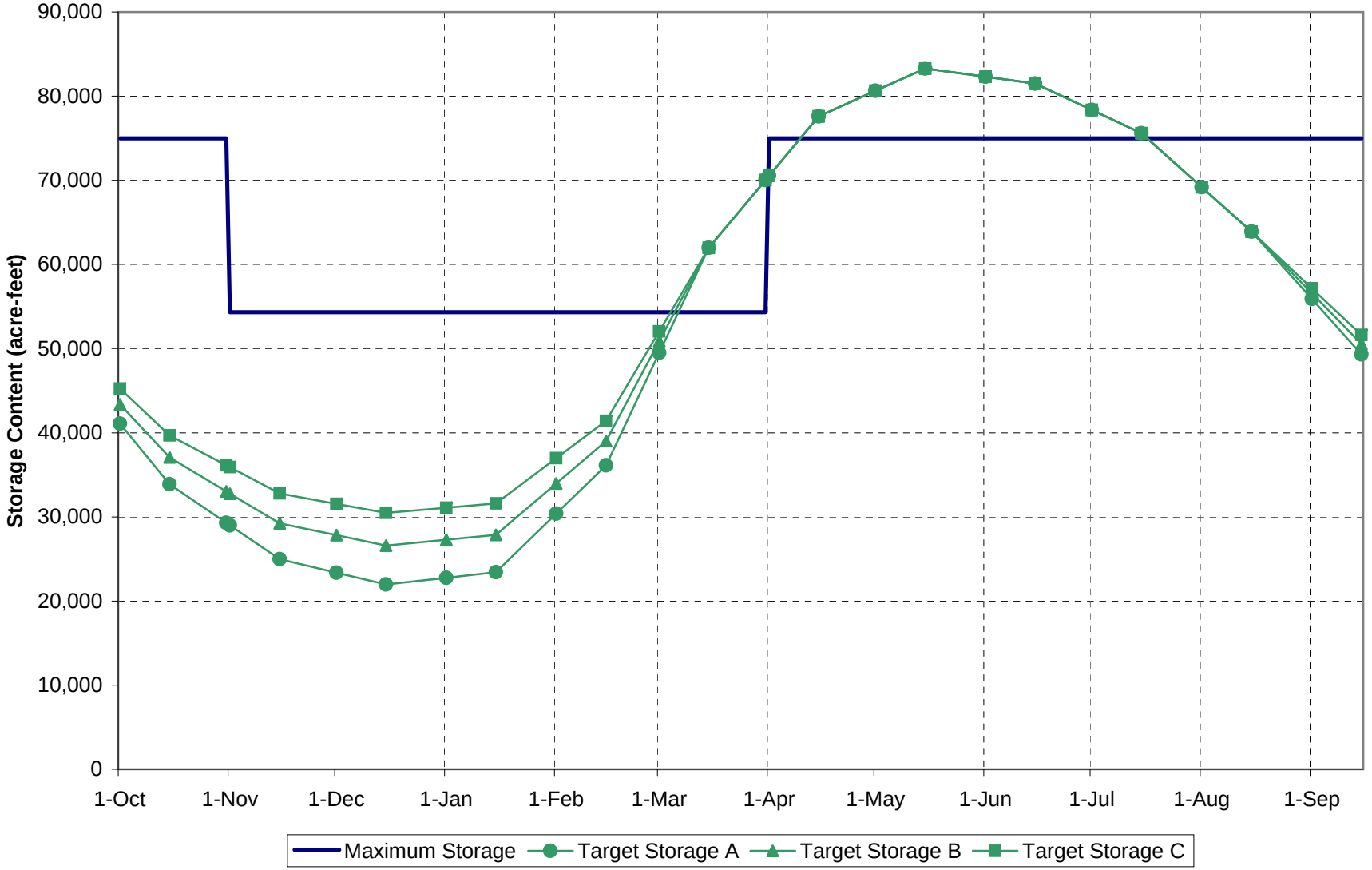


Figure 4 - Lake Mendocino Historical Outflow during May through November
Water Years 1961 - 2006

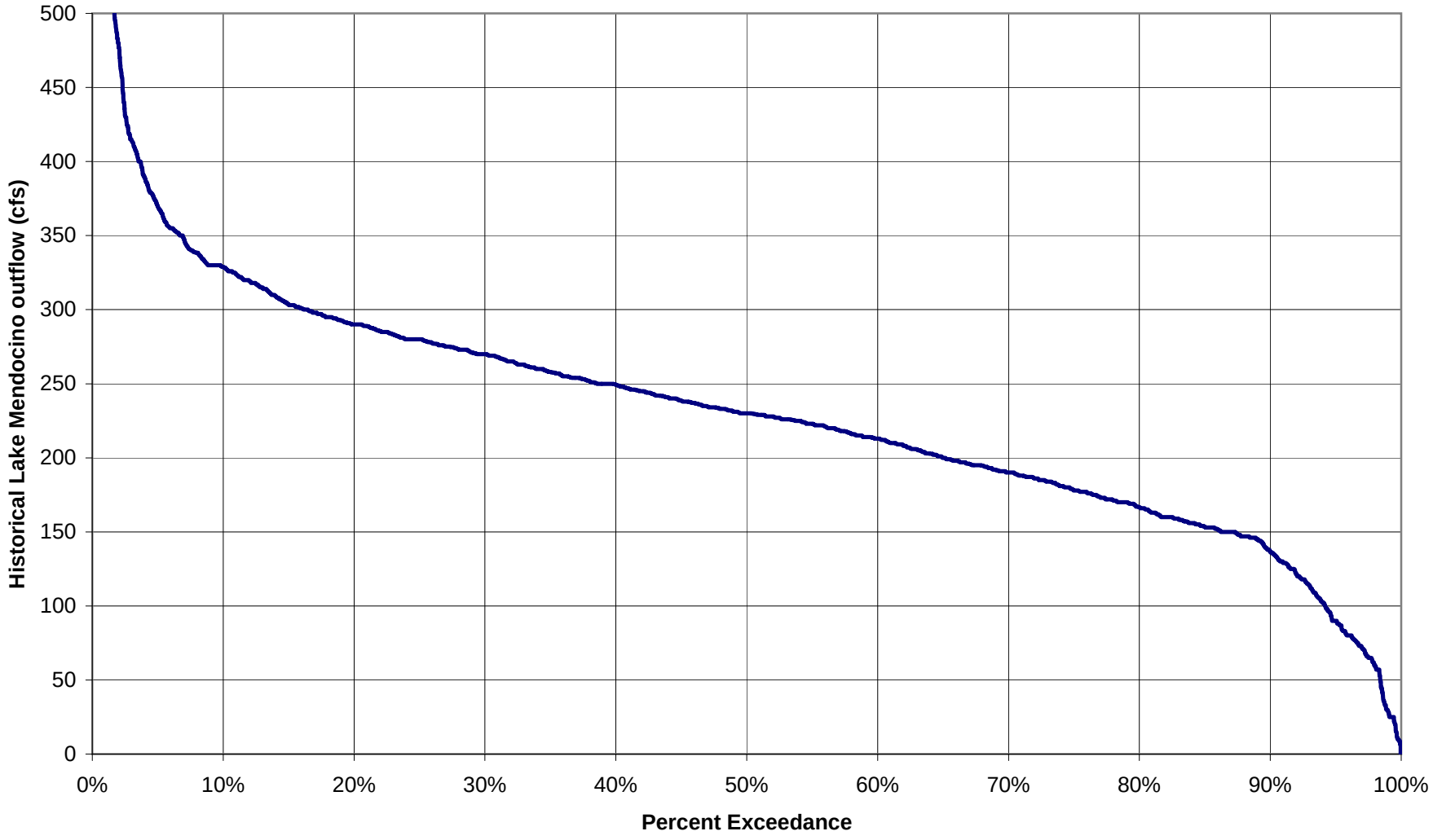
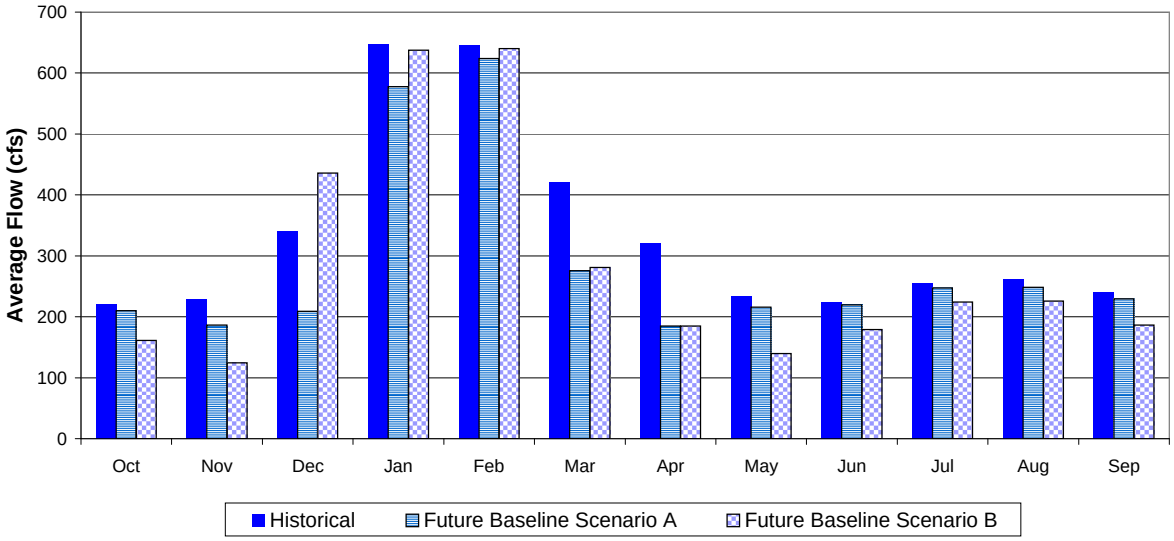


FIGURE 5 - Lake Mendocino Outflows

Average for Water Years 1961 - 2006



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Historical	221	229	341	647	646	421	321	234	224	256	262	240	336
Future Baseline Scenario A	210	186	209	578	624	276	185	216	219	247	249	230	284
Future Baseline Scenario B	161	125	436	637	640	281	185	140	179	224	226	187	284

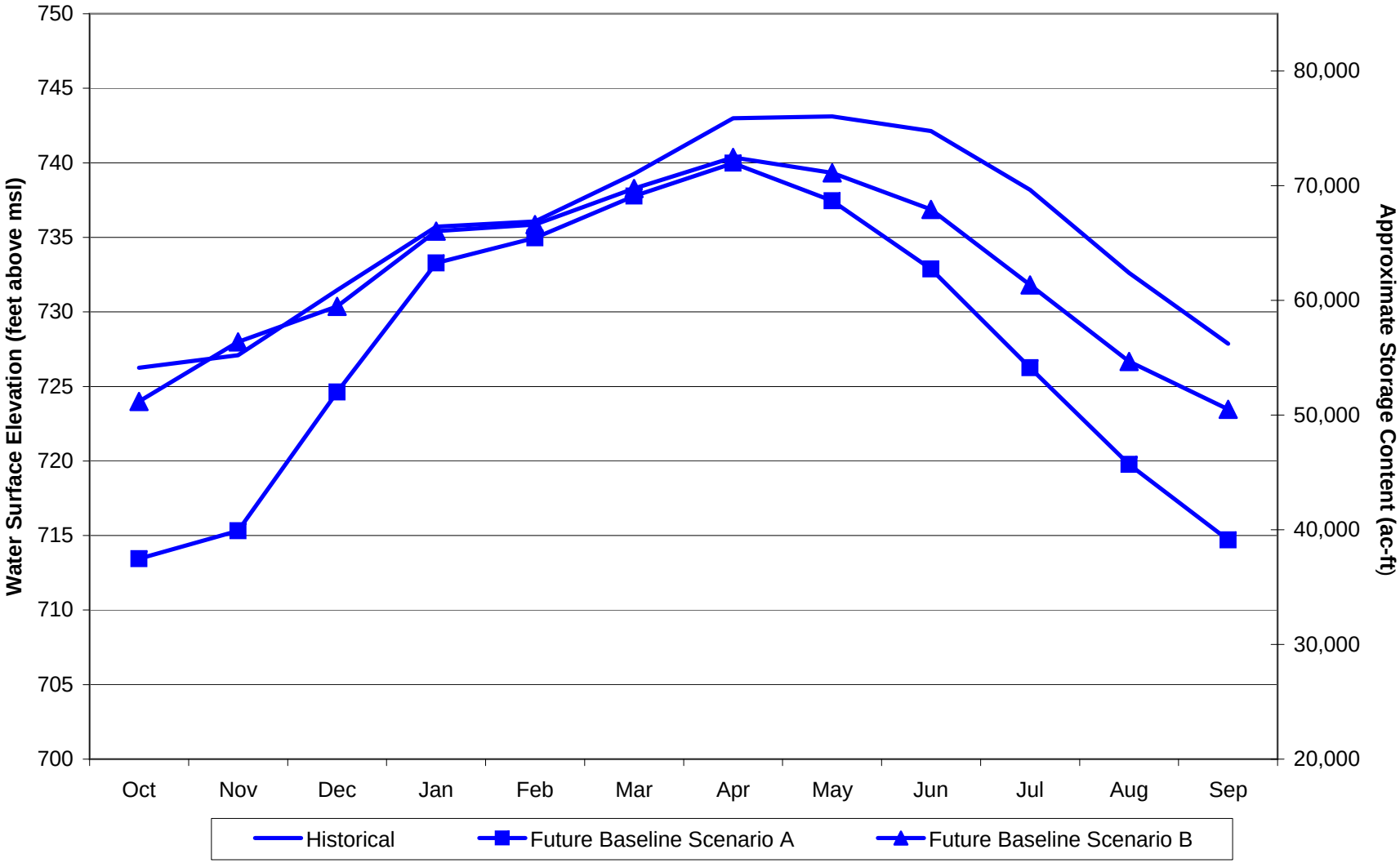
Future Scenarios: Inflow to Lake reduced by FERC license condition E5.

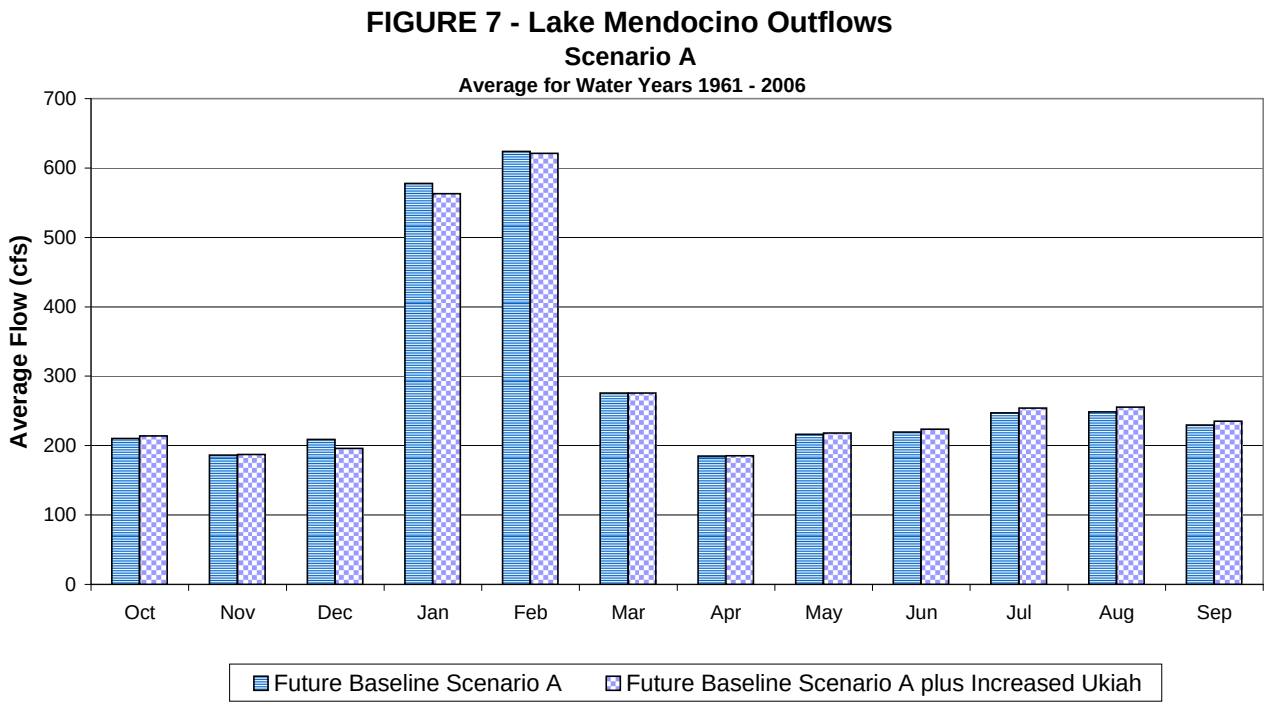
Scenario A: May-Nov downstream demand = historical release capped at 275 cfs.

Scenario B: May-Nov downstream demand = historical release minus excess River flow above D-1610 reqmt.

FIGURE 6 - Lake Mendocino Average Water Level

Water Years 1961 - 2006





	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Future Baseline Scenario A	210	186	209	578	624	276	185	216	219	247	249	230	284
Future Baseline Scenario A plus Increased Ukiah	214	187	196	563	621	276	185	218	224	254	255	235	284

Future Scenarios: Inflow to Lake reduced by FERC license condition E5.

Scenario A: May-Nov downstream demand = historical release capped at 275 cfs.

Scenario B: May-Nov downstream demand = historical release minus excess River flow above D-1610 reqmt.

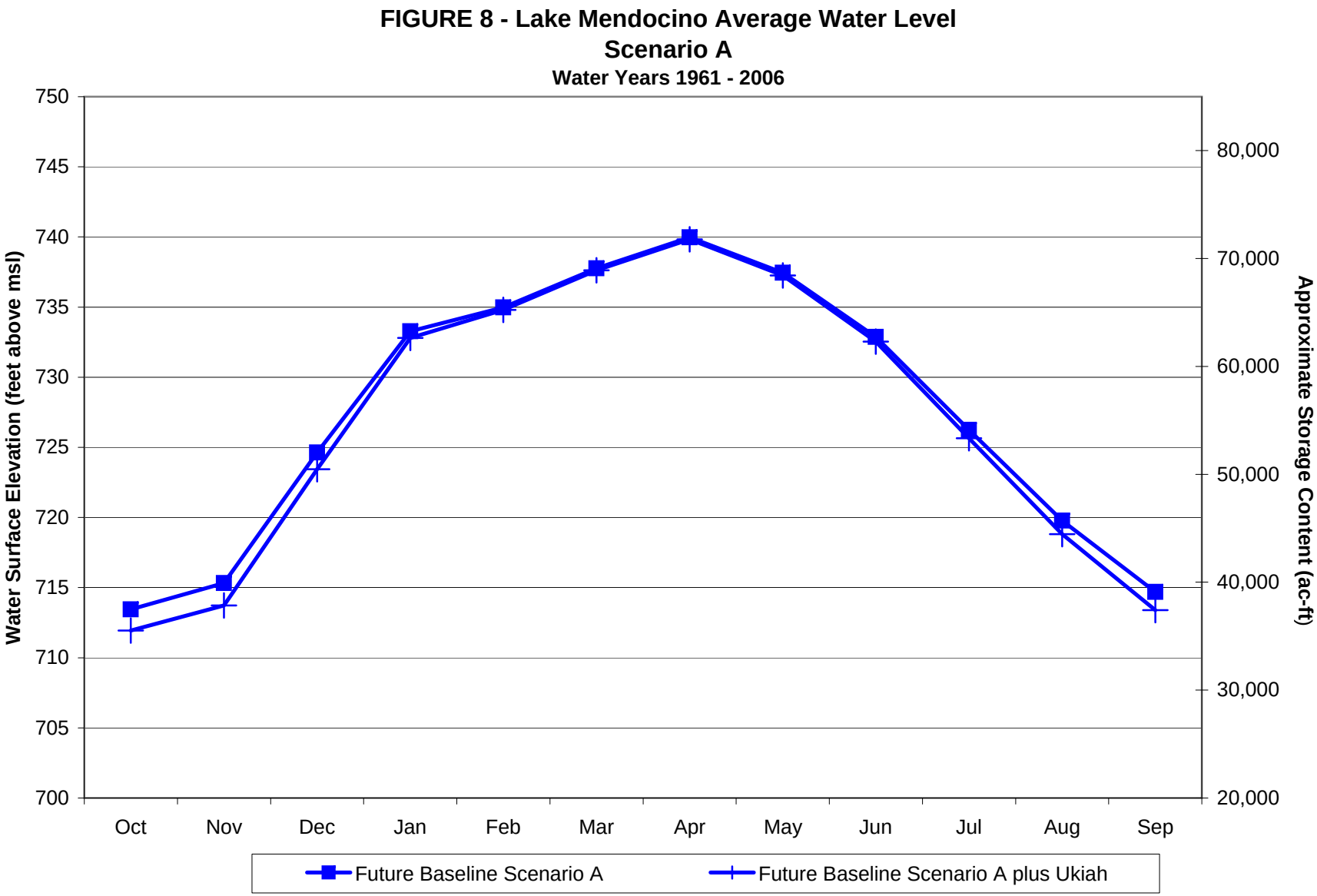
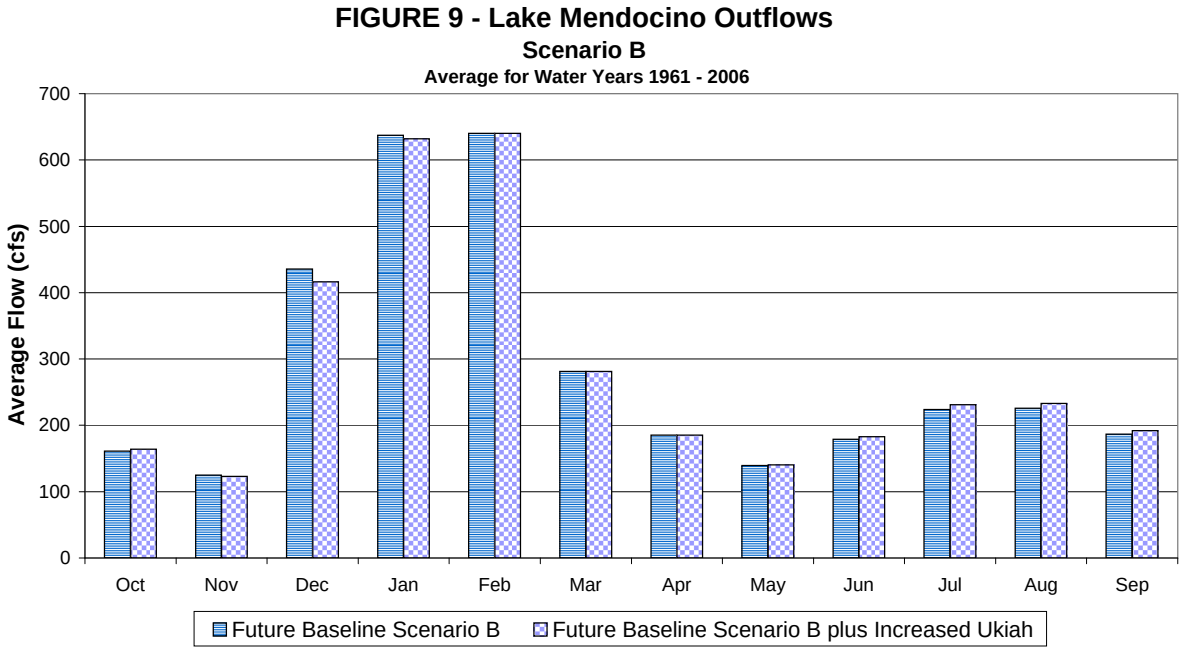


FIGURE 8 - Lake Mendocino Average Water Level
Scenario A
Water Years 1961 - 2006
Water Surface Elevation (feet above msl)
750
745
740
735
730
725
720
715
710
705
700
Approximate Storage Content (ac-ft)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Future Baseline Scenario A
Future Baseline Scenario A plus Ukiah



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Future Baseline Scenario B	161	125	436	637	640	281	185	140	179	224	226	187	284
Future Baseline Scenario B plus Increased Ukiah	164	123	416	632	640	281	185	141	183	231	233	192	284

Future Scenarios: Inflow to Lake reduced by FERC license condition E5.

Scenario A: May-Nov downstream demand = historical release capped at 275 cfs.

Scenario B: May-Nov downstream demand = historical release minus excess River flow above D-1610 reqmt.

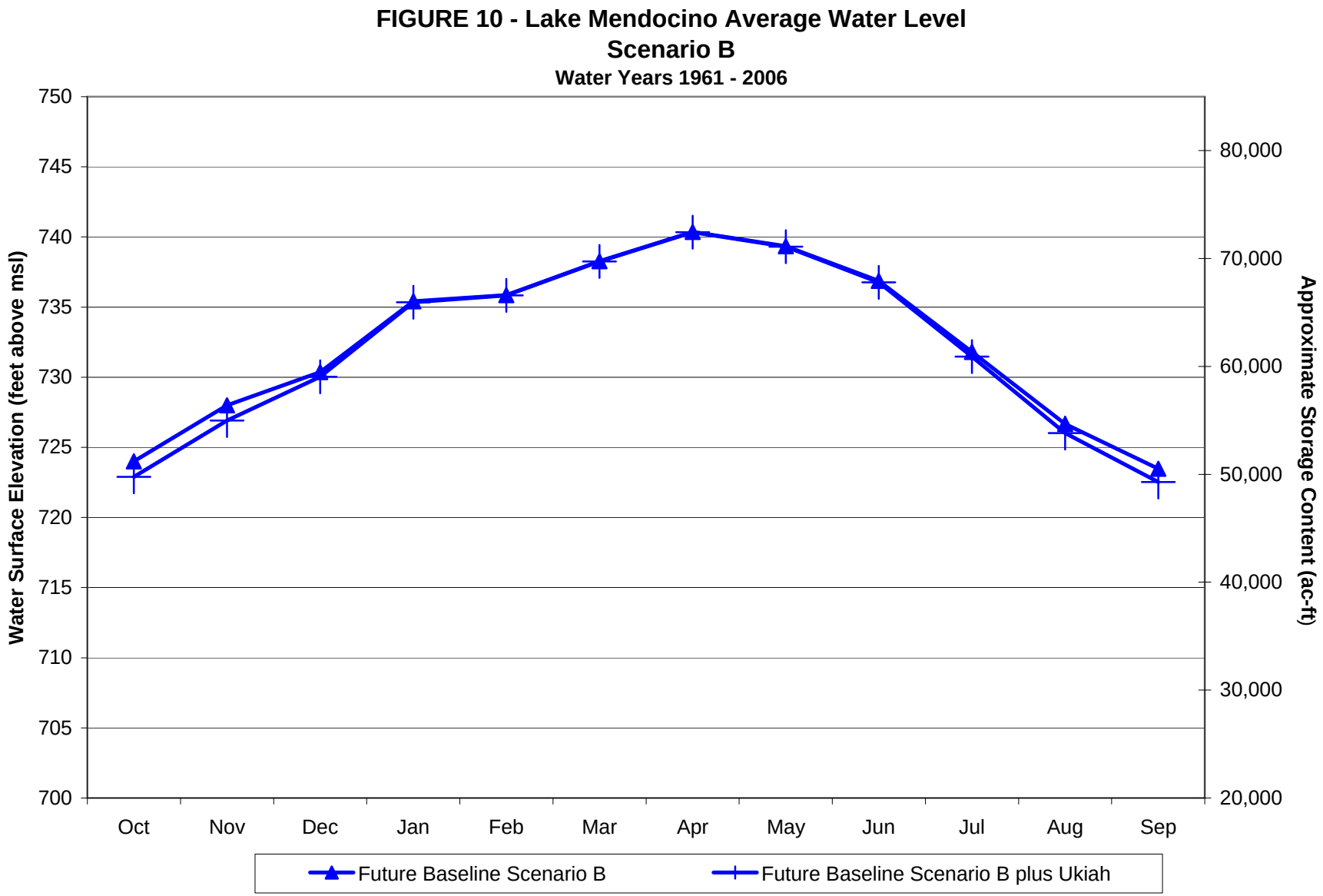
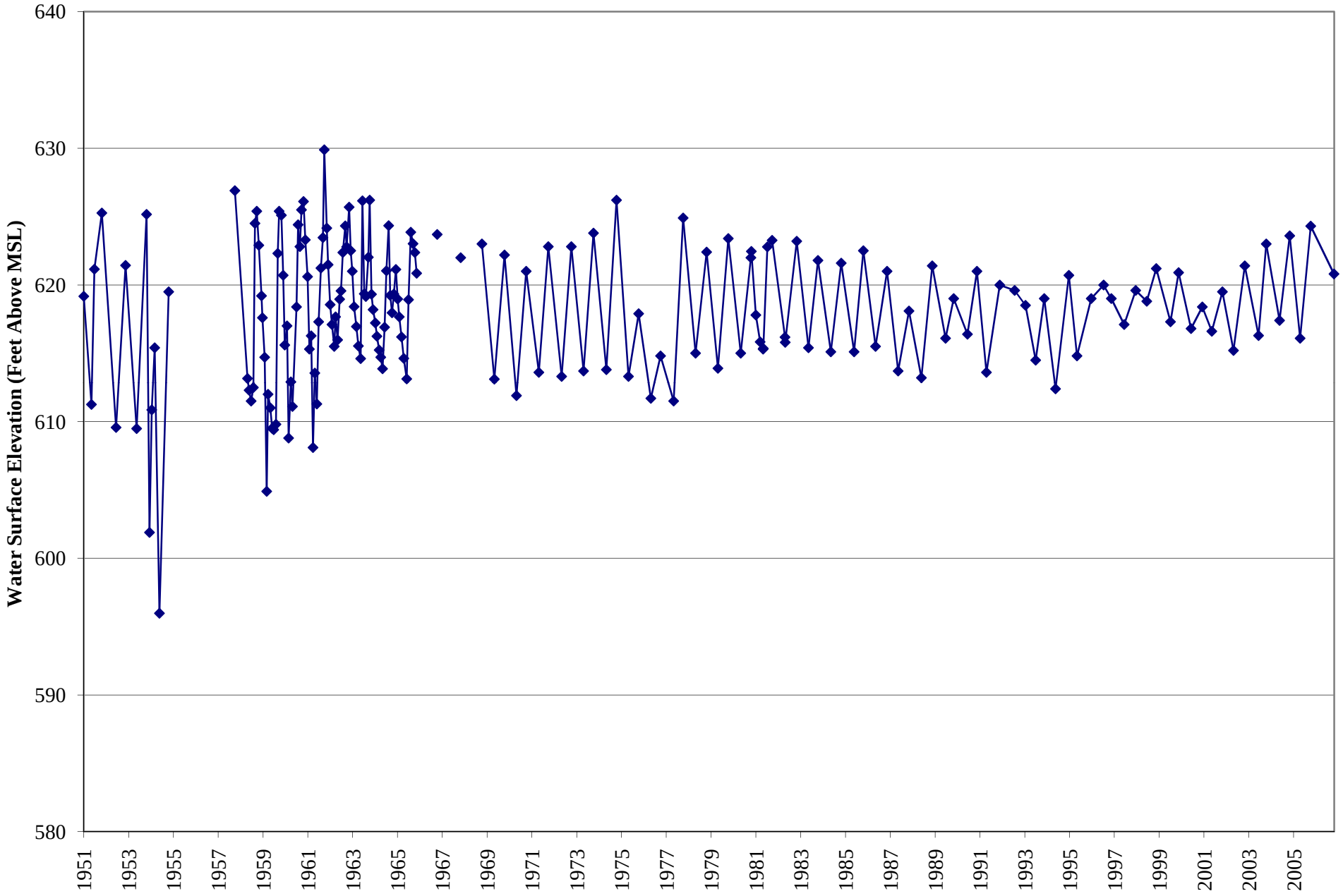


FIGURE 10 - Lake Mendocino Average Water Level
Scenario B
Water Years 1961 - 2006
Water Surface Elevation (feet above msl)
750
745
740
735
730
725
720
715
710
705
700
Approximate Storage Content (ac-ft)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Future Baseline Scenario B
Future Baseline Scenario B plus Ukiah

FIGURE 11
Well 15N12W08L001

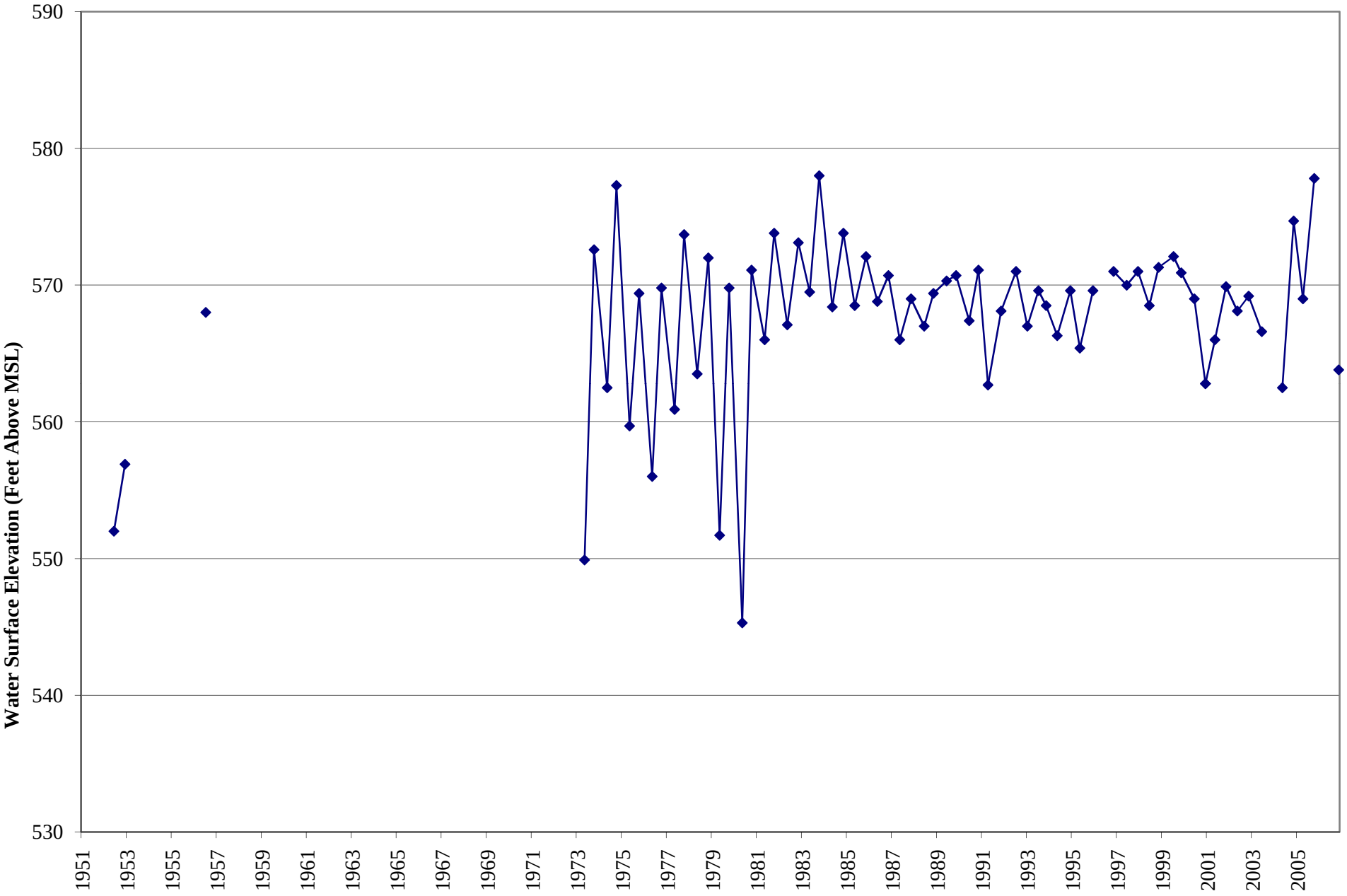
10/31/2007



G:\City of Ukiah Litigation\, COULP034.xls, GW Well 15N12W08L001 Graph

FIGURE 12
Well 14N12W05K001

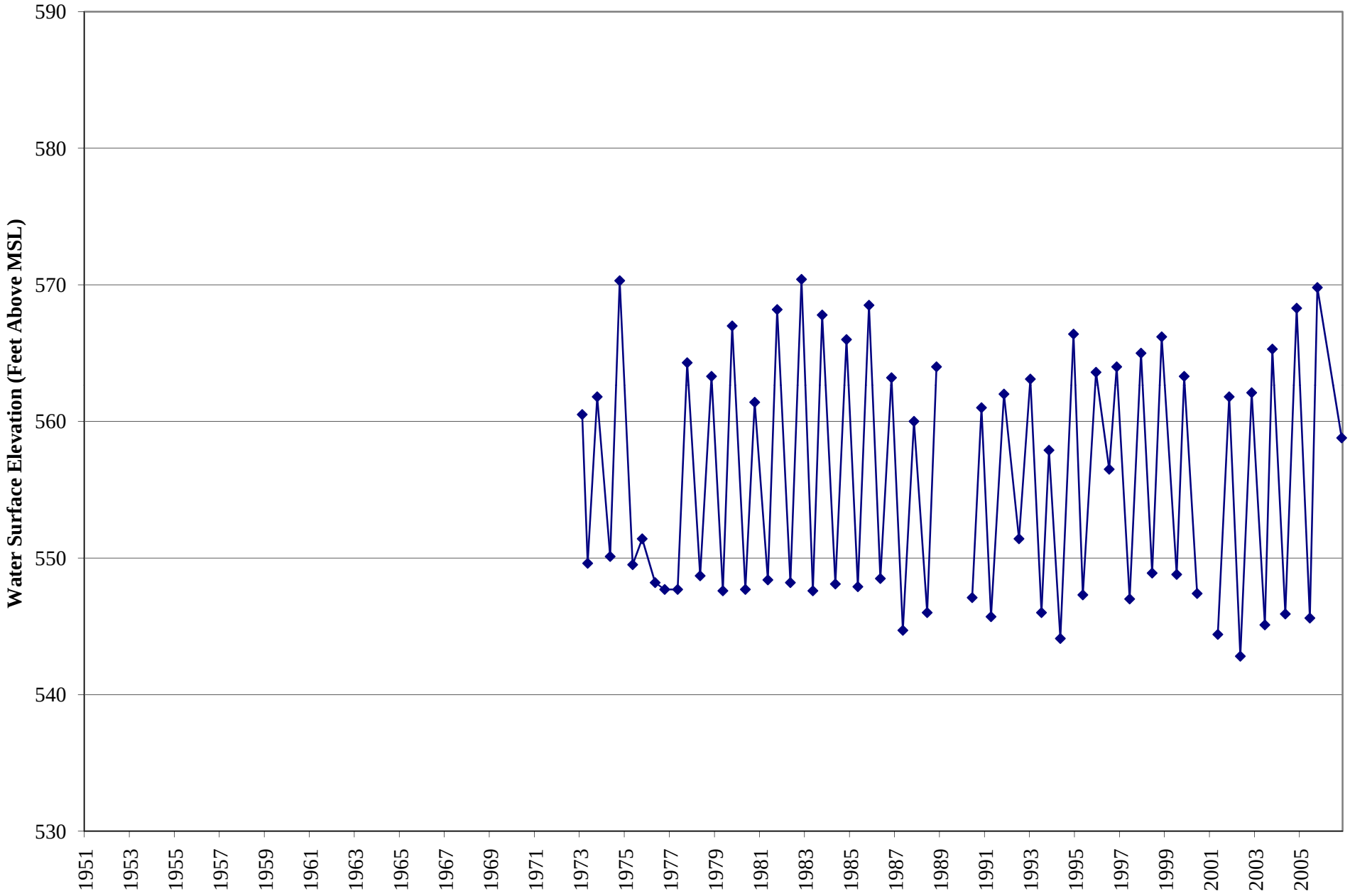
10/31/2007



G:\City of Ukiah Litigation\, COULP034.xls, GW Well 14N12W05K001 Graph

FIGURE 13
Well 15N12W34Q001

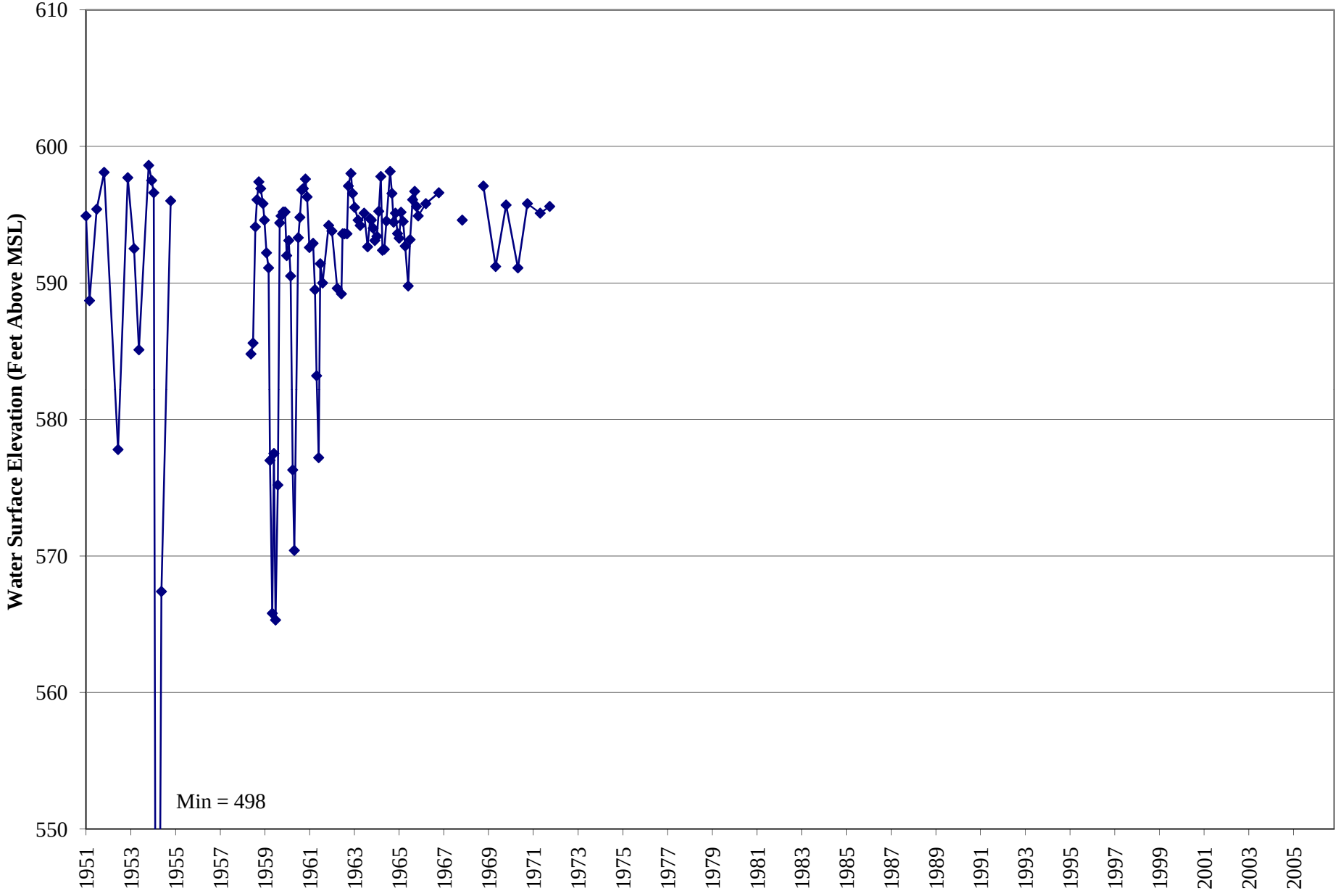
10/31/2007



G:\City of Ukiah Litigation\, COULP034.xls, GW Well 15N12W34Q001 Graph

FIGURE 14
Well 15N12W35M001

10/31/2007



G:\City of Ukiah Litigation\, COULP034.xls, GW Well 15N12W35M001 Graph

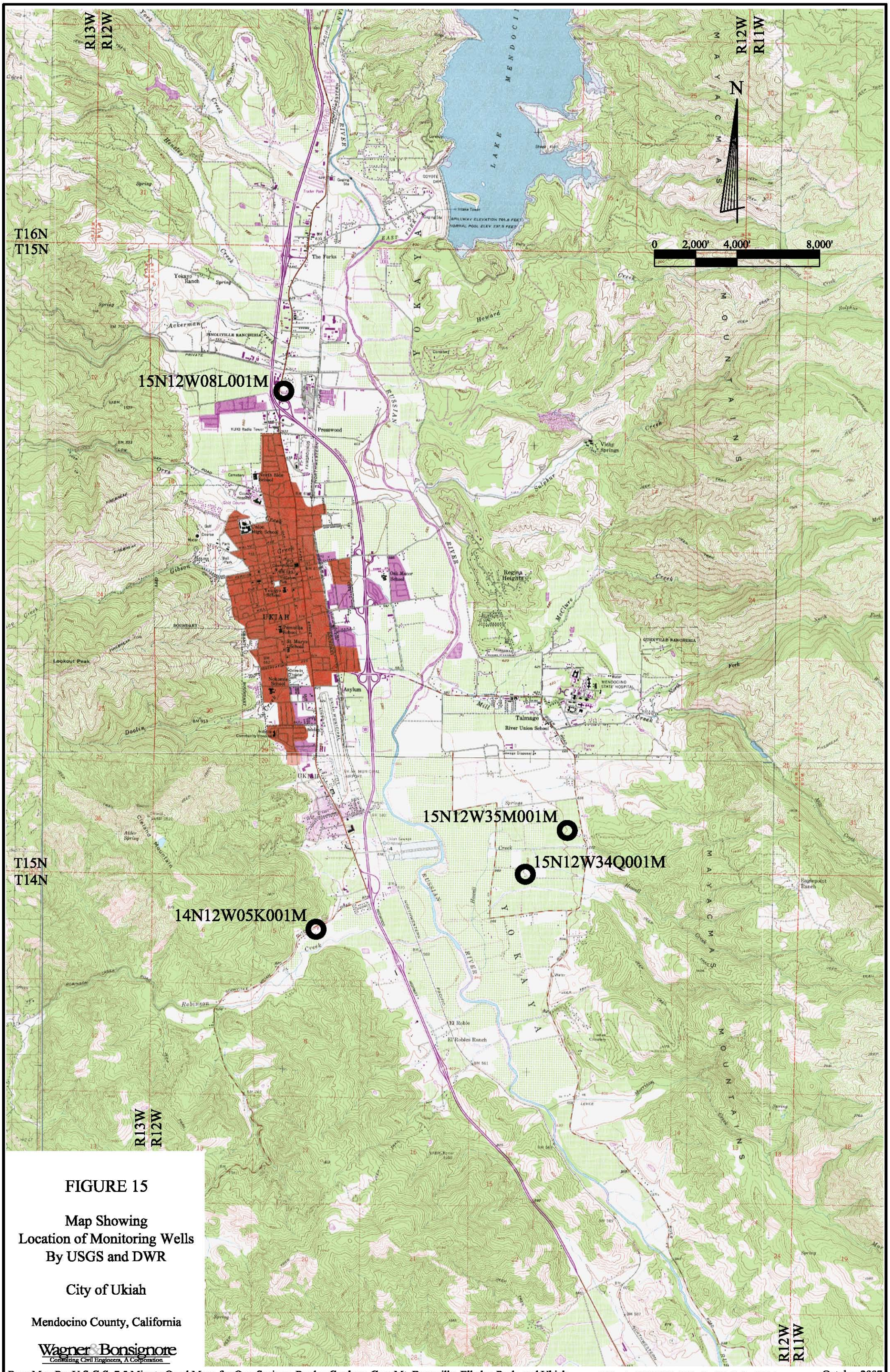


FIGURE 15

Map Showing
Location of Monitoring Wells
By USGS and DWR

City of Ukiah

Mendocino County, California

Wagner & Bonsignore
Consulting Civil Engineers, A Corporation

Base Map Per U.S.G.S. 7.5 Minute Quad Maps for Orrs Springs, Purdys Gardens, Cow Mt, Boonville, Elledge Peak, and Ukiah

Q:\Drawings\Ukiah\Ukiah-Petition\dwg\Monitoring Wells.dwg

October 2007

McLean

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Division of Safety of Dams

Certificate of Approval

This Is To Certify That, pursuant to Part 1 of Division 3 of the California Water Code, the Department of Water Resources of the State of California has found that the Scott Dam and Reservoir, State Application Number 97-101, located in Sec. 14, Tp. 18 N, R. 10 W, M.D.B. & M., Lake County, State of California, are safe to impound water; and the use of said dam and reservoir to impound water in accordance with and subject to the following terms and conditions is hereby authorized: 1. Water may be impounded to Elevation 1910.00, assumed datum as shown on Pacific Gas and Electric Company Drawing No. 46975, revised September 25, 1936.

2. Spillway gates shall be held in the full-open position every season between November 1 and April 1, both dates inclusive except slide gates 1, 2, 3, 4, 21, 24, 25, and 26 which shall be in the full-closed position and slide gate 20 which shall be held in the half-open position.

This certificate of approval supersedes every previous certificate of approval or written consent for use issued by the State of California relative to said dam and reservoir.

Witness my hand and the Seal of the Department of Water Resources of the State of California

this 4th day of December 19 78

J. Deady

Division Engineer, Reg. C. E. No. 6500

Pacific Gas and Electric Company
Hydro Generation

E-1

Lake Pillsbury

Capacity Table 3.01

	U.S.G.S. Elevation (Ft.)	PG&E Elevation (Ft.)	Gross Storage Acre Feet
Zero Capacity	1736.00	1817.7	0
Outlet Sill	1740.70	1822.40	22.6
Spill Crest	1818.30	1900.00	54,338
Top of Spillway Gates	1828.30	1910.00	74,993
Crest of Dam	1838.30	1920.00	

PG&E datum = U.S.G.S. datum + 81.70 ft.

Note: The original topographic survey of Lake Pillsbury was made by the Snow Mountain Power Company in 1921. The potential gross capacity of the reservoir was then calculated to be 94,863 acre feet

In order to determine the loss of capacity, due to deposition of sediments, the U.S. Geological Survey performed a survey in 1959 using a recording fathometer and careful triangulation controls. A new gross capacity was found to be 86,785 acre feet

In April of 1984 U.S.G.S. performed another survey and found the gross capacity of 80,643 acre feet at PG&E elevation of 1910.00

This new capacity table was developed by PG&E using Omnistar satellite based position and an Odom Hydrotrac Survey Echo Sounder with a depth accuracy of 0.1%. The Hypack navigation software and Surfer software where used to produce 96 skeletal rating points at 1.00 foot intervals. Hydstra surface water package was used to extrapolate the points logarithmically to produce the final table to 0.01 feet resolution. Maximum Storage at 1910.00 feet = 74,993 acre feet.

This table supersedes all previous tables.
Made by: Frank Lynch, October 26, 2006 and applied back to October 01, 2005

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ORIGINAL

Pacific Gas and Electric Company

John S. Keenan
Senior Vice President
Generation & Chief Nuclear Officer

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Fax: 415.973.2313

October 16, 2006

Honorable Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
OEP/Division of Hydropower Administration and Compliance
888 First Street, NE
Washington, DC 20426

Re: Potter Valley Project, FERC No. 77
Response to Resource Agency Letter Re Operating Rule Compliance

Dear Secretary Salas:

On August 3, 2006 and August 15, 2006, respectively, the California Department of Fish and Game (CDFG) and the National Marine Fisheries Service (NMFS) filed letters with FERC raising concerns regarding PG&E's implementation of the new flow regime under the amended license for the Potter Valley Project (Project). In response to those letters, PG&E notified FERC staff at the Regional Office of its intent to consult with both CDFG and NMFS to better understand their concerns. PG&E met with representatives of CDFG, NMFS, and the Round Valley Indian Tribes (RVIT) on September 7 and October 5, 2006 to discuss the new flow regime for the Project. After these meetings, PG&E reviewed all flow records for the Project since the new flow regime was implemented in June of 2004. Based on that review, PG&E discovered that CDFG and NMFS were correct in their assertions, and also that additional errors had occurred in implementing the flow releases.

As the Senior Vice President of Generation for PG&E, I want to assure you that PG&E takes these implementation errors very seriously. PG&E already has taken a number of specific actions to ensure its operations are in full compliance with the new flow regime, including providing additional operator training and instructions. Within the next 30 days, PG&E will provide FERC with a list of any additional corrective actions that may be appropriate.

In total, there have been three types of errors: (1) overreleases in 2005 and 2006 that occurred during times when Cape Horn Dam was spilling water, due to the mistaken application of NMFS' Reasonable and Prudent Alternative (RPA); (2) overreleases that occurred in 2004, 2005 and 2006 as a result of PG&E's efforts to comply with the East Branch Russian River (EBRR) minimum flow requirements set forth in RPA Section E.3; and (3) overreleases that occurred in the fall of 2004 as a result of PG&E's failure to make the required seasonal adjustments required by the RPA. Each of these scenarios is discussed in turn below. A summary of the RPA Flow Requirements is included for reference in Attachment A.

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A. Overreleases When Cape Horn Dam Was Spilling

PG&E has determined that during periods when Cape Horn Dam was spilling in 2005 and 2006, PG&E misapplied the limitations set forth in Section E.5 and instead diverted water to the EBRR up to the maximum available tunnel capacity. The specific dates and amounts of the overreleases are set forth in Attachment B to this letter.

PG&E's misapplication of the Section E.5 limitations during times of spill was wholly unintentional and stemmed from PG&E's erroneous reliance on the modeling developed by the Department of the Interior (DOI) during the license amendment proceeding. Although the DOI modeling was initially developed to support the flow proposal recommended by DOI and NMFS in response to FERC's draft environmental impact statement, NMFS also relied upon this modeling to develop its RPA. Thus, the assumptions of the DOI modeling are reflected in the final environmental impact statement prepared by FERC as well as the final biological opinion prepared by NMFS.

The DOI modeling assumed that diversions to the EBRR during times of spill at Cape Horn Dam would be maximized to the full tunnel capacity. Specifically, the instructions for the modeling described the assumptions as follows:

> If the sum of the accretion [between the Cape Horn and Scott dams] and the Lake Pillsbury release is greater than the sum of the Cape Horn Dam release and the tunnel diversion then sufficient flow is reaching Cape Horn Dam to meet the minimum flow requirements both for the Eel River below Cape Horn Dam and in the diversion tunnel. In this case, there is no need for additional flow releases from Lake Pillsbury and the excess accretion is *used to fill the diversion tunnel up to its capacity.* The accretion flow above the tunnel capacity is released at Cape Horn Dam.

See Attachment C, "Generalized Hydrologic/Operational Model of the Upper Eel River Basin/Potter Valley Project," prepared for DOI by the National Resources Consulting Engineers, Inc. at p. 13 (emphasis added).

Although the modeling assumed that diversions to the EBRR would be maximized when Cape Horn Dam was spilling, the final language in RPA Section E.5 specifying maximum diversions to the EBRR did not incorporate an exception for spill conditions. Unfortunately, when PG&E began implementing the RPA flows, personnel who had been involved in the license amendment proceeding and familiar with the DOI modeling erroneously applied the modeling logic during periods of spill at Cape Horn Dam rather than follow the limitations specifically set forth in Section E.5. The result is that PG&E overreleased to the EBRR during times of spill in both 2005 and 2006.

Based on its meetings with the resource agencies and RVIT, PG&E recognizes its error and has taken steps to ensure that operational personnel are fully informed of the

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apparent discrepancy between the modeling and the language RPA in Section E.5. PG&E will strictly adhere to the diversion limitations set forth in Section E.5 unless and until FERC and NMFS determine some modification is appropriate.

B. Overreleases Resulting From PG&E's Efforts To Ensure Compliance With EBRR Minimum Flow Requirements

In addition to the overreleases that occurred in 2005 and 2006 during times of spill, PG&E's recent review of its flow records has revealed numerous instances where the actual diversions to the EBRR exceeded the maximum diversions set forth in RPA Section E.5, as a result of PG&E's addition of a small buffer to its EBRR releases to ensure that it fully met the minimum flow requirements set forth in RPA Section E.3. The specific dates and amounts of these overreleases are set forth in Attachment D.

Whenever a license condition requires a minimum instream flow release, it is standard industry practice to release a small amount above the required minimum to ensure that the release does not fall below the minimum requirement. Following this standard industry practice, PG&E added a small buffer to the EBRR diversions (typically in the range of 10 cfs) in order to ensure compliance with the minimum instream flow requirements set forth in RPA Section E.3. However, because the minimum release requirements in Section E.3 are defined in the same way as the maximum diversion limits set forth in Section E.5 (i.e., the EBRR releases set forth in Section C.1 plus the PVID releases), this practice of including a buffer in the EBRR diversions resulted in slight overreleases to the EBRR when the limitations of RPA Section E.5 applied (i.e. when Lake Pillsbury was below the Target Storage Curve). For example, if the maximum release under Section E.5 was 125 cfs, PG&E would release approximately 135 cfs in order to ensure it met the minimum flow requirement set forth in Section E.3. Had PG&E not applied this buffer, it would have run the risk of falling below the minimum flow requirements.

In order to ensure that PG&E's future operations comply with the new flow regime, PG&E is seeking guidance from the Commission regarding which release obligation should take priority when Lake Pillsbury is below the Target Storage Curve – the minimum requirements set forth in RPA Section E.3 or the maximum limitation set forth in RPA Section E.5. PG&E also plans to consult with NMFS regarding the issue and will provide the Commission with any response it receives.

C. Overreleases Resulting From PG&E's Failure To Make The Seasonal Adjustments Required By The RPA

PG&E's review of its records also revealed that in the first year of implementing the new flow regime, PG&E failed to take into account the seasonal adjustments to the maximum flows to the EBRR required by Section E.5. The specific dates and amounts of the overreleases are set forth in Attachment E.

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Under RPA Section E.5, the maximum release to the EBRR when Lake Pillsbury is below the Target Storage Curve varies by season. From May 15 through September 15 the maximum release is 125 cfs; from September 16 through October 15 the maximum release decreases to 85 cfs; from October 16 through April 14 the maximum release decreases again to 40 cfs; and from April 15 through May 14 the maximum release increases again to 85 cfs.

Based on the flow records, PG&E failed to implement these seasonal adjustments in the fall of 2004. Accordingly, although the maximum release to the EBRR should have decreased from 125 cfs to 85 cfs on September 16, 2004, PG&E appears to have continued to release the 125 cfs maximum, while applying the approximately 10 cfs buffer described in the preceding section. PG&E did not repeat this error in 2005 or 2006. PG&E has retrained its operators on the seasonal variations and provided them with clear written instructions on how to implement them.

Because of the wet winter that occurred in the winter of 2004/2005, PG&E does not believe the error in storage regulation in 2004 resulted in any negative environmental impacts. Lake storage began to exceed the Target Storage Curve on December 9, 2004, and remained above Target Storage Curve through March 14, 2005. Conditions after March 14, 2005 are discussed earlier in this letter and in Attachment B.

PG&E acknowledges its compliance failure in relation to the issues described above and is committed to fully and accurately implementing the RPA. PG&E also acknowledges the important role that CDFG and NMFS played in bringing this issue to our attention. Although the RPA sets forth a technically complex and challenging flow schedule to implement, PG&E takes responsibility and is accountable for these errors. PG&E prides itself on its hydroelectric compliance record; the performance here simply fails to live up to PG&E standards.

If you have any questions or concerns, please contact Randy Livingston, Sr. director – Power Generation at (415) 973-6950.

Sincerely,

John S. Keenan

TCandelario:msp

Attachments

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cc:

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National Marine Fisheries Service
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Covelo, CA 95428

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ATTACHMENT A

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ATTACHMENT A. Summary of RPA Flow Requirements

On January 28, 2004, FERC issued its Order Amending License for the Potter Valley Project. *In re Pacific Gas and Electric Company*, 106 FERC ¶ 61,065. FERC's order adopted NMFS' Reasonable and Prudent Alternative (RPA), which contained several provisions for a new flow regime at Potter Valley. Appendix A of the Order Amending License contained numerous operating rules for Project flows, including prescribed minimum and maximum flows to the EBRR under varying circumstances. Specifically, the RPA provided:

> C.1. Minimum flows of the East Branch of the Russian River, *MF16,* measured at the PG&E gauge E-16, but excluding flows released for the Potter Valley Irrigation District, shall be computed as shown in the following table:

Minimum Flow of the East Branch Russian River				
Period		Classification		
From	Through	Normal	Dry	Critical
Sep 16	Apr 14	35 cfs	35 cfs	5 cfs
Apr 15	May 14	35 cfs	25 cfs	5 cfs
May 15	Sep 15	75 cfs	25 cfs	5 cfs

> * * * * *

> E.3. Release to the East Branch Russian River shall be greater than or equal to the minimum flow MF16 specified in Section C plus the release for the Potter Valley Irrigation District.

> * * * * *

> E.4. Release for the Potter Valley Irrigation District shall not exceed 5 cfs from October 16-April 14 and 50 cfs from April 15 to October 15. If CLP (April 1) is less than 25,000 ac-ft, this release shall not exceed 25 cfs during the following period from April 15 through October 15.

> * * * * *

> E.5. Diversions in excess of the sum of the minimum flow MF16 specified in Section C and the release to the Potter Valley Irrigation District specified in Section E.4 acan [sic] only be made when the Lake Pillsbury Storage is above the Target Storage Curve. Exceptions to the rule can occur only due to rate [sic] and brief emergency power and water demands.

Thus, RPA Section E.3 defines the minimum flows to the EBRR that must be met throughout the year as the sum of the minimum flows set forth in RPA Section C.1 plus the releases to PVID. RPA Section E.5 defines the maximum flows to the EBRR when Lake Pillsbury is below the Target Storage Curve in the same way. Thus, based on the

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flow schedules set forth in sections E.3 and E.4, in normal water years[1] the maximum diversions to the EBRR when Lake Pillsbury was below the Target Storage Curve should have been as follows:

October 16 – April 14	40 cfs
April 15 – May 14	85 cfs
May 15 – September 15	125 cfs
September 16 – October 15	85 cfs

[1] The years 2004, 2005 and 2006 were all classified as normal water years.

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ATTACHMENT B

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Attachment B. Over-releases at Potter Valley PH During Times of Spill at Cape Horn Dam

	Lake Pillsbury	Potter Valley PH				Eel River at CHD	
Date	Comparison to Target Storage Curve (TSC)	E-16	RPA E-16 Allowance	Over-release (cfs)		E-11	RPA E-11 Minimum
3/15/2005	<TSC	260	40	220		471	110
3/16/2005	<TSC	254	40	214		215	110
3/17/2005	<TSC	256	40	216		168	110
3/18/2005	<TSC	264	40	224		109	110
3/19/2005	<TSC	263	40	223		227	110
3/20/2005	<TSC	187	40	147		1260	110
3/21/2005	<TSC	97	40	57		4420	110
3/23/2005	<TSC	75	40	35		4870	110
3/24/2005	<TSC	160	40	120		3360	110
3/25/2005	<TSC	260	40	220		2170	110
3/26/2005	<TSC	262	40	222		1390	110
3/27/2005	<TSC	262	40	222		1590	110
3/28/2005	<TSC	263	40	223		3290	110
3/29/2005	<TSC	260	40	220		2820	110
3/30/2005	<TSC	259	40	219		2020	110
3/31/2005	<TSC	262	40	222		1720	110
4/1/2005	<TSC	262	40	222		1460	110
4/2/2005	<TSC	263	40	223		1240	110
4/3/2005	<TSC	262	40	222		1310	110
4/4/2005	<TSC	262	40	222		1340	110
4/5/2005	<TSC	262	40	222		1100	110
4/6/2005	<TSC	261	40	221		456	110
4/15/2005	<TSC	163	85	78		718	110
4/16/2005	<TSC	163	85	78		699	110
4/17/2005	<TSC	163	85	78		682	110
4/18/2005	<TSC	116	85	31		662	110
4/19/2005	<TSC	105	85	20		641	110
4/20/2005	<TSC	114	85	29		520	110
4/21/2005	<TSC	114	85	29		322	110
4/22/2005	<TSC	171	85	86		262	110
4/23/2005	<TSC	264	85	179		107	110
4/24/2005	<TSC	264	85	179		110	110
4/25/2005	<TSC	264	85	179		111	110
4/26/2005	<TSC	264	85	179		109	110
4/27/2005	<TSC	264	85	179		114	110
4/28/2005	<TSC	264	85	179		111	110
4/29/2005	<TSC	264	85	179		152	110
4/30/2005	<TSC	244	85	159		285	110
5/1/2005	<TSC	166	85	81		355	110
5/2/2005	<TSC	165	85	80		385	110
5/3/2005	<TSC	164	85	79		380	110
5/4/2005	<TSC	164	85	79		397	110
5/5/2005	<TSC	164	85	79		777	110
5/6/2005	<TSC	164	85	79		764	110

Unofficial FERC-Generated PDF of 20061020-0025 Received by FERC OSEC 10/18/2006 in Docket#: P-77-000

Attachment B. Over-releases at Potter Valley PH During Times of Spill at Cape Horn Dam

	Lake Pillsbury	Potter Valley PH				Eel River at CHD	
Date	Comparison to Target Storage Curve (TSC)	E-16	RPA E-16 Allowance	Over-release (cfs)		E-11	RPA E-11 Minimum
5/7/2005	<TSC	164	85	79		754	110
5/8/2005	<TSC	164	85	79		875	110
5/9/2005	<TSC	163	85	78		2560	110
5/10/2005	<TSC	163	85	78		2120	110
5/11/2005	<TSC	162	85	77		873	110
5/12/2005	<TSC	163	85	78		869	110
5/13/2005	<TSC	162	85	77		948	110
5/14/2005	<TSC	162	85	77		1200	110
5/15/2005	<TSC	162	125	37		1160	110
5/16/2005	<TSC	162	125	37		1040	110
5/17/2005	<TSC	162	125	37		737	110
5/20/2005	<TSC	162	125	37		2170	110
5/21/2005	<TSC	161	125	36		1070	110
5/22/2005	<TSC	161	125	36		1270	110
5/23/2005	<TSC	161	125	36		1220	110
5/24/2005	<TSC	161	125	36		1190	110
5/25/2005	<TSC	161	125	36		992	110
5/26/2005	<TSC	161	125	36		663	110
5/27/2005	<TSC	161	125	36		419	110
5/28/2005	<TSC	161	125	36		412	110
5/29/2005	<TSC	160	125	35		431	110
5/30/2005	<TSC	160	125	35		639	110
5/31/2005	<TSC	160	125	35		629	110
6/1/2005	<TSC	165	125	40		570	110
6/2/2005	<TSC	165	125	40		479	110
6/3/2005	<TSC	165	125	40		337	110
6/4/2005	<TSC	165	125	40		197	110
6/5/2005	<TSC	165	125	40		191	106
6/6/2005	<TSC	165	125	40		188	94
6/7/2005	<TSC	164	125	39		188	83
6/8/2005	<TSC	164	125	39		238	74
6/9/2005	<TSC	159	125	34		750	66
6/10/2005	<TSC	152	125	27		382	59
6/11/2005	<TSC	152	125	27		147	53
6/12/2005	<TSC	152	125	27		139	48
6/13/2005	<TSC	152	125	27		133	44
6/14/2005	<TSC	152	125	27		130	40
6/15/2005	<TSC	152	125	27		127	37
6/16/2005	<TSC	152	125	27		439	34
6/17/2005	<TSC	152	125	27		823	31
6/18/2005	<TSC	150	125	25		280	29
6/19/2005	<TSC	150	125	25		268	27
6/20/2005	<TSC	150	125	25		234	26
6/21/2005	<TSC	150	125	25		222	24
6/22/2005	<TSC	150	125	25		215	23

SONOMA COUNTY WATER AGENCY

FILE:WC/40-6.1-1 PG&E POTTER VALLEY
PROJECT OPERATIONS

June 8, 2007

Mr. David Moller
Manager of Relicensing
Pacific Gas & Electric Company
245 Market Street - Mail Code N11C
San Francisco, CA 94105

Dear Mr. Moller:

Thank you for meeting with Sonoma County Supervisors Mike Reilly and Paul Kelley and myself on May 17, 2007, to discuss PG&E's recent changes to Potter Valley Project operations.. As we discussed in our meeting, the Sonoma County Water Agency (Agency) and the County of Sonoma are very concerned about the changes in flows into the Russian River watershed from the Potter Valley Project instituted by PG&E beginning in the fall of 2006. These flow changes have adversely affected water storage levels in Lake Mendocino, to the point where predicted storage in Lake Mendocino may fall to unprecedented low levels in late summer and early fall, with potentially catastrophic impacts to threatened Chinook salmon within the Russian River.

The Agency is taking action to attempt to mitigate the impacts of PG&E's changes in Potter Valley Project operations and preserve fall storage in Lake Mendocino. These actions include requesting and receiving authority from the State Water Resource Control Board to temporarily reduce Russian River minimum instream flow requirements, and working with the Agency's customers and other water users to implement additional water conservation measures.

As discussed in our meeting, PG&E implemented the changes in Potter Valley Project operations, which critically reduced Lake Mendocino storage, without consulting with or informing the Agency or the County. The Agency and the County still do not know how PG&E is operating the Project, or whether operating the project using other criterion that is also consistent with the existing Federal Energy Regulatory Commission (FERC) license could have resulted in higher Lake Mendocino storage. Although Potter Valley Project diversions to the Russian River watershed are critical to the Russian River fishery and to the region's water supply, PG&E changed those diversions without analyzing the impact of the changes on these interests, and without notifying or discussing the impact of the changes with those impacted by the changes.

We were encouraged to hear at the May 17, 2007 meeting that PG&E is now willing to provide information about Project operations to the Agency, and to include the Agency in future meetings regarding project operations. At the May 17, 2007 meeting, you requested, and we agreed to provide, specific detail about the types of information and arrangements requested by the Agency. Those details are attached.

P.O. Box 11628 - Santa Rosa, CA 95406 - 404 Aviation Boulevard - Santa Rosa, CA 95403 - (707) 526-5370 - Fax (707) 544-6123

As you know, PG&E is obligated under its 1965 agreement with the Agency to operate the Project, consistent with its license and its power production needs to maximize the water supply benefit of the Project to the Agency. We believe that agreement requires a full sharing of information with the Agency, and full participation by the Agency in ongoing discussions about Project operations. Moreover, as noted in our meeting, the Agency has significant expertise in the areas of hydrology, modeling, engineering, and fisheries biology, and is willing to use that expertise to work with PG&E and other stakeholders to maximize the benefit of the Project for both Russian River and Eel River interests.

Since the impact of the 2004 FERC license amendment on flows into the Russian River watershed is in reality much greater than anticipated, we are looking forward to working with PG&E to explore with National Marine Fishery Service what flexibility exists within the current license to correct these issues and, if needed, what the process would be to gain their support for any necessary modifications to the license.

We look forward to a prompt response to our requests. If you have any questions about the requests, please call Chris Murray at (707) 547-1925.

Sincerely,

Randy D. Poole
General Manager/Chief Engineer

Enc

c Supervisor Mike Reilly
Supervisor Paul Kelley
✓ Chris Murray
Steve Shupe

Jb:fileserver/data/cl/jablodow/engr/Scherzinger/draft of letter to pge re pvp information final 6-8-07.doc

Information and Coordination Requests to PG&E

Operations and Maintenance Documentation

1. Reliability criteria for determining scope of maintenance program for all facilities.

2. Maintenance requirements for all facilities and actual maintenance schedules.

3. Actual operating criteria, plans, and instructions to operations staff, including all operating manuals or instructions provided to operations staff regarding operations under or implementation of the reasonable and prudent alternatives contained in the 2004 FERC license.

4. Any alternative or contingency operating criteria, plans, and instructions to operating staff, including description of criteria used to determine when alternative operations would be implemented.

5. Identify and provide any and all computer programs (including modeling programs) currently used to operate the Project or to evaluate the flow impact of different operational scenarios.

6. Identify positions and personnel associated with each operational task.

7. Identify positions and personnel responsible for operations and operations policy decisions throughout the entire chain of command.

8. Identify the annual budget limit associated with Project facilities maintenance and replacement and the priority of maintenance and replacement in the event of budget shortage.

Agency Coordination Requests

1. Provide notification of operation mode changes.

2. Provide notification of any operation difficulties or emergencies.

3. Provide notification of any inspections of facilities.

4. Provide notification of unscheduled shut downs or significant flow reductions in the tunnel.

5. Provide notification and coordination (including providing copies of study reports) on any fishery studies performed.

6. Provide access to all project areas for fisheries studies, operations coordination, and inspection of facilities.

7. Include SCWA in project-related meetings with regulatory agencies and stakeholders, including NOAA Fisheries, Department of Fish and Game, Federal Energy Regulatory Commission, Round Valley Indian Tribes and others.

8. Provide right of first refusal of sale of Project.

9. Identify long and short term goals and plans for the Project

Information and Coordination Requests to PG&E

Long Term Strategies

1. Work with SCWA to develop and communicate PG&E's long term vision/plan for operation of the project.

2. Work with SCWA to develop and communicate salmonid recovery strategies for the Russian River and Eel River watersheds.

3. Work with SCWA to develop and communicate plans and strategies with respect to license renewal.

4. Work with SCWA to develop and coordinate project operations to facilitate and balance Eel River and Russian River basin water supply needs and salmonid recovery goals.

5. Amend 1965 Agreement to incorporate notification and coordination activities described above.

Pacific Gas and Electric Company®

Power Generation

245 Market Street
San Francisco, CA 94105

Mailing Address
Mail Code N11C
P. O. Box 770000
San Francisco, CA 94177

June 22, 2007

Mr. Randy D. Poole
General Manager/Chief Engineer
Sonoma County Water Agency
404 Aviation Boulevard
Santa Rosa, CA 95403

Re: Potter Valley Project, FERC Project No. 77
Response to Sonoma County Water Agency Letter dated June 8, 2007

Dear Mr. Poole:

Thank you for your June 8, 2007 letter concerning Pacific Gas and Electric Company's Potter Valley Project. As we discussed in our May 17, 2007 meeting with you, National Marine Fisheries Service (NMFS) and representatives of the Sonoma County Board of Supervisors, PG&E is committed to working with your agency and other East Branch Russian River (EBRR) water users to try to minimize water supply impacts, while still complying with the mandatory conditions of the Potter Valley Project operating license issued to PG&E by the Federal Energy Regulatory Commission (FERC).

We realize how important the water the Potter Valley Project diverts from the Eel River into the EBRR is to the beneficiaries of this water. That's why, when it was brought to PG&E's attention by the California Department of Fish and Game and the NMFS in 2006 that the water diversions we were making to the EBRR were greater than what is allowed under the license amendment issued by FERC in 2004, and we realized we would need to modify operations to comply with the conditions of the license, we analyzed the impacts and immediately began communications with your agency, other water users, local elected officials, and the media to advise of these changes.

As we reviewed with you and other EBRR water users in November 2006, the reduction in diversions from the Eel River into the EBRR required by the license amendment was considerably greater than what had been anticipated during the amendment proceeding and what was initially implemented by PG&E. As discussed with you and presented in detail at a November 2006 meeting with the Potter Valley Irrigation District attended by members of your staff, the average annual reduction in diverted water resulting from compliance with the license amendment is forecast by PG&E to be approximately 33% rather than the 15% that was anticipated during the amendment proceeding and in the NMFS Biological Opinion used by FERC in its order amending the license.

Your letter included a list of information and coordination requests related to the Potter Valley Project. As you know, Project flow information has been made publicly available on a daily basis via the Internet since March of this year. Additionally, for many years now, PG&E has provided your agency with daily telephone reports regarding key Project operational data such as water elevation and storage in Lake Pillsbury, water releases and spill from Lake Pillsbury and Van Arsdale Reservoir, and water flow through Potter Valley Powerhouse. We will continue to provide your agency with this operational information, plus we will review the list of additional information you have requested and will respond separately. The list of information and coordination requests also asked that PG&E provide Sonoma County Water Agency with a right of first refusal on the sale of the Potter Valley Project. While we appreciate your interest in the future of the Potter Valley Project, PG&E has no current plans to sell the Project and does not see a right of first refusal as feasible.

Again, PG&E fully recognizes the importance of Potter Valley Project water diversions to EBRR water users. We look forward to continuing to work with your agency and others to try to minimize the impact of greater-than-anticipated reductions in these diversions resulting from operating the Potter Valley Project in compliance with the Project license.

Yours truly,

David Moller, Director
Hydro Licensing

DWM/msp

cc: See attached list

cc: Supervisor Mike Reilly
Board of Supervisor
Sonoma County Water Agency
575 Administration Dr., Room 100-A
Santa Rosa, CA 95403

Supervisor Paul Kelley
Board of Supervisor
Sonoma County Water Agency
575 Administration Dr., Room 100-A
Santa Rosa, CA 95403

Mr. Chris Murray
Water Agency Principal Engineer
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Steve Shupe, Esq.
County Counsel
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Mr. Randy Brown
U.S. Department of Interior
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1655 Heindon Road
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Mr. Robert Floerke, Manager – Region 3
California Department of Fish and Game
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Yountville, CA 94599

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Mesa, AZ 85202

Mr. Jeffery Jahn
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National Marine Fisheries Service
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Ms. Donna Cobb
California Department of Fish and Game
Northern Region
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Redding, CA 96001

Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
Mail Code: DHAC, PJ-12
888 First Street, N.E., Room 1A
Washington, D.C. 20426

Ms. Janet K.F. Pauli, Chairman
Mendocino County Inland Water and Power Commission
425 Talmage Road
Ukiah, CA 95482

APPENDIX I

Response to Comments

The following summarize written comments received and the response to those comments. The actual comment letters are on file with the City Clerk and may be examined during regular City business hours.

Response to comments from Sonoma County Water Agency

Item	Comments	Response
1	Page ES-1 – Second to last paragraph "The City obtains it water supply… " – Missing the s on it.	This will be corrected in the final version
2	Page ES-1 – Last paragraph Why would water be pumped between wells that are no longer used.	The statement referring to Well 6 pumping to Well 2 will be clarified in the final version.
3	Page ES-4 – Five barriers for recycled water program Barrier 1 – Many farmers have storage facilities now. Barrier 2 – Just a perception, or is it a fact. Barrier 3 – Not a barrier, see Water Code Section 1010. Barrier 4 – But do they have rights to the water they are using? Barrier 5 – More expensive, perhaps, but still very cost effective.	The City of Ukiah met with the local farm bureau and farmers to discuss recycled water opportunities. The barriers mentioned in the Urban Water Management Plan (UWMP) were expressed by the local farmers and agriculture industry at this meeting. A statement will be provided in the UWMP indicating that these are barriers perceived by the local farmers and agriculture industry. A public education program will be needed to demonstrate the benefits of a recycled water program.
4	Page ES-5 – Second to paragraph Change application to petition	Application will be changed to petition in the final version
5	Page ES-6 – General comment The City should become a member of CUWCC and the MOU and implement all 14 BMPs	Comment noted.
6	Page 2-1 - First paragraph of Section 2.1, second sentence By What Agency was the water supply permit in 1939	The permit was granted by a predecessor to the Department of Health Services. This will be clarified in the final version.

	granted.	
7	Page 2-1 - First paragraph of Section 2.1, last sentence Is this a DHS number? It is not a water right number.	Yes, it is a DHS number. This will be clarified in the final version.
8	Page 2-1 – Second paragraph of Section 2.2 Are the customers served by the City within its water right place of use	The City has filed a Petition for Extension of Time. This petition includes a change to the City's water right place of use. This will be clarified in the final version.
9	Page 3-9 – First paragraph of Section 3.7.2 What about MCRRFCWCID? 800 AF	The 800 AF that the City can purchase from MCRRFCWCID is listed as project water in this UWMP. No further action will be completed on this comment.
10	Page 3-16 – General Comment The only water available to Ukiah, from the Russian River, is the water flowing into Lake Mendocino and any tributary flows arising downstream from Coyote Dam. The City has no right to pump water that has been stored in lake Mendocino and later released into the East Fork RR.	The City agrees with this comment as it pertains to the East Fork Russian River. The City has no intention of using stored water from Lake Mendocino. No further action will be completed on this comment.
11	Page 3-17 – General Comment This analysis assumes that shortfalls in available supply from natural flow and Potter Valley imported water are made up from Sonoma County Water Agency supplies stored in Lake Mendocino. Ukiah does not have a contract with SCWA	The future Ukiah extractions under its water right permit will come from The Ukiah Valley groundwater basin. SCWA's permit 12947A is limited to water originating in the East Fork Russian River. SCWA comment does not make it clear why it considers the future extractions by the City to be project water. The City's water right permit authorizes diversions from Russian River Underflow, Jan 1 to December 31 without a bypass condition. It is not necessary for Ukiah to enter into a contract with SCWA to extract water from the groundwater basin (or the subterranean stream). During very dry years, some of the City's water use can be made under its contract with the Flood Control District, to the extent that it is necessary. The contract, for 800 acre feet, is roughly 4 cfs during the dry season.
12	Page 3-22 – First full paragraph, reference to 37,300 acre-feet This number should be divided by gross tunnel diversions, not tunnel diversions less PVID diversions.	PVID diversions were accounted for in the analysis of historic and future inflow to Lake Mendocino
13	Page 3-22 – First full paragraph, reference to 26 percent This 26% is calculated by dividing reductions in gross tunnel diversions by net lake inflows….Apples and oranges.	The 26% reduction is determined as stated in the text as the percent change in annual Potter Valley Project imports to the East Fork Russian River due to the E-5.
14	Table 4 in Chapter 3 – General comment Available supply for all Pre-49 and Post 49 water rights from PVID downstream including the City of Ukiah	Yes, 1977 was a very dry year, which followed a dry year in 1976. Of course, there are other sources of water available in the Russian River basin in addition to the Potter Valley Project imports to East Fork Russian River.
15	Page 7-1 – First paragraph of Section 7.1, reference to CUCWCC Sign up.	Comment noted.
16	Page 7-2 – First paragraph of Section 7-2 DMM 7, 8, and 12 are being implemented too.	A statement clarifying this will be added to final version.

Responses to Comments from LAFCO Executive Director, contained in a letter dated October 4, 2007

A general description of the Ukiah groundwater basis is provided, followed by specific responses to the Executive Director's comments. References are to items and page numbers in his letter.

Ukiah groundwater basin.

The Ukiah Valley groundwater basin (aquifer) underlies Ukiah Valley and Redwood Valley. Geologic and groundwater characteristics underlying Sanel Valley are similar, however, bedrock effectively separates the Sanel aquifer from the Ukiah aquifer.

The Ukiah Valley is the largest of several interior valleys in Mendocino County that fall along the north-northwest trending Mayacama Fault Zone. The basement rock is of the Franciscan Complex, of variable but minor water yielding capacity. The valley is filled up to 2000 feet deep with unconsolidated or loosely cemented gravel, sand, silt, and clay deposited through eons of erosion, transport and sedimentation.

The valley fill is categorized as three separate deposits. The oldest and lowest unit is the continental basin deposits. It is estimated to be up to 2000 feet in depth near the axis of the valley. Wells completed in the continental basin deposits produce water slowly because of consolidated, fine-grained material and low permeability. Well yield ranges from 1 – 50 gallons per minute (gpm). The second unit is the continental terrace deposits, situated mostly on the periphery of the valley. These deposits are relatively thin (up to 25 feet), have a low permeability and are not a significant groundwater source.

The third valley fill unit is the Holocene alluvium, consisting of uncemented gravel, sand, silt and clay deposited in the last 10,000 years. The Holocene alluvium covers approximately 30 square miles throughout broad areas of the flood plain and more narrow bands along the Russian River north of the Forks and along tributary streams. It is generally less than 100 feet thick but extends up to 200 feet in depth. Consisting of coarse and uncemented sediments, the alluvium exhibits high porosity and permeability, thereby holding a significant quantity of water and transmitting water rapidly. Well yields range from 100 to 1000 gpm. The volume of water available from pumping from upper 100 feet of the most productive portion of the aquifer is estimated at 90,000 acre-feet.

Groundwater in the alluvium is hydraulically connected to and interacts with surface flows. The principal source of groundwater is infiltration of precipitation. Other sources contributing to Ukiah valley groundwater are streamflow leakage,

deep percolation from irrigation and treated effluent discharged via the City of Ukiah percolation ponds.

The groundwater table (the underground water surface) fluctuates seasonally, being at its highest level in March or April at the end of the wet season, and at its lowest in October, at the end of the dry season. Seasonal fluctuations range on the order of 5 to 20 feet.

Measurements have been taken and recorded over a long time period at a few wells in the valley. Measurements were generally taken twice a year, at the end of the wet season and at the end of the dry season. The groundwater measurements show the water table rebounds during the wet season to about the same elevation in all but abnormally dry years such as 1977. The water table rebounded completely in one year of normal precipitation. Water surface measurements over the long-term show no trend in groundwater levels.

A 1986 USGS investigation (referenced below and attached) of groundwater levels in the Ukiah Valley found that, “None of the hydrographs show any prominent long-term declines. Water levels measured during the 1980’s are remarkably similar to those measured during the 1960’s and 1970’s.” Bulletin 118 of the California Department of Water Resources, updated 2/27/04, in its section on the Ukiah Valley Groundwater Basin (referenced below and attached) states, “Based on hydrographs from DWR monitored wells, groundwater levels in the past 30 years have remained relatively stable. During drought conditions there is increased drawdown during summer months and less recovery in winter months. Post-drought conditions rebound to approximately the same levels as pre-drought conditions.”

Water Level in the Ukiah Valley

Wagner & Bonsignore prepared Figures 1 through 4 (attached) which show water table hydrographs through 2007 from the available record of long-term monitoring of wells in Ukiah Valley. Figure 5 shows the location of those wells. The hydrographs show the seasonal fluctuation due to the precipitation, the effect of drought in 1977, and the absence of a long-term trend in water surface elevation.

Because the alluvium contains and transmits water easily, there is significant interaction between the Ukiah basin aquifer and the Russian River. Water level measurements show that in most years in spring the aquifer is full and spills to the river. At the southern end of the Ukiah groundwater basin, the bedrock rises toward the surface and groundwater must move to the surface stream (Russian River) to move downstream. The predominant movement of water is from the Ukiah groundwater basin to the Russian River. However, conditions fluctuate and occasionally result in some water moving from the river to the aquifer.

When the river stage is high, water moves from the river into bank storage, where it is temporarily held until the river stage falls and water drains back to the river. When the aquifer water table is low, as happens toward the end of the dry season, water moves from the river to the aquifer. This is compounded by the effect of phreatophytes (water-loving plants) drawing water from the aquifer. Finally, pumping of wells will cause a localized drawdown of the water table, which can result in flow moving from the river to the aquifer.

Specific Responses.

Item 10. page 6: City's Water Right Permit Extension, LAFCO writes that the "City Consumed a total of 4131 acre feet of water in 2004."

The commentor has confused consumptive use with water production. The consumptive use of the City's diversions in 2004 (and proportionally for any other year) is about 43% of the total amount diverted. As described in detail in the above report, return flows make a significant contribution to the hydrologic system.

Items 11, 12, 13 and 14, pp. 7-11: Comments considered together with the following response:

The Executive Director suggests that there exists the need for a groundwater basin study, although the comments do not specifically address the areas of concern, offering instead a general concern that there may be a problem with water supply. He also discounts the USGS and DWR Bulletin as outdated and based on inadequate data.

The hydrographs that were evaluated by USGS in 1985 and by DWR in its Bulletin 118, updated in 2004, clearly show that groundwater conditions in the valley have changed very little, if at all. The wells with the longest record that are readily available and included herein, which include draw-down data up to 2007, show the same response today as they did in the past. The water level data is likely the most reliable information we have indicating the overall water supply health of the groundwater basin. The City may want to begin developing a plan for implementing a groundwater monitoring system to provide more complete and accurate data. This would be a long term project that would have to be implemented over a number of years.

The Executive Director cites a statement by Dr. Sari Sommarstrom, Ph.D. recommending a "specific ground-water study of the Ukiah Valley.., to determine the relative amounts of surface and groundwater currently used, irrigation recharge rates and movement, and the safe yield of the groundwater basin." Such a study as suggested by the Executive Director might prove to be a useful investigation for future planning as part of a comprehensive regional water management program; but it is not necessary at this time in order to conclude

that sufficient water supplies exist to continue the development of the City's water rights.

Runnoff into surface streams represent potential recharge to the Ukiah groundwater aquifer. Those streams include the East Fork Russian River, West Fork Russian River and ungaged tributaries to Ukiah Valley. The ungaged tributaries include Hensley, Ackerman, Orrs, Doolin, Robinson, Howard, Sulphur, McClure Howell, Morrison and 12 unnamed creeks. The drainage area of the ungaged tributaries is 137 percent of the drainage area of the West Fork. Total flow of the ungaged tributaries can be estimated based on 137 percent of the West Fork flow.

To estimate streamflow entering Ukiah Valley from the East Fork in the future, an adjustment was made to account for the effect of the FERC license E5 condition constraint. This adjustment had the effect of reducing future East Fork flows by 37,300 acre-feet per year, on average.

Total surface flow entering the Ukiah Valley in the future, on an average annual basis, can be estimated as follows.

	Thousand Acre-Feet Per Year
Historical Inflow to Lake Mendocino	250.1
Historical Import to East Fork	(141.5)
Future Import to East Fork	104.2
Subtotal (Future East Fork)	212.8
West Fork	129.1
Ungaged Stream (137% of West Fork)	176.9
Total Surface Inflow to Ukiah Valley	518.8

The City's future estimated water production is about 8400 acre feet of which about 57% returns to the system representing a depletion of 3600 acre feet. The amount of available recharge from streamflow is approximately 140 times greater than the City's future net demand (the City's depletion is 0.67% of the average annual surface stream supply to the valley).

The Executive Director suggests that a groundwater management plan is needed to address the questions that it lists as bullet items on pages 9 and 10. The City agrees in principal that a water management program which includes groundwater monitoring, conservation and regional cooperation with other agencies is a good idea. A first step toward comprehensive groundwater management would be the development of a regional groundwater monitoring program that could be implemented over time with cost sharing and cooperation from all of stakeholders in the region.

Response to Comments from Barbara Spazek, Executive Director of Mendocino County Russian River Flood Control and Water Conservation Improvement District, dated October 15, 2007.

The significant points in the comment letter are paraphrased followed by a response. A more general response is also provided.

a) **Assertion:** Lake Mendocino was represented by Wagner & Bonsignore, Consulting Engineers ("WBE") as the source of supply for the City of Ukiah;

Response: The WBE analysis in the UWMP acknowledges that the City has no right to store water in Lake Mendocino and does not rely on "Project Water" as the City's source of supply, except under its water supply contract with the District. The analysis explains how current demand is met without encroaching on the District's or the Sonoma County Water Agency's right to Project Water, and how future demand can be met from groundwater wells without using Project Water.

b) **Assertion:** WBE did not evaluate the effects on water users on the Russian River.

Response: WBE's fundamental assumption is that future demands were met by mimicking historic releases. Those demands included all uses, lawful and unlawful and in-stream flow requirements.

c) **Assertion:** Increased diversions by Ukiah would impact water users downstream on the Russian River.

Response: WBE's analysis shows that downstream demands, including in-stream uses, and lawful and unlawful diversions will be met in the future, if the City fully develops its 20 cfs water right.

d) **Assertion:** Post-1949 water rights have no right to divert imported water.

Response: Post 1949 water users can divert imported water to the extent that it is in excess to the demands of all pre-1949 users and excess to other prior right holders. The WBE analysis only relies on imported water to the extent of the City's right.

e) **Assertion:** Return flows from outdoor water use are zero.

Response: WBE estimated return flow to the groundwater aquifer from outdoor use, assuming that the use was largely irrigation of lawns, gardens, parks, open space etc. Such return flow to the groundwater system is not related to the City's waste discharge requirements ("WDRs") at the Wastewater Treatment Plant. The analysis did include return flows from the City's percolation

ponds which obviously return water to the groundwater aquifer. WBE did not evaluate whether, to what extent or by what means those return flows re-enter the Russian River. Such a determination is not necessary for the water availability analysis. Under its WDRs, the City is required to conduct a study to determine whether and by what means the water which percolates out of its WWTP ponds reaches the Russian River.

General Response to Comments:

The City of Ukiah diverts from groundwater and underflow of the Russian River. The City's right to divert is based on a pre-1914 right, a contract with the District, its water rights permit and a pre-1949 right confirmed in Water Board decision D-1610. The City does not in any way direct the storage to, or release of water from, Lake Mendocino, nor does it regulate diversions on the Russian River downstream of the Lake. The City of Ukiah's diversions may have an indirect effect on Russian River stream flows, and thus Lake Mendocino operations, by virtue of possible induced seepage losses on the Russian River. The manner of groundwater-surface water interaction is complex. WBE modeled the largest reasonably probable impact of Ukiah diversions on Russian River flows. Note, however, that Ukiah is not responsible for, nor authorized to, administer Lake Mendocino or the Russian River.

Contrary to the statements in the District letter, WBE accounted for and modeled all historical river losses and diversions on the Russian River downstream of the Forks to Healdsburg. In WBE Scenario A, downstream demands on the Russian River were set equal to historical releases from Lake Mendocino up to 275 cfs (dry season releases in excess of 275 cfs were considered unnecessary). In WBE Scenario B, downstream demands on the Russian River were set equal to historical releases from Lake Mendocino reduced by the amount that gauged streamflows were in excess of the D-1610 minimum flow. In the WBE modeling, all water uses on the Russian River were included as demands for release from Lake Mendocino and all demands were satisfied – no shortage occurred. Outdoor water use in Ukiah is not collected and routed to the City's wastewater system. Some portion of the outdoor water use returns to the river system as surface runoff and deep percolation beyond the root zone of lawns and landscaping. This was estimated as 15 percent of the outdoor water use based on water use estimates for pasture and a 70%-efficiency for sprinkler application. The resulting 20-30% return flow estimate was reduced to 15% to be conservative.

Note that the storage right for Lake Mendocino is limited to water in the East Fork Russian River.

As the District Exhibit A shows, substantial tributary inflow accrues to the Russian River downstream of Lake Mendocino, that is, drainage area above

Lake Mendocino: 105 square miles, drainage area above Cloverdale: 502 square miles.

The District's Exhibit C has some flaws. First, there is conversion error for all "cfs" values. Second, the exhibit ignores contribution from tributaries downstream of the Forks. Third, Exhibit C ignores groundwater storage and flow as source to water users and to Russian River streamflow. Fourth, Exhibit C provides no basis for the 3,000 acre-feet per month riparian use. It is more likely than not that riparian acreage, the uses which were included in the 8100 af of pre-1949 use recognized in Decision D 1030, has not significantly increased. Fifth, Exhibit C implies that post-1949 water rights could not divert imported water.

Response to comments, dated October 16, 2007, from Pinky Kushner

1. Comment: Figure 2.2 is confusing, because it depicts two different spheres of influence.

Response: The revised plan includes the proposed sphere of influence as described in the City's General Plan adopted in 1995.

2. Comment: What is the future of the Ranney Collector?

Response: In 2001 the Ranney Division of Layne Christensen (now a division of Reynolds, Inc.) was hired to evaluate and rehabilitate the City's Ranney collector well. This work began in June 2001. Initially, Ranney cleaned the existing laterals to increase water production. Ranney estimated the yield of the well would be increased from 4 million gallons per day (MGD) to between 5.5 MGD and 8.0 MGD. Ranney completed the rehabilitation work on the existing laterals in March 2002. Cleaning the laterals did not result in any increase in yield. However, the water quality did improve. There was significantly less turbidity, which reduced plant operations and maintenance (O&M) costs.

Ranney concluded that a significant portion of the loss in capacity of the Ranney well was due to changes in the Russian River water level, flow rate, width, distance from the Ranney and river bottom permeability. These changes resulted in decreased saturated aquifer thickness, decreased aquifer transmissivity and decreased recharge to the aquifer.

Without restoration of the river, Ranney concluded that it would not be possible to restore the Ranney well to its previously higher capacity. However, Ranney did believe that by installing several new laterals, it would be possible to increase the yield by 0.43 to 0.86 MGD under summer conditions of low river flow rates. Ranney completed installation of four new laterals in June 2003, at a cost of over $700,000, which increased the yield from the Ranney well by 0.32 MGD.

Based on consultation with Ranney, the City has concluded that there are no further steps that can be taken to increase the yield of the Ranney Collector. For that reason, the City has opted to explore off river wells to increase its source capacity.

To address the impact of turbidity on the City's ability to use the Ranney Collector in the winter, the City has received a quote of $300,000 per unit, not including related piping and installation costs, for pre-filtration units designed for use with the City's existing Microfloc filtration units at the City's water treatment plant.[1] This is an option that the City may wish to explore further, as it would provide redundant capacity during the winter months. However, in addition to the installation costs, on-going expenses for Operations and Maintenance would be higher than from the City's groundwater wells due to the greater level of treatment required for water derived from the Ranney. The City will explore the financial feasibility of this option in the next two years.

3. Comment: The revised plan refers to percolated groundwater rather than groundwater. What is the evidence that there is percolated groundwater?

Response: The plan was revised to include definitions of groundwater and percolated groundwater and to use those terms consistently. See Plan, p. ES-1, Water System, second paragraph. The term "percolating groundwater" is used primarily in reference to Well No. 4, which has been consistently treated by the City and accepted by the State Water Board as percolating groundwater. But see, generally, the discussion of groundwater in §3.2.1, beginning on p. 3-2, and in §3.2.3, beginning on p. 3-4, and response to comments for LAFCO Executive Director, above.

4. Comment: Aren't the ponds at the waste water treatment plant evaporation ponds, not percolation ponds?

Response: The ponds are labeled "percolation ponds" in the Waste Discharge Order approved by the North Coast Regional Water Quality Control Board for the City's Wastewater Treatment Plant. That order requires the City to plan and conduct a hydrologic study of the ponds over the next three years.

Comment: The discussion of recycled water should acknowledge potential pollutants in recycled wastewater, including bioactive pharmaceuticals.

Response: The plan concludes that substantial barriers exist to using recycled water on private property. It proposes developing a plan to determine the feasibility of using recycled water for certain public property applications. Potential pollutants, including pharmaceuticals in treated effluent, would be part of any such feasibility study.

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[1] Alan Jamison, Water Treatment Plant Manager, personal communication with U.S. Filter.

5. Comment: The plan should describe how the City will help preserve water for agriculture in the Ukiah Valley.

Response: Comment noted. The Plan does conclude that all uses of water, including agricultural uses, which have been made historically, can continue to be met, even if the City uses its full entitlement under its water rights permit and taking into account reduced diversions from the Eel River.

6. Comment: The plan should include measures to preserve groundwater recharge, including permeable paving.

Response: Comment noted. The plan notes that the groundwater basin sources of recharge exceed the potential increase in demand by the City over the next 20 years by 140 times, but all measures to preserve recharge are worth considering.

7. Comment: The population projections in Table 5.1 appear unrealistic.

Response: As a result of reducing the planning area to the proposed sphere of influence as described in the1995 General Plan, the population estimates have been revised and reduced. The projections exclude current water users. The growth projections rely on land use designations for that area in the 1995 General Plan, since those areas will only be served by the City, if they are annexed at which point the City, not the County, land use designations will apply. The mixed use designation for the Lovers' Lane property is assumed to be mixed use agriculture. The Masonite Property is designated for industrial use.

Response to comments from Paul Zellman, dated October 16, 2007

1. Comment: The UWMP focuses too much on paper water rights and not enough on deficiencies in the City water system's extraction capacity, particularly the decline in production from the Ranney Collector, and on the use of conservation to address those deficiencies.

Response: The discussion in Section 3.10 of the UWMP concerns the amount of water actually available to meet the City's entitlement under its water rights permit and all other historic diversions from the Russian River below Lake Mendocino.

As to efforts to improve the production of the Ranney Collector, see response to Comment No. 2 from Pinky Kushner, above, at pp. 9-10.

2. Comment: The City should place more reliance on water conservation to address production shortfalls. In that effort, the City should implement DMMs 11 and 5.

a. DMM 11 provides for retail conservation pricing.

Response: The City recently raised its water rates in connection with financing improvements to its water system, including new storage capacity. Water rates have recently been determined to be “property related fees” within the meaning of Proposition 218, which imposes both substantive and procedural requirements on establishing or changing City water rates. In relation to the Proposition 218 requirement that the charge to any property owner must be based on the proportional cost to serve that customer, conservation pricing raises certain legal issues that require evaluation.

For these reasons, the City will evaluate conservation pricing in connection with any future revision to its water rates to the extent such pricing can be lawfully imposed.

b. DMM 5 provides for Large Landscaping Conservation Programs and Incentives.

Response: See response to Comment Nos. 4 and 5, below, at pp. 11-13.

3. Comment: Section 7.3 of the UWMP, addressing Current Water Conservation Programs, makes mathematical errors and commingled indoor and outdoor use in calculating the effectiveness of DMM 1.

Response: The comment points out computational problems in this analysis in the UWMP. On Page 3, the calculation in Appendix F was based on $1.29 per 748 gallons, which is the November 2008 City rate. The value of $1,206 stated in the document is correct. The November 2008 number reflects better the cost of water for BMP 1. The $0.91 per 748 gallons is the November 2005 value. Apparently this did not get updated. This change has been added.

On Page 4, 465 gpd/unit was recomputed based on 0.73 acre feet per year per connection. This equates to 237,873 gallons per year per connection. Dividing this by 365, gallons per day per connection is 652. Taking 60 percent of this for outdoor use, the outdoor use is equal to 391 gallons per day for a single family residence. For a multifamily residence, the outdoor use would be 156 gallons per day. Adjustments have been made in Appendix F to reflect this change. As far as the 0.868 afy usage, the UWMP has been revised using 0.73 afy, which is based on the average from 2000 to 2005. Based on the numbers for 2006, the usage was closer to 0.66 afy. The comment correctly points out that the outdoor usage was commingled with the indoor usage in calculating the Benefit/Cost ratio. The UWMP has been changed to correct this.

4. Comment: The statements regarding Planning Department review of landscape plans is vague. The Model Landscape Conservation Ordinance is more specific and should be adopted.

Response: To elaborate on the shorthand statements in the UWMP regarding landscaping and water conservation, Section 9087(D)(1)(b) of the Ukiah City Code does state that "Landscape plantings shall be those which grow well in Ukiah's climate without extensive irrigation." That subsection goes on to provide a preference for native species. Item (j) in that same Section requires Landscaping Pans to include automatic irrigation systems.

The City has been concerned about water conservation and landscaping for some time now. In August of 1996, the City adopted the Landscaping and Streetscape Design Guidelines. These Guidelines include a number of provisions that strongly encourage water conserving landscaping. If fact, at the bottom of page 1 in the Introduction, it states "The Guidelines emphasize water conservation as it relates to the design of landscaping treatments for new development projects. Guideline directives are included for the application of drip irrigation systems, drought-tolerant plant species, the use of organic mulches, and the reduction of lawn/turf areas in new project design."

The Guidelines also include the following:

Chapter 1 Item (A)(5): "Indigenous and/or drought-tolerant water conserving plants and landscapes should be used.

Chapter 1 Item (C)(4): "Irrigation systems must be designed for efficient conservation of water; examples include drip systems, bubblers, hose bibs, low flow and low flow angle systems."

Chapter 1 Item (C)(8): "Automatic watering systems set to water at night are encouraged."

Chapter 1 Item (E)(5): "Exotic plant materials should be avoided - especially if they require intensive care and/or excessive water."

In practice, the City planning department provides copies of the above statutes/guidelines to potential applicants so they can design their Landscaping Plans accordingly.

The Model Landscape Conversation Ordinance addresses new and existing landscaping. Adopting these requirements in the City will involve significant policy discussion.

This summer, the City undertook a number of water conservation measures. City staff reported those efforts to the City Council at its April 18, 2007, meeting (as

Agenda Item 11.C and at its July 18, 2007, meeting as Agenda item 10.C. With respect to the California Urban Water Conservation Council's memorandum of understanding regarding Urban Water Conservation and implementation of the 14 best management practices, the staff recommended signing the MOU. The staff will place this item on a City Council agenda for consideration in fiscal year 2007-2008.

5. Comment: The commenter could not find a conservation budget of $12,000, as reported under DMMs 7-8 in the UWMP.

Response: In fact, the 2007-2008 budget sets aside $2,000 for Public Education water conservation brochures. The UWMP will be revised to accurately reflect this number. As to the broader comment regarding water conservation, the City has worked extensively to reduce water used for its own landscaping at parks and the golf course. It has also worked with the Ukiah Unified School District and the Russian River Cemetery District to reduce water consumption for landscape irrigation. (See Agenda Summary Report for Item 10c at July 18, 2007, City Council meeting.) As previously stated, the City staff will present the California Urban Water Conservation Council's memorandum of understanding regarding Urban Water Conservation and implementation of the 14 best management practices during the current fiscal year.

FIGURE 1
Well 15N12W08L001

10/11/2007

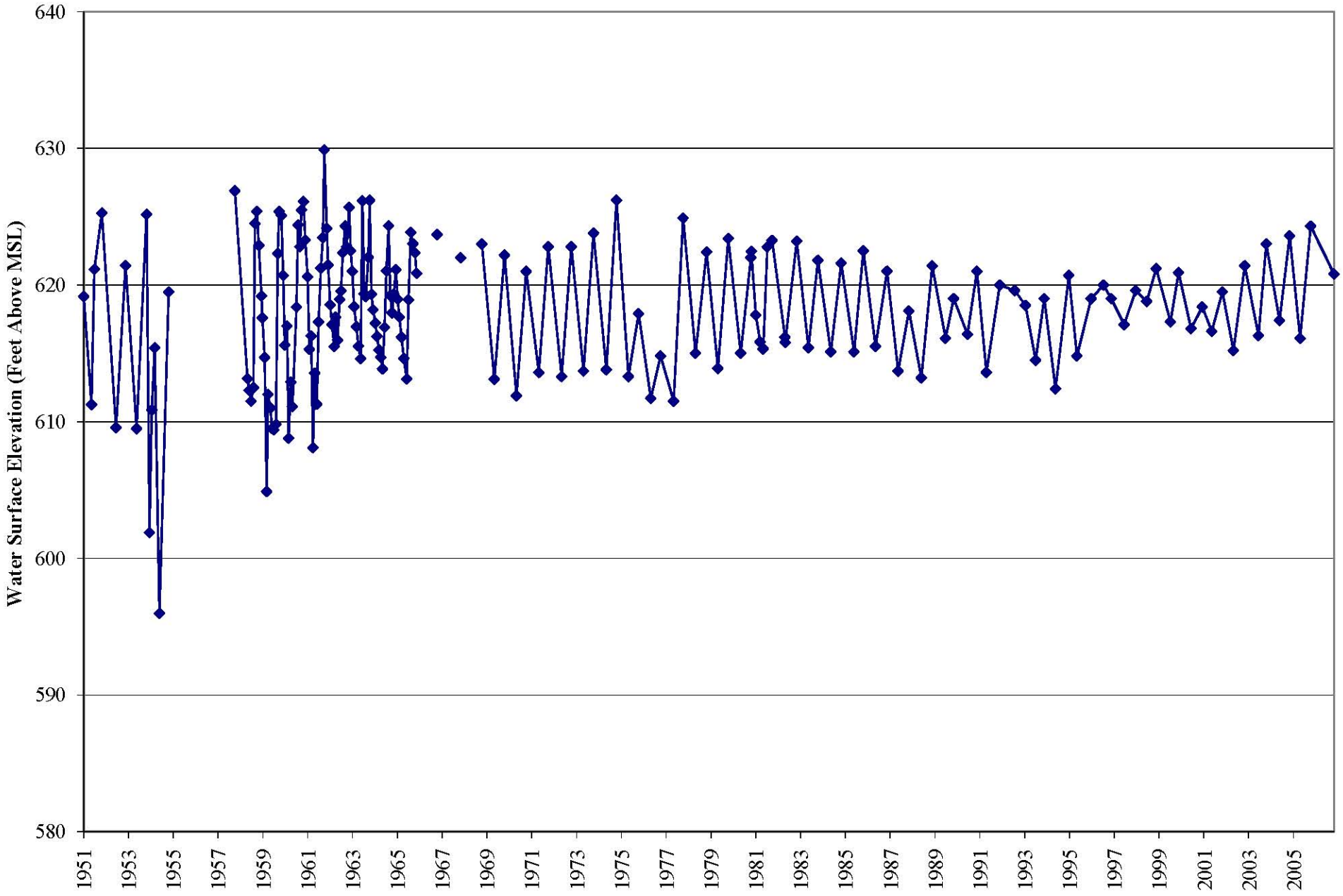

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FIGURE 2
Well 14N12W05K001

10/11/2007

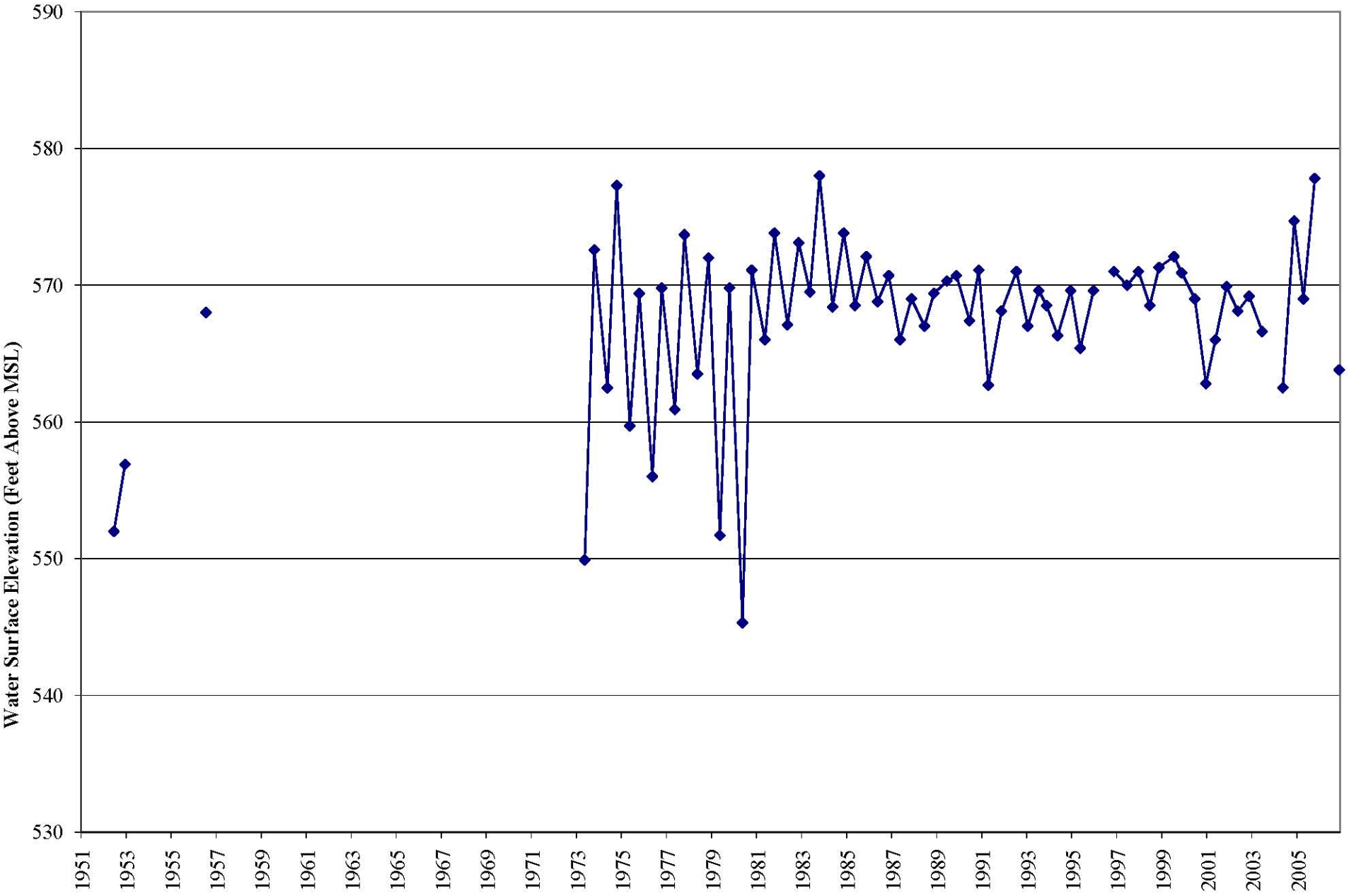

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FIGURE 3
Well 15N12W34Q001

10/11/2007

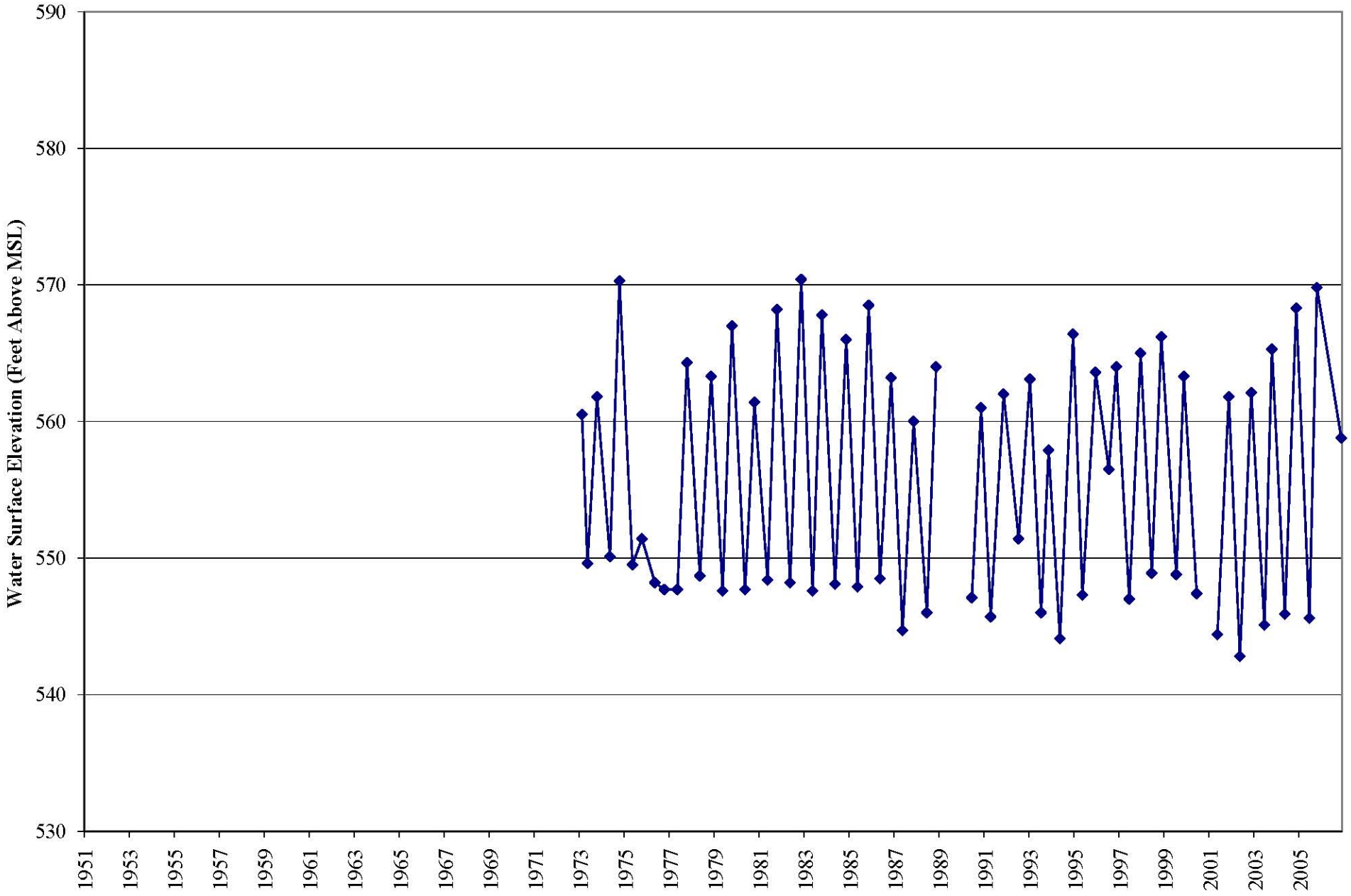

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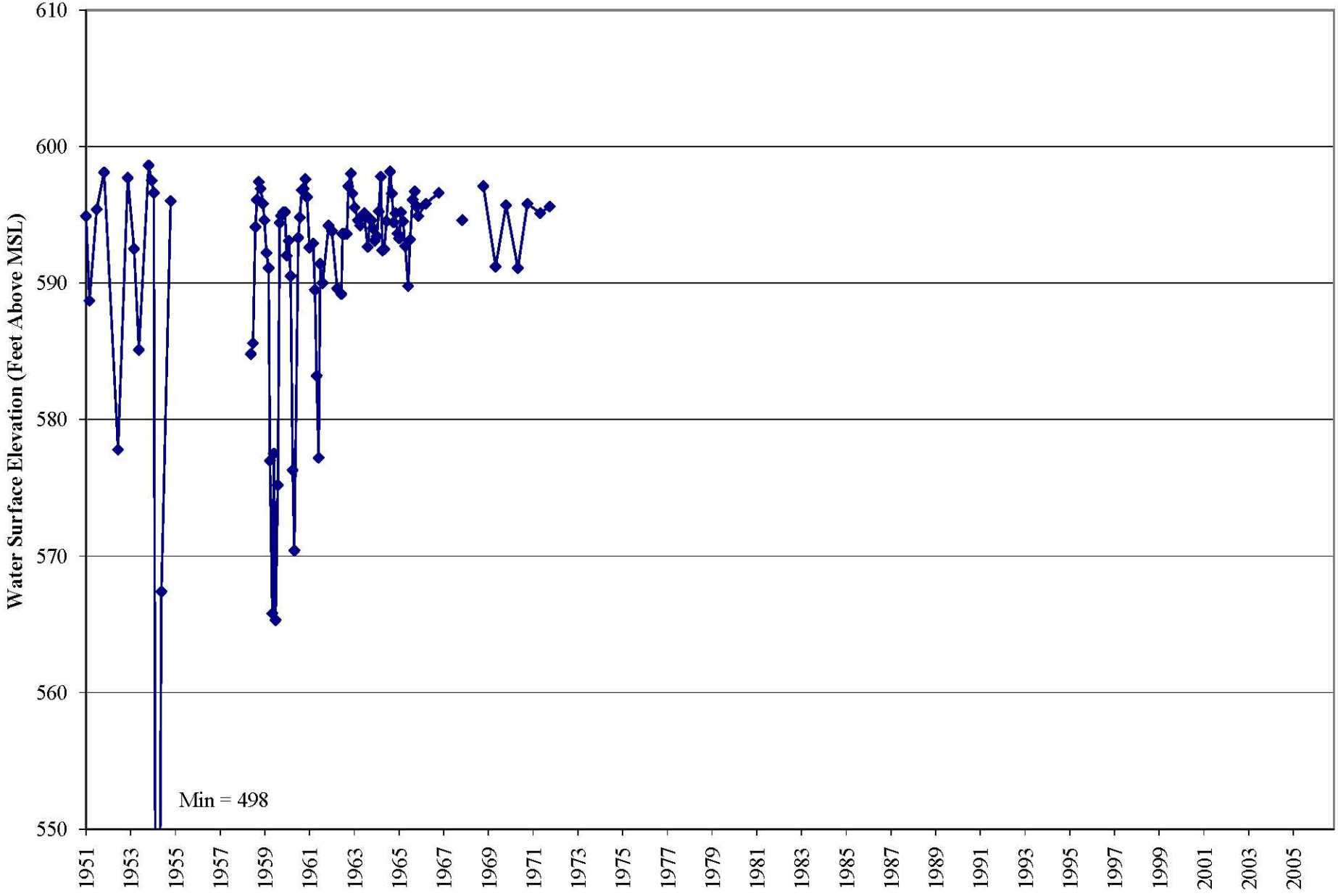
FIGURE 4
Well 115N12W35M001

10/11/2007



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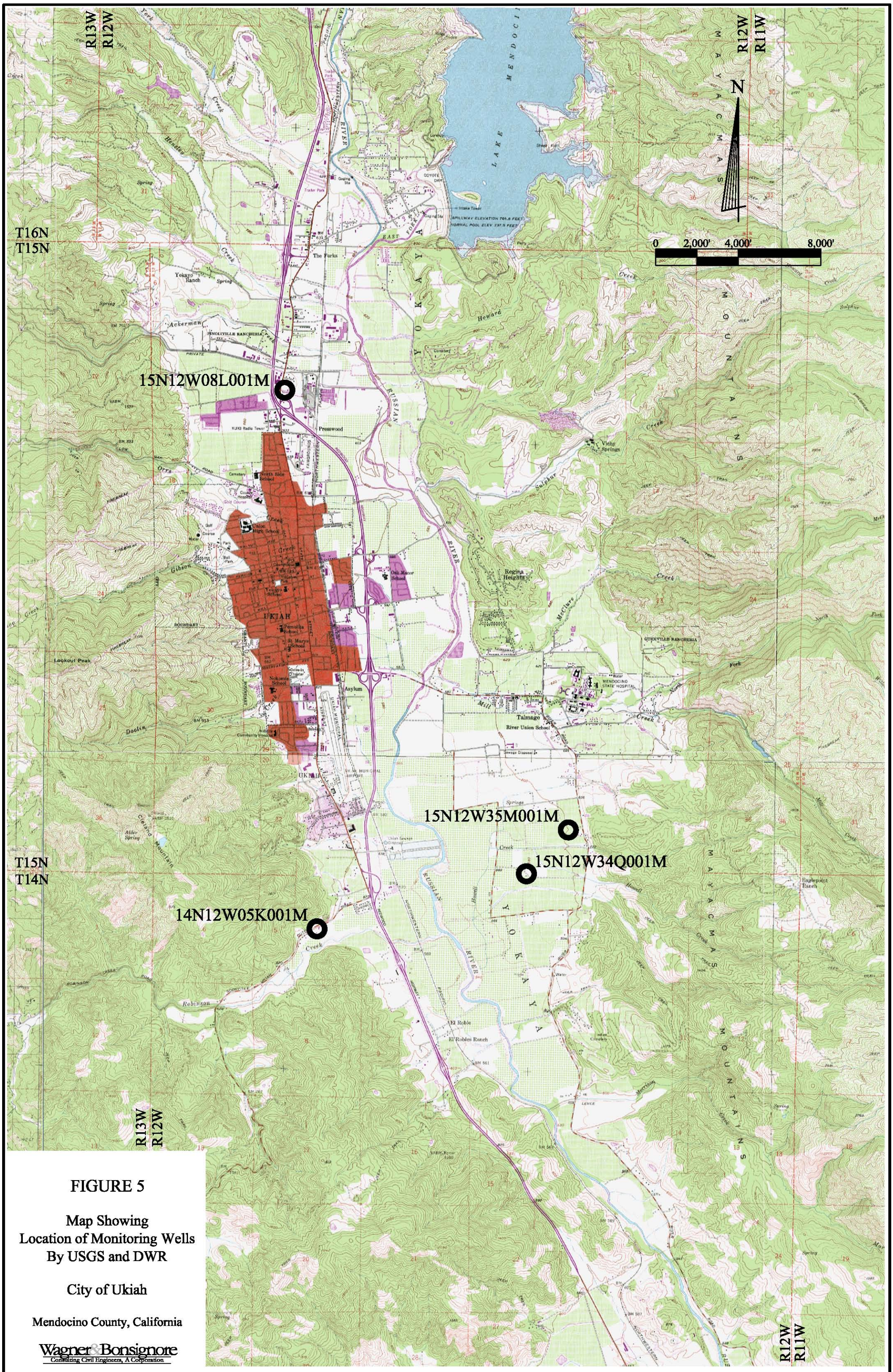

FIGURE 5

Map Showing
Location of Monitoring Wells
By USGS and DWR

City of Ukiah

Mendocino County, California

Wagner & Bonsignore
Consulting Civil Engineers, A Corporation

Base Map Per U.S.G.S. 7.5 Minute Quad Maps for Orrs Springs, Purdys Gardens, Cow Mt, Boonville, Elledge Peak, and Ukiah

Q:\Drawings\Ukiah\Ukiah-Petition\dwg\Monitoring Wells.dwg

October 2007

REFERENCES

Bartle Wells Associates. "City of Ukiah Water Utility: Water Rate Study and Preliminary Financing Plan." (March 2005).

City of Ukiah Official Website. http://www.cityofukiah.com/. (2005).

County of Mendocino. "Mendocino County General Plan." Department of Water Resources. (1977).

California Irrigation Management Information System website at http://wwwcimis.water.ca.gov/cimis/data.jsp, Data retrieved September 7, 2005.

Charles, Leonard. Various emails.

Department of Water Resources. *DWR Bulletin 118 - California's Groundwater Update 2003.* (2003).

Jamison, Alan. Water Treatment Plan Supervisor. (2005).

Kennedy/Jenks Consultants. "Urban Water Management Plan 2002 Update." (November 2002).

Olea, Tatiana. Bartle Wells Associates. (2005).

Whealen, Paula J. Wagner and Bonsignore. (2005).

Robert C. Wagner, Wagner and Bonsignore (2007)