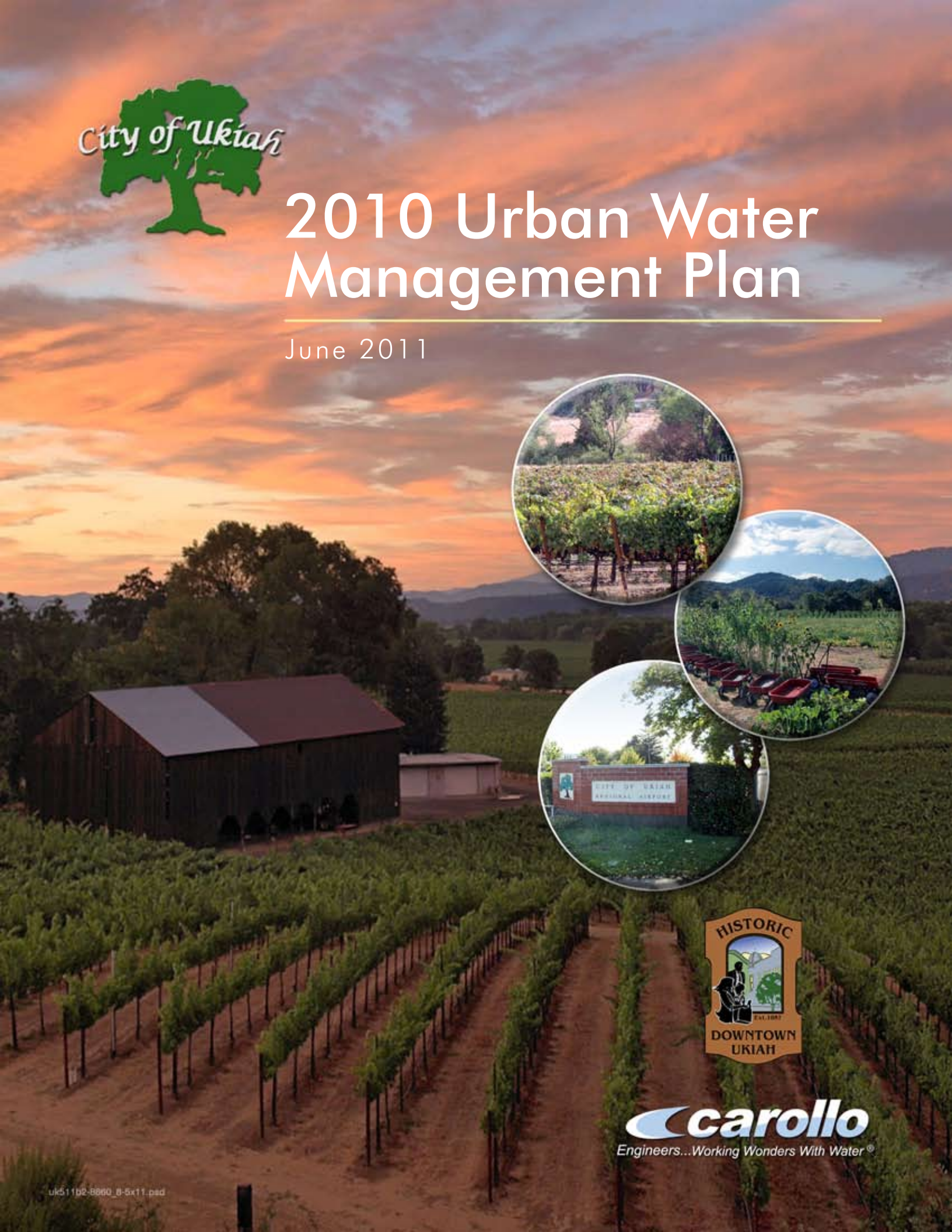
City of Ukiah

2010 Urban Water Management Plan

June 2011



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June 9, 2011
8660B.00

City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482

Attention: Mr. Tim Eriksen, Director of Public Works

Subject: 2010 Urban Water Management Plan

Dear Mr. Eriksen:

We are pleased to submit for your use the City of Ukiah 2010 Urban Water Management Plan (UWMP). The 2010 UWMP document was prepared in accordance with the Urban Water Management Planning Act of 1983 and subsequent amendments, as well as other applicable regulations. The purpose of the UWMP is to maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during water drought conditions.

The report is organized according to the recommended format established by the California Department of Water Resources as follows:

- Chapter 1 – Plan Preparation
- Chapter 2 – System Description
- Chapter 3 – System Demands
- Chapter 4 – System Supplies
- Chapter 5 – Water Supply Reliability and Water Shortage Contingency Planning
- Chapter 6 – Demand Management Measures
- Chapter 7 – Completed UWMP Checklist

We would like to extend our thanks to you, Mr. Tim Eriksen, Director of Public Works; Mr. Jarod Thiele, Public Works Administrator; Mr. Paul Smith, Water Treatment Plant Supervisor; and other City staff whose courtesy and cooperation were valuable components in completing this study and producing this report.

Sincerely,

CAROLLO ENGINEERS, INC.

Thomas A. Greci, P.E.
Project Manager

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TAG/LJC:cjp

Enclosures: 2010 Urban Water Management Plan

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City of Ukiah
2010 Urban Water Management Plan
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The Water supplier is a: **Municipality**

The Water supplier is a: **Retailer**

Utility services provided by the water supplier include: **Water, Sewer**

Is This Agency a Bureau of Reclamation Contractor? **No**

Is This Agency a State Water Project Contractor? **No**

City of Ukiah

300 Seminary Avenue
Ukiah, CA 95482
707.463.6200

2010 URBAN WATER MANAGEMENT PLAN

June 2011

Prepared By

Carollo Engineers, Inc.
2700 Ygnacio Valley Road, Suite 300
Walnut Creek, CA 94598
925.932.1710

City of Ukiah

2010 Urban Water Management Plan

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LIST OF ABBREVIATIONS

Abbreviation	Definition
˚F	Degrees Fahrenheit
AB	State Assembly Bill
Act	Urban Water Management Planning Act
ADWF	Average Dry Weather Flow
AF	acre-feet
AFY	acre-feet per year
AWT	Advanced Wastewater Treatment
AWWF	Average Wet Weather Flow
Basin	Ukiah Valley Groundwater Basin

Abbreviation	Definition
BMPs	Best Management Practices
Bulletin 118	California's Groundwater: Bulletin 118, prepared by the Department of Water Resources
CCR	California Code of Regulations
CFS	cubic feet per second
CII	Commercial, Industrial, Institutional
CIMIS	California Irrigation Management Information System
City	City of Ukiah
Contingency Plan	Urban Water Shortage Contingency Plan
County	Mendocino County
CUWCC	California Urban Water Conservation Council
DMM	Demand Management Measure
DOF	California Department of Finance
DPH	California Department of Public Health
DWR	California Department of Water Resources
EDU	Equivalent Dwelling Unit
EIR	environmental impact report
EPA	U.S. Environmental Protection Agency
ETo	Evapotranspiration
gpcd	gallons per capita per day
GPD	gallons per day
GPM	gallons per minute
Guidebook	DWR Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan
GWMP	Groundwater Management Plan
GWR	Groundwater Rule
LAFCo	Local Agency Formation Commission
MCL	Maximum Contaminant Level
MFR	multi-family residential
MG	million gallons
MGD	million gallons per day
MHI	Medium Household Income

Abbreviation	Definition
MOU	Memorandum of Understanding
MSL	mean sea level
Notification Plan	Water Quality Emergency Notification Plan
NPDES	National Pollutant Discharge Elimination System
Plan	Urban Water Management Plan
PWWF	Peak Wet Weather Flow
RWMP	Recycled Water Master Plan
RWQCB	Regional Water Quality Control Board
SBx7-7	Water Conservation Act of 2009
SFR	single-family residential
SOI	Sphere of Influence
State Water Board	California State Water Resources Control Board
ULFT	Ultra Low Flush Toilet
USGS	U.S. Geological Survey
USGS Investigative Report	Water Resources Investigation Report 85-4258 on Groundwater Resources in Mendocino County (1986)
UVSD	Ukiah Valley Sanitation District
UWMP	Urban Water Management Plan
UWMPA	Urban Water Management Planning Act
UWWTP	Ukiah Waste Water Treatment Plant
WTP	Water Treatment Plant

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Chapter 1

PLAN PREPARATION

1.1 PURPOSE

The California Water Code requires urban water suppliers within the state to prepare and adopt Urban Water Management Plans (UWMPs) for submission to the California Department of Water Resources (DWR). The UWMPs, which are required to be filed every five years, must satisfy the requirements of the Urban Water Management Planning Act (UWMPA) of 1983 including amendments that have been made to the Act and other applicable regulations. The UWMPA requires urban water suppliers servicing 3,000 or more connections, or supplying more than 3,000 acre-feet (AF) of water annually, to prepare an UWMP.

The purpose of the UWMP is for water suppliers to evaluate their long-term resource planning and establish management measures to ensure adequate water supplies are available to meet existing and future demands. The UWMP provides a framework to help water suppliers maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during water drought conditions. This report, which was prepared in compliance with the California Water Code, and as set forth in the 2010 guidelines and format established by the DWR, constitutes the City of Ukiah (City) 2010 UWMP.

The City did not participate in an area, regional, watershed, or basin-wide UWMP.

1.2 BACKGROUND

1.2.1 Urban Water Management Planning Act

In 1983, State Assembly Bill (AB) 797 modified the California Water Code Division 6 by creating the UWMPA. Several amendments to the original UWMPA, which were also introduced in 1983, increased the data requirements and planning elements to be included in the 2005 and 2010 UWMPs.

Initial amendments to the UWMPA required that total projected water use be compared to water supply sources over the next 20 years, in 5-year increments. Recent DWR guidelines recommend projecting through a 25-year planning horizon to maintain a 20-year timeframe until the next UWMP update has been completed.

Other amendments require that UWMPs include provisions for recycled water use, demand management measures, and a water shortage contingency plan. The UWMPA requires inclusion of water supply reliability and water shortage contingency planning, which meets the specifications set forth therein. Analysis of recycled water use was

added in the reporting requirements and figures prominently in the evaluation of future and alternative water supplies. Each water supplier must describe their water demand management measures that are being implemented or that are scheduled for implementation. Each urban water purveyor must coordinate the preparation of the water shortage contingency plan with other urban water purveyors in the area, to the extent practicable.

In addition to the UWMPA and its amendments, there are several other regulations that are related to the content of the UWMP. In summary, the relevant regulations are:

- **AB 1420:** Requires implementation of demand management measures (DMMs)/best management practices (BMPs) and meeting the 20x2020 targets to qualify for water management grants or loans.
- **AB 1465:** Requires water suppliers to describe opportunities related to recycled water use and stormwater recapture to offset potable water use.
- **Amendments Senate Bill (SB) 610 (Costa, 2001), and AB 901 (Daucher, 2001):** Effective beginning January 1, 2002, require counties and cities to consider information relating to the availability of water to supply new large developments by mandating the preparation of further water supply planning (Daucher) and Water Supply Assessments (Costa).
- **SB 1087:** Requires water suppliers to report single-family residential (SFR) and multi-family residential (MFR) projected water use for lower income areas separately.
- **Amendment SB 318 (Alpert, 2004):** Requires the UWMP to describe the opportunities for development of desalinated water, including but not limited to, ocean water, brackish water, and groundwater, as long-term supply.
- **AB 105 (Wiggins, 2004):** Requires urban water suppliers to submit their UWMPs to the California State Library.
- **SBx7-7:** Requires development and use of new methodologies for reporting population growth estimates, base per capita use, and water conservation. This water bill also extended the 2010 UWMP submittal deadline for retail agencies to July 1, 2011. As of the date of this report, DWR is still finalizing two of the four new methodologies that an agency can choose from to establish their intermediate (2015) and year 2020 water conservation targets.
- **SB 1478:** This bill extends the 2010 UWMP deadline for wholesale agencies to July 1, 2011, as SBx7-7 did for retail agencies.

1.2.2 Previous Urban Water Management Plans

Pursuant to the UWMPA, the City previously prepared an UWMP in 2005, which was approved and adopted on November 26, 2007. Following adoption, the 2005 UWMP was

submitted to and considered complete by DWR. The City also prepared an UWMP in 2002, fulfilling the 2000 UWMP requirements. This 2010 UWMP report serves as an update to the 2005 UWMP and draws substantially from that document.

1.3 COORDINATION

The UWMPA requires that the UWMP identify the agencies with which the City coordinated in the planning, discussion, and preparation of the UWMP. In addition, documentation is required to provide assurance that appropriate public notification deadlines and submission requirements are met.

Law

> *10620 (d) (2). Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.*
>
> *10621 (b). Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.*
>
> *10635 (b). The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.*
>
> *10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.*
>
> *10642. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area.*

While preparing the 2010 UWMP, the City coordinated its efforts with relevant agencies to ensure that the data and issues are presented accurately. Table 1.1 summarizes the external outreach conducted during UWMP preparation. Appendix A contains copies of outreach documents.

Table 1.1 Coordination with Appropriate Agencies (Guidebook Table 1)
2010 Urban Water Management Plan
City of Ukiah

Coordinating Agencies	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	X	
City of Ukiah	X	X	X	X	X	X	
General Public Civic Center Lobby City's Website					X	X	
Mendocino County Planning & Building Services					X	X	
Local Agency Formation Commission		X	X		X	X	
Redwood Valley County Water District					X	X	
Willow County Water District					X	X	
Millview County Water District					X	X	
Calpella County Water District					X	X	
Rogina Water Company					X	X	
Ukiah Chamber of Commerce					X	X	

Table 1.1 Coordination with Appropriate Agencies (Guidebook Table 1)
2010 Urban Water Management Plan
City of Ukiah

Coordinating Agencies	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
Mendocino Environmental Center					X	X	
Mendocino County Russian River Flood Control and Water Conservation Improvement District		X	X		X	X	
Mendocino County Water Agency					X	X	
Sonoma County Water Agency					X	X	
California Water Impact Network					X	X	

Notes:

1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

The City also provided formal written notification to Mendocino County that the City's UWMP was being updated for 2010. In accordance with the UWMPA, this notification was provided to Mendocino County at least 60 days prior to the public hearing of the plan. Copies of the final UWMP will be provided to Mendocino County no later than 30 days after its submission to DWR.

The City is committed to encouraging the active involvement of diverse social, cultural, and economic elements of its citizenry. From June 1 to June 15, 2011, the City placed a notice in the local newspaper stating that its UWMP was being updated and that a public hearing would be conducted to address comments and concerns from members of the community. The notice stated that a public review period would be scheduled from June 1 to June 15, 2011. A copy of this notification is included in Appendix B. The Draft 2010 UWMP was made available for public inspection at the City of Ukiah City Hall, located at 300 Seminary Avenue, Ukiah. In addition, the City also posted a copy of the public review draft UWMP on its website.[1]

The City held a workshop on June 8, 2010 in the Ukiah Valley Conference Center, located at 200 South School Street; Ukiah, CA 95482. The workshop provided an opportunity for the City's customers, residents, and employees to learn and ask questions about the current and future water supply of the City.

1.3.1 Data Sources and Previous Reports

This UWMP was prepared by compiling data from a variety of sources, including federal, state, and local government agencies. In addition, existing documents concerning water management in Ukiah and surrounding areas were used. The following documents were utilized in the development of this UWMP:

- Urban Water Management Plan, City of Ukiah, 2005
- General Plan Update, City of Ukiah, 1995 (revised 2004)
- General Plan, Mendocino County, 2010
- Regional Housing Needs Plan, Mendocino County, 2008
- Ukiah Valley Area Plan Water Supply Assessment, 2010
- California Water Plan, Bulletin 160-09, Department of Water Resources, Update 2009

This UWMP was prepared by Carollo Engineers, Inc. with assistance from Wagner and Bonsignore, a consulting firm that specializes in water rights issues. The work performed

[1] www.cityofukiah.com

by Wagner and Bonsignore has been incorporated in to the various sections of this UWMP, and is included as a technical memorandum in Appendix C.

1.4 PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Pursuant to the requirements of the UWMPA, this section summarizes the adoption, submittal, and implementation of the City's 2010 UWMP.

Law

> *10621 (c). The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640)*
>
> *10642. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.*
>
> *10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.*
>
> *10644 (a). An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.*
>
> *10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier, and the department shall make the plan available for public review during normal business hours.*

1.4.1 Plan Adoption

The City prepared the 2010 UWMP during the spring and summer of 2011. The plan was updated after the public workshop and adopted by its City Council on June 15, 1010. A copy of the adopting resolution is provided in Appendix D.

1.4.2 Plan Submittal

The City submitted the UWMP to the DWR on [DATE]. Within 30 days of submitting the UWMP to DWR, the adopted UWMP was made available for public review during normal business hours at the locations specified for the viewing of the Draft 2010 UWMP, submitted to the California State Library, and submitted to Mendocino County. Appendix E provides verification that the adopted UWMP was submitted to the agencies listed above within the required timeline.

If major changes are made to this 2010 UWMP after adoption by the City, the City will hold an additional public hearing and the City Council will readopt the plan.

1.4.3 Plan Implementation

As part of this UWMP, the City intends to implement on-going and future action items. Timelines for the anticipated implementation schedule of specific activities/programs are presented in the body of the report as the activities and programs are discussed.

1.5 REPORT ORGANIZATION

This report is organized according to the recommended format by the DWR's Guidebook to Assist Urban Water Suppliers to prepare a 2010 Urban Water Management Plan (Guidebook). The UWMP contains seven chapters, followed by appendices that provide supporting documentation for the information presented herein. The chapters are as follows:

- Chapter 1 – Plan Preparation
- Chapter 2 – System Description
- Chapter 3 – System Demands
- Chapter 4 – System Supplies
- Chapter 5 – Water Supply Reliability and Water Shortage Contingency Planning
- Chapter 6 – Demand Management Measures
- Chapter 7 – Completed Urban Water Management Plan Checklist

Additionally, the chapters are preceded by an UWMP Contact Sheet.

1.6 CLIMATE CHANGE

DWR guidelines suggest that urban water suppliers consider the potential effects related to climate change in their 2010 UWMPs. However, there are currently no specific climate change requirements in the UWMPA or in the Water Conservation Bill of 2009. Therefore, it is left to each supplier's discretion as to whether or not to account for the potential effects of climate change in their 2010 UWMP.

For the purposes of this 2010 UWMP, the City has opted not to include information or analysis related to climate change. If there are specific requirements for addressing climate change in UWMPs in the future, the City will incorporate these in their 2015 UWMP.

1.7 ABBREVIATIONS

To conserve space and improve readability, this report includes many abbreviations. The abbreviations are spelled out in the text the first time they are used and are subsequently

identified by abbreviation only. A summary of the abbreviations used in this report is provided in the report Table of Contents.

1.8 ACKNOWLEDGEMENTS

Carollo Engineers wishes to acknowledge and thank the following City Staff:

Tim Eriksen	Public Works Director
Jarod Thiele	Public Works Administration
Paul Smith	Water Treatment Plant Supervisor

Their cooperation and courtesy in obtaining a variety of necessary information were valuable components in completing and producing this report.

The following staff of Carollo Engineers was primarily involved in the preparation of this plan:

Lou Carella, P.E.	Principal-in-Charge
Tommy Greci, P.E.	Project Manager
Paul Friedlander, P.E.	Quality Service Manager
Ryan Orgill, P.E.	Project Engineer
Maggie Herzog, E.I.T.	Staff Engineer
Debra Dunn	GIS/Graphics

SYSTEM DESCRIPTION

The Urban Water Management Planning Act (UWMPA) requires that the Urban Water Management Plan (UWMP) include a description of the water purveyor's service area and various aspects of the area served including climate, population, and other demographic factors.

Law

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631. (a). Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.*

2.1 SERVICE AREA PHYSICAL DESCRIPTION

The City of Ukiah (City) is located in Mendocino County in the northern coastal region of California (Figure 2.1). The City is situated in the Yokayo Valley approximately 60 miles north of Santa Rosa, 20 miles south of Willits, and 5 miles south-west of Lake Mendocino, and is surrounded by coastal ranges in southern Mendocino County. The valley is bordered on the west by the Mendocino Range and on the east by the Mayacamas Mountains. Elevations in the nearby mountains reach over 1,800 feet above mean sea level (MSL), while elevations in the valley range from about 560 feet above MSL in the south near El Robles Ranch to 670 feet above MSL in the north near Calpella. Interstate Highway 101 runs north to south through the City along its eastern boundary. The Russian River flows from north to south through the Ukiah area. Ukiah is the county seat for Mendocino County.

Originally part of a Mexican Land Grant, the City began its history as a valley settlement in 1856. Lumber production became a major industry by the end of the 1940s because of the City's moderate climate and productive soil; currently, agriculture is the largest industry in Ukiah and the rest of Mendocino County[1]. Ukiah is home to wineries, grape vineyards, pear orchards, and wood production plants, in addition to up-and-coming non-agricultural manufacturers.

[1] www.cityofukiah.com

Figure 2.1
City of Ukiah
2010 Urban Water Management Plan
City of Ukiah

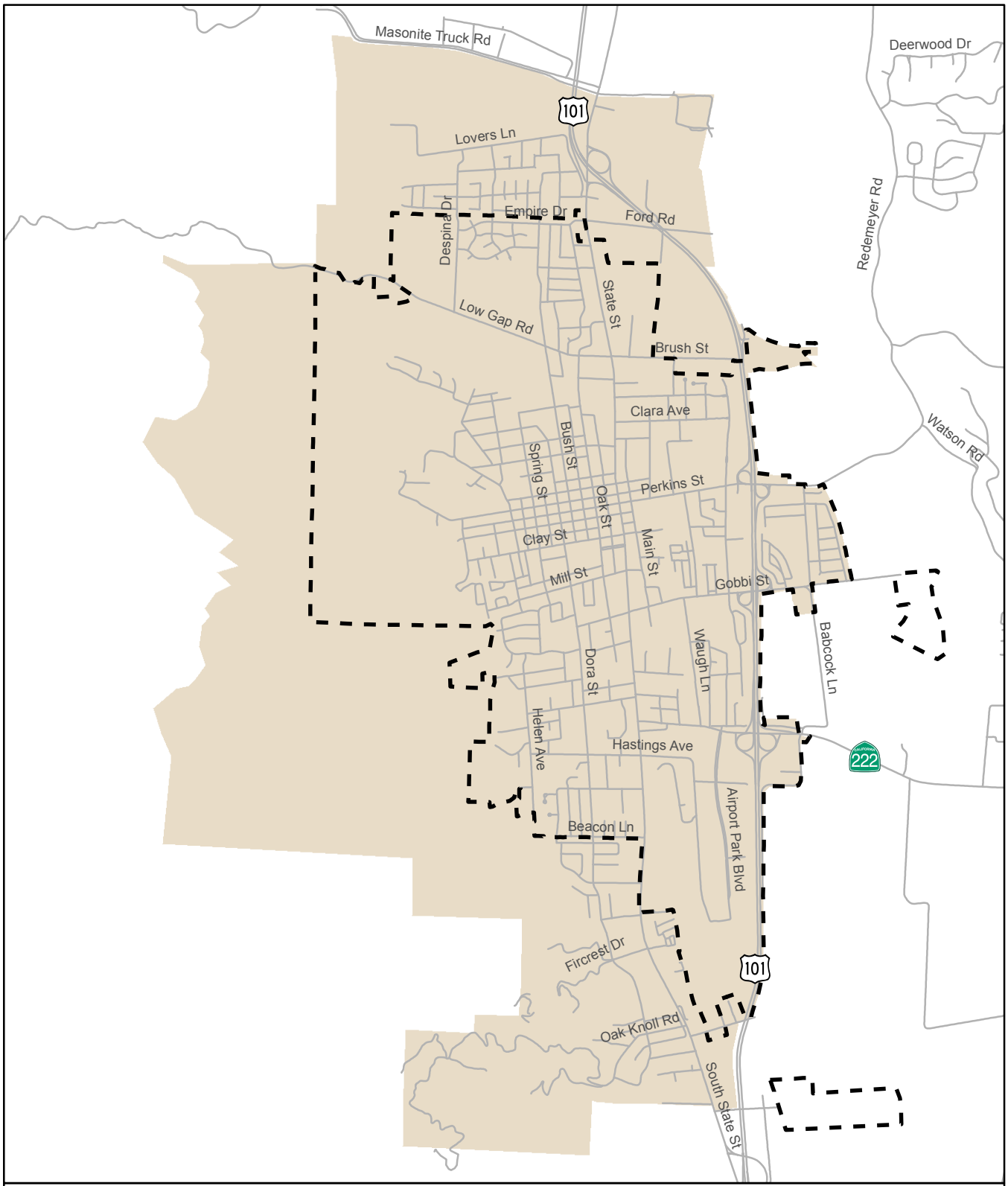
The City's General Plan, adopted in December 1995 and revised in 2004, identifies boundaries associated with two planning areas: the incorporated area within the City limits and the unincorporated area, which is a combination of the Sphere of Influence (SOI) and additional Planning Area. The City limits include the land currently within the City of Ukiah. The City's SOI (Figure 2.2) represents the land limits to which the City may extend its services and project its growth over the next 20 years. The SOI must be adopted by the Local Agency Formation Commission (LAFCo) if the City wants to consider annexing land area. For comprehensive policy planning, the City's General Plan also incorporates an additional Planning Area study, which encompasses the surrounding Ukiah Valley and includes the City of Ukiah. The Planning Area includes land area which is unlikely to be annexed by the City within the next 20 years.[2]

Although the City provides water service to a few connections outside the city limits (within the Brush Street Triangle) this UWMP assumes that the City's current and future water system will not extend beyond the boundaries of the SOI described in the General Plan. The City's SOI comprises approximately 9.55 square miles (6,112 acres). Based on the original 1995 General Plan estimates, the City will reach buildout by 2015. As the City annexes land area in the SOI over the next 20 years, the water service area and population of the City will expand. Service area population growth is projected and discussed in Section 2.2 of this report.

Three water purveyors surround the City: (1) the Millview County Water District to the north, (2) the Rogina Water Company to the east, and (3) the Willow County Water District to the south. However, the City is the largest public water service provider in the Ukiah Valley, providing roughly half of the valley's public water supply.[3] The City provides water to businesses and residences within its City limits. The aforementioned water districts serve the unincorporated areas surrounding the City. Property owners without access to the City or one of the district systems obtain water from individual wells or springs.[4]

The incorporated area of the City is governed by a five-person City Council in a Council-Mayor-Manager form of government. The Mayor is selected by the City Council each year from the five member Council. General administration and day-to-day operations are directed by the City Manager who is appointed by the Council. The City is a general law municipality, governed by the State of California in conjunction with its local ordinances.

[2] City of Ukiah General Plan (1995, revised 2004).
[3] Ukiah Valley Area Plan (2010).
[4] City of Ukiah General Plan (1995, revised 2004).



Legend

- Streets
- City Limits
- Sphere of Influence

N

0 2,000 4,000 Feet

Figure 2.2
Sphere of Influence
2010 Urban Water Management Plan
City of Ukiah

City of Ukiah

carollo

2.1.1 Service Area Climate

The climate in the City can be classified as coastal with average rainfall rates of about 35.2 inches per year. Most of the annual precipitation occurs during the period from November through April. Table 2.1 summarizes monthly average reference evapotranspiration (ETo) rates, rainfall, and temperature. The average monthly precipitation and average monthly temperatures are also shown on Figure 2.3.

Table 2.1 Climate
2010 Urban Water Management Plan
City of Ukiah

Month	Average ETo[1] (inches)	Average Rainfall[2] (inches)	Average Min. Temperature[2] (°F)	Average Max. Temperature[2] (°F)	Average Temperature[2] (°F)
January	0.98	5.38	36.0	56.4	46.2
February	1.58	5.70	37.7	60.1	48.9
March	3.02	3.72	40.0	65.8	52.9
April	4.64	2.97	41.5	66.9	54.2
May	5.98	0.83	47.0	78.9	63.0
June	7.00	0.30	51.6	84.9	68.3
July	7.98	0.02	56.4	93.9	75.2
August	7.03	0.00	54.1	92.2	73.2
September	5.18	0.12	49.6	87.8	68.7
October	3.36	1.14	43.9	77.4	60.7
November	1.42	3.97	40.1	63.6	51.9
December	0.92	11.08	37.2	55.4	46.3
Annual	**49.09**	**35.23**	**44.6**	**73.6**	**59.1**

Notes:
1. Source: California Irrigation Management Information System (CIMIS), Station No. 85: Hopland FS (period of record 1989-2010).
2. Source: Western Regional Climate Center, Station: Ukiah Municipal Airport (period of record 2001-2008).

The average annual temperature is 59.1 degrees Fahrenheit (°F). The City typically has warm daytime temperatures and cool nighttime temperatures. The City does not experience extreme seasonal temperatures.

The relative humidity in the City averaged 85 percent in January 2010 while the July 2010 relative humidity averaged 56 percent. Wind direction is variable and wind speed averages less than 4 miles per hour.

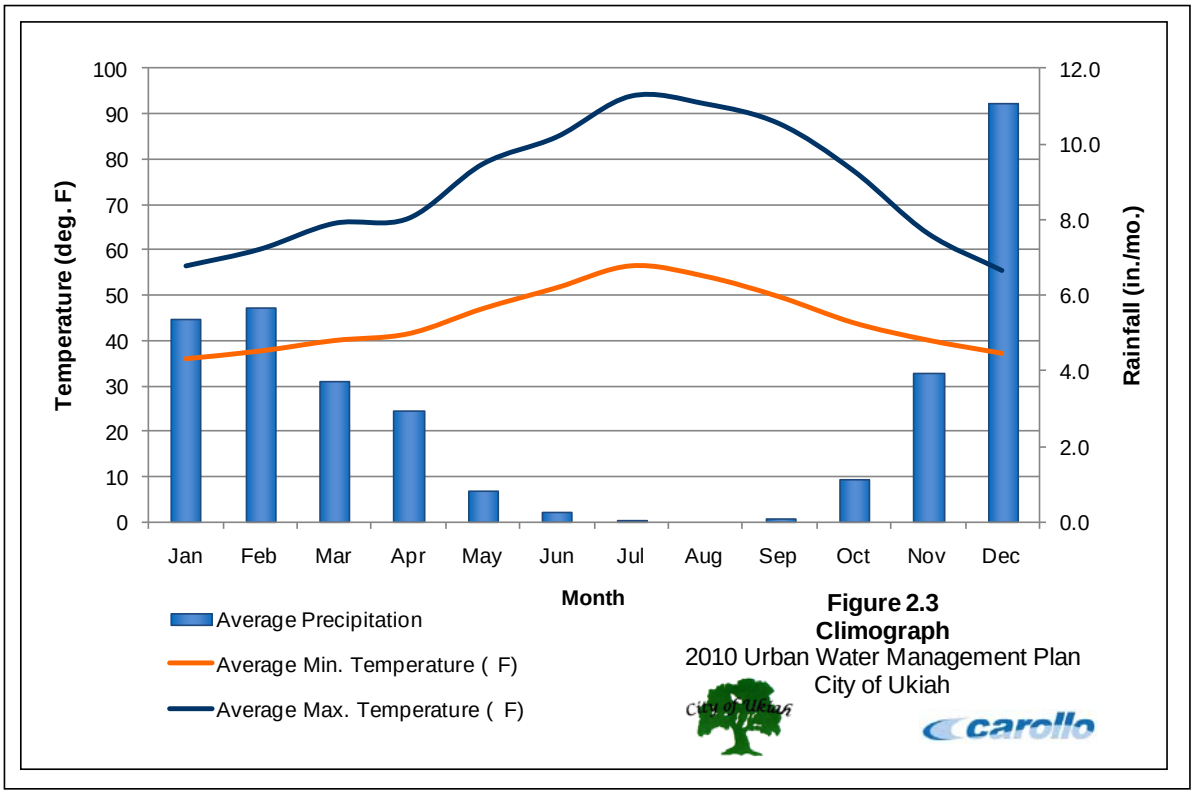


Figure 2.3
Climograph
2010 Urban Water Management Plan
City of Ukiah

2.2 SERVICE AREA POPULATION

The incorporated City of Ukiah has a population of approximately 15,612 as of January 1, 2010[5], and represents approximately 18 percent of Mendocino County. The median annual growth rate between 1995 and 2010 was approximately 0.4 percent, although the City has experienced a net decrease from its 2003 population of 15,942. The City population increased between 2009 and 2010 by 0.1 percent.

Population projections, shown in Table 2.2 and Figure 2.4 were used to forecast water requirements for the City. Historical population statistics shown on Figure 2.4 are from California Department of Finance (DOF) estimates. The General Plan proposes an SOI which represents the ultimate limits to which the City will extend its services over the next 20 years. The most recent population projection for the City of Ukiah was included in the 2010 Mendocino County General Plan, in which the annual population growth for the City is estimated at one percent through 2020. Based on this most recent estimate by the County, recent periods of slow growth, population decline, future annexation plans, and buildout

[5] California Department of Finance.

(expected to occur by 2015); an annual population growth rate of one percent was used for the projections between 2015 and 2035.

Table 2.2 Population - Current and Projected (Guidebook Table 2)
2010 Urban Water Management Plan
City of Ukiah

Years	2010	2015	2020	2025	2030	2035	Data Source
Service Area Population[2]	15,682	16,482	17,323	18,206	19,135	20,111	Source[3]

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare of 2010 Urban Water Management Plan" by DWR.
2. Service area population is defined as the population served by the distribution system.
3. Projected estimates based on expected population growth from the Mendocino County General Plan, adopted March 2010. An annual growth rate of one percent was used.

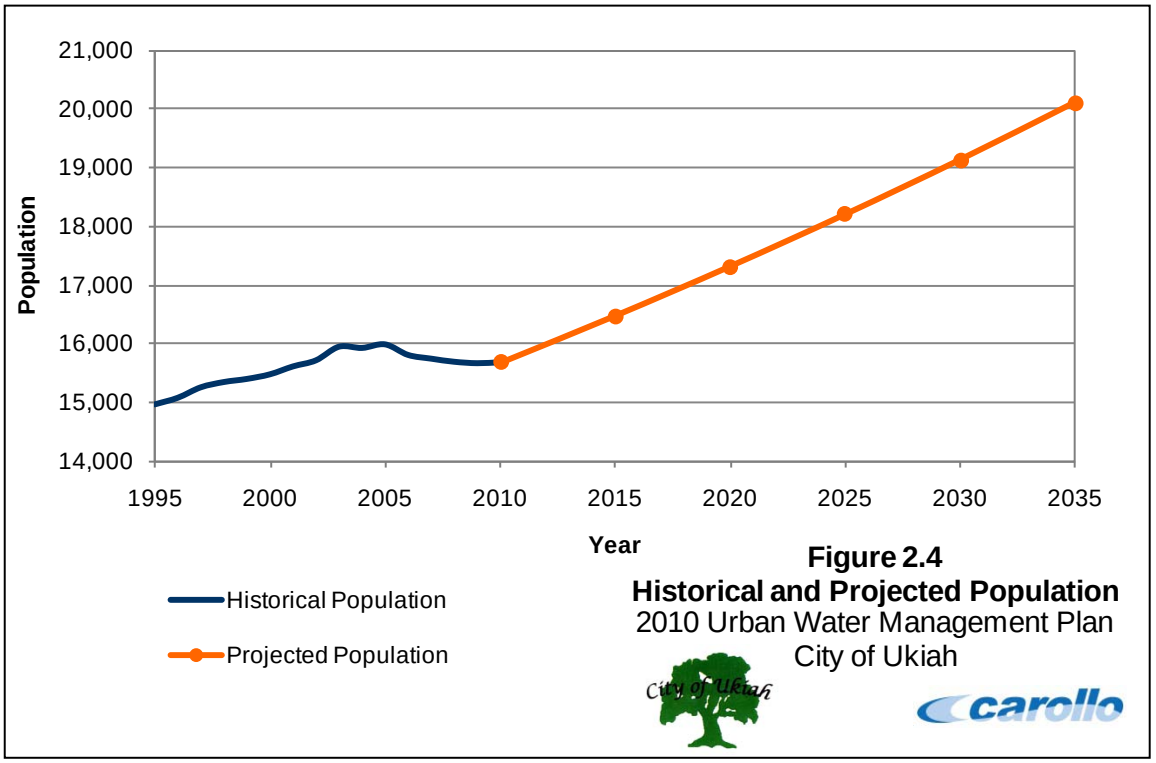


Figure 2.4
Historical and Projected Population
2010 Urban Water Management Plan
City of Ukiah

According to 2000 Census, the City's Median Household Income (MHI) in year 1999 was $32,707. The State defines a disadvantaged community as a community with an annual MHI that is less than 80 percent of the statewide MHI. Using 2000 U.S. Census data, 80 percent of the statewide annual MHI is $37,540. Therefore, the City can be described as

a “disadvantaged community.” The 2000 Census gives the racial demographic distribution of Ukiah as the following: 79.5 percent white, 1.0 percent African American, 3.8 percent American Indian, 1.7 percent Asian, and 9.7 percent other races.

2.3 EXPANSION PROJECTS

The UWMPA requires that the UWMP identify major developments within the agency’s service area that would require water supply planning.

Law

> *10910. (a) Any city or county that determines that a project, as defined in section 10912, is subject to the California Environmental Quality…*
>
> *10912. For the purpose of this part, the following terms have the following meanings:*
>
> *10912 (a) “Project” means any of the following:*
> *(1) A proposed residential development of more than 500 dwelling units.*
> *(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.*
> *(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.*
> *(4) A proposed hotel or motel, or both, having more than 500 rooms.*
> *(5) A proposed industrial, manufacturing or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.*
> *(6) A mixed-use project that includes one or more of the projects specified in this subdivision.*
> (7) *A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.*

The City is not currently considering any large expansion projects as defined by the UWMP.

SYSTEM DEMANDS

This chapter describes the City of Ukiah's (City's) baseline (base daily per capita) water use, the interim and urban water use targets, water system demands, water demand projections, and water use reduction plan.

3.1 BASELINES AND TARGETS

The Urban Water Management Planning Act (UWMPA) requires that the Urban Water Management Plan (UWMP) identify a baseline water demand, urban water use target, and interim urban water use target for the City.

Law

> *10608.20 (e). An urban retail water supplier shall include in its urban water management plan…due in 2010 the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data*

The baseline daily per capita use is the first step in determining the City's urban water use targets over the planning horizon. The current per capita use sets the baseline for which the urban and interim urban water use targets are determined. These targets are necessary to judge compliance with the 2020 use reductions set forth in the Water Conservation Bill of 2009 (SBx7-7).

The baselines and targets summarized in this section apply specifically to the City. The California Department of Water Resources (DWR) allows agencies to participate in regional alliances in which water use baselines and targets are determined regionally, provided certain criteria are met. The City has elected not to participate in such an alliance.

3.1.1 Baseline Water Use

The first step in developing the baseline water use for the City is determining the applicable range and years for which the baseline average will be calculated. The UWMPA stipulates an agency may use either a 10 or 15-year average to determine their baseline. If 10 percent of total urban retail water deliveries in 2008 were from recycled water, then the agency can use a 15-year average baseline if it chooses. The City does recycle a small unmeasured amount of its wastewater effluent for landscape irrigation, process washdown, and spray water at the wastewater treatment plant. The City does not currently use recycled water to offset urban retail water use. For this reason, a 10-year average was used for baseline determination. In addition to the 10-year baseline, a 5-year baseline is also calculated, which is used to establish the minimum criteria for the City's use reduction targets. A summary of the 2008 total and recycled water deliveries, 10-year baseline range, and 5-year baseline range is included in Table 3.1.

Table 3.1	Base Daily Per Capita Water Use: 10 to 15-Year Range (Guidebook Table 13) 2010 Urban Water Management Plan City of Ukiah		
Base	**Parameter**	**Value**	**Units**
10- to 15-Year Base Period	2008 total water deliveries	3,661	AFY
	2008 total volume of delivered recycled water	0	AFY
	2008 recycled water as a percent of total deliveries	0.0	Percent
	Number of years in base period	10	Years
	Year beginning base period range	1995	--
	Year ending base period range	2004	--
5-Year Base Period	Number of years in base period	5	Years
	Year beginning base period range	2003	--
	Year ending base period range	2007	--

Notes:

1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

The data used to calculate the 10-year baseline is included in Table 3.2. The UWMPA requires a continuous range with the end of the range ending between December 31, 2004 and December 31, 2010 be used for the baseline determination. As shown in Table 3.1 and Table 3.2, the City's selected 10-year base period begins in year 1995 and ends in year 2004.

DWR allows agencies that meet specific criteria to deduct certain types of water uses from their baseline and target estimates, including recycled water, industrial process water, and agricultural water. At this time, the City has opted not to exclude industrial process water from its gross water use. DWR allows that agencies may revise their per capita water use targets in the 2015 round of UWMPs. The City may reconsider the industrial process water exclusion at that point.

Table 3.2	Base Daily Per Capita Water Use: 10-Year Range (Guidebook Table 14) 2010 Urban Water Management Plan City of Ukiah			
Base Period Year		**Distribution System Population**	**Daily System Gross Water Use (MGD)**	**Annual Daily Per Capita Water Use (gpcd)**
Sequence	**Calendar Year**			
1	1995	14,977	3.46	231
2	1996	15,088	3.59	238
3	1997	15,263	3.49	229
4	1998	15,351	3.36	219
5	1999	15,403	3.77	245
6	2000	15,480	3.65	236
7	2001	15,612	3.65	234
8	2002	15,714	3.72	237
9	2003	15,942	3.45	217
10	2004	15,921	3.68	231
		Base Daily Per Capita Water Use		**232**

The data used to calculate the 5-year baseline is included in Table 3.3. The UWMPA requires that a continuous range, with the end of the range ending between December 31, 2007 and December 31, 2010, be used for baseline determination. As shown in Table 3.3, the City's selected 5-year base period begins in year 2003 and ends in year 2007.

The City's historical water consumption for the period 1995 through 2010 is shown in Figure 3.1. This figure also depicts the selected 5-year and 10-year baseline values.

3.1.2 Target Water Use

SBx7-7 is the new law governing water conservation in California that was enacted November 2009. The law requires that all water suppliers increase water use efficiency with the overall goal to decrease per-capita consumption within the state by 20 percent. SBx7-7 required DWR to develop certain criteria, methods, and standard reporting forms through a public process that can be used by water suppliers to establish their baseline water use and determine their water conservation targets (the UWMPA requires urban water suppliers to determine the urban and interim urban water use targets for 2020 and 2015, respectively). DWR provided four different methods to establish water conservation targets. These four methods are summarized in this section.

Table 3.3	Base Daily Per Capita Water Use: 5-Year Range (Guidebook Table 15) 2010 Urban Water Management Plan City of Ukiah			
Base Period Year		Distribution System Population	Daily System Gross Water Use (MGD)	Annual Daily Per Capita Water Use (gpcd)
Sequence	Calendar Year			
1	2003	15,942	3.45	217
2	2004	15,921	3.68	231
3	2005	15,981	3.35	210
4	2006	15,804	3.42	217
5	2007	15,742	3.34	212
			Base Daily Per Capita Water Use	**217**

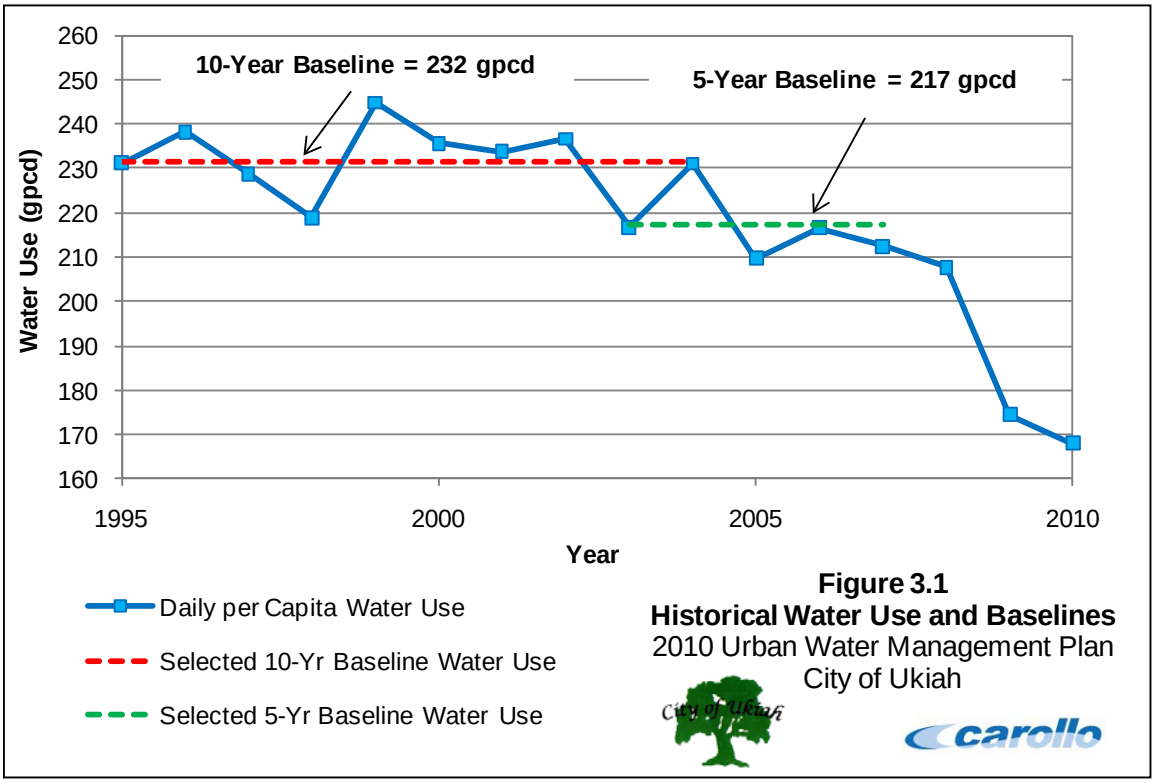


Figure 3.1
Historical Water Use and Baselines
2010 Urban Water Management Plan
City of Ukiah

3.1.2.1 Method 1 - Baseline Reduction Method

The Method 1 2020 water conservation target is defined as a 20 percent reduction of average per-capita from the 10-year continuous baseline period. Based on the baseline daily per capita use of 232 gallons per capita per day (gpcd) determined previously (Table 3.2), the target use for Method 1 is 185 gpcd. The 2015 interim water use target is

simply the midpoint of the baseline and the 2020 water conservation target, or 208 gpcd for Method 1 in the City's case.

3.1.2.2 Method 2 - Efficiency Standard Method

The 2020 water conservation target of this method is determined by calculating efficiency standards for indoor use separately from outdoor use for residential sectors, and an overall reduction of 10 percent for commercial, industrial, and institutional (CII) sectors. The aggregated total of the efficiency standards in each area is then used to create a conservation target.

Very few agencies within the State have the data necessary to determine a target water use using Method 2. It is not feasible for the City to use this methodology since the City lacks the detailed landscaped area estimates to calculate the landscaped area water use.

3.1.2.3 Method 3 - Hydrologic Region Method

This method uses the ten regional urban water use targets for the state. Based on the water supplier's location within these regions, a static water use conservation target for 2020 is assigned.

A map showing the California hydrologic regions and 2020 conservation goals is included in the *DWR Guidebook to Assist Urban Water Suppliers to Prepare a 2010 UWMP* (Guidebook). To determine the target using Method 3, 95 percent of the region-specific conservation goal is calculated. Based on a 2020 target of 137 gpcd for the North Coast region, the City's Method 3 target is 130 gpcd for 2020. The City's 2015 interim water use target for Method 3 is then calculated to be 181 gpcd.

3.1.2.4 Method 4 - BMP Based Method

Method 4 identifies water savings obtained through identified practices and subtracts them from the baseline daily per capita water use value identified for the water supplier. The water savings identified that can be used to reduce the baseline daily per capita water use value include:

- Indoor residential use savings;
- Commercial, industrial, and institutional savings;
- Landscape and water loss savings; and
- Metered savings.

The Method 4 per capita water use target was calculated using the City's 10-year baseline period (1995 to 2004). However, information was not available on the CII metered water deliveries for 2004. Therefore, for the year 2004 only, the amount of water delivered to CII customers was assumed to be an average of the water delivered to CII accounts in 2003

and 2005. CII water delivery data was available for all of the other years in the chosen 10-year Method 4 baseline period.

A discussion of each of savings components and the subsequent calculated savings specifically for the City is included below.

- **Indoor Residential Savings.** Since indoor and outdoor water use is delivered through a single meter, an assumption of 70 gpcd has been provided by DWR for standard residential indoor water use. To determine indoor residential savings potential, the draft provisional method outlines two methodologies. First, a best management practices (BMP) calculator has been developed to sum the savings for four conservation elements including single and multi-family residential housing toilets, residential washers, and showerheads. Due to insufficient data on the implementation of these water-saving measures, it is not used to assess indoor residential savings for the City. The City will use what has been termed the "default option" to determine these savings. Based on the provisional method, this default value is 15 gpcd.
- **Commercial, Industrial, and Institutional Savings.** Baseline CII water use can be established for the City based on data provided in the City's DWR Public Water Systems Statistics Sheet for years 1995 to 2004 (the 10-year baseline period). Based on this data, the baseline per capita CII water use for years 1995 to 2004 is 28 gpcd. The draft provisional method estimates a default value for CII savings of 10 percent. The CII water savings are therefore 3 gpcd.
- **Landscape and Water Loss Savings.** The landscape and water loss water use is determined by subtracting the default indoor water use of 70 gpcd and CII water use of 28 gpcd from the calculated year 1995 to 2004 baseline per capita use. Based on a baseline per capita water use of 232 gpcd, the landscape and water loss use is 133 gpcd. The draft provisional method estimates a default value for landscape and water loss savings of 21.6 percent. The landscape and water loss savings are therefore 29 gpcd.
- **Metered Savings.** Metered savings are considered in addition to the savings attributed to the three sectors previously discussed. Based on a volume of 145.7 million gallons (MG) of deliveries to unmetered connections in 1999 (which is the methodology established by DWR), the unmetered per capita use was 26 gpcd in 1999. Using the assumed savings outlined in the draft provisional method of 20 percent from full metering of the City's connections, savings from metering is calculated as 5 gpcd.

A summary of the Method 4 water use target calculation procedure is shown on Figure 3.2. The City's 2020 target water use is calculated as the baseline water use minus the total savings (residential indoor, CII, landscape, and water loss, and meter savings). In the City's case, the total water savings accounts for 52 gpcd, which equates to a 2020 target water

use of 180 gpcd in 2020, and a corresponding interim water use target for Method 4 of 206 gpcd in 2015. A summary of baseline water use by sector and individual savings calculated using Method 4 is included in Table 3.4.

3.1.2.5 Minimum Water Use Reduction Requirement

The final step in determining the applicability of the water use target for the City is to confirm the water use targets meet the minimum reduction requirements as defined by DWR. To confirm the chosen 2020 per capita target, the 5-year average baseline previously determined (Table 3.3) is used. The chosen target (calculated using one of the four methods described above) must be less than 95 percent of the 5-year baseline. In order to meet this minimum criteria, the City's 2020 target per capita water use must be less than or equal to 206 gpcd.

3.1.3 Summary of Baseline and Target Water Use

Based on the 2020 water use targets calculated using the four methodologies described previously, the urban water use target for the City is 185 gpcd. Using the 10-year baseline of 232 gpcd, the 2015 interim water use target is 208 gpcd. This target was determined using Method 1 (Section 3.1.2.3). According to the DWR guidelines, this target is valid since it is less than the minimum 5-year baseline target confirmation criteria of 206 gpcd (Section 3.1.2.5).

The baseline water use, target per capita use determined based on the four methods, and the selected target and interim target are summarized in Table 3.5.

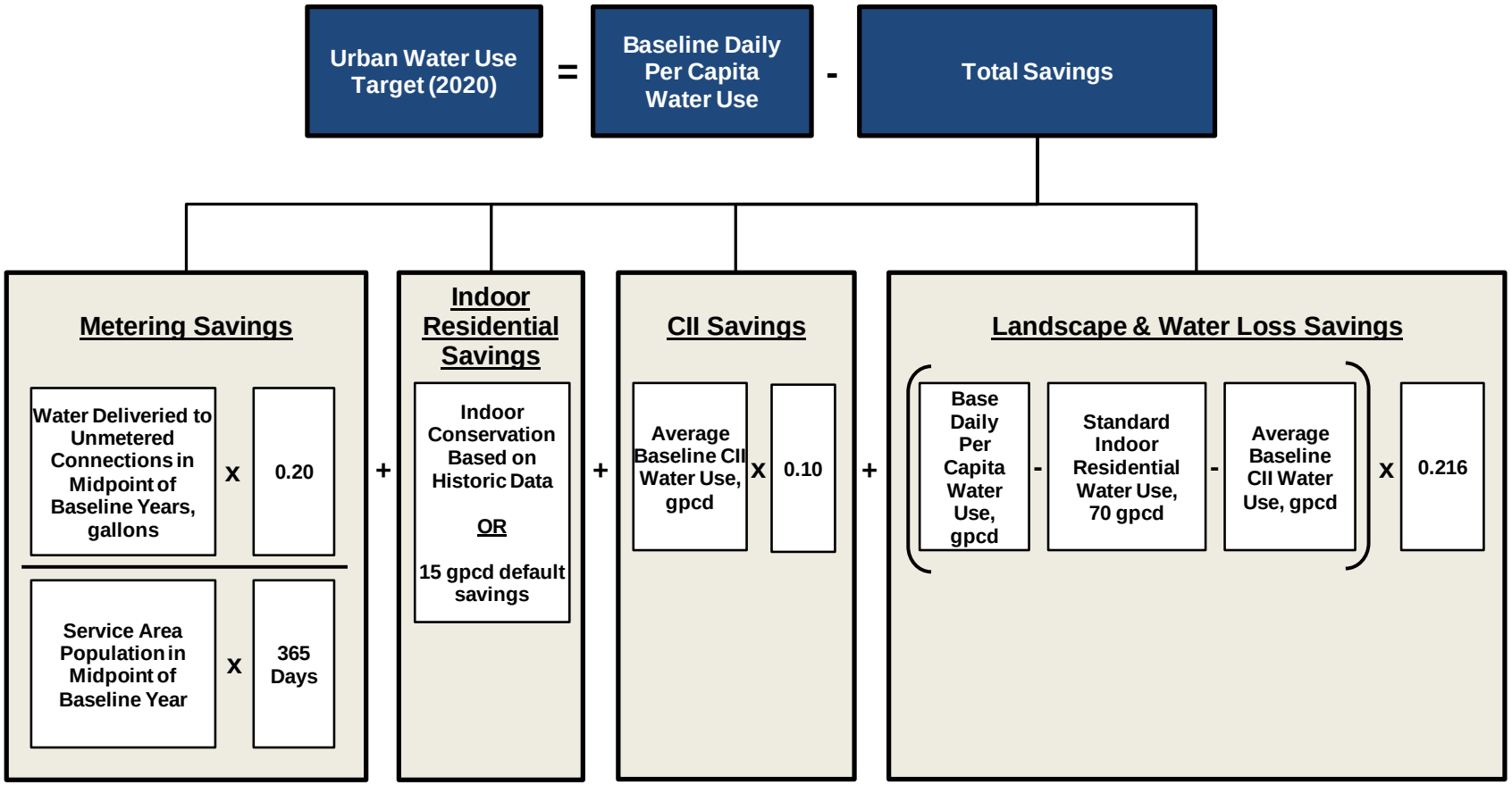


Figure 3.2
Method 4 Target Water Use Calculation Procedure
2010 Urban Water Management Plan
City of Ukiah

Table 3.4 Method 4 Target Determination Summary
2010 Urban Water Management Plan
City of Ukiah

	Per Capita Water Use (gpcd)
Baseline Water Use	
Residential Indoor[1]	70
CII	28
Landscape/Water Loss[2]	133
Total	231
Water Savings	
Residential Indoor[3]	15
CII[4]	3
Landscape/Water Loss[5]	29
Metered Savings[6]	5
Total	52
Method 4 2020 Target Water Use	**180**
Method 4 Interim 2015 Target Water Use	**206**

Notes:
1. Standard value based on guidelines in provisional Method 4.
2. Landscape/Water Loss = Total Baseline Water Use - Residential Indoor Water Use - CII Water Use
3. Standard value based on guidelines in draft provisional Method 4.
4. CII water savings of 10 percent based on guidelines in provisional Method 4.
5. Landscape/water loss savings of 21.6 percent based on guidelines in provisional Method 4.
6. Metered savings of 20 percent based on guidelines in provisional Method 4.

Table 3.5 Baseline and Target Water Use Summary 2010 Urban Water Management Plan City of Ukiah								
Baselines (gpcd)		Target Based on Each Determination Method (gpcd)				Minimum Reduction Requirement[3] (gpcd)	Target[4] (gpcd)	Interim Target[5] (gpcd)
10-Year[1]	5-Year[2]	1	2	3	4[3]			
232	217	185	n/a	130	180	206	185	208

Notes:
1. 10-Year Baseline Years: 1995 to 2004
2. 5-Year Baseline Years: 2003 to 2007
3. Minimum criterion for the Urban Water Use Target is defined as the 95 of the 5-year base daily per capita water use (0.95*217 gpcd).
4. Urban Water Use Target determined using Method 1.
5. Interim Urban Water Use Target defined as the average of the 10-year baseline per capita water use and Urban Water Use Target.

3.2 WATER DEMANDS

The UWMPA requires that the UWMP identify the quantity of water supplied to the agency's customers including a breakdown by user classification.

Law

> *10631 (e) (1). Quantify, to the extent records are available, past and current water use, and projected water use (over the same five-year increments described in subdivision (a)), identifying the uses among water use sectors including, but not necessarily limited to, all of the- following uses: (A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; and (I) Agricultural.*
>
> *10631 (e) (2). The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.*
>
> *10631.1 (a). The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.*

3.2.1 Historical Water Use

The City provides potable water service to its residential, commercial, industrial, and institutional customers within its service area. In 2010, the City produced 962 million gallons or 2,952 acre-feet (AF), which is equivalent to 2.6 million gallons per day (MGD) of water servicing a population of approximately 15,682. Table 3.6 lists the historical annual water production from 1995 to 2010.

Table 3.6	Historic Monthly Water Production (1995 - 2010) 2010 Urban Water Management Plan City of Ukiah				
	Annual Water Production			Population	
Year	Total Annual (MG)	Average Monthly (MG)	Average Daily (MGD)	Population[1]	Per Capita Consumption (gpcd)
1995	1,264	105.3	3.5	14,977	231
1996	1,315	109.6	3.6	15,088	238
1997	1,274	106.2	3.5	15,263	229
1998	1,226	102.2	3.4	15,351	219
1999	1,376	114.7	3.8	15,403	245
2000	1,335	111.3	3.7	15,480	236
2001	1,332	111.0	3.6	15,612	234
2002	1,357	113.1	3.7	15,714	237
2003	1,261	105.1	3.5	15,942	217
2004	1,346	112.2	3.7	15,921	231
2005	1,223	101.9	3.4	15,981	210
2006	1,249	104.1	3.4	15,804	217
2007	1,220	101.7	3.3	15,742	212
2008	1,193	99.4	3.3	15,690	208
2009	998	83.2	2.7	15,666	175
2010	962	80.2	2.6	15,682	168

Notes:
1. Source: California Department of Finance Population Estimates.

Table 3.7 and Table 3.8 summarize the historical number of connections and associated annual water use by customer type for year 2005 and 2010, respectively.

Figure 3.3 shows the current year 2010 distribution of user types and the distribution of water use.

Table 3.7 Water Deliveries – Actual, 2005 (Guidebook Table 3)
2010 Urban Water Management Plan
City of Ukiah

Water Use Sectors	2005				
	Metered		Not Metered		Total Deliveries[1] (AFY)
	No. of Accounts[1]	Deliveries[1] (AFY)	No. of Accounts[1]	Deliveries[2] (AFY)	
Single family	3,393	1,253	63	68	**1,321**
Multi-family	598	1,290	0	0	**1,290**
Commercial/Institutional	1,454	922	0	0	**922**
Industrial	0	0	0	0	**0**
Landscape	71	221	0	0	**221**
Agriculture	0	0	0	0	**0**
Other (Fire Service)	202	0	0	0	**0**
Total	**5,718**	**3,687**	**63**	**68**	**3,754**

Notes:
1. Source: 2005 DWR Public Water System Statistics.
2. Unmetered deliveries are estimated by water use sector using the unit deliveries for metered customers, and then scaled to match the unmetered water deliveries (total deliveries - metered deliveries). System losses cannot be reliably differentiated from unmetered deliveries to paying customers. For this reason, unmetered deliveries include system losses.

3.2.2 Per Capita Consumption

The per capita consumption rate, coupled with the population forecasts provided in Chapter 2, is used for estimating the City's future water requirements, evaluating the adequacy of the supply source, and determining storage needs.

From 1995 to 2010, the consumption rate in the City ranged between a low of 168 gpcd in 2010 and a high of 245 gpcd in 1999. As noted in Section 3.1.1, the City's selected 10-year baseline water use was calculated to be 232 gpcd. Figure 3.4 illustrates the projected per capita water use reduction to meet the City's 2020 water use target.

Table 3.8 Water Deliveries – Actual, 2010 (Guidebook Table 4)
2010 Urban Water Management Plan
City of Ukiah

Water Use Sectors	2010				
	Metered		Not Metered		Total Deliveries[1] (AFY)
	No. of Accounts[1]	Deliveries[1] (AFY)	No. of Accounts	Deliveries (AFY)	
Single family	3,814	738	0	0	738
Multi-family	673	738	0	0	738
Commercial/Institutional	824	707	0	0	707
Industrial	3	51	0	0	51
Landscape	87	192	0	0	192
Agriculture	0	0	0	0	0
Other (Fire Service)	172	0	0	0	0
Total	**5,573**	**2,427**	**0**	**0**	**2,427**

Notes:
1. "Source: 2010 DWR Public Water System Statistics.

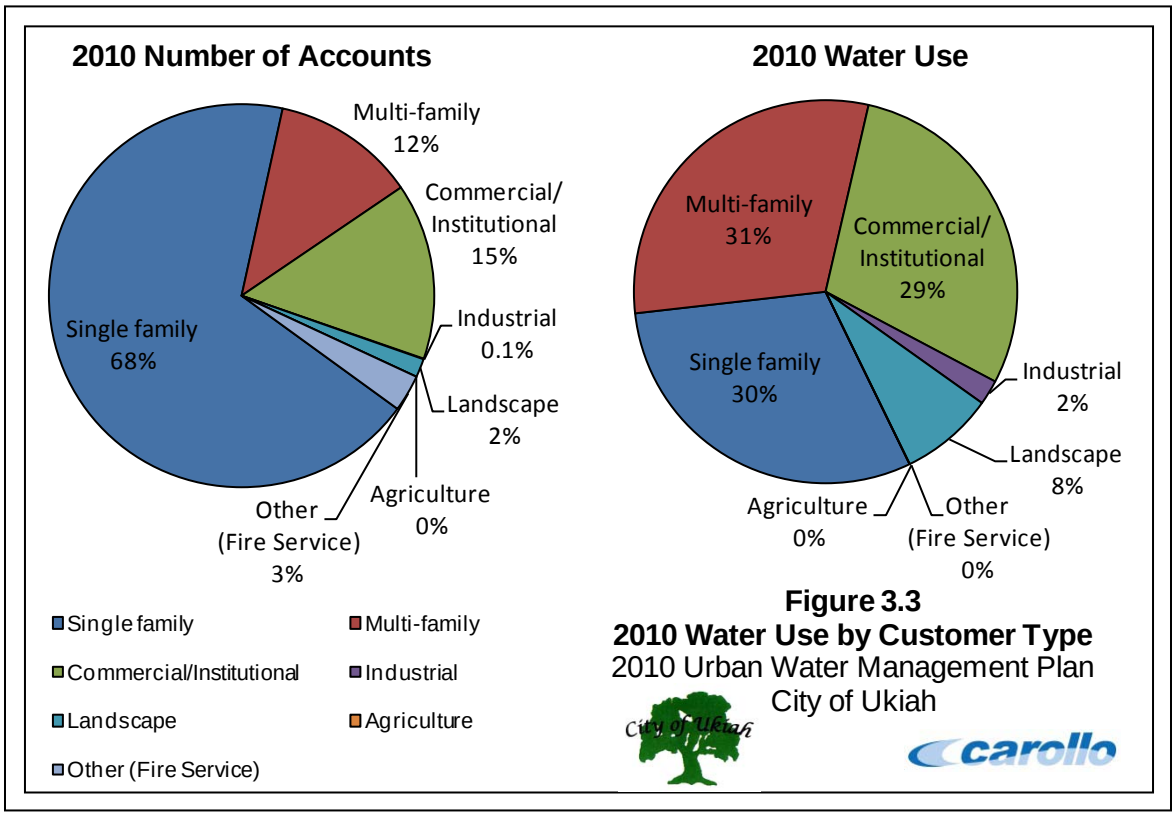


Figure 3.3
2010 Water Use by Customer Type
2010 Urban Water Management Plan
City of Ukiah

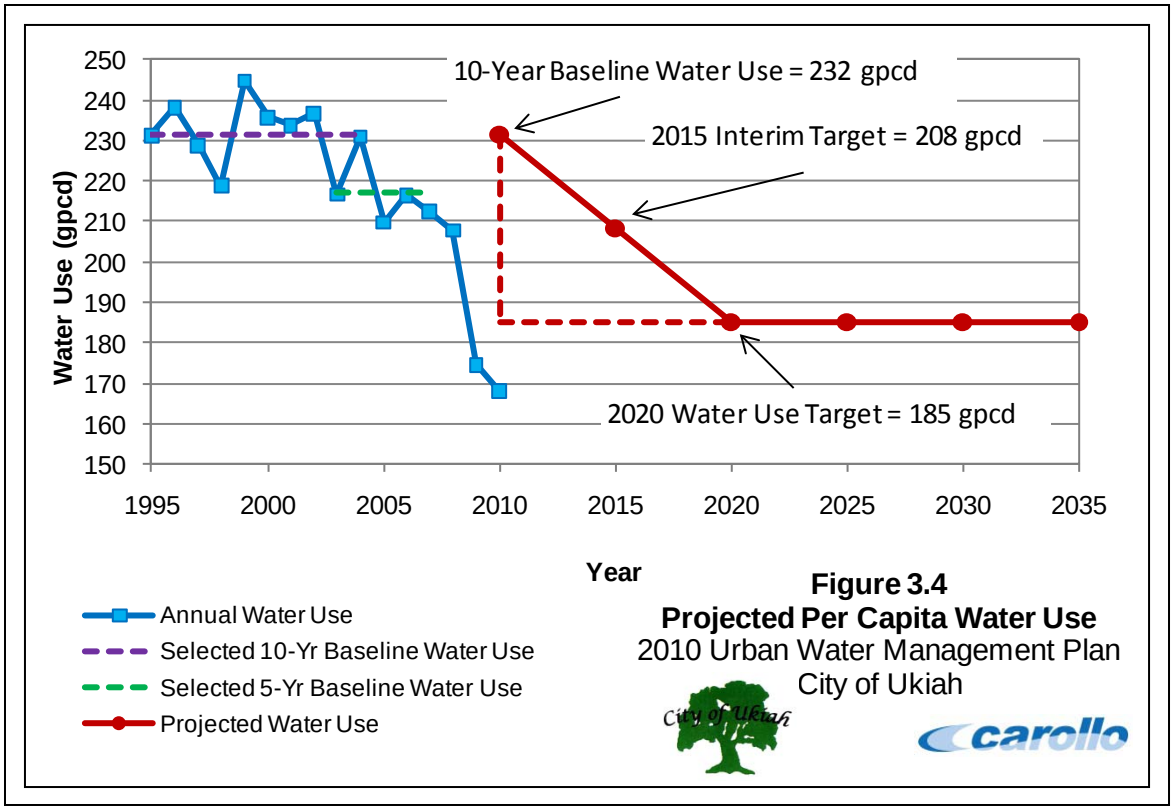


Figure 3.4
Projected Per Capita Water Use
2010 Urban Water Management Plan
City of Ukiah

Since the City's 1999 peak per capita water use, per capita demand has decreased significantly to its current value of 168 gpcd. Because of the City's recent water conservation efforts, the baseline, interim, and target per capita consumption calculated are all above current consumption. Therefore, the per capita water use targets and water demand projections (described in the next section) through 2035 represent relatively conservative values for the City.

The recent decline in per capita consumption is likely due to the City having installed water meters on all service connections by 2005 and encouraged water conservation. In combination with the economic recession beginning in 2008, the installation of meters, adoption of a variable water rate structure based on consumption, and water conversation education efforts likely have encouraged residents to conserve water.

It is not clear whether the recent declines in per capita consumption can be sustained by the City, and whether the declining water use trend is temporary or permanent. Accordingly, the conservative per capita consumptions and water use projections were used in this UWMP. The City may re-evaluate its target per capita use or its target determination method in its 2015 UWMP.

3.2.3 Water Demand Projections

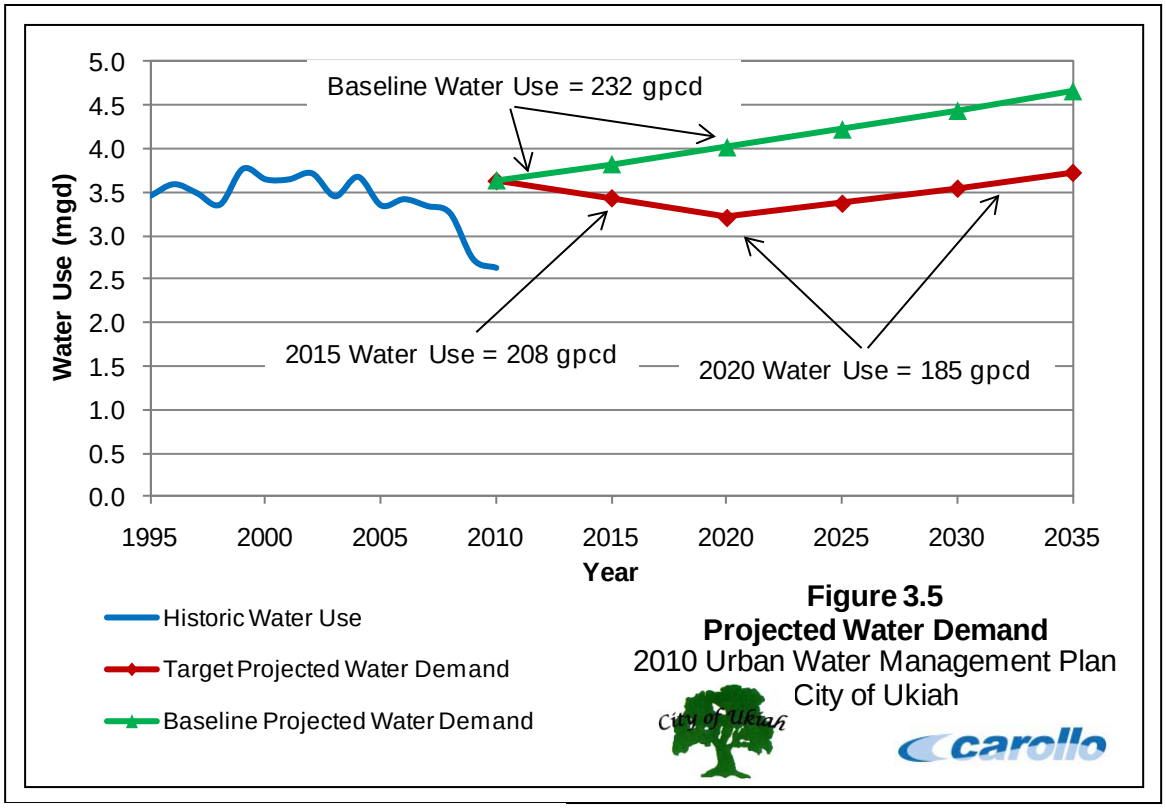
The projected annual water demands for year 2015 were developed by multiplying the projected 2015 population by the City's 2015 interim water use target of 208 gpcd. The projected annual water demands for year 2020 and beyond were developed by multiplying the projected population by the City's 2020 water use target (185 gpcd).

Table 3.9 summarizes the projected water demands based on the City's 2020 water use target. Also included for reference in Table 3.9 is the projected water demand based on the selected 10-year baseline water use. By meeting its target per capita water use, the City could reduce its year 2035 water use from 4.7 MGD (5,217 AFY) to 3.7 MGD (4,173 AFY). Figure 3.5 provides a graphical representation of the information presented in Table 3.9.

Table 3.9 Projected Water Demands
2010 Urban Water Management Plan
City of Ukiah

Year	Distribution System Population	Projected Water Use (mgd)			
		Target Demands[1]		Baseline Demands[2]	
		(MGD)	(AFY)	(MGD)	(AFY)
2015	16,482	3.4	3,848	3.8	4,275
2020	17,323	3.2	3,595	4.0	4,493
2025	18,206	3.4	3,778	4.2	4,722
2030	19,135	3.5	3,971	4.4	4,963
2035	20,111	3.7	4,173	4.7	5,217

Notes:
1. Target demand projections are based on the City's per capita water use targets for 2015 and 2020.
2. Baseline demand projections are based on the City's selected 10-year baseline water use.



The projected connections and water demands for each sector for years 2015 to 2035 are summarized in Table 3.10, Table 3.11, and Table 3.12. To project the number of connections per sector, it was assumed that the number of connections will grow consistently with the projected water demands.

3.2.3.1 Sales to Other Agencies

To date, the City has made no sales to other agencies, nor does the City anticipate any in the future (Table 3.13), but the City is studying the possibility of delivering City water to other agencies either through direct sales or through the Mendocino County Russian River Flood Control and Water Conservation Improvement District (Flood Control District).

Table 3.10 Water Deliveries – Projected, 2015 (Guidebook Table 5) 2010 Urban Water Management Plan City of Ukiah					
	2015				
	Metered		Not Metered		Total Deliveries (AFY)
Water Use Sectors	No. of Accounts	Deliveries (AFY)	No. of Accounts	Deliveries (AFY)	
Single family	4,009	1,014	0	0	1,014
Multi-family	707	1,014	0	0	1,014
Commercial/Institutional	866	972	0	0	972
Industrial	3	70	0	0	70
Landscape	91	264	0	0	264
Agriculture	0	0	0	0	0
Other (Fire Service)	181	0	0	0	0
Total	**5,857**	**3,333**	**0**	**0**	**3,333**

Table 3.11 Water Deliveries – Projected, 2020 (Guidebook Table 6) 2010 Urban Water Management Plan City of Ukiah					
	2020				
	Metered		Not Metered		Total Deliveries (AFY)
Water Use Sectors	No. of Accounts	Deliveries (AFY)	No. of Accounts	Deliveries (AFY)	
Single family	4,213	947	0	0	947
Multi-family	743	947	0	0	947
Commercial/Institutional	910	908	0	0	908
Industrial	3	65	0	0	65
Landscape	96	247	0	0	247
Agriculture	0	0	0	0	0
Other (Fire Service)	190	0	0	0	0
Total	**6,156**	**3,114**	**0**	**0**	**3,114**

Table 3.12	Water Deliveries – Projected 2025, 2030, 2035 (Guidebook Table 7) 2010 Urban Water Management Plan City of Ukiah					
	2025 Metered		**2030 Metered**		**2035 Metered**	
Water Use Sectors	**No. of Accounts**	**Deliveries (AFY)**	**No. of Accounts**	**Deliveries (AFY)**	**No. of Accounts**	**Deliveries (AFY)**
Single family	4,428	995	4,654	1,046	4,891	1,099
Multi-family	781	995	821	1,046	863	1,099
Commercial/ Institutional	957	954	1,005	1,003	1,057	1,054
Industrial	3	69	4	72	4	76
Landscape	101	259	106	272	112	286
Agriculture	0	0	0	0	0	0
Other (Fire Service)	200	0	210	0	221	0
Total	**6,470**	**3,272**	**6,800**	**3,439**	**7,147**	**3,615**

Table 3.13	Sales to Other Water Agencies (Guidebook Table 9) 2010 Urban Water Management Plan City of Ukiah						
	Water Use (AFY)						
Agency	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
None	0	0	0	0	0	0	0
Total, AFY	**0**	**0**	**0**	**0**	**0**	**0**	**0**

3.2.3.2 Other Water Demands

Additional water uses and losses in the City's service area are presented in Table 3.14. Projected system losses are based on the average percent estimated losses incurred in between 2006 and 2010. Unaccounted-for water is calculated as the difference between yearly water production volumes and metered water deliveries. Average system losses between 2006 and 2010 are 13 percent, with water losses in 2010 estimated at 18 percent of total water produced. The estimated system losses for the past five years are higher than typical values. Identification of these losses will provide the City with the opportunity to improve its overall delivery system performance. Because the City still had 63 unmetered connections in 2005, the unaccounted-for water for that year is included in the unmetered delivery volumes in Table 3.7.

Table 3.14 Additional Water Uses and Losses (Guidebook Table 10) 2010 Urban Water Management Plan City of Ukiah							
Water Use[1]	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
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 Water	0	0	0	0	0	0	0
System Losses[2]	N/A	526	515	481	506	531	559
Other	0	0	0	0	0	0	0
Total, AFY	**N/A**	**526**	**515**	**481**	**506**	**531**	**559**

Notes:
1. Any water accounted for in Guidebook Tables 3 through 7 are not included in this table.
2. System losses for 2005 are included in Table 3.7, in the unmetered delivery volume estimates.
3. System losses for 2015 through 2035 are based on the percentage losses from 2006 through 2010.

3.2.3.3 Total Water Demand Projections

The City's total average annual demands are presented in Table 3.15. Water use for 2010 is less than the water use projected for 2015 because the City's current per capita daily use is less than the 2015 interim and 2020 per capita goals on which projected values are based.

As discussed in the previous sections, the City does not have any plans for delivering urban water for uses other than municipal type uses (e.g.; residential, commercial, industrial, institutional, etc.). For this reason, there should be no obstacles to the City providing the projected demands presented in Table 3.15 from a technical or economic perspective.

Table 3.15 Total Water Use (Guidebook Table 11) 2010 Urban Water Management Plan City of Ukiah							
	Water Use (AFY)						
Water Use	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Total water deliveries	3,754	2,427	3,333	3,114	3,272	3,439	3,615
Sales to other water agencies	0	0	0	0	0	0	0
Additional water uses and losses(1)	0	526	515	481	506	531	559
Total, AFY	**3,754**	**2,952**	**3,848**	**3,595**	**3,778**	**3,971**	**4,173**

Notes:
1. System losses for 2005 are included in Table 3.7, in the unmetered delivery volume estimates.
2. System losses for 2015 through 2035 are based on the percentage losses from 2006 through 2010.

3.2.4 Wholesale Water Demand Projections

The UWMPA requires retail water agencies that receive wholesale water to report the projected water demand data that was sent to each wholesale agency from which it receives water.

Law

> *10631 (k). Urban water suppliers that rely upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).*

Flood Control District holds water rights 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 that allows the purchase of up to 800 AF of water annually under the Flood Control District's permit. For purposes of this UWMP, the Flood Control District is considered a wholesale water provider (Table 3.16).

3.2.5 Lower Income Water Demand Projections

Section 10631.1 (a) of the California Water Code requires that retail urban water suppliers include projected water use for lower income single family and multifamily households. Section 50079.5 of the Health and Safety Code defines lower income households as 80 percent of the median income, adjusted for family size. Based on these definitions,

Table 3.17 projects water demands associated with lower income water users through year 2035. These estimates are generated based on data from the 2000 Census and income group definitions from the California Health and Safety Code, which is based on percentage of median household income (MHI). Low income and very low income households are defined as making 50 percent and 30 percent, respectively, of the MHI. It was assumed that income was evenly distributed through the income ranges given in the 2000 Census. It should be noted that the lower income demand projections presented in Table 3.17 are included in the total water use projections provided in Table 3.10 through Table 3.15.

Table 3.16 Retail Agency Demand Projections Provided to Wholesale Suppliers (Guidebook Table 12)
2010 Urban Water Management Plan
City of Ukiah

Wholesaler	Contracted Volume (AFY)	Water Use (AFY)					
		2010	2015	2020	2025	2030	2035
None	800	800	800	800	800	800	800
Total	**800**	**800**	**800**	**800**	**800**	**800**	**800**

Table 3.17 Low Income Projected Water Demands (Guidebook Table 8)
2010 Urban Water Management Plan
City of Ukiah

Low Income Water Demands	Water Use (AFY)				
	2015	2020	2025	2030	2035
Single Family Residential	481	450	472	497	522
Multi-Family Residential	481	450	472	497	522
Total, AFY	**962**	**899**	**945**	**993**	**1,044**

Notes:
1. Low/moderate income percentages were based on 2000 Census data.

3.3 WATER USE REDUCTION PLAN

The UWMPA requires that retail water agencies develop an implementation plan for compliance with the SBx7-7 water use targets.

Law

> *10608.36. Urban wholesale water suppliers shall include in the urban water management plan… an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.*
>
> *10608.26. Urban retail water suppliers are to prepare a plan for implementing the Water Conservation Bill of 2009 requirements and conduct a public meeting which includes consideration of economic impacts.*

The City determined its 10-year baseline water use and urban water use targets in accordance with the methods described in the DWR 2010 UWMP Guidebook. After doing so, the interim and target per capita water uses were both higher than the current (2010) per capita water use estimates. If the City can maintain its low water consumption rates, it will meet 2020 conservation goals. However, if consumption rates begin to rise above interim and target water use goals, the City must implement additional conservation measures to meet its 2020 goals.

Although the City is currently below its 2020 targets, the City intends to continue and develop its water conservation programs. Primary goals for the City's conservation efforts are described as Demand Management Measures (DMMs) in Chapter 6 of this UWMP. Implementation of appropriate DMMs will help the City reach its water use targets. In particular, the City currently performs the following services to encourage and/or require water conservation from its customers:

- Meter audits help to identify water-use problems, recommend repairs, and instruct on efficient landscaping principles and use of irrigation timers when appropriate.
- Leak detection, leak repair, and old meter replacement on an ongoing basis, which help identify system losses and provide more accurate readings.
- Landscape plan review for new developments. Included in the City's Municipal Code is a requirement for all landscape planting to be appropriate for the City's climate and not require extensive irrigation.
- Public awareness campaigns on water conservation issues through bill stuffers, Consumer Confidence Reports, radio broadcasts, and on the City's website.
- School educational programs including water treatment plant tours and educational materials.
- Water rate pricing schedule that encourages water conservation and varies based on meter size and unit consumption.
- Conservation coordination efforts from all City staff members.
- Regulations that give the City permission to discontinue water service for customers who waste water.
- Ultra low flush toilet replacement incentive and rebate program.

All of the aforementioned water conservation activities have already been implemented by the City. The City will continue to pursue water conservation efforts as appropriate and make adjustments to available programs when necessary. These conservation efforts, along with the DMMs described in Chapter 6, will be implemented throughout the next 5 years until re-evaluation in the 2015 UWMP.

Chapter 4

SYSTEM SUPPLIES

The Urban Water Management Planning Act (UWMPA) requires that the Urban Water Management Plan (UWMP) include a description of the agency's existing and future water supply sources for the next 20 years. The description of water supplies must include detailed information on the groundwater basin such as water rights, determination if the basin is in overdraft, adjudication decree, and other information from the groundwater management plan.

Much of the information contained in Chapters 4 and 5 is summarized from the Technical Memorandum (TM) prepared by Wagner and Bonsignore, which describes the water supply sources, rights, and reliability pertaining to the City. The TM is included as Appendix D, which can be referenced for more detailed discussion of these topics.

Law

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (b). Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a) [to 20 years or as far as data is available]. If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

10631 (b) (1). (Provide a) copy of any groundwater management plan adopted by the urban water supplier…

10631 (b) (2). (Provide a) description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or board has adjudicated the rights to pump groundwater, (provide) a copy of the order or decree adopted by the court or by the board…(Provide) a description of the amount of groundwater the urban water supplier has the legal right to pump under the decree…For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

10631 (b) (3). (Provide a) detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic records.

10631 (b) (4). (Provide a) detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonable available, including, but not limited to, historic use records.

4.1 WATER SUPPLY SOURCES

This section describes the existing and projected water supply sources for the City.

The City's water supply sources include groundwater, surface water from the underflow of the Russian River, and project water available from the Mendocino County Russian River Flood Control and Water Conservation Improvement District. In addition, the City is in the process of developing a Recycled Water Master Plan (RWMP), prepared by Carollo Engineers. Projected uses of recycled water and a description of RWMP efforts are described in Section 4.6.

4.1.1 Water Supply Facilities

The City's water supply facilities include five active wells and a Ranney Collector. Table 4.1 below provides a summary of the water supply sources, including description of the type of supply source for each facility.

Table 4.1 Water Supply Sources
2010 Urban Water Management Plan
City of Ukiah

Facility	Type of Supply	Current Status	Production Capacity (GPM)
Ranney Collector[2]	Surface water	Active	3,194
Well #3	Groundwater influenced by surface water	Active	600
Well #4	Groundwater	Active	799
Well #5	Groundwater influenced by surface water	Active	300
Well #7	Groundwater	Active	799
Well #8	Groundwater	Active	694
		Total Active Well Capacity (GPM)	**6,386**
		Total Active Well Capacity (AFY)	**10,308**

Notes:
1. Source: City staff records.
2. The Ranney Collector can only be used during the dry season when surface water turbidity is low.

The City's water supply sources fall into two categories: surface water diversion and groundwater. The City's surface water is obtained from the Ranney Collector and Wells 3 and 5, which draw water from an alluvial zone along the Russian River. Water taken from these sources is considered under the influence of surface water by the California

Department of Public Health (DPH). Accordingly, water diverted from the Ranney Collector and Wells 3 and 5 is classified as surface water. The City also draws groundwater from Wells 4, 7, and 8.

4.1.2 Distribution System and Storage

The City's water distribution system consists of: (1) pumping from wells that are either groundwater wells or wells under the influence of surface water, (2) surface water collection, (3) high-capacity pumping station at the water treatment plant, (4) storage reservoirs, and (5) piping to and within the distribution system.

After chlorination, surface water Well 3 is pumped directly into the distribution system. Wells 4 and 7, following chlorination, also pump directly into the water distribution system. The high service pumps at the water treatment plant draw stored, treated water and pump it into the water distribution system.

The City has eight distribution reservoirs with a combined storage capacity of 6.1 million gallons (MG; 18.7 acre-feet [AF]). The storage reservoirs provide short term treated water storage to be used on a daily basis and for emergency situations such as fire fighting. The reservoirs 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 station, and three new storage tanks completed in 2005 (two 1.5 MG tanks and one 315,000-gallon tank). The storage facilities are not considered additional water supply sources for the City.

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 gallons per minute (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.

4.1.3 Current and Projected Water Sources

The City's current and projected water supply sources are summarized in Table 4.2.

Mendocino County Russian River Flood Control and Water Conservation Improvement District holds Water Right Permit 12947B for storage and use of up to 8,000 AF annually. This water supply includes water stored in Lake Mendocino and directly diverted from the East Fork of the Russian River. The City has a water supply agreement that allows the purchase up to 800 AF of water annually under the Permit 12947B. The Mendocino County Russian River Flood Control and Water Conservation Improvement District is considered a wholesale provider for purposes of this UWMP.

Table 4.2 Water Supplies - Current and Projected (Guidebook Table 16)
2010 Urban Water Management Plan
City of Ukiah

Water Supply Sources		Projected Water Supply (AFY)					
Water purchased from:	**Wholesale Supplied Volume**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Project Water (Mendocino County Russian River Flood Control and Water Conservation Improvement District)	Yes	800	800	800	800	800	800
Supplier-produced groundwater(2)	No	3,705	3,705	3,705	3,705	3,705	3,705
Supplier-produced surface water(3)	No	14,480	14,480	14,480	14,480	14,480	14,480
Supplier-produced surface water (pre-1914 Rights)	No	2,027	2,027	2,027	2,027	2,027	2,027
Transfers In	No	0	0	0	0	0	0
Exchanges In	No	0	0	0	0	0	0
Recycled Water(4)	No	200	428	667	919	1,183	1,462
Desalinated Water	No	0	0	0	0	0	0
Total		**21,212**	**21,440**	**21,679**	**21,931**	**22,195**	**22,474**

Notes:

1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Based on groundwater pumping capacities provided by the City.
3. Permit 12952 (Application 15704) authorizes diversion of 20 CFS, with no annual limit. Therefore, the City's potential water right is reported above.
4. Estimated values based on preliminary data for use in the City's Recycled Water Master Plan.

Also included in the City's water supply is diversion of Russian River underflow for municipal purposes, under a water right Permit 12952 (Application 15704). Under

Permit 12952, water can be diverted at a rate not to exceed 20 cubic feet per second (CFS; 9,000 GPM) from January 1 through December 31 with no annual limit. Additionally, the City has a pre-1914 appropriative water right for at least 2.8 CFS for diversion from the Russian River for a maximum of 2,027 AF annually.

4.1.4 Wholesale Supplies

As indicated on Table 4.3, the City has the opportunity to receive wholesale water from the Mendocino County Russian River Flood Control and Water Conservation Improvement District.

Table 4.3 Wholesale Supplies – Existing and Planned Sources of Water (Guidebook Table 17)
2010 Urban Water Management Plan
City of Ukiah

Wholesale Sources	Contracted Volume (AFY)	Projected Water Supply (AFY)				
		2015	2020	2025	2030	2035
Project Water (Mendocino County Russian River Flood Control and Water Conservation Improvement District)	800	800	800	800	800	800
Total	**800**	**800**	**800**	**800**	**800**	**800**

4.2 GROUNDWATER BASIN

This section describes the Ukiah Valley Groundwater Basin (Basin).

4.2.1 Groundwater Basin Description

For planning purposes, the Department of Water Resources (DWR) has subdivided the State of California into ten separate hydrologic regions, corresponding to the State's major drainage basins. The Basin (Number 1-52 as described in DWR Bulletin 118) is located in southeastern Mendocino County and is the largest basin along the Russian River. The Basin is approximately 22 miles long and 5 miles wide, and underlies Ukiah Valley and Redwood Valley. This basin is not adjudicated.

Detailed information and discussion on the geological characteristics of the Basin is included Appendix C.

The United States Geological Survey (USGS) published a Water Resources Investigation Report 85-4258 in 1986 on the Groundwater Resources in Mendocino County, California (USGS Investigative Report). Storage capacities and groundwater elevations within the Basin were evaluated in the USGS Investigative Report. USGS concluded that groundwater

wells in the Basin, monitored over a 30-year period, show no prominent long term declines. In addition, hydrograph analysis indicates that the Basin is recharged fully each year except when precipitation falls below 60 percent of normal.

DWR Bulletin 118 suggests that groundwater in storage is approximately 90,000 AF in the upper 100 feet of the most productive area of the Ukiah Valley, and an additional 45,000 AF within the margins of the Ukiah Valley. Therefore, the volume of water available from pumping from the upper 100 feet of the most productive portion of the aquifer is estimated at 90,000 acre-feet. Groundwater is hydraulically connected to and interacts with surface flows. Plate I in Appendix C shows the estimated boundaries of the groundwater basin consistent with DWR Bulletin 118, and the estimated groundwater availability within the Basin.

4.2.2 Groundwater Management Plan

A groundwater management plan has not been prepared for the City, Ukiah Valley, or Mendocino County. In the future, the City may consider coordination with other agencies within the Basin to develop a more comprehensive groundwater management plan.

4.2.3 Groundwater Levels and Historical Trends

In general, the Basin experiences seasonal and year-to-year variation in groundwater elevations due to relative rainfall and pumping, as described in Bulletin 118 and the USGS Investigative Report. However, these variations tend to be small and water levels, in general, recover.

Groundwater elevations fluctuate seasonally, being the highest level in March or April at the end of the wet season, and lowest in October at the end of the dry season. Seasonal fluctuations range on the order of 5 to 20 feet. Long-term measurements are taken and recorded from several wells within the Ukiah Valley. Plate II in Appendix C shows available groundwater hydrographs within the Ukiah Valley.

The USGS Investigative Report found that, from the available hydrographs of the Basin, none of the hydrographs show prominent long-term declines. In fact, water levels measured during the 1980s are similar to those measured during the 1960s and 1970s.

DWR Bulletin 118 corresponds with this assessment. According to Bulletin 118, groundwater levels in the Basin have remained relatively stable in the past 30 years. As expected, there is increased drawdown during summer months and less recovery in winter months when the area experiences drought conditions. Post-drought groundwater conditions rebound to approximately the same levels as pre-drought conditions.

Based on the historical information available for the Basin, groundwater supplies are expected to adequately meet existing and future demands.

4.2.4 Groundwater Overdraft

The current and historical groundwater trends for this Basin indicate that there is no long-term decline in water levels that suggest water shortage or overdraft. The Basin is not considered to be in a state of overdraft by DWR, and is not projected to be in a state of overdraft in the near future.

4.3 EXISTING AND PROJECTED GROUNDWATER PUMPING

This section quantifies the historical and projected groundwater pumping by the City (Table 4.4 and Table 4.5).

Table 4.4 Historic Groundwater Pumping (Guidebook Table 18)
2010 Urban Water Management Plan
City of Ukiah

Basin Name	Metered or Unmetered	Historic Pumping Rates (AFY)				
		2006	2007	2008	2009	2010
Ukiah Valley Groundwater Basin[(1)]	Metered	1,347	1,185	1,380	1,486	1,990
Total Groundwater Pumped[(2)]		**1,347**	**1,185**	**1,380**	**1,486**	**1,990**
Groundwater as Percent of Total Water Supply		**6.4**	**5.6**	**6.6**	**7.1**	**9.5**

Notes:
1. Total water supply is provided in Table 4.2 and is 21,012 acre-feet per year (in 2010), including contract water, appropriative rights, and groundwater. All of the City water, whether diverted from groundwater wells or diverted under its appropriative rights, is supplied by groundwater.
2. Groundwater volumes taken from DWR statistic sheets 2006-2010, provided by the City.

Table 4.5 Projected Groundwater Pumping (Guidebook Table 19) 2010 Urban Water Management Plan City of Ukiah					
	Projected Pumping Rates (AFY)				
Basin Name	**2015**	**2020**	**2025**	**2030**	**2035**
Ukiah Valley Groundwater Basin	3,705	3,705	3,705	3,705	3,705
Total Groundwater Pumped(1)	**3,705**	**3,705**	**3,705**	**3,705**	**3,705**
Groundwater as Percent of Total Water Supply(2)	**17**	**17**	**17**	**16**	**16**

Notes:

2. Groundwater pumped represents the total groundwater pumping capacity of Wells 4, 5, 7, and 8. Actual groundwater pumped will likely be less than the total groundwater pumping capacity.
3. Projected total water supply volumes are listed in Table 4.2 of this UWMP.

4.4 TRANSFER AND EXCHANGE OPPORTUNITIES

The UWMPA requires that the UWMP address the opportunities for transfers or exchanges.

Law

> *10631 (d). Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.*

This section quantifies transfer and exchange opportunities for the City (Table 4.6).

The City does not transfer or exchange water with its neighboring water suppliers. However, the City has emergency intertie agreements with Millview County Water District and Willow County Water District, which provides that in the event of a water supply emergency, the City will receive water deliveries from the Districts through the interconnected water supply system. However, the City is considering a regional water management plan that may involve other water purveyors within the Ukiah Valley, including:

- Calpella County Water District
- Hopland Utilities District
- Millview County Water District
- Redwood Valley County Water District
- Rogina Water Company
- Sonoma County Water Agency
- Willow County Water District

The regional planning effort is currently in its early development stages. Involved agencies are in the process of identifying priorities and needs prior to moving forward with any potential future transfers or exchanges.

Table 4.6 Transfer and Exchange Opportunities (Guidebook Table 20)
2010 Urban Water Management Plan
City of Ukiah

Transfer Agency	Transfer or Exchange	Short Term or Long Term	Proposed Volume (AFY)
Calpella County Water District	N/A	N/A	0
Hopland Utility District	N/A	N/A	0
Millview County Water District	Yes	Long-term	N/A
Redwood Valley County Water District	N/A	N/A	0
Rogina Water Company	N/A	N/A	0
Sonoma County Water Agency	N/A	N/A	0
Willow County Water District	Yes	Long-term	N/A
Total			**0**

Note:

1. Millview and Willow County Water Districts have entered into an emergency intertie agreement with the City. Although the agreement does not specify volumes, the signatories agree to provide water supplies during a water supply emergency, as the systems are interconnected.

4.5 DESALINATED WATER OPPORTUNITIES

The UWMPA requires that the UWMP address the opportunities for development of desalinated water, including ocean water, brackish water, and groundwater.

Law

> *10631 (i). Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long term supply.*

This section describes the desalinated water opportunities for the City (Table 4.7).

The surface water and groundwater supplies currently used by the City do not require desalinization. Saltwater intrusion is not expected to occur in the Basin. The City has no immediate plans to explore desalinization opportunities because its surface and groundwater sources are expected to provide adequate long-term supply.

Table 4.7 Opportunities for Desalinated Water 2010 Urban Water Management Plan City of Ukiah	
Sources of Water	**Opportunities for Desalinated Water**
Ocean Water	None
Brackish Ocean Water	None
Brackish Groundwater	None
Other	None

4.6 RECYCLED WATER OPPORTUNITIES

The UWMPA requires that the UWMP address the opportunities for development of recycled water, including the description of existing recycled water applications, quantities of wastewater currently being treated to recycled water standards, limitations on the use of available recycled water, an estimate of projected recycled water use, the feasibility of projected uses, and practices to encourage the use of recycled water.

Law

10633. Provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.

10633 (a). (Describe) the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

10633 (b). (Describe) the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

10633 (c). (Describe) the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

10633 (d). (Describe and quantify) the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

10633 (e). (Describe) the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

10633 (f). (Describe the) actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

10633 (g). (Provide a) plan for optimizing the use of recycled water in the supplier's service

area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

4.6.1 Wastewater Treatment Facilities

The Ukiah Wastewater Treatment Plant (UWWTP) is owned and operated by the City. The UWWTP receives wastewater from the City's wastewater collection system and the Ukiah Valley Sanitation District (UVSD) wastewater collection system, and serves a population of about 20,000 residential, commercial, and industrial customers. The City collection system receives wastewater from about 82 percent of the City's service area and serves about 75 percent of the City's population. The UVSD serves the remaining portion of the City's service area and about 25 percent of the City's population, as well as an additional 5,000 residential customers from the urban areas surrounding the City.

The UWWTP includes primary, secondary, and tertiary treatment facilities, as well as solids handling facilities. The tertiary treatment facilities are referred to as the Advanced Wastewater Treatment (AWT) System. Table 4.8 summarizes the treatment capacity of the UWWTP and Table 4.9 summarizes the major components of the UWWTP facilities.

The UWWTP's effluent discharges are regulated by a National Pollutant Discharge Elimination System (NPDES) permit – Order No. R1-2006-0049, NPDES No. CA0022888. The permit was adopted on September 20, 2006 and expires on November 9, 2011.

Table 4.8 Treatment Capacities for UWWTP
2010 Urban Water Management Plan
City of Ukiah

Design Flow Criterion	Units	Secondary Treatment	AWT System[1] (Tertiary Treatment)
Average Dry Weather Flow (ADWF)	MGD	3.01	N/A[2]
Average Wet Weather Flow (AWWF)	MGD	6.89	4
Peak Wet Weather Flow (PWWF)	MGD	24.5	8

Note:
1. The Advanced Wastewater Treatment (AWT) Facility produces effluent that meets Title 22 recycled water requirements.
2. The AWT system is not operated during dry weather flows.

Table 4.9 Major Components of UWWTP Facilities 2010 Urban Water Management Plan City of Ukiah		
Primary and Secondary Treatment Facilities	**AWT System (Tertiary Treatment Facilities)**	**Solids Handling Facilities**
• influent pump station • bar screen facility and grit removal system • primary clarifiers • trickling filter pump station and trickling filters • aeration basins • solids contact tanks • secondary clarifiers • chlorine disinfection system	• applied water pump station • coagulation system • multimedia tertiary filters • chlorine contact basins • dechlorination system	• dissolved air flotation thickeners • anaerobic digesters • belt filter press for dewatering

The UWWTP discharges disinfected secondary effluent to three percolation/evaporation ponds located at the UWWTP on a year-round basis, and discharges disinfected tertiary effluent to the Russian River as needed during wet weather months. The UWWTP is only permitted to discharge disinfected, tertiary wastewater to the Russian River from October 1 through May 14 at a discharge rate of up to one percent of the total Russian River flow. The Water Quality Control Plan for the North Coast Region (Basin Plan) prohibits the discharge of treated wastewater from the UWWTP from May 15 through September 30.

Discharge of treated wastewater effluent is a critical component of the City's water balance. During dry weather months, wastewater flows to the UWWTP are low enough that the full flow is stored in the percolation ponds. During these months, the AWT System is not in operation. During wet weather flows, the AWT System is operated to provide tertiary treatment of flows in excess of that which can be stored in the ponds. Flows in excess of that which can be stored in the ponds and that which can be discharged to the Russian River must be disposed of by other means including reuse of treated effluent onsite. The UWWTP currently reuses an average of about 0.29 MGD of treated effluent onsite (323 AFY). In recent wet years, the UWWTP has discharged the maximum flow that can be stored in the ponds and discharged to the river. As flows increase in the future, additional pond storage will be needed or an additional discharge alternative, such distribution to recycled water customers, must be developed.

4.6.1.1 History of Expansions

The original wastewater treatment facility was constructed in 1958 and provided secondary treatment at an average dry weather flow capacity of 2.5 MGD and a peak wet weather flow capacity of 10.5 MGD. At that time all treated effluent was discharged to the Russian River.

The UWWTP has been expanded and upgraded several times since then. In 1983 the facility was expanded to increase the treatment capacity to an average dry weather flow capacity of 2.8 MGD and a maximum wet weather capacity of 7.0 MGD. In 1986, the third percolation/evaporation pond was constructed to increase the treated effluent storage capacity and in 1989 an effluent pump station was constructed to convey secondary treated effluent to the third pond. In 1989, the Regional Water Quality Control Board (RWQCB) required tertiary treatment of all river discharges and secondary treatment for all discharges to the evaporation/percolation ponds. To meet this requirement, the plant was upgraded again in 1995. The project included the construction of the fourth secondary clarifier, a new solids handling facility, and the AWT system, as well as upgrades to the headworks.

The most recent upgrade to the facility occurred in 2009 to expand the facility to its current treatment capacity and to upgrade the AWT system to meet Title 22 recycled water standards. This upgrade included a new headworks facility, a new bar screen facility and grit removal system, conversion of the existing secondary clarifiers to primary clarifiers, a new trickling filter pump station and upgrades to the trickling filters, conversion of the existing primary clarifiers to solids contact tanks, modifications to the chlorine disinfection facilities, and other miscellaneous upgrades.

4.6.1.2 Future Expansions

Although no expansion projects are planned for the near term, the City is expected to grow and the UWWTP will need to be expanded to accommodate this growth. In 2003, the City developed 2025 Design Criteria for the City's wastewater treatment capacity and projected that the total wastewater flows of the service area would increase steadily over the next few decades. The total flow in 2025 was projected to be approximately 6,363 AFY, equivalent to an average annual flow of about 5.7 MGD.

4.6.2 Water Recycling Facilities

The UWWTP's AWT system produces disinfected, tertiary treated effluent that meets Title 22, Division 4, Chapter 3, California Code of Regulations (CCR) for recycled water. The City is currently developing a RWMP to determine how this effluent can be put to its highest and best use to increase the reliability and maximize the capacity of the City's wastewater treatment facilities. Analysis of the tertiary effluent water quality is underway to determine the various applications the recycled water could be used for, especially with respect to irrigation.

The AWT system is currently operated as needed during wet weather months (October through mid May) to treat flows in excess of that which can be stored in the onsite percolation/evaporation ponds. Although this effluent meets recycled water standards, it is not distributed to any recycled water users outside the treatment plant and is discharged by gravity to the Russian River. The UWWTP does not currently have any excess storage on site to store the recycled water or pumping capacity to deliver the recycled water to

potential customers. At a minimum a new pump station and distribution system would be needed to convey the water to recycled water customers.

A significant number of potential recycled water customers have been identified through previous studies and the preliminary efforts of the RWMP. These customers primarily include local farmers and agricultural businesses. Other potential customers include City-owned sites such as the Ukiah Municipal Airport, City parks and schools, Anton Stadium, the City softball complex, the City Civic Center, the City and County Fairgrounds, and the Ukiah Golf Course. Through initial RWMP efforts, about 700 acres of vineyards and orchards have been identified as potential land that could be served with recycled water. At these sites the recycled water would primarily be used for frost protection and irrigation. The 2005 Urban Water Management Plan estimated about 236 acres of publicly-owned land that could be irrigated with recycled water.

In developing the RWMP, the City will further identify, quantify, and map the potential recycled water demand in the City and surrounding areas. It will also group potential customers into recycled water service areas based on their location. The groupings will be used to define recycled water project alternatives and potential phasing of a recycled water program.

4.6.3 Wastewater Generation

Table 4.10 includes the historical and projected wastewater flows collected and treated within the service area. Projected wastewater flows are based on actual wastewater flow data from 2001 – 2010 and population data and projections presented herein.

Table 4.11 summarizes the projected methods of disposal of wastewater flows. Values presented herein are preliminary and for example purposes only. They are to be further developed and finalized in the adopted RWMP.

Table 4.12 summarizes the projected methods of disposal of wastewater flows.

Table 4.10	Recycled Water – Wastewater Collection and Treatment (Guidebook Table 21) 2010 Urban Water Management Plan City of Ukiah						
	Volume (AFY)						
Type of Wastewater	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Wastewater Collected and Treated in Service Area	4,592	4,668	4,896	5,135	5,387	5,652	5,930
Volume that meets recycled water standard	441	1,686	1,913	2,153	2,405	2,669	2,947

Notes:
1. 2005 and 2010 wastewater flows based on actual plant data.
2. Wastewater flow projections for 2015 – 2035 based on wastewater flows from 2001 – 2010 and population projections presented herein.

Table 4.11	Recycled Water – Non-Recycled Wastewater Disposal (Guidebook Table 22) 2010 Urban Water Management Plan City of Ukiah						
		Volume (AFY)					
Method of Disposal	**Treatment Level**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Discharge to Russian River	Tertiary	1,686	1,686	1,686	1,686	1,686	1,686
Evaporation/ Percolation from Ponds	Secondary	2,782	2,782	2,782	2,782	2,782	2,782
Reuse within Plant	Secondary	200	200	200	200	200	200
Recycled water use	Tertiary	0	228	467	719	983	1,262
Total		**4,668**	**4,896**	**5,135**	**5,387**	**5,652**	**5,930**

Notes:
1. Assumes that evaporation losses in the UWWTP ponds are negligible.
2. Assumes discharge to the river and to the percolation ponds remains the same because facility is currently near its discharge capacity during wet years.
3. Assumes recycled water program is implemented to make up the difference between projected wastewater volumes and current volumes discharged to the Russian River, discharged to the ponds, and reused onsite.

4.6.4 Current Recycled Water Use

Table 4.12 summarizes the recycled water use that was projected in the 2005 Urban Water Management Plan and the actual recycled water use that has occurred. As projected, the only recycled water use that has occurred is on-site reuse of secondary treated effluent for landscape irrigation, process washdown, and spray water.

Table 4.12 2010 Recycled Water Use Compared to 2005 UWMP Use Projections (Guidebook Table 24) 2010 Urban Water Management Plan City of Ukiah		
	Volume (AFY)	
User Type	**2010 Actual**	**2005 Projection for 2010**
Agricultural Irrigation	0	0
Landscape Irrigation	0	0
Commercial Irrigation	0	0
Golf Course Irrigation	0	0
Wildlife Habitat	0	0
Wetlands	0	0
Industrial Reuse	0	0
Groundwater Recharge	0	0
Seawater Barrier	0	0
Geothermal Energy	0	0
Indirect Potable Reuse	0	0
Consumptive reuse within the plant[(1)]	200	**323**
Total	**200**	**323**

Notes:
1. Use of recycled water within the WWTP property boundaries estimated by City staff.

4.6.5 Projected Recycled Water Use

Potential uses for recycled water in the Ukiah Valley include urban irrigation, agricultural irrigation and agricultural frost protection. The City is currently potential recycled water users within the Valley as part of the RWMP. Preliminary estimates have been developed for agricultural applications and urban irrigation and are included in Table 4.13.

Table 4.13 Recycled Water – Potential Future Use (Guidebook Table 23)
2010 Urban Water Management Plan
City of Ukiah

User Type	Description	Feasible?	Volume (AFY) 2015	2020	2025	2030	2035
Agricultural Irrigation	Irrigation and frost protection for vineyards and orchards	TBD(2)	216	444	683	934	1,198
Landscape Irrigation	City parks, schools and recreational facilities	TBD(2)	11	23	36	49	63
Commercial Irrigation		TBD(2)	0	0	0	0	0
Golf Course Irrigation		TBD(2)	0	0	0	0	0
Wildlife Habitat		TBD(2)	0	0	0	0	0
Wetlands		TBD(2)	0	0	0	0	0
Industrial Reuse		TBD(2)	0	0	0	0	0
Groundwater Recharge		TBD(2)	0	0	0	0	0
Seawater Barrier		TBD(2)	0	0	0	0	0
Geothermal Energy		TBD(2)	0	0	0	0	0
Indirect Potable Reuse		TBD(2)	0	0	0	0	0
Other	Reuse within the wastewater treatment plant	Yes	200	200	200	200	200
Total			**428**	**667**	**919**	**1,183**	**1,462**

Notes:
1. All values and descriptions presented herein are preliminary and are to be finalized in the Recycled Water Master Plan. Assumes 95 percent of recycled water use will be for agricultural use and 5 percent will be for landscape irrigation.
2. To be determined in the City's Recycled Water Master Plan.

The scope of recycled water use within the City will be determined through the recycled water master planning process and detailed in the RWMP. The master planning effort will yield recycled water customer service area groups and recycled water project alternatives. Potential recycled water customers will be grouped into possible recycled water service area groups based on their location. The alternatives development process will include

defining the transmission, distribution, and storage required to supply recycled water to each of the service area groups. The alternatives will include sizing and routing of pipelines, sizing, location and elevation of storage and sizing of pump stations.

Successful implementation of recycled water use also hinges on public support and acceptance. The City intends to work closely with stakeholders including its customers, farmers and wine growers, associated agencies, and others throughout the master planning process to ensure the benefits and costs of recycled water are fully communicated and understood. Visioning and educational workshops will be held to address the concerns of potential customers, including but not limited to:

- Subsidization of the recycled water program;
- Correspondence of seasonal water demands to recycled water supply and storage requirements;
- Impacts of recycled water on organic certification and marketability of crops;
- Impacts of recycled water on water rights;
- Improvement of the reliability of existing supplies due to recycled water use, particularly with respect to frost protection needs.

To implement recycled water use, the City will need to install a distribution system that will convey the recycled water to existing customers. Depending on the use, customers may also need to develop private storage capacity. For example, growers that will use the water for frost protection during frost events will need to store the recycled water conveyed from the UWWTP for use during frost events.

4.6.6 Encouraging Recycled Water Use

To encourage recycled water use, the City plans to:

- hold educational workshops to inform and involve stakeholders;
- work closely with stakeholders to evaluate recycled water program alternatives;
- work to secure funding to offset costs to the City.

As part of the RWMP, the City will hold visioning and educational workshops to identify and address stakeholder concerns, to determine stakeholder values and challenges, and to develop public support of recycled water use. The City will also work closely with stakeholders to evaluate the cost and benefits of various recycled water program alternatives. The City will take a triple bottom line approach using financial, social, and environmental criteria, developed from stakeholder input, to holistically assess the impact of each alternative. To minimize financial impacts, the City will work to identify equitable cost recovery methods and capitalize on all available alternative funding options including grant and low-interest loans.

The City's RWMP will determine the specific methods that the City will use to encourage uses of recycled water. The City's methods to encourage recycled water use (Table 4.14) will be developed and described in the City's RWMP.

Table 4.14 Methods to Encourage Recycled Water Use (Guidebook Table 25)
2010 Urban Water Management Plan
City of Ukiah

	Projected Volume (AFY)					
Actions	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Financial Incentives	TBD(1)	TBD(1)	TBD(1)	TBD(1)	TBD(1)	TBD(1)
Other	TBD(1)	TBD(1)	TBD(1)	TBD(1)	TBD(1)	TBD(1)

Notes:
1. These values will be determined in the City's Recycled Water Master Plan.

4.6.7 Recycled Water Use Optimization Plan

The RWMP will provide the City of Ukiah with short- and long-term alternatives for maximizing their resources through the implementation of recycled water. The RWMP will consider projected water and wastewater supply and demand to identify the City's maximum expansion point for recycled water use.

4.7 FUTURE WATER PROJECTS

The UWMPA requires that suppliers describe water supply projects and programs may be undertaken to meet the projected water demands.

Law

> *10631 (h). (Describe) all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.*

The City does not currently have planned future water supply projects. As discussed in previous sections, the City's current supply sources are considered adequate for providing existing and projected water demands.

Currently, the City's total supply capacity of its wells and Ranney Collector is 10,308 AFY (6,386 GPM). The City's firm capacity, which is defined as the total capacity minus the capacity of the two largest supply sources, is 6,315 AFY (3,912 GPM). The City's firm

capacity is approximately 43 percent higher than the maximum projected demand through 2035. The total current supply capacity is 65 percent higher than projected 2035 demands. Therefore, the City has no planned projects to increase its water supply production capacity. Maintenance and well replacement projects may be performed on an as-needed basis.

Table 4.15 Future Water Supply Projects (Guidebook Table 26)
2010 Urban Water Management Plan
City of Ukiah

Project Name	Projected Start Date	Projected Completion Date	Potential Project Constraints	Projected Annual Supply (AFY)				
				Normal Year	Single Dry Year	Multiple Dry Year First Year	Multiple Dry Year Second Year	Multiple Dry Year Third Year
None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

WATER SUPPLY RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING

This chapter describes the reliability of the City of Ukiah's (City's) water supplies, including a discussion of the City's water shortage contingency plan, as well as potential supply disruptions associated with water quality issues and drought.

5.1 WATER SUPPLY RELIABILITY

The Urban Water Management Planning Act (UWMPA) requires that the Urban Water Management Plan (UWMP) address the reliability of the agency's water supplies. This includes a description of supplies that are vulnerable to seasonal or climatic variations.

Law

> *10631 (f). An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.*
>
> *10631 (c) (2). For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.*

This section describes the water supply reliability of the water supply sources for the City.

5.1.1 Resource Maximization/Import Minimization

The City recognizes the importance of maintaining a high quality reliable water supply. Although water is a renewable resource, there is a limit on the amount of water that can be sustainably drawn from a given supply source (e.g., groundwater basins, surface water sources). The main focus for the City is to maximize the efficient use of water and to promote conservation. This will be accomplished through the implementation of demand management measures (DMMs) that have not been implemented by the City, continued implementation of DMMs that are currently being implemented by the City, and other conservation activities.

The City is committed to maximizing its use of current supply sources. As described in Chapter 4 of this UWMP, the City has groundwater and surface water resources available within the Ukiah Valley to meet existing and projected demands. In 2008, the City brought Wells 7 and 8 online for continued maximization of its groundwater supply. In addition, the City maintains its existing surface water diversion facilities (the Ranney Collector and Well 3) and has petitioned the State Water Resources Control Board (State Water Board) to include additional points of diversion under Permit 12952 (Application 15704). The City does not import water and does not anticipate importing water in the future to augment supply.

5.1.2 Factors Affecting Supply Reliability

There are a variety of factors that can impact water supply reliability. Factors impacting the City's supply sources are indicated as appropriate in Table 5.1. A brief discussion on each of these factors is provided below.

Due to the nature of the City's appropriative rights and the volume of storage within the groundwater basin, it is unlikely that the City would experience a reduction in supply reliability. An evaluation of the groundwater and surface water available to satisfy the City's appropriative rights is provided in Appendix C for reference.

Table 5.1 Factors Resulting in Inconsistency of Supply (Guidebook Table 29)
2010 Urban Water Management Plan
City of Ukiah

Water Supply Sources	Specific Source Name	Limitation Quantification	Legal	Environ-mental	Water Quality	Climatic
Surface Water, Permit 12952 (Application 15704)[2]	Russian River Underflow	14,480 AF	Change to Permit	None	None	None
Surface Water, Pre-1914 rights	Russian River	2,027 AF	None	None	None	None
Groundwater	Ukiah Valley	None	None	None	None	None
Project Water	Russian River	800 AF	Change to Contract	None	None	None
Recycled Water	Ukiah Wastewater Treatment Plant	TBD[(3)]	None	None	None	None

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Permit 12952 (A15704) authorizes diversion of 20 CFS, with no annual limit. As a practical matter, if peak demand is 20 CFS, annual total diversion distributed according to current use patterns would result in a total diversion of approximately 8,700 AF. However, the City's water right is valid for the 14,480 AF as reported above.
3. The City is currently developing a Recycled Water Master Plan, which will include an evaluation of the projected uses and limitations for recycled water use in the City.

A fundamental factor that affects water supply reliability is the hydraulic capacity of supply and distribution system facilities (e.g., groundwater wells, treatment facilities, transmission mains). As the City continues to grow, it will construct the additional supply and distribution system facilities necessary to accommodate the increased water demands associated with

this growth. For this reason, the physical capacity of the City's supply facilities is assumed to not be a limiting factor affecting the reliability of the City's supply in the future, as is not listed in Table 5.1.

5.1.2.1 Legal Factors

The legal factors affecting supply reliability can be divided into two categories based on the City's supply sources: legal factors affecting groundwater reliability and legal factors affecting surface water availability.

Currently, the legal presumption pertaining to groundwater is that all well water that the City pumps is percolating groundwater. The City will make a determination regarding whether future wells require an appropriative water rights permit using applicable legal standards and the available data. Water rights permits, if appropriate, would be obtained from the State Water Resources Control Board (State Water Board) after all applicable requirements are met. Historically, State Division of Water Rights staff has generally accepted that existing Well 4 pumps groundwater. City Wells 7 and 8 are also presumed to pump groundwater; however, in the event of an evidentiary finding, the City has named Wells 7 and 8 as proposed points of diversion in its current petition before the State Water Board.

Pertaining to surface water, the City's Water Right Permit 12952 expired on December 31, 2000. The City has 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 is 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. The initial study is complete, and the project description is tentatively approved. The City is currently proceeding with preparation of the administrative draft EIR.

The City's existing permit and pre-1914 right to divert from the Russian River provide a reliable supply source, which is unlikely to be interrupted due to legal factors, as illustrated above.

More information on the legal factors affecting groundwater and surface water reliability can be found in Appendix C.

5.1.2.2 Environmental Factors

Environmental factors affecting water supply reliability typically include concerns over protection of ecosystems, particularly for fish and wildlife resources. To date, the City's groundwater supply has not been impacted by any environmental factors, and the City does not anticipate future disruption of groundwater supply as a result of environmental factors. Similarly, the City does not anticipate disruption of surface water supply as a result of environmental factors due to existing regulation of flow rates in the Russian River.

The City's 2005 UWMP included an analysis of water availability under a variety of surface water supply scenarios, including a reduction in Eel River imports. The model, prepared by

Wagner and Bonsignore, was updated in 2010 as part of the City's ongoing EIR analysis. The results of the model indicate that, given the current regulatory parameters, surface water is available for diversion by the City; this report is included within Appendix C.

5.1.2.3 Water Quality Factors

Water quality issues are not anticipated to have significant impact on water supply reliability. Unforeseen future occurrences of chemical contamination or the lowering of maximum contaminant levels (MCLs) for naturally-occurring constituents can be mitigated with proper treatment. If water quality becomes an issue for water supply reliability in the future, the City will evaluate the need for upgrades to its current treatment system or construction of a new water treatment facility.

In the future, the City will take the steps necessary to comply with all existing and future groundwater quality regulations and to continue to provide reliable water service to its residents.

5.1.2.4 Climatic Factors

Climatic factors affecting the reliability of a given water supply system generally are a function of seasonal precipitation and runoff characteristics. The Ukiah area receives an average of 36.5 inches of precipitation a year, as measured by the DWR "Ukiah" gage near the City. The relatively abundant precipitation contributes runoff to the Russian River system and recharges the groundwater basin. During drought conditions, when surface water supplies are limited or unavailable, water supply is available to the City from the groundwater storage basin. Chapter 4 describes the historical and projected characteristics of the groundwater basin and supply sources underlying the City.

Accordingly, it is unlikely that the City's supply reliability would be inhibited by climatic factors, as the groundwater basin can support the City's demand during below-average precipitation periods.

5.2 WATER SHORTAGE CONTINGENCY PLANNING

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses specified issues.

Law

> *10632 (a). (Describe) stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.*
>
> *10632 (c). Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.*
>
> *10632 (d). Additional, mandatory prohibitions against specific water use practices during*

water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

10632 (e). Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

10632 (f). Penalties or charges for excessive use, where applicable.

10632 (g). An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

10632 (h). A draft water shortage contingency resolution or ordinance.

10632 (i). (Provide) a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

In 1977, the City of Ukiah adopted a Water Shortage Emergency Plan (see Appendix F), 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 passed a resolution in 2009 which declared a state of local emergency pursuant to the Emergency Services Act and a Stage I water emergency under section 3602 of the City's Municipal Code (Appendix G). The City's declaration of this Stage I water emergency (described in the next section) was initiated in response to the drought of 2009, which occurred as a result of below-average rainfall and reduced storage in Lake Mendocino.

Emergency situations have also been declared as a 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.

5.2.1 Stages of Action and Reduction Objectives

The Water Shortage Emergency Plan adopted by the City describes three stages of rationing that will be invoked during declared water shortages. Each stage includes a water reduction objective, in percent of normal water demands. The rationing plan is dependent on the cause, severity, and anticipated duration of the water supply shortage. A

combination of voluntary and mandatory water conservation measures would be used to reduce water usage in the event of water shortages. Table 5.2 shows the three stages and their representative shortages.

Table 5.2 Water Shortage Contingency - Rationing Stages (Guidebook Table 35)
2010 Urban Water Management Plan
City of Ukiah

Stage	Condition	Reduction Objective
I - Minor Shortage Potential	• Below average rainfall in the previous 12-24 months • 10 percent or more of municipal wells out of service • Warm weather patterns typical of summer months	10-20% reduction in total water demands from baseline
II - Moderate Shortage Potential	• Below average rainfall in the previous 24-36 months • Prolonged periods of low water pressure • 10 percent or more of municipal wells out of service • Warm weather typical of summer months	20-35% reduction in total water demands from baseline
III - Critical Shortage Potential	• Below average rainfall in the previous 36 months • Prolonged periods of low water pressure • 10 percent or more of municipal wells out of service • Warm weather patterns typical of summer months	35-50% reduction in total water demands from baseline

Emergency response stage actions become effective when the City Manager declares that the City is unable to provide sufficient water supply to meet ordinary demands, to the extent that insufficient supplies would be available for human consumption, sanitation, and fire protection. The declaration will be based on his/her judgment as to the degree of the immediate or future supply deficiency.

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.

5.2.1.1 Administration of Water Shortage Program

The administration of a water shortage program would involve coordination among a number of City departments. It is anticipated that the Public Works Department would have primary responsibility for managing the program, since it is responsible for the City's water system. An individual in the Public Works Department would be identified as the Program Manager and be the primary coordinator of water shortage activities.

An appropriate organizational structure for water shortage management team would be determined based on the actual situation. Specific individuals would be designated to fill the identified roles. The City would probably not have to hire additional staff or outside contractors to implement the program.

The major elements to be considered in administering and implementing the program include:

- **Identifying the City staff members to fill the key roles on the water shortage management team.** It is anticipated that the Public Works Director would designate the appropriate individuals, including the Program Manager.
- **Intensifying the public information program to provide comprehensive information on the water shortage and necessary actions that must be undertaken by the City and by the public.** The scope of the public information program can be developed by reviewing published references, especially those published by the Department of Water Resources (DWR), and researching successful

aspects of the current programs conducted by neighboring water agencies. A public information hotline may be advisable to answer any questions regarding the program.

- **Monitoring program effectiveness.** Ongoing monitoring will be needed to track supply availability and actual water user reductions. This procedure will allow the City to continuously re-evaluate the situation and make informal decisions as to whether another reduction level is needed.
- **Enforcing program requirements.** From the 35 to 50 percent reduction programs, enforcement of water use prohibitions and water use allocations will be more important in achieving the program goals. Inspectors and enforcement personnel could be identified among City staff that is in the community on other business, such as police, street maintenance, meter readers, etc.
- **Dealing with equity issues that might arise from the mandatory restrictions or higher water rates.** Depending on the level of restriction, there may be a greater need to address specific concerns of individual customers who might have special conditions or extenuating circumstances and are unduly affected by the program. A procedure should be identified for dealing with such special requests and/or for reviewing specific accounts.
- **Coordinating with surrounding water districts.** A groundwater shortage supply for the City would likely affect regional groundwater supplies as well. Therefore, if the City is forced to declare a water shortage emergency, surrounding water districts may also be affected. Under the influence of a water shortage situation where the water shortage contingency plan must be implemented, it is critical that the City coordinate its water conservation efforts with surrounding water districts.
- **Adjusting water rates.** Revenues from water sales should be reviewed periodically to determine whether an increase in rates might be needed to cover revenue shortfalls due to the decrease in demand.
- **Addressing new development proposals.** During periods of severe water shortage, it may be necessary to impose additional requirements on new development to reduce new demand or to temporarily curtail new service connections.

5.2.2 Actions during a Catastrophic Interruption

The City has described its emergency response plan in Division 6, Chapter 2 – Emergency Services of the City of Ukiah City Municipal Code. Table 5.3 describes the types of catastrophes considered in the Municipal Code. The City has developed an extensive response plan and has organized its emergency efforts with applicable relief agencies and municipalities in the area.

Table 5.3 Catastrophe Actions Discussed in City Municipal Code 2010 Urban Water Management Plan City of Ukiah	
Type of Catastrophe	**Discussed in Emergency Services Municipal Code**
Air pollution	Yes
Fire	Yes
Flood	Yes
Storm	Yes
Epidemic	Yes
Earthquake	Yes
Power Outages	No
War	Yes
Hazardous materials	Yes
Environmental disaster	Yes

5.2.3 Mandatory Prohibitions on Water Wasting

Mandatory compliance measures enacted during a water shortage are more severe than voluntary measures, produce greater savings, and are less costly to the utility. The principal drawback to these measures is the customer resentment if the measures are not seen as equitable. Therefore, such measures should be accompanied by a good public relations campaign.

Mandatory measures may include:

- Ordinances making water waste illegal
- Ordinances controlling landscape irrigation
- Ordinances restricting non-irrigation outdoor water uses
- Prohibitions on new connections or the incorporation of new areas
- Rationing

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 5.4.

Table 5.4 Water Shortage Contingency - Mandatory Prohibitions (Guidebook Table 36) 2010 Urban Water Management Plan City of Ukiah	
Prohibitions	**Mandatory Prohibition Stage**
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 surface 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 to wash any motor vehicle, trailer, airplane, or boat by hosing or otherwise using water directly from a faucet or other outlet.	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

5.2.4 Consumption Reduction Methods in Most Restrictive Stage

In order to achieve a 50 percent reduction in water use during the most restrictive stage of a water supply emergency, the City will implement and enforce the water prohibitions described in Section 5.2.3. Other mandated restrictions in water use for all reductions stages, including Stage 3, will be determined by the City Council, and may include the actions described in Table 5.5. The reduction methods described in Table 5.5 are potential

reduction methods that the City could implement if faced with an extreme water shortage situation.

It should be noted that the City has never experienced a critical water shortage situation where Stages II or III have imposed required restrictions on water customers. In its 2009 drought resolution, however, the City did direct the City Manager to encourage a voluntary Russian River water conservation goal of 50 percent. According to the City's 2009 Annual Water Quality Report (Appendix H), the water conservation program and community as a whole were able to reduce water consumption by 35 percent over the summer months and 20 percent for the entire year.

5.2.5 Excessive Use Penalties

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 5.6 lists the specifics of these charges and in what stages they may occur.

5.2.6 Revenue and Expenditure Impacts/Measures to Overcome Impacts

The majority of operating costs for most water agencies are fixed rather than a function of the amount of water sold. As a result, when significant conservation programs are undertaken, it is frequently necessary to raise water rates because the revenue generated is based on lower total consumption while the revenue required is basically fixed.

To date, the City has not experienced shortages where it has implemented mandatory 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. In this case, the City could increase its rates as a measure to overcome revenue impacts. Table 5.7 describes the measures to overcome revenue impacts that have been discussed by the City.

Table 5.5	Water Shortage Contingency - Consumption Reduction Methods (Guidebook Table 37) 2010 Urban Water Management Plan City of Ukiah	
Reduction Method Description	**Stage When Method Takes Effect[1]**	**Projected Reduction[2] (%)**
Prohibit or eliminate watering of ornamental turf areas, actively-used turf areas, trees, and shrubs.	Stage 1 - 3	Up to 50
Limit number of watering events per week. May include prescription of hand-held hoses with positive shutoff nozzle or drip irrigation systems. Prohibits or eliminates sprinkler use.	Stage 1 - 3	Up to 50
Restrict use of potable water for construction purposes. Require use of reclaimed or non-potable water for application to construction sites.	Stage 1 - 3	Up to 50
Require certification that a reduction of the projected average water usage for development of construction projects shall be achieved.	Stage 1 - 3	Up to 50

Notes:
1. Consumption reduction measures will be implemented by the City as appropriate given the nature of the water supply shortage.
2. Projected reductions, in concept, should be capable of achieving a system-wide reduction of 50 percent.

Table 5.6	Water Shortage Contingency - Penalties and Charges (Guidebook Table 38) 2010 Urban Water Management Plan City of Ukiah
Penalty/Charge	**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 (non-essential) uses described in Table 5.4	II, III

Table 5.7	Proposed Measures to Overcome Revenue Impacts 2005 Urban Water Management Plan City of Ukiah
Measures	**Discussed?**
Rate adjustment	Yes
Development of reserves	Yes
Reserve Fund	Yes

5.2.7 Water Shortage Contingency Ordinance/Resolution

The City adopted its water shortage emergency plan in 1977. A copy of the adopted resolution is included in Appendix F.

5.2.8 Reduction Measuring Mechanism

The City's primary mechanism of measuring water use and, subsequently, water use reduction, is through the use of water meters. Therefore, to measure actual reductions in water use in the course of carrying out a water supply shortage contingency plan, the City will perform frequent water meter readings for individual connections.

5.3 WATER QUALITY

The UWMPA requires that the UWMP include a discussion of the water quality impacts on an agency's supply reliability.

Law

> *10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.*

This section describes the impacts of water quality on the City's water supply sources.

5.3.1 Improvement Projects

The City's Water Treatment Plant (WTP) was constructed and began operation in April 1992, and treats water collected in the Ranney Collector. The WTP, located about 300 feet from the Ranney Collector, uses a Microfloc contact clarification-filtration technology to treat collected water. Treatment processes include prechlorination, adsorption, clarification, mixed-media gravity filtration, and disinfection. Treated water is pumped to a 1.5 million gallon (MG) clearwell for post-chlorination. 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 included 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.

5.3.2 Water Quality Impacts Summary

The quality of the City's water system is regulated by the Department of Public Health (DPH), 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 expected.

Table 5.8 below summarizes the current and projected water supply changes due to water quality. The City has a Water Quality Emergency Notification Plan (Notification Plan) for use when an imminent danger to the health of the water consumers exists. Within the Notification Plan, City staff is directed to contact local authorities, radio stations, television stations, and newspapers. If necessary, City makes door-to-door notifications during the hours that other media sources are not available to broadcast a warning.

Table 5.8 Water Quality - Current and Projected Water Supply Impacts (Guidebook Table 30)
2010 Urban Water Management Plan
City of Ukiah

Water Source	Description of Condition	Potential Supply Impacts (AFY)					
		2010	2015	2020	2025	2030	2035
Russian River	None	0	0	0	0	0	0
Project Water	None	0	0	0	0	0	0
Groundwater	None	0	0	0	0	0	0
Recycled Water	None	0	0	0	0	0	0

5.4 DROUGHT PLANNING

The UWMPA requires that an UWMP include water supply and demand projections for normal, single-dry year, and multiple-dry years.

Law

10631 (c) (1). Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following: (A) an average water year, (B) a single dry water year, (C) multiple dry water years.

10632 (b). (Provide) an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

10635 (a). Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

This section considers the City's water supply reliability during three climate-related water scenarios: normal water year, single dry water year, and multiple dry water years. These scenarios are defined by DWR as follows:

- **Normal Year**: The normal year is a year or an averaged range of years in the historical sequence that most closely represents median runoff levels and patterns. It is defined as the median runoff over the previous 30 years or more.
- **Single Dry Year**: This is defined as the year with the minimum useable supply. The supply quantities for this condition are derived from the minimum historical annual yield.
- **Multiple Dry Years**: This is defined as the three consecutive years with the minimum useable supply. Water systems are more vulnerable to these droughts of long duration, because they deplete water storage reserves in local and state reservoirs and in groundwater basins. The supply quantities for this condition are derived from the minimum of historical three-year running average yields.

5.4.1 Basis of Water Year Data

Historical rainfall data available for Ukiah were examined to establish a basis of water year for normal, single dry, and multiple dry years. As shown in Table 5.9, for the purposes of this report, the year 1962 is classified as a "normal" year, the average of years 1976 and 1977 is classified as a "single dry" year, and the years 1990 to 1992 are classified as "multiple dry" years.

Table 5.9 Basis of Water Year Data (Guidebook Table 27)
2005 Urban Water Management Plan
City of Ukiah

Water Year Type	Base Year(s)
Average Water Year	1962
Single Dry Water Year	1976-1977
Multiple Dry Water Years	1990-1992

5.4.2 Supply Reliability - Historic and Current Conditions

During drought years, water use patterns will typically change. Outdoor water use will typically increase as irrigation is used as a replacement for decreased rainfall.

Table 5.10 and Table 5.11 describe the water supply availability in single and multiple dry water years based on available supply during an average water year. The estimated historical water supply conditions are based on the volume of water available on the water year of 2010. The water supply conditions in 2010 reflect current supply conditions, from which future dry year supplies may be estimated. During the dry water years described in Table 5.9, the City did not experience a reduction in supply availability.

Supply availabilities for single and multiple dry years represent a scenario in which supply is reduced up to 50 percent. This is a conservative estimate, which is consistent with the water reduction scenario provided in Section 10632 of the California Water Code. It is unlikely that the City will experience a reduction of this magnitude in groundwater or surface water supply due to legal, environmental, water quality, or climatic changes. The City's appropriative rights and the extensive groundwater storage within the Ukiah Valley groundwater basin ensure water supply reliability for the City.

Table 5.10 Supply Reliability - Historical Conditions (Guidebook Table 28)
2005 Urban Water Management Plan
City of Ukiah

		Multiple Dry Years		
Average/Normal Year	**Single Dry Year**	**Year 1**	**Year 2**	**Year 3**
21,012 AF[1]	10,506 AF	10,506 AF	10,506 AF	10,506 AF
Percent of Average Year	50	50	50	50

Notes:
1. Based on water available in 2010, and does not include potential future supply from recycled water.

Table 5.11 Supply Reliability - Current Water Source (Guidebook Table 31)
2005 Urban Water Management Plan
City of Ukiah

	Water Use (AFY)				
			Multiple Dry Years		
Water Supply Sources	**Average/ Normal Year[1]**	**Single Dry Year**	**2011**	**2012**	**2013**
Russian River	16,507	8,254	8,254	8,254	8,254
Project Water	800	400	400	400	400
Groundwater	3,705	1,853	1,853	1,853	1,853
Percent of Average Year	100	50	50	50	50

Notes:
1. Based on available water supply sources for 2010, and does not include future potential recycled water supply.

5.4.3 Projected Normal Year Supply/Demand

The projected normal water year water supply and demand projections are provided in Table 5.12.

Table 5.12 Supply and Demand Comparison - Normal Year (Guidebook Table 32) 2005 Urban Water Management Plan City of Ukiah					
	Projected Supply/Demand (AFY)				
Supply/Demand Condition	**2015**	**2020**	**2025**	**2030**	**2035**
Supply Totals (from Guidebook Table 16)	21,615	21,895	22,175	22,735	23,295
Demand totals (from Guidebook Table 11)	3,848	3,595	3,778	3,971	4,173
Supply and Demand Difference	17,767	18,300	18,397	18,764	19,122
Difference as Percent of Supply	82	84	83	83	82
Difference as Percent of Demand	462	509	487	473	458

5.4.4 Projected Single Dry Year Supply/Demand

The projected single dry year water demands through 2035 are estimated based on the normal year demands and a 50 percent supply reduction scenario. The projected single dry water year supplies and demands are presented in Table 5.13.

Table 5.13 Supply and Demand Comparison - Single Dry Year (Guidebook Table 33) 2005 Urban Water Management Plan City of Ukiah					
	Projected Supply/Demand (AFY)				
Supply/Demand Condition	**2015**	**2020**	**2025**	**2030**	**2035**
Supply Totals (from Guidebook Table 16)	10,808	10,948	11,088	11,368	11,648
Demand totals (From Guidebook Table 11)	3,848	3,595	3,778	3,971	4,173
Supply and Demand Difference	6,960	7,353	7,310	7,397	7,475
Difference as Percent of Supply	64	67	66	65	64
Difference as Percent of Demand	181	205	193	186	179

Notes:
1. Assumes a maximum 50 percent reduction in available supply during dry years.

5.4.5 Projected Multiple Dry Year Supply/Demand

The projected multiple dry year water demands through 2035 are estimated based on the normal year demands and a 50 percent supply reduction scenario. The projected multiple dry water year supplies and demands are presented in Table 5.14. Because maximum 50 percent reduction of supplies is already assumed, supplies and demands are not expected to decrease further between the years of a multiple dry year event.

Table 5.14 Supply and Demand Comparison - Multiple Dry Year Events (Guidebook Table 34)
2005 Urban Water Management Plan
City of Ukiah

Year		Supply/Demand Condition	Projected Supply/Demand (AFY)				
			2015	2020	2025	2030	2035
Multiple-Dry Year	1st Year Supply	Supply Totals	10,808	10,948	11,088	11,368	11,648
		Demand totals	3,848	3,595	3,778	3,971	4,173
		Supply and Demand Difference	6,960	7,353	7,310	7,397	7,475
		Difference as Percent of Supply	64	67	66	65	64
		Difference as Percent of Demand	181	205	193	186	179
	2nd Year Supply	Supply Totals	10,808	10,948	11,088	11,368	11,648
		Demand totals	3,848	3,595	3,778	3,971	4,173
		Supply and Demand Difference	6,960	7,353	7,310	7,397	7,475
		Difference as Percent of Supply	64	67	66	65	64
		Difference as Percent of Demand	181	205	193	186	179
	3rd Year Supply	Supply Totals	10,808	10,948	11,088	11,368	11,648
		Demand totals	3,848	3,595	3,778	3,971	4,173
		Supply and Demand Difference	6,960	7,353	7,310	7,397	7,475
		Difference as Percent of Supply	64	67	66	65	64
		Difference as Percent of Demand	181	205	193	186	179

Notes:
1. Assumes a maximum 50 percent reduction in available supply during dry years.

DEMAND MANAGEMENT MEASURES

The Urban Water Management Planning Act (UWMPA) identifies 14 Demand Management Measures (DMMs) for urban water suppliers to address. These measures are derived from the original Best Management Practices (BMPs) established in the UWMPA and the 1991 Memorandum of Understanding (MOU).

Law

> *10631 (f) (1) and (2). (Describe and provide a schedule of implementation for) each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following: (A) water survey programs for single-family residential and multifamily residential customers; (B) residential plumbing retrofit; (C) system water audits, leak detection, and repair; (D) metering with commodity rates for all new connections and retrofit of existing connections; (E) large landscape conservation programs and incentives; (F) high-efficiency washing machine rebate programs; (G) public information programs; (H) school education programs; (I) conservation programs for commercial, industrial, and institutional accounts; (J) wholesale agency programs; (K) conservation pricing; (L) water conservation coordinator; (M) water waste prohibition; (N) residential ultra-low flush toilet replacement programs.*
>
> *10631 (f) (3). (Provide) a description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.*
>
> *10631 (f) (4). (Provide) an estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.*
>
> *10631 (g). (Provide) an evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following: (1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors; (2) Include a cost-benefit analysis, identifying total benefits and total costs; (3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost; (4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.*

In 1991 (amended September 16, 1999), an MOU regarding urban water conservation in California was made that formalizes an agreement between Department of Water Resources (DWR), water utilities, environmental organizations, and other interested groups to implement DMMs and make a cooperative effort to reduce the consumption of California's water resources. This MOU is administered by the California Urban Water Conservation Council (CUWCC). The City of Ukiah (City) is not currently a signatory of the MOU and is therefore not a member of CUWCC.

However, the City realizes the importance of the BMPs to ensure a reliable future water supply. The City is committed to implementing water conservation and water recycling programs to maximize sustainability in meeting future water needs for its customers. Due to the continued effective water conservation measures implemented by the City, the 2010 per-capita water use has dropped to roughly 168 gallons per capita per day (gpcd), from 208 gpcd in 2008 and 231 gpcd in 2004.

The DMMs described hereafter fall into one of four categories (Table 6.1). In the City's case, the 14 DMMs required for discussion by DWR are either implemented, not implemented, or not applicable. The City does not have any upcoming plans to implement new DMMs.

For the DMMs that have already been implemented, the City continually assesses the success of its programs and makes changes to the organization and/or operation of the conservation measures as appropriate.

6.1 DMM 1 - WATER SURVEY PROGRAMS FOR SINGLE-FAMILY RESIDENTIAL AND MULTI-FAMILY RESIDENTIAL CUSTOMERS

This program consists of annual water audits, water use surveys, and surveys of past program participants. Audits are conducted by trained auditors and may include low-flow device installation. Audits identify water use problems, recommend improvements, provide instruction in landscape principles and irrigation timer use, and identify indoor and outdoor leaks.

6.1.1 Implementation Status

The City does not have an established survey program for single-family and multi-family residences. Establishment of a water survey program is not being considered at this time.

6.1.2 Cost Benefit Analysis

The City is not currently implementing this DMM. An economic analysis was performed on this DMM and is included in Appendix I, which is summarized in Table 6.2. The economic analysis performed considered the relative benefits of implementing this DMM from an agency perspective and from a society perspective. The difference in net program costs often results from additional customer program costs, accounted for under the society perspective estimates.

Table 6.1 Demand Management Measures
2005 Urban Water Management Plan
City of Ukiah

Demand Management Measure	Implemented	Planning to Implement	Cost Effective Analysis Completed	Not Applicable
DMM 1 - Water Survey Programs[1]			☑	
DMM 2 - Residential Plumbing Retrofit[1]			☑	
DMM 3 - Water System Audits	☑			
DMM 4 - Metering with Commodity Rates	☑			
DMM 5 - Landscape Irrigation Programs	☑			
DMM 6 - Washing Machine Rebate Program[1]			☑	
DMM 7 - Public Information	☑			
DMM 8 - School Education	☑			
DMM 9 - Commercial, Industrial & Institutional Programs	☑			
DMM 10 - Wholesale Agency Programs				☑
DMM 11 - Conservation Pricing	☑			
DMM 12 - Water Conservation Coordinator	☑			
DMM 13 - Water Waste Prohibition	☑			
DMM 14 - Ultra Low Flush Toilet Replacement[2]	☑		☑	

Notes:
1. These programs have not been implemented by the City. Therefore, a cost/benefit analysis of these DMMs is required.
2. Although this program is being implemented to an extent, there is possibility for the expansion of this program. Therefore, a cost benefit analysis was performed for this DMM.

As shown in Table 6.2, the benefit/cost ratios for this DMM from an agency perspective and society perspective are 0.05 and 0.06, respectively. This indicates that this conservation measure is not justified from a cost perspective, and that the City may not consider its implementation in the near future.

Table 6.2	Cost Benefit Analysis, DMM 1 2010 Urban Water Management Plan City of Ukiah					
Perspective	**Net Program Cost ($)**	**Total Water Saved[(2)] (AF)**	**Net Present Value ($)**	**Simple Unit Supply Cost ($/AF)**	**Discounted Unit Supply Cost ($/AF)**	**Benefit/Cost Ratio**
Agency Perspective	35,264	9.9	(33,329)	3,568	3,827	0.05
Society Perspective	42,164	9.9	(39,764)	4,266	4,515	0.06

Notes:
1. Numbers in parentheses indicated negative numbers.
2. Total water saved represents the total water savings over a 25-year period.

6.1.3 Economic/Non-Economic Factors

There are certain advantages that could be realized by performing residential water audits, including a reduction in the amount of groundwater pumped by the City and an opportunity to characterize water use practices of the City residents. However, implementation of this DMM would require staff time and resources be allocated to a program that would likely provide little benefit to the City on a cost basis.

6.1.4 Legal Authority

This DMM is a survey program that could be implemented by the City. The City has the legal authority to implement this DMM; however, it has chosen not to.

6.2 DMM 2 - RESIDENTIAL PLUMBING RETROFIT

This program consists of installing physical devices to reduce the amount of water used or to limit the amount of water, which can be served to the customer. This includes working with local programs and businesses to offer free water conservation information and materials to residents. In accordance with State Law, low-flow fixtures have been required on all new construction since 1978. In addition, State legislation enacted in 1990 requires all new buildings after January 1, 1992 to install Ultra Low Flush Toilets (ULFT).

Several studies suggest that savings resulting from miscellaneous interior retrofit fixtures can range between 25 and 65 gpd per housing unit. The studies also suggest that installation of retrofit fixtures in older single-family homes tend to produce more savings, while newer multi-family homes tend to produce fewer saving per housing unit.

6.2.1 Implementation Status

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

6.2.2 Cost Benefit Analysis

The City is not currently implementing this DMM. An economic analysis was performed on this DMM and is included in Appendix I, which is summarized in Table 6.3. The economic analysis performed considered the relative benefits of implementing this DMM from an agency perspective and from a society perspective. The difference in net program costs often results from additional customer program costs, accounted for under the society perspective estimates.

Table 6.3 Cost Benefit Analysis, DMM 2
2010 Urban Water Management Plan
City of Ukiah

Perspective	Net Program Cost ($)	Total Water Saved[(2)] (AF)	Net Present Value ($)	Simple Unit Supply Cost ($/AF)	Discounted Unit Supply Cost ($/AF)	Benefit/Cost Ratio
Agency Perspective	36,875	8.6	(35,127)	4,272	4,429	0.05
Society Perspective	36,875	8.6	(34,720)	4,272	4,398	0.06

Notes:
1. Numbers in parentheses indicated negative numbers.
2. Total water saved represents the total water savings over a 25-year period.

As shown in Table 6.3, the benefit/cost ratios for this DMM from an agency perspective and society perspective are 0.05 and 0.06, respectively. This indicates that this conservation measure is not justified from a cost perspective, and that the City may not consider its implementation in the near future.

6.2.3 Economic/Non-Economic Factors

There are certain advantages that could be realized by offering residential plumbing retrofit kits to City residents, primarily a reduction in the amount of groundwater pumped by the City. However, implementation of this DMM would require staff time and resources be allocated to a program that would likely provide little benefit to the City on a cost basis.

6.2.4 Legal Authority

The City does not have an enforceable ordinance in effect requiring replacement of high-flow showerheads and other water use fixtures with low-flow fixtures; therefore, the

City does not have the legal authority to require that these water-conserving fixtures be installed.

6.3 DMM 3 - SYSTEM WATER AUDITS, LEAK DETECTION, AND REPAIR

A water audit is a process of accounting for water use throughout a water system in order to quantify the unaccounted-for water. Unaccounted-for water is the difference between metered production and metered consumption on a system-wide basis. A leak detection program typically consists of both visual inspection as well as audible inspection. Visual inspection includes the inspection of distribution system appurtenances (e.g., fire hydrants, valves, meters, etc.) to identify obvious signs of leakage. To perform audible leak detection, specialized electronic listening equipment is used to detect the sounds associated with distribution system leakage. This process allows the agency to pinpoint the location of suspected leaks.

6.3.1 Implementation Status

The City currently performs leak detection and repair on an ongoing basis. Because the City was fully metered in 2005, its system water audit program is thorough and represents an accurate estimate of water system losses. The City calculates system water losses annually and reports this information to DWR. In addition to calculating system losses, the City is in the process of replacing old meters in the system. New meters will provide a more comprehensive portrayal of water use within the City.

6.3.2 Steps Necessary to Implement

To implement this DMM, the City manages an ongoing water system audit program. Steps necessary to implement this DMM include:

- Tracking metered production and delivery values over time to evaluate system losses;
- Compilation of annual report to DWR with unaccounted-for water losses in the system;
- Training staff on system-wide auditing procedures;
- Visual and measured inspection of meter and conveyance infrastructure;
- Replacement of older meters with new meters;
- Ongoing calibration of water meters to ensure accuracy.

6.3.3 Implementation Schedule

The water system audits and leak detection activities are performed on an ongoing, year-round basis.

6.3.4 Methods to Evaluate Program Effectiveness

It is through the City's annual report to the DWR that the system water audit program is evaluated for effectiveness. The annual report monitors 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.

6.4 DMM 4 - METERING WITH COMMODITY RATES FOR ALL NEW CONNECTIONS AND RETROFIT OF EXISTING CONNECTIONS

This DMM requires water meters for all new construction and billing by volume of use, as well as establishing a program for retrofitting any existing unmetered connections.

6.4.1 Implementation Status

The City has implemented this DMM. The City's water distribution system is fully metered. In addition, the City is in the process of replacing old meters in the system to provide more accurate readings of water use in its service area.

6.4.2 Steps Necessary to Implement

To implement this DMM, the City maintains its meter reading program and continually evaluates replacement of old meters in the system. The City provides support for this DMM in the way of staff time and City resources.

6.4.3 Implementation Schedule

The City will continue to install and read meters on all new services and will replace aging meters on an ongoing, year-round basis.

6.4.4 Methods to Evaluate Program Effectiveness

Effectiveness of this DMM will be evaluated by comparison of prior water use to future water use. The City does not record number of meter retrofits. However, the City recently restructured its rate schedule in an effort to reduce water use in the future. The City's water rate structure includes both a fixed meter charge and a consumption charge, as shown in Table 6.4.

Table 6.4 Proposed Water Rate Schedule 2010 Urban Water Management Plan City of Ukiah						
	Year					
Type of Charge	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
Meter Size						
3/4" Meter	$15.24	$22.71	$26.11	$28.46	$31.31	$32.25
1" Meter	$25.90	$38.59	$44.38	$48.37	$53.21	$54.81
1 1/2" Meter	$50.28	$74.92	$86.15	$93.91	$103.30	$106.40
2" Meter	$80.75	$120.32	$138.37	$150.82	$165.90	$170.88
3" Meter	$152.36	$227.02	$261.07	$284.57	$313.02	$322.41
4" Meter	$254.45	$379.13	$436.00	$475.24	$522.76	$538.45
6" & Up	$507.37	$755.98	$869.38	$947.62	$1,042.38	$1,073.66
Fire Service 2" & Under	$16.15	$24.06	$27.67	$30.16	$33.18	$34.18
Fire Service 3" Meter	$30.47	$45.40	$52.21	$56.91	$62.60	$64.48
Fire Service 4" Meter	$50.89	$75.83	$87.20	$95.05	$104.55	$107.69
Fire Service 6" & Up	$101.47	$151.19	$173.87	$189.52	$208.47	$214.72
Consumption Rate						
$/Unit(1)	$1.29	$1.90	$2.21	$2.41	$2.65	$2.73

Notes:
1. Unit = hundred cubic feet or 748 gallons.

6.5 DMM 5 - LARGE LANDSCAPE CONSERVATION PROGRAMS AND INCENTIVES

This DMM calls for agencies to commence assigning water budgets to accounts with dedicated irrigation meters and provide water-use large landscape water audits to commercial, industrial, and institutional (CII) customers with mixed-use meters.

6.5.1 Implementation Status

The City's Planning Department reviews all landscape plans for proposed 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." It is through this planning review process that the City manages its large landscape water consumers to ensure responsible water use for new developments.

6.5.2 Steps Necessary to Implement

The City's Planning Department reviews all proposed landscaping plans for new developments. During the review process, the City addresses large landscaping concerns with the developer in an effort to create landscapes that do not require extensive irrigation. New developments can only be approved once a landscaping plan that adheres to the City's Municipal Code is proposed.

6.5.3 Implementation Schedule

The City evaluates the proposed landscaping plans for all new developments on an ongoing, year-round basis. All new developments are required to adhere to the landscaping ordinances of City's Municipal Code.

6.5.4 Methods to Evaluate Program Effectiveness

The City has very few CII accounts and does not track the water use for large landscape consumers. Therefore, the City has not historically tracked the actual water savings associated with the implementation of this DMM. The City has not established other methods of evaluate the effectiveness of this DMM.

6.6 DMM 6 - HIGH-EFFICIENCY WASHING MACHINE REBATE PROGRAM

This program generally provides a financial incentive (rebate offer) to qualifying customers who install a high efficiency washing machine in their home. Other regional municipalities that performed an economic analysis on this program concluded that it would have a low benefit-to-cost ratio.

6.6.1 Implementation Status

This program is not currently implemented in the City, and the City does not plan to implement it in the future.

6.6.2 Cost Benefit Analysis

The City is not currently implementing this DMM. An economic analysis was performed on this DMM and is included in Appendix I, which is summarized in Table 6.5. The economic analysis performed considered the relative benefits of implementing this DMM from an agency perspective and from a society perspective. The difference in net program costs often results from additional customer program costs, accounted for under the society perspective estimates.

Table 6.5	Cost Benefit Analysis, DMM 6 2010 Urban Water Management Plan City of Ukiah					
Perspective	**Net Program Cost ($)**	**Total Water Saved[(2)] (AF)**	**Net Present Value ($)**	**Simple Unit Supply Cost ($/AF)**	**Discounted Unit Supply Cost ($/AF)**	**Benefit/Cost Ratio**
Agency Perspective	21,110	4.8	(20,364)	4,421	5,172	0.04
Society Perspective	21,110	4.8	(1,949)	4,421	5,017	0.91

Notes:
1. Numbers in parentheses indicated negative numbers.
2. Total water saved represents the total water savings over a 25-year period.

As shown in Table 6.5, the benefit/cost ratios for this DMM from an agency perspective and society perspective are 0.04 and 0.91, respectively. This indicates that this conservation measure is not justified from a cost perspective, and that the City may not consider its implementation in the near future. However, of the DMMs not yet implemented, this DMM (from a society perspective) has the highest benefit/cost ratio. The City may take this into consideration in the future when evaluating potential water conservation opportunities.

6.6.3 Economic/Non-Economic Factors

There are certain advantages that could be realized by offering high efficiency washing machine rebates to City residents, including a reduction in the amount of groundwater pumped by the City and a reduction in the amount of electricity used by City residents. However, implementation of this DMM would require staff time and resources be allocated to a program that would likely provide little benefit to the City on a cost basis.

6.6.4 Legal Authority

This DMM is simply a rebate program that could be implemented by the City. The City has the legal authority to implement this DMM; however, it has chosen not to.

6.7 DMM 7 - PUBLIC INFORMATION PROGRAMS

This program consists of distributing information to the public through a variety of methods including brochures, radio and television, school presentations and videos, and web sites.

6.7.1 Implementation Status

The City has implemented this DMM. The City understands that public awareness of water conservation issues is an important factor in ensuring a reliable water supply. The activities

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

6.7.2 Steps Necessary to Implement

To implement this DMM, the City promotes public awareness of water conservation through occasional bill stuffers, distribution of its Annual Water Quality Report, radio broadcasts, and the City website. In addition, City employees are encouraged to discuss conservation measures with customers. The City continually evaluates its involvement in and development of public education programs.

6.7.3 Implementation Schedule

The City provides public information programs on water conservation and other water issues on an ongoing, year-round basis.

6.7.4 Methods to Evaluate Program Effectiveness

The City does not directly measure the effectiveness of this DMM. In general, however, more public awareness and education programs give customers increased knowledge of water conservation opportunities.

6.8 DMM 8 - SCHOOL EDUCATION PROGRAM

This DMM requires water supplier to implement a school education program that includes providing educational materials and instructional assistance.

6.8.1 Implementation Status

The City has implemented this DMM. The cost of this program comes from the City's conservation budget (described in Section 6.7).

6.8.2 Steps Necessary to Implement

To implement this DMM, the City offers local school tours of its water treatment plant and provides materials to schools for conservation education. In addition, four science classes on public water supply are offered once a year at the local high school.

6.8.3 Methods to Evaluate Program Effectiveness

The City does not directly measure the effectiveness of this DMM. In general, however, more public awareness and education programs give customers increased knowledge of water conservation opportunities. It is especially important to teach children water conservation practices and to educate them on the important aspects of safe and sustainable water provision.

6.9 DMM 9 - CONSERVATION PROGRAMS FOR COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL ACCOUNTS

With this DMM, 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.

6.9.1 Implementation Status

This DMM has been implemented by the City.

6.9.2 Steps Necessary to Implement

The City has only three industrial customers, including Mendocino Brewing Company and Maverick Enterprises who make up the majority of the water use in the industrial sector. To implement this DMM, the City surveys the water usage of these industries. Any new commercial, industrial, or institutional developments will be reviewed by the City's Planning Department and must meet all requirements of the City's Municipal Code.

6.9.3 Implementation Schedule

This DMM will be performed on an ongoing basis.

6.9.4 Methods to Evaluate Program Effectiveness

The City has not historically tracked the actual water savings associated with the implementation of this DMM. The City has not established other methods of evaluate the effectiveness of this DMM.

6.10 DMM 10 - WHOLESALE AGENCY PROGRAMS

This DMM applies to wholesale agencies and defines a wholesaler's role in terms of financial, technical, and programmatic assistance to its retail agencies implementing DMMs. The City is not a water wholesaler.

6.11 DMM 11 - CONSERVATION PRICING

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

6.11.1 Implementation Status

The City has implemented this DMM through the development of a combination fixed/variable rate schedule which is dependent on meter size and consumption. The City's rate structure incorporates American Water Works Association demand capacity guidelines

so that price increases across meter size in proportion to the potential demand a customer can place on the water system.

6.11.2 Steps Necessary to Implement

In 2005, the City restructured its water rate schedule to include fixed meter charges based on meter size and variable charges based on consumption (Table 6.4). These rates were updated and increased minimally in 2009, primarily to recover costs associated with water treatment and delivery with decreased consumption and subsequent reduced funding.

6.11.3 Implementation Schedule

The City will continue its current rate structure through the fiscal year 2014-2015. When appropriate, City will re-evaluate its rate structure and continue to implement water pricing that encourages water conservation.

6.11.4 Methods to Evaluate Program Effectiveness

The effectiveness of this DMM will be evaluated by comparison of City water use prior to and following the implementation of conservation pricing. The City's conservation pricing is expected to decrease overall consumption by water customers.

6.12 DMM 12 - WATER CONSERVATION COORDINATOR

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

6.12.1 Implementation Status

The City has implemented this DMM. In practice, all City staff encourages implementation of water conservation measures by the City's residents. In particular, the Water and Sewer Division provide indoor and outdoor conservation tips for customers. However, the City intentionally calls upon the support of City staff as a whole to perform the duties that would be assigned to an individual conservation coordinator. In this way, coordination can be handled by specialized departments to achieve optimum water conservation.

6.12.2 Steps Necessary to Implement

Water conservation coordination for the City is established by policies determined by the City council and includes answering questions of the public by maintenance and meter reading staff while in the field.

6.12.3 Implementation Schedule

This DMM will be performed on an ongoing, year-round basis.

6.12.4 Methods to Evaluate Program Effectiveness

The effectiveness of this DMM will be evaluated in conjunction with the success of the City's water conservation efforts as a whole.

6.13 DMM 13 - WATER WASTE PROHIBITION

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

6.13.1 Implementation Status

The City has implemented this DMM and will continue to enforce the water waste ordinance in the future. The City's Municipal Code states "Where negligent or wasteful use of water exists on a customer's premises, seriously affecting the general service, the City may discontinue the service if such conditions are not corrected within five (5) days after giving customer written notice of intent to do so" (§4.1.7.3571).

6.13.2 Steps Necessary to Implement

If the City determines that a customer is wastefully using water, the City first sends a letter to the customer to call attention to their wasteful practice and ask for correction. If the water waste condition is not corrected within five days after the written notice, service may be discontinued if necessary.

6.13.3 Implementation Schedule

This DMM will be performed on an ongoing, year-round basis.

6.13.4 Methods to Evaluate Program Effectiveness

The City has not established a method to evaluate the effectiveness of this DMM.

6.14 DMM 14 - RESIDENTIAL ULTRA LOW FLUSH TOILET REPLACEMENT PROGRAMS

State legislation requires the installation of efficient plumbing in new construction, and, effective in 1994, requires that only ULFTs be sold in California. ULFTs include toilets that use 1.6 gallons per flush or less.

6.14.1 Implementation Status

The City has implemented an ULFT rebate program, but does not record the number of rebates given out nor the expenditures by the City as a result of this program.

6.14.2 Steps Necessary to Implement

The City complies with the applicable State and Federal regulations regarding rebates for the replacement of older toilets with an ULFT and installation of ULFTs in new construction.

6.14.3 Implementation Schedule

This DMM is an ongoing, year-round program.

6.14.4 Methods to Evaluate Program Effectiveness

The City does not keep track of the number of rebates given or the expenditures associated with this program. Therefore, the City has not developed a method to evaluate the effectiveness of this DMM.

6.14.5 Cost Benefit Analysis for Expansion of Program

Although it does have an ULFT rebate program, the City does not keep records of the extent or expenditures related to this program. Therefore, an economic analysis was performed on this DMM and is included in Appendix I, which is summarized in Table 6.6. The economic analysis performed considered the relative benefits of implementing this DMM from an agency perspective and from a society perspective. The difference in net program costs often results from additional customer program costs, accounted for under the society perspective estimates.

Table 6.6 Cost Benefit Analysis, DMM 14
2010 Urban Water Management Plan
City of Ukiah

Perspective	Net Program Cost ($)	Total Water Saved[2] (AF)	Net Present Value ($)	Simple Unit Supply Cost ($/AF)	Discounted Unit Supply Cost ($/AF)	Benefit/Cost Ratio
Agency Perspective	36,000	49.8	(28,949)	723	933	0.20
Society Perspective	44,125	49.8	(36,727)	887	1,090	0.17

Notes:
1. Numbers in parentheses indicated negative numbers.
2. Total water saved represents the total water savings over a 25-year period.

As shown in Table 6.6, the benefit/cost ratios for this DMM from an agency perspective and society perspective are 0.20 and 0.17, respectively. This indicates that this conservation measure is not justified from a cost perspective, and that the City may not consider further development of this program in the near future.

6.15 EXISTING CONSERVATION SAVINGS

An estimate of existing conservation savings as a result of the implementation of the above DMMs is not currently available. According to the City's 2005 UWMP, 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 reduce water consumption further. However, the City anticipates achieving additional water savings through the future development and implementation of the DMMs described in this chapter.

6.16 PLANNED WATER SUPPLIES

The City does not plan to implement any water supply projects that would provide water at a higher unit cost than was accounted for in the cost benefit analyses performed for DMMs 1, 2, 6, and 14.

COMPLETED UWMP CHECKLIST

7.1 UWMP CHECKLIST

In order to expedite the review of the 2010 Urban Water Management Plans (UWMPs), the California Department of Water Resources (DWR) has developed a "Completed UWMP Checklist" that may be completed by urban water suppliers and included in their UWMPs. DWR offers two separate checklists with identical content, but which are organized differently. One version of the checklist is organized according to the Water Code legislative order. The other checklist is organized by topic, similar to the organization of DWR's Guidebook to Assist Urban Water Suppliers to Prepare a 2010 UWMP. Because the City of Ukiah's (City's) 2010 UWMP is organized according to the recommended guidebook format, the completed UWMP checklist (Table 7.1) presented on the following pages is organized by topic. Values in ***blue italics*** represent values input for the City's 2010 UWMP in the standardized DWR table.

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Ukiah

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
PLAN PREPARATION				
4	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	10620(d)(2)		*Ch. 1, Sec. 1.3 (pg. 1-3 to 1-6) & Table 1.1*
6	Notify, at least 60 days prior to the public hearing on the plan required by Section 10642, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Any city or county receiving the notice may be consulted and provide comments.	10621(b)		*Ch 1, Sec 1.3 (pg. 1-7)*
7	Provide supporting documentation that the UWMP or any amendments to, or changes in, have been adopted as described in Section 10640 et seq.	10621(c)		*Ch. 1, Sec. 1.3.2 (pg. 1-8) & App. D*
54	Provide supporting documentation that the urban water management plan has been or will be provided to any city or county within which it provides water, no later than 60 days after the submission of this urban water management plan.	10635(b)		*Ch. 1, Sec. 1.3.3 (pg. 1-8) & App. E*
55	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	10642		*Ch. 1, Sec. 1.3 (pg. 1-3) & Table 1.1*
56	Provide supporting documentation that the urban water supplier made the plan available for public inspection and held a public hearing about the plan. For public agencies, the hearing notice is to be provided pursuant to Section 6066 of the Government Code. The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water. Privately-owned water suppliers shall provide an equivalent notice within its service area.	10642		*Ch. 1, Sec. 1.3 (pg. 1-3) & App. B*
57	Provide supporting documentation that the plan has been adopted as prepared or modified.	10642		*Ch. 1, Sec. 1.3.2 (pg. 1-8) & App. D*
58	Provide supporting documentation as to how the water supplier plans to implement its plan.	10643		*Ch. 1, Sec. 1.3.4 (pg. 1-8)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Ukiah

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
59	Provide supporting documentation that, in addition to submittal to DWR, the urban water supplier has submitted this UWMP to the California State Library and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. This also includes amendments or changes.	10644(a)		*Ch. 1, Sec. 1.3.3 (pg. 1-8) & App. E*
60	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the urban water supplier has or will make the plan available for public review during normal business hours	10645		*Ch. 1, Sec. 1.3.3 (pg. 1-8)*
SYSTEM DESCRIPTION				
8	Describe the water supplier service area.	10631(a)		*Ch. 2, Sec. 2.1 & 2.2 (pg. 2-1 to 2-8)*
9	Describe the climate and other demographic factors of the service area of the supplier	10631(a)		*Ch. 2, Sec. 2.1.1 & Sec. 2.2 (pg. 2-5 to 2-8)*
10	Indicate the current population of the service area	10631(a)	Provide the most recent population data possible. Use the method described in "Baseline Daily Per Capita Water Use." See Section M.	*Ch. 2, Sec. 2.2 (pg. 2-6)*
11	Provide population projections for 2015, 2020, 2025, and 2030, based on data from State, regional, or local service area population projections.	10631(a)	2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	*Ch. 2, Sec. 2.2 (pg. 2-7)*
12	Describe other demographic factors affecting the supplier's water management planning.	10631(a)		*Ch. 2, Sec. 2.2 (pg. 2-8)*
SYSTEM DEMANDS				
1	Provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	10608.20(e)		*Ch. 3, Sec. 3.1 (pg. 3-1 to 3-10)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Ukiah

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
2	*Wholesalers:* Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions. *Retailers:* Conduct at least one public hearing that includes general discussion of the urban retail water supplier's implementation plan for complying with the Water Conservation Bill of 2009.	10608.36 10608.26(a)	Retailers and wholesalers have slightly different requirements	***Ch. 1, Sec. 1.3 (pg. 1-7)***
3	Report progress in meeting urban water use targets using the standardized form.	10608.40		***Not Applicable until 2015 UWMP***
25	Quantify past, current, and projected water use, identifying the uses among water use sectors, for the following: (A) single-family residential, (B) multifamily, (C) commercial, (D) industrial, (E) institutional and governmental, (F) landscape, (G) sales to other agencies, (H) saline water intrusion barriers, groundwater recharge, conjunctive use, and (I) agriculture.	10631(e)(1)	Consider 'past' to be 2005, present to be 2010, and projected to be 2015, 2020, 2025, and 2030. Provide numbers for each category for each of these years.	***Ch. 3, Sec 3.2 (pg. 3-10 to 3-21)***
33	Provide documentation that either the retail agency provided the wholesale agency with water use projections for at least 20 years, if the UWMP agency is a retail agency, OR, if a wholesale agency, it provided its urban retail customers with future planned and existing water source available to it from the wholesale agency during the required water-year types	10631(k)	Average year, single dry year, multiple dry years for 2015, 2020, 2025, and 2030.	***Not Applicable***
34	Include projected water use for single-family and multifamily residential housing needed for lower income households, as identified in the housing element of any city, county, or city and county in the service area of the supplier.	10631.1(a)		***Ch. 3, Sec. 3.2.5 (pg. 3-21)***
SYSTEM SUPPLIES				
13	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, and 2030.	10631(b)	The 'existing' water sources should be for the same year as the "current population" in line 10. 2035 and 2040 can also be provided.	***Ch. 4, Section 4.1.3 (pg. 4-5)***

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Ukiah

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
14	Indicate whether groundwater is an existing or planned source of water available to the supplier. If yes, then complete 15 through 21 of the UWMP Checklist. If no, then indicate "not applicable" in lines 15 through 21 under the UWMP location column.	10631(b)	Source classifications are: surface water, groundwater, recycled water, storm water, desalinated sea water, desalinated brackish groundwater, and other.	*Ch. 4, Sec. 4.1.1 (pg. 4-4) & Sec. 4.2 (pg. 4-7 to 4-9)*
15	Indicate whether a groundwater management plan been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	10631(b)(1)		*Ch. 4, Sec. 4.2.2 (pg. 4-8)*
16	Describe the groundwater basin.	10631(b)(2)		*Ch. 4, Sec. 4.2.1 (pg. 4-7 to 4-9)*
17	Indicate whether the groundwater basin is adjudicated? Include a copy of the court order or decree.	10631(b)(2)		*Ch. 4, Sec. 4.2.1 (pg. 4-7)*
18	Describe the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. If the basin is not adjudicated, indicate "not applicable" in the UWMP location column.	10631(b)(2)		*Not Applicable*
19	For groundwater basins that are not adjudicated, provide information as to whether DWR has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition. If the basin is adjudicated, indicate "not applicable" in the UWMP location column.	10631(b)(2)		*Ch.4, Sec. 4.2.4 (pg. 4-9)*
20	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	10631(b)(3)		*Ch. 4, Sec. 4.3 (pg. 4-9 to 4-10)*
21	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	10631(b)(4)	Provide projections for 2015, 2020, 2025, and 2030.	*Ch. 4, Sec. 4.3 (pg. 4-9 to 4-10)*
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)		*Ch. 4, Sec. 4.4 (pg. 4-10 to 4-11)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Ukiah

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
30	Include a detailed description of all water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years, excluding demand management programs addressed in (f)(1). Include specific projects, describe water supply impacts, and provide a timeline for each project.	10631(h)		*Ch. 4, Sec. 4.7 (pg. 4-21 to 4-23)*
31	Describe desalinated water project opportunities for long-term supply, including, but not limited to, ocean water, brackish water, and groundwater.	10631(i)		*Ch. 4, Sec. 4.5 (pg. 4-11 to 4-12)*
44	Provide information on recycled water and its potential for use as a water source in the service area of the urban water supplier. Coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	10633		*Ch. 4, Sec. 4.6 (pg. 4-12 to 4-21)*
45	Describe the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	10633(a)		*Ch. 4, Sec. 4.6.1 to 4.6.4 (pg. 4-13 to 4-18)*
46	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	10633(b)		*Ch. 4, Sec. 4.6.3 (pg. 4-16 to 4-18)*
47	Describe the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.	10633(c)		*Ch. 4, Sec. 4.6.4 (pg. 4-18)*
48	Describe and quantify the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.	10633(d)		*Ch. 4, Sec. 4.6.5 (pg. 4-19 to 4-20)*
49	The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	10633(e)		*Ch. 4, Sec. 4.6.4 (pg. 4-18) & Sec. 4.6.5 (pg. 4-19 to 4-20)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Ukiah

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
50	Describe the actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.	10633(f)		*Ch. 4, Sec. 4.6.6 (pg. 4-20 to 4-21)*
51	Provide a plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.	10633(g)		*Ch. 4, Sec. 4.6.7 (pg. 4-21)*
WATER SHORTAGE RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING				
5	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	10620(f)		*Ch. 5, Sec. 5.1.1 (pg. 5-1 to 5-2)*
22	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage and provide data for (A) an average water year, (B) a single dry water year, and (C) multiple dry water years.	10631(c)(1)		*Ch. 5, Sec. 5-4 (pg. 5-14 to 5-19)*
23	For any water source that may not be available at a consistent level of use - given specific legal, environmental, water quality, or climatic factors - describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.	10631(c)(2)		*Ch. 5, Sec. 5.1.2 (pg. 5-2 to 5-4)*
35	Provide an urban water shortage contingency analysis that specifies stages of action, including up to a 50-percent water supply reduction, and an outline of specific water supply conditions at each stage	10632(a)		*Ch. 5, Sec. 5.2.1 (pg. 5-6 to 5-8)*
36	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.	10632(b)		*Ch. 5, Sec. 5.4.2. (pg. 5-16)*
37	Identify actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.	10632(c)		*Ch. 5, Sec. 5.2.2 (pg. 5-9)*
38	Identify additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.	10632(d)		*Ch. 5, Sec. 5.2.3 & 5.2.4 (pg. 5-9 to 5-11)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Ukiah

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
39	Specify consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.	10632(e)		*Ch. 5, Sec. 5.2.4 (pg. 5-11)*
40	Indicated penalties or charges for excessive use, where applicable.	10632(f)		*Ch. 5, Sec. 5.2.5 (pg. 5-11 to 5-12)*
41	Provide an analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.	10632(g)		*Ch. 5, Sec. 5.2.6 (pg. 5-11 to 5-13)*
42	Provide a draft water shortage contingency resolution or ordinance.	10632(h)		*Ch. 5, Sec. 5.2.7 (pg. 5-13) & App. F*
43	Indicate a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)		*Ch. 5, Sec. 5.2.8 (pg. 5-13)*
52	Provide information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments, and the manner in which water quality affects water management strategies and supply reliability	10634	For years 2010, 2015, 2020, 2025, and 2030	*Ch. 5. Sec. 5.3 (pg. 5-13 to 5-14)*
53	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. Base the assessment on the information compiled under Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)		*Ch. 5, Sec. 5.4.3 to 5.4.5 (pg. 5-17 to 5-19)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Ukiah

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
DEMAND MANAGEMENT MEASURES				
26	Describe how each water demand management measures is being implemented or scheduled for implementation. Use the list provided.	10631(f)(1)	Discuss each DMM, even if it is not currently or planned for implementation. Provide any appropriate schedules.	***Ch. 6, Sec. 6.1 to 6.14 (pg. 6-1 to 6-15)***
27	Describe the methods the supplier uses to evaluate the effectiveness of DMMs implemented or described in the UWMP.	10631(f)(3)		***Ch. 6, Sec. 6.1 to 6.14 (pg. 6-1 to 6-15)***
28	Provide an estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the ability to further reduce demand.	10631(f)(4)		***Ch. 6, Sec. 6.1 to 6.14 (pg. 6-1 to 6-15)***
29	Evaluate each water demand management measure that is not currently being implemented or scheduled for implementation. The evaluation should include economic and non-economic factors, cost-benefit analysis, available funding, and the water suppliers' legal authority to implement the work.	10631(g)	See 10631(g) for additional wording.	***Ch. 6, Sec. 6.1 to 6.14 (pg. 6-1 to 6-15)***
32	Include the annual reports submitted to meet the Section 6.2 requirements, if a member of the CUWCC and signer of the December 10, 2008 MOU.	10631(j)	Signers of the MOU that submit the annual reports are deemed compliant with Items 28 and 29.	***Not Applicable***

Notes:
1. The UWMP Requirement descriptions are general summaries of what is provided in the legislation. Urban water suppliers should review the exact legislative wording prior to submitting its UWMP.
2. The Subject classification is provided for clarification only. It is aligned with the organization presented in Part I of this guidebook. A water supplier is free to address the UWMP Requirement anywhere with its UWMP, but is urged to provide clarification to DWR to facilitate review.

APPENDIX A – OUTREACH DOCUMENTS AND COORDINATION WITH RELEVANT AGENCIES

City of Ukiah

March 25, 2011

County of Mendocino
Attn: Executive Office
501 Low Gap Road #110
Ukiah, CA 95482-3734

Subject: **Notice of Preparation of the 2010 City of Ukiah Urban Water Management Plan (UWMP)**

Dear Executive Officer Angelo:

Pursuant to the requirements of the California Water Code, Division 6, Part 2.6 Urban Water Management Planning, Section 10621 (b), every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

This letter is intended to notify your agency that the City of Ukiah (City) is in process of preparing the 2010 UWMP. Based on the City's current schedule, we expect to have a public review draft of the 2010 UWMP available for review by June 1, 2011 at which point your agency will receive a notification letter that the draft UWMP is available for public review.

If your agency would like to submit comments or provide input to the City in anticipation of the development of the 2010 UWMP, please submit written copies to:

Jarod Thiele
Public Works Administration
City of Ukiah
300 Seminary Avenue
Ukiah, CA 95482-5400

Sincerely,

CITY OF UKIAH

Jarod Thiele

Jarod Thiele for Tim Eriksen
Director of Public Works/City Engineer

cc: Tommy Greci, Carollo Engineers, Inc.
Tim Eriksen, Director of Public Works/City Engineer

APPENDIX B – NOTICE OF PUBLIC REVIEW OF 2010 URBAN WATER MANAGEMENT PLAN

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Legal No. **0004020971**

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City of Ukiah

Notice of Public Hearing -2010
Urban Water Management Plan

NOTICE IS HEREBY GIVEN THAT Pursuant to California Water Code (CWC) section 10642 and 10608, a public hearing will be held on the 2010 Urban Water Management Plan (2010 UWMP).

The City of Ukiah (City) will conduct a public hearing on June 15, 2011, at 6:15 pm in the City Council Chambers located at 300 Seminary Avenue to receive public comment relative to the proposed 2010 UWMP and the water conservation baseline and targets associated with the Water Conservation Act of 2009. This will be an update to the City's 2005 UWMP. The 2010 UWMP complies with recent amendments to the CWC.

A copy of the 2010 Final Draft UWMP is available, during normal business hours, at the City Hall. You can also access this document at the City of Ukiah website at www.cityofukiah.com.

The final draft will be presented by the consultant at a workshop for the public on June 8, 2011 at 2 p.m.at the Ukiah Valley Conference Center, 200 S. School Street, in the Chenin Blanc Room.

For questions concerning the document, please contact Jarod Thiele at 707-463-6755. Written comments are requested by the close of business on June 8, 2011.

Send written comments to: Jarod Thiele, Public Works Dept., 300 Seminary Ave, Ukiah, CA 95482.

Upon completion of said public hearing, the plan will be adopted as prepared or as modified.

This notice shall be published once a week for two successive weeks.

s/JoAnne M. Currie, City Clerk for City of Ukiah

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
COUNTY OF MENDOCINO

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of the Ukiah Daily Journal, a newspaper of general circulation, printed and published daily in the City of Ukiah, County of Mendocino and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Mendocino, State of California, under the date of September 22, 1952, Case Number 9267; that the notice, of which the annexed is a printed copy (set in type not smaller than non-pareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

6/1/2011, 6/8/2011

I certify (or declare) under the penalty of perjury that the foregoing is true and correct.

Dated at Ukiah, California,
June 8th, 2011

Signature

MOLLY MORANDI, LEGAL CLERK

APPENDIX C – TECHNICAL MEMORANDUM ON WATER SUPPLY, RIGHTS, AND RELIABILITY (WAGNER AND BONSIGNORE)

Technical Analysis
of
Future Water Supply Reliability

Supporting Chapters 4 and 5
Of the
City of Ukiah 2010 Urban Water Management Plan

June, 2011

Wagner&Bonsignore
Consulting Civil Engineers, A Corporation
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Sacramento CA 95833

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Executive Summary

This report documents analyses conducted to evaluate water supply reliability for the 2010 City of Ukiah Urban Water Management Plan update. The analysis considers the Russian River hydrology in the context of the changing regulatory environment affecting resource management decisions, as well as City of Ukiah projected maximum demand authorized under its existing water right permit.

The City holds, among other water rights, a 1954 appropriative water right Permit 12952 (Application 15704) for 20 cfs from Russian River Underflow. To determine the maximum authorized diversion volume under the terms of the permit, we evaluated monthly water use for the 2004 through 2010 period, and found that peak demand occurs in July. Accordingly, we fixed July demand at 20 cfs, and projected demand for the remaining months based on the monthly average use pattern. The projected annual demand is expected to be around 8,700 acre-feet. This demand was used to evaluate depletion from the Russian River, which was estimated to be 37% of the total demand on an annual basis.

In addition to projected demand from the City, the analysis evaluated water required to satisfy other demands downstream of Lake Mendocino, including river losses, and all releases required to meet minimum instream flow requirements under both the 2008 Biological Opinion related to salmonids in the Russian River, and State Water Resources Control Board Decision 1610. Inflow to the Russian River system was estimated based on historic gaged flow from the Eel River imports, the East and West Forks of the Russian River and naturally tributary areas.

The results of the analysis indicate that water is available from the Russian River to meet the City of Ukiah's projected maximum demand under Permit 12952 (Application 15704) under a regulatory environment dictated by the terms of Decision 1610, or the Biological Opinion. Furthermore, the analysis demonstrates that the City's maximum demand has an insignificant impact on the Russian River system, as demonstrated by the negligible reduction in water surface elevation of Lake Mendocino.

Average unimpaired tributary inflow to the Ukiah Valley as measured at the West Fork Russian River gage is about 126,000 acre feet annually. Average unimpaired inflow as previously calculated for the 1975 through 2003 period of record from the East Fork Russian River is 77,000 acre feet annually. Precipitation falling on the watershed tributary to Ukiah Valley (137 square miles) is 267,000 acre feet annually, based on an average of 36.5 inches of precipitation per year. Although a portion of the precipitation will contribute to runoff, conservatively assuming that 25% recharges, an average of 67,000 acre-feet per year is available. Accordingly, the total recharge opportunity to the Ukiah Valley including the Russian River and precipitation is conservatively estimated at about 270,000 acre-feet per year, on average, and exceeds the City's expected maximum 8,700 acre-foot draft on the groundwater resources by 3,100%. Consequently we do not expect the groundwater resources to experience any meaningful long term decline in the future.

Accordingly, the analysis supports the information provided in Chapters 4 and 5 of the Urban Water Management Plan. Specifically, the analysis demonstrates that the City's appropriative rights provide a reliable water supply, and that the City's projected maximum diversion does not measurably impact the underlying groundwater table or the Russian River.

CHAPTER 4

2010 CITY OF UKIAH

URBAN WATER MANAGEMENT PLAN

4.1 WATER SUPPLY SOURCES

The City's water supply sources include groundwater, surface water from the underflow of the Russian River, and 800 acre-feet of project water available from the Mendocino County Russian River Flood Control and Water Conservation Improvement District. The City is completing a recycled water management plan, and recycled water may become available as an additional supply. Table 4.2 below below provides a summary of the water supply sources.

4.1.1 Water Supply Facilities

The following table provides a list of all groundwater and surface water diversion facilities currently in use by the City.

Table 4.1 Water Supply Wells
2010 Urban Water Management Plan
City of Ukiah

Facility	Type of Supply	Current Status	Production Capacity (gpm)
Ranney Collector[(2)]	Surface water	Active	3194
Well #3	Groundwater influenced by surface water	Active	600
Well #4	Groundwater	Active	799
Well #5	Groundwater influenced by surface water	Active	300
Well #7	Groundwater	Active	799
Well #8	Groundwater	Active	694
	Total Active Well Capacity 100% (gpm)		**6,386**
	Total Active Well Capacity 100% (AFY)		**10,308**
	Total Active Well Capacity 80% (AFY)		**8,246**

Notes:
1. Source: City staff records.
2. The Ranney Collector can only be used during the dry season when surface water turbidity is low.

The supply facilities summarized above are described in more detail in the following sections.

Surface Water Diversion

The City's surface water supply is obtained from a Ranney collector and Wells 3 and 5, which draw water from an alluvial zone along the Russian River. The supply source has been deemed groundwater under the direct influence of surface water by the California Department of Public Health (CDPH) pursuant to 22 CCR §64651.10 of the California Water Works Standards. The determination is based on turbidity of the diverted water, which fluctuates with the turbidity in the Russian River. Accordingly, although the diversion is from Russian River underflow and may also be considered groundwater, water diverted from the Ranney Collector and Wells 3 and 5 is classified as surface water. Well 3 has an estimated pumping capacity of 600 gpm and Well 5 has an estimated pumping capacity of 300 gpm. The Ranney collector was constructed in 1966 along the banks of the Russian River with a design capacity of 13 million gallons per day (mgd). Production has steadily declined from a maximum of 9 mgd to a current capacity of 4.6 mgd. The significant capacity loss may be a result of clay and silt compaction above the Ranney Collector, or may indicate that the Russian River channel is moving away from the Ranney collector. The Ranney collector can only be used when turbidity in the Russian River is low, a condition which occurs during dry weather conditions. During the rainy months, Russian River turbidity increases and the Microfloc contact clarification-filtration units located at the water treatment plant cannot be operated efficiently.

Groundwater

The City currently diverts groundwater at Wells 4, 7 and 8. Well 4 has a capacity of 799 gpm, Well 7 has a capacity of 799 gpm and Well 8 has a capacity of 694 gpm. Wells 7 and 8 were brought online in 2008.

4.1.2 Distribution System and Storage

Intentionally left blank.

Current and Projected Water Sources

The following is a summary of the City's current and projected water sources, followed by a description of the basis of right for each source.

Table 4.2	Water Supplies – Current and Projected (Guidebook Table 16) 2010 Urban Water Management Plan City of Ukiah						
Water Supply Sources		**2010**	**2015**	**2020**	**2025**	**2030**	**2035 - opt**
Water purchased from:	**Wholesaler supplied volume (yes/no)**						
Project Water (Mendocino County Russian River Flood Control and Water Conservation Improvement District)	Yes	800	800	800	800	800	800
Supplier-produced groundwater[1]	No	3,705	3,705	3,705	3,705	3,705	3,705
Supplier-produced surface water Permit 12952 (Application 15704)[2]	No	14,480	14,480	14,480	14,480	14,480	14,480
Supplier-produced surface water (pre-1914 Rights)	No	2,027	2,027	2,027	2,027	2,027	2,027
Transfers in	No	0	0	0	0	0	0
Exchanges In	No	0	0	0	0	0	0
Recycled Water[3]	No	0	603	883	1,163	1,723	2,283
Desalinated Water	No	0	0	0	0	0	0
	Total	**21,012**	**21,615**	**21,895**	**22,175**	**22,735**	**23,295**

Units: acre-feet per year

[1] Assumed groundwater pumping capacity based on information from Carollo Engineering is 3,705 acre-feet.

[2]Permit 12952 (A15704) is authorizes diversion of 20 cfs, with no annual limit. As a practical matter, if peak demand is 20 cfs, annual total diversion distributed according to current use patterns would result in a total diversion of approximately 8,700 acre-feet. However, the City's water right is valid for the 14,480 acre-feet as reported above.

[3] Estimate of recycled water available provided by Carollo Engineering.

The following sections describe the water supply sources itemized in Table 4.2 above.

Contract Water/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 that allows the purchase up to 800 AF of water annually under the District's permit. The District is considered a wholesale provider for purposes of this UWMP, and Table 4.3 in section 4.1.4 provides the projected wholesale amounts of project water.

Supplier Produced Groundwater

The City assumes Wells 4, 7 and 8 pump groundwater. However, the City has filed petitions with the State Water Resources Control Board to add Wells 5, 7 and 8 to its water right permit, as a precaution in the event there is an evidentiary finding that the water pumped from wells is actually subject to the permitting authority of the Sate Water Board. There is a legal presumption that groundwater pumped from a groundwater basin is not subject to appropriation by permit. The City does not waive this legal presumption regarding groundwater.

Appropriative Rights: Supplier Produced Surface Water

An evaluation of the groundwater and surface water available to satisfy the City's appropriative rights is provided in Appendix 1 for reference. The following describes the City's appropriative rights.

<u>Water Right Permit 12952 (Application 15704)</u>

Water Right Permit 12952 (Application15704) 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 Permit expired on December 31, 2000 and the City filed a Petition for Extension of Time with the State Water Board. The City has also filed a Petition with the State Water Board to add Wells 5, 7 and 8 and expand its place of use under Permit 12952 (Application 15704). The Permit is valid while the Petitions are processed and currently covers Wells 2 (no longer in use) and 3 and the Ranney collector.

<u>Pre 1914 Water Right</u>

The City has Pre-1914 Appropriative Right for at least 2.8 cfs for diversion from the Russian River for a maximum of 2,027 acre-feet annually. This water right is recognized in State Water Rights Board (predecessor to State Water Resources Control Board) Decision 1030.

Recycled Water

The City is currently completing a recycled water management plan, and anticipates that recycled water could be available for landscape irrigation and consumptive reuse within the water treatment plant.

Wholesale Supplies

Table 4-3	Wholesale Supplies – Existing, Planned Sources of Water (Guidebook Table 17) 2010 Urban Water Management Plan City of Ukiah						
Wholesale sources	**Contracted Volume**	**2015**	**2020**	**2025**	**2030**	**2035 - opt**
District[1]	800	800	800	800	800	800

Units: acre-feet per year

[1]*Mendocino County Russian River Flood Control and Water Conservation Improvement District*

4.2 GROUNDWATER BASIN

This section provides a description of the Ukiah Valley Groundwater Basin.

4.2.1 Groundwater Basin 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. This basin is not adjudicated.

The Ukiah Valley groundwater basin (aquifer) is approximately 22 miles long and 5 miles wide and 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 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.

Information on the storage capacity and groundwater levels within the Ukiah Valley Groundwater Basins is found in the United States Geological Survey (USGS) published Water Resources Investigation Report 85-4258, "Groundwater Resources in Mendocino County, California" which 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, drawdown of groundwater levels increases, but the levels recover in post-drought conditions.

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 attached Plate I shows the estimated boundaries of the groundwater basin, consistent with DWR Bulletin 118 and estimated groundwater availability within the Ukiah Valley Groundwater Basin.

4.2.2 Groundwater Management Plan

A groundwater management plan has not been prepared for the Ukiah Valley or Mendocino County.

The City may coordinate with other affected agencies within the Basin to develop more information about the Ukiah groundwater basin and as a first step toward developing a groundwater study and a groundwater management plan.

4.2.3 Groundwater Levels and Historical Trends

In general, the Ukiah Valley groundwater basin experiences seasonal and year to year variation in water levels due to climate and pumping stresses, as described in Bulletin 118 and the USGS Investigative Report 85-4258 referenced above. 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.

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.

The attached Plate II shows available groundwater hydrographs within the Ukiah Valley, as described above.

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.)

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.

Accordingly, as described above, published data indicates the groundwater supplies are adequate to meet existing and future demands. In addition, Plate II contains hydrographs of long-term monitoring wells in

Ukiah Valley. The hydrographs show the seasonal fluctuation due to precipitation, the effect of drought in 1977 and the absence of a long-term trend in water surface elevation.

4.2.4 Groundwater Overdraft

There does not appear to be a long term decline in water levels that would suggest shortage or overdraft in the Ukiah Valley. The basin is not considered over drafted and is not currently projected to be over drafted.

The attached Plate II provides groundwater hydrographs of long-term monitoring wells in Ukiah Valley. The hydrographs show the seasonal fluctuation due to precipitation, the effect of drought in 1977 and the absence of a long-term trend in water surface elevation.

4.3 EXISTING AND PROJECTED GROUNDWATER PUMPING

Table 4.4 below provides information on groundwater pumping reported on the Department of Water Resources Statistics Sheets from 2006 through 2010.

Table 4.4 **Groundwater Volume Pumped (Guidebook Table 18)**
2010 Urban Water Management Plan
City of Ukiah

Basin name(s)	Metered or Unmetered	2006	2007	2008	2009	2010
Ukiah Valley Groundwater Basin[1]	Metered	1,347	1,185	1,380	1,486	1,990
	Total groundwater pumped	1,347	1,185	1,380	1,486	1,990
Groundwater as a percent of total water supply[2]		**6.4%**	**5.6%**	**6.6%**	**7.1%**	**9.5%**

Units: acre-feet per year

[1]Total water supply is provided in Table 4.2 and is 21,012 acre-feet per year, including contract water, appropriative rights and groundwater. We note that all of the City water whether diverted from groundwater wells or diverted under its appropriative rights is supplied by groundwater.

[2] Groundwater volume reported above taken from DWR statistic sheets 2006-2010.

Table 4.5 below provides projected groundwater pumping volumes for the 2015 – 2035 period of record. The volume is assumed to be the maximum capacity of the City's existing groundwater pumping facilities, which are itemized in Figure 4-1.

Table 4.5	Groundwater – Volume Projected to be Pumped (Guidebook Table 19) 2010 Urban Water Management Plan City of Ukiah				
Basin name(s)	**2015**	**2020**	**2025**	**2030**	**2035**
Total Water Supply (Table 4.2)	21,615	21,895	22,175	22,735	23,295
Ukiah Valley Groundwater Basin[1]	3,705	3,705	3,705	3,705	3,705
Total groundwater pumped	3,705	3,705	3,705	3,705	3,705
Percent of total water supply	17%	17%	17%	16%	16%

Units: acre-feet per year
[1]Groundwater pumped assumed to be total groundwater pumping capacity of Wells 4, 5, 7 and 8.

4.4 TRANSFER AND EXCHANGE OPPORTUNITIES

The City does not transfer or exchange water with any of the surrounding water suppliers. However, the City has emergency intertie agreements with Millview County Water District and Redwood Valley County Water District, which provide that in the event of a water supply emergency, the City will receive water deliveries from the Districts through the interconnected supply system.

In addition, the City is considering a regional approach to water management involving water purveyors within the Ukiah Valley. Such an approach would involve cooperation and potential transfers and exchanges between the following regional water suppliers:

- Millview County Water District
- Willow County Water District
- Rogina Water Company
- Calpella County Water District
- Redwood Valley County Water District
- Sonoma County Water Agency
- Hopland Utilities District

The regional planning effort is currently in its early stages, and agencies are identifying priorities and needs prior to moving forward with any potential future transfers or exchanges.

Table 4.6 Transfer and Exchange Opportunities (Guidebook Table 20)
2010 Urban Water Management Plan
City of Ukiah

Transfer agency	Transfer or exchange	Short term or long term	Proposed Volume
Millview County Water District[1]	Yes	Long-term	N/A
Willow County Water District	N/A	0	0
Rogina Water Company	N/A	0	0
Calpella County Water District	N/A	0	0
Redwood Valley County Water District[1]	Yes	Long-Term	N/A
Sonoma County Water Agency	N/A	0	0
Hopland Utility District	N/A	0	0
Total			**0**

Notes:
Units: acre-feet per year
[1]Millview and Redwood Valley Water District are part of an emergency intertie agreement with the City. Although the agreement does not specify volumes, the signatories have agreed to provide water supplies through the interconnected systems in the event of a water supply emergency.

4.5 DESALINATED WATER OPPORTUNITIES

Currently the surface water and groundwater supplies available to the City do not require desalinization. The City has no immediate plans to explore opportunities to desalinate ocean water, due to the plentiful supply of surface and groundwater in the region.

4.6 RECYCLED WATER OPPORTUNITIES

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4.7 FUTURE WATER PROJECTS

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CHAPTER 5

2010 CITY OF UKIAH

URBAN WATER MANAGEMENT PLAN

5.1 WATER SUPPLY RELIABILITY

The following sections provide a description of the City's water supply reliability.

5.1.1 Resource Maximization/Import Minimization

As described in Chapter 4, the City has groundwater and surface water resources available within the Ukiah Valley to meet existing and projected demand. To maximize resources available, the City has continued development of groundwater resources, bringing groundwater Wells 7 and 8 online in 2008. Chapter 4 includes a list of additional water supply development projects the City has planned. In addition, the City maintains its existing surface water diversion facilities (the Ranney Collector and Well 3) and has petitioned the State Water Resources Control Board to include additional points of diversion under Permit 12952 (Application 15704).

Currently the City does not import water and does not anticipate importing water in the future to augment supply.

5.1.2 Factors Affecting Supply Reliability

The following sections provide a description of the various factors which might impact water supply reliability, including legal, environmental, water quality and climatic factors. As indicated below, due to the nature of the City's appropriative rights and the volume of storage within the groundwater basin, it is unlikely that the City would experience a reduction in supply reliability.

An evaluation of the groundwater and surface water available to satisfy the City's appropriative rights is provided in Appendix 1 for reference.

5.1.2.1 Legal Factors

Legal Factors Affecting Groundwater Reliability:

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;
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.

With respect to Ukiah, the State Water Board has not made a finding related to groundwater the City might pump in the future. The legal presumption is that well water is percolating groundwater, and 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 State Water Board. Historically, Division of Water Rights staff have generally accepted that existing Wells 4 pumps groundwater. City Wells 7 and 8 are presumed to pump groundwater, however, in the event of an evidentiary finding, the City has named the wells as proposed points of diversion in its petition before the State Water Board.

Future diversions will be from groundwater sources, whether or not these sources are determined to be under the jurisdiction of the State Water Board.

Legal Factors Affecting Surface Water Reliability

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 is 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. The initial study is complete, and the City 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.) 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.)"

It is reasonable, although not guaranteed, 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.

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.

The City's existing permit and pre 1914 right to divert from the Russian River provide a reliable supply source, which is unlikely to be interrupted due to legal factors, as illustrated above.

5.1.2.2 Environmental Factors

Environmental factors affecting water supply reliability include any impediments to supply related to protection of fish and wildlife resources. Groundwater supply has not been impacted by any environmental factors to date, and the City does not anticipate future disruption of groundwater supply as a result of environmental factors. Similarly, the City does not anticipated disruption of surface water supply as a result of environmental factors due to existing regulation of flow rates in the Russian River.

Decision 1610 of the State Water Resources Control Board regarding permits for diversion by the Sonoma County Water Agency (SCWA) specified minimum flow rates to be maintained on the Russian River from the Forks (at Ukiah) to Dry Creek (just south of Healdsburg). The Decision also specified minimum flow rates on Dry Creek (below Lake Sonoma) and on the Russian River from Dry Creek to the ocean. SCWA has met these flow requirements by releasing water from Lake Mendocino and Lake Sonoma in the dry season. Because of the rates involved and the location of Lake Sonoma, the requirements below Healdsburg do not affect management of Lake Mendocino.

Decision 1610 specified minimum flow rates that differ by season of the year and type of water year. The requirements range from as low as 25 cfs in a critically dry month to as high as 185 cfs in the spring with high reservoir levels. The requirements of D-1610 are conditioned on inflow to and storage in Lake Pillsbury (in the headwaters of the Eel River) and on storage in Lake Mendocino.

The Biological Opinion (BO) pursuant to the Endangered Species Act for anadromous salmonids in the Russian River basin issued September 24, 2008 directed the SCWA to file a petition to the State Water Board to amend D-1610 for the purpose of reducing Russian River flows during the dry season. SCWA has filed that petition (as well as an Urgency Petition for the same effect which has been accepted by the State Water Board). The effect of the requirements for the Russian River above Dry Creek is to reduce the minimum flow during the months of June through October in normal years from 150 or 185 cfs (depending on hydrological conditions) to 125 cfs.

The 2007 UWMP included an analysis of water available under various surface water supply scenarios, including a reduction in Eel River imports. In addition, the model was updated in 2010 as part of the City's ongoing EIR analysis. The results of the model indicated that given the current regulatory parameters, surface water is available for diversion by the City. The report is included herewith for reference.

As described above, water is available for diversion under the regulations currently in place to protect fish and wildlife resources. Accordingly, existing environmental regulations ensure supply reliability for the City.

5.1.2.3 Water Quality Factors

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 contaminate levels for naturally occurring constituents can be mitigated by construction new treatment facility prior to water delivery into the water distribution system.

5.1.2.4 Climatic Factors

The Ukiah area receives an average of 36.5 inches of precipitation a year, as measured by the DWR "Ukiah" gage near the City of Ukiah. Table 5.1 below shows the annual rainfall measured at the Ukiah gage near the City of Ukiah. The relatively abundant precipitation contributes runoff to the Russian River system and recharges the groundwater basin. During average and above average years, supply exceeds the City's demand.

To evaluate precipitation during dry periods, we evaluated the 25% driest years of record. Table 5.2 shows that during 19 of the 25 dry years, precipitation was over 20 inches. During the dry years, should surface water be unavailable, water supply is available to the City from the groundwater storage basin. The City's demand is insignificant when compared to the volume of water in the groundwater basin, which DWR Bulletin 118 estimates to contain approximately 90,000 acre-feet in storage. In addition, the hydrographs in Plate II demonstrate that groundwater surface elevations do not show evidence of long term reduction, remaining relatively stable.

Accordingly, it is unlikely that the City's supply reliability would be influenced by climatic factors, as the groundwater basin can support the City's demand during below-average precipitation periods.

Chart 5.1

Annual Precipitation Measured at Ukiah Precipitation Station near Ukiah, California

(Precipitation measured in inches)

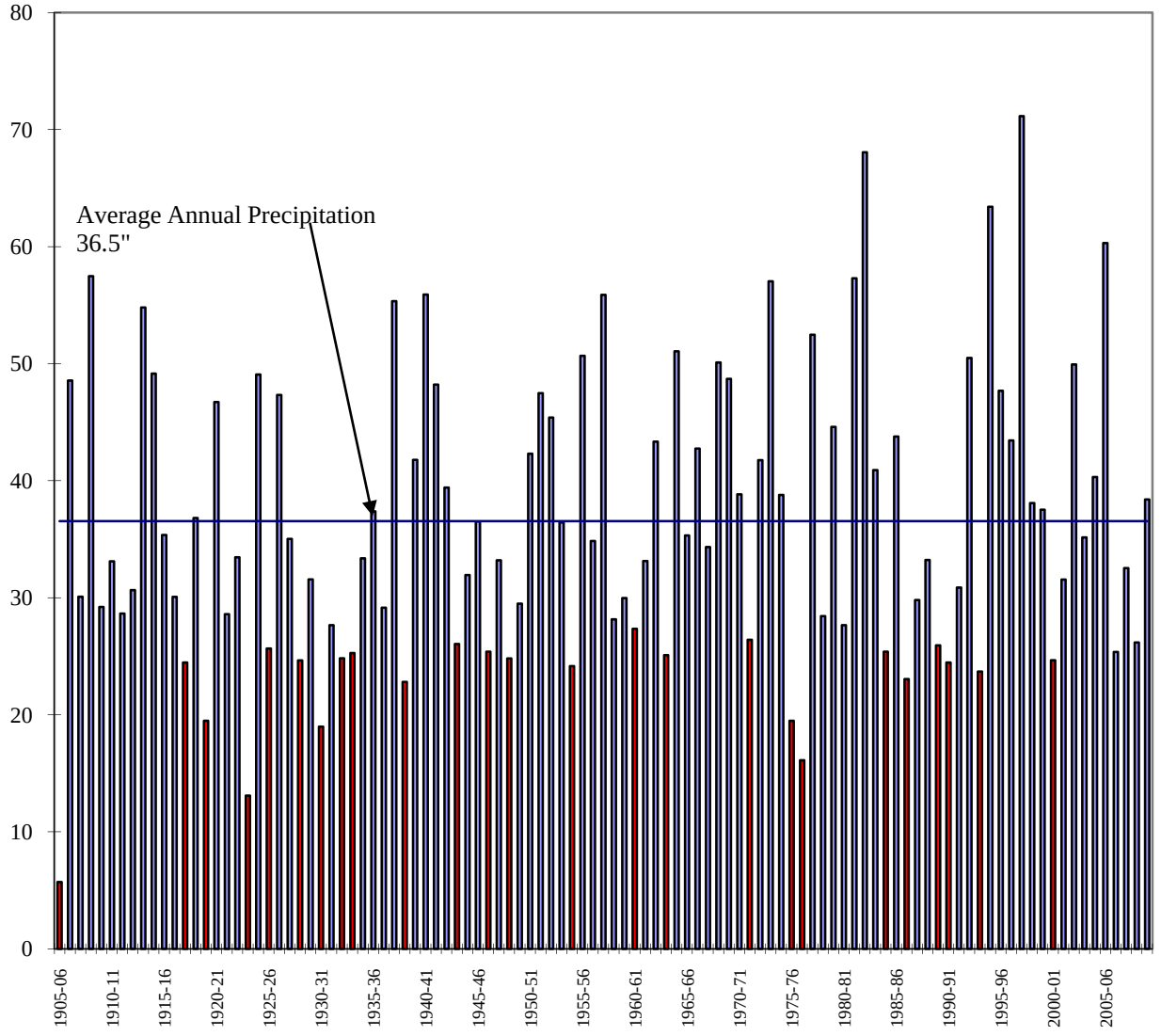
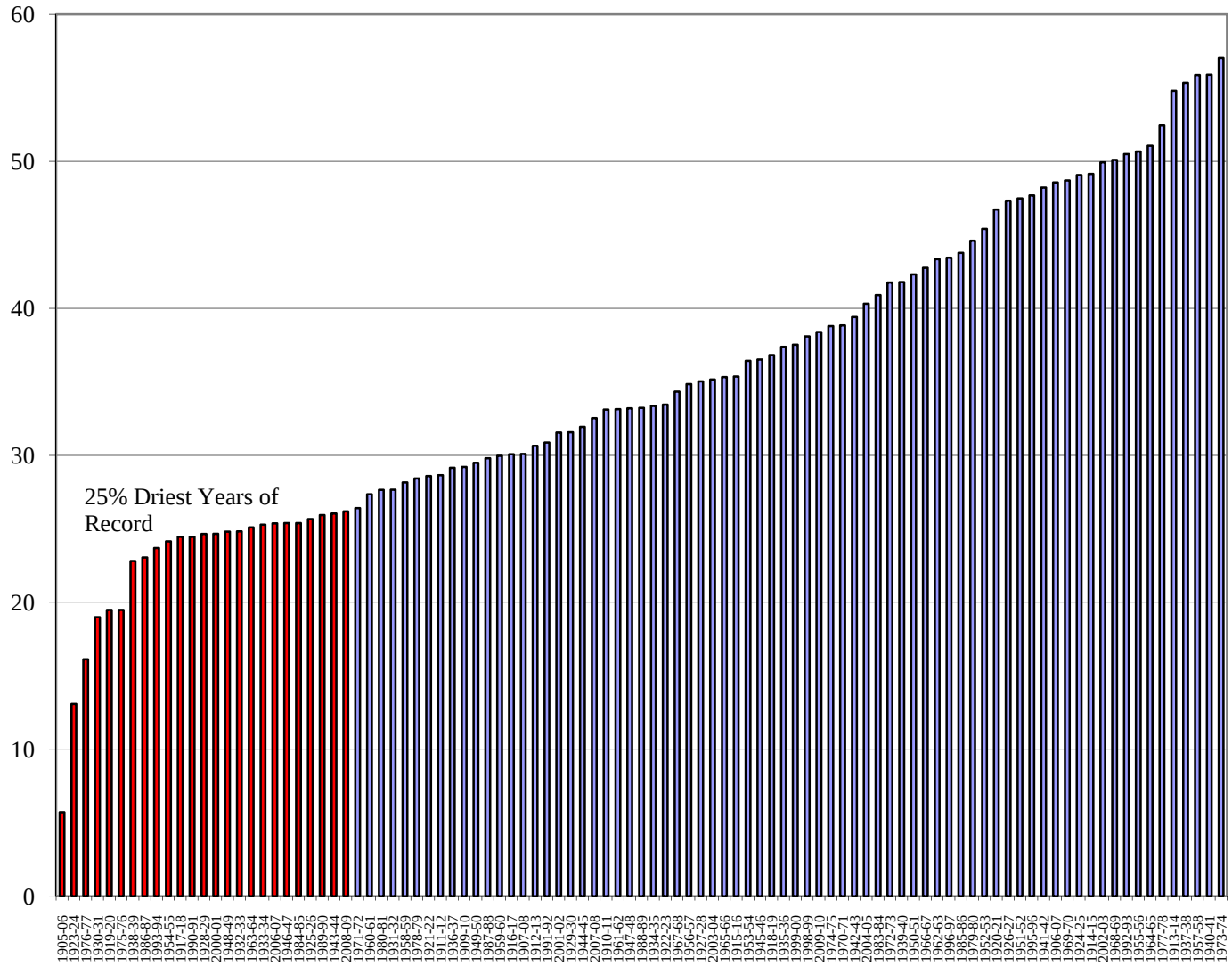


Chart 5.2
Driest 25% of Years of Record
Annual Precipitation Measured at Ukiah Precipitation Station near Ukiah, California

(Precipitation measured in inches)



The following table summarizes the factors affecting supply reliability for the various sources names in Table 4.2.

Table 5.1 Factors Resulting in Inconsistency of Supply (Guidebook Table 29)
2010 Urban Water Management Plan
City of Ukiah

Water supply sources[1]	Specific source name, if any	Limitation quantification	Legal	Environ - mental	Water quality	Climatic
Surface Water, Permit 12952 (Application 15704)[2]	Russian River Underflow	14,480 afa	Change to Permit	None	None	None
Surface Water, Pre-1914 rights	Russian River	2,027 afa	None	None	None	None
Groundwater	Ukiah Valley	None	None	None	None	None
Project Water	Russian River	800	Change to Contract	None	None	None
Recycled Water	--	unknown	None	None	None	None

Units: acre-feet per year
[1]From Table 4.2.
[2]Permit 12952 (A15704) is authorizes diversion of 20 cfs, with no annual limit. As a practical matter, if peak demand is 20 cfs, annual total diversion distributed according to current use patterns would result in a total diversion of approximately 8,700 acre-feet. However, the City's water right is valid for the 14,480 acre-feet as reported above.

5.2 WATER SHORTAGE CONTINGENCY PLANNING

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5.3 WATER QUALITY

5.3.1 Improvement Projects

The Water Treatment Plant (WTP) commenced operation in April 1992 and treats water collected in the Ranney collector. The WTP is located about 300 feet from the Ranney Collector and uses the Microfloc contact clarification-filtration technology. 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 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.

5.3.2 Water Quality Impacts Summary

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 5.2 below summarizes the current and projected water supply changes due to water quality. 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.

Table 5.2 Water Quality – Current and Project Water Supply Impacts (Guidebook Table 30)
2010 Urban Water Management Plan
City of Ukiah

Water source	Water Quality Condition	2010	2015	2020	2025	2030	2035 - opt
Russian River	None	0	0	0	0	0	0
Project Water	None	0	0	0	0	0	0
Groundwater	None	0	0	0	0	0	0
Recycled Water	None	0	0	0	0	0	0

Units: acre-feet per year

5.4 DROUGHT PLANNING

This section considers the City's water supply reliability during three climate-related water scenarios: normal water year, single dry water year, and multiple dry water years. These scenarios are defined in DWR's UWMP guidebook as follows:

Average Year — (Normal Year) a year or an averaged range of years in the historical sequence that most closely represents median runoff levels and patterns. It is defined as the median runoff over the previous 30 years or more. This median is recalculated every 10 years.

Single-dry year — generally considered to be the lowest annual runoff for a watershed since the water-year beginning in 1903. Suppliers should determine this for each watershed from which they receive supplies.

• *Multiple-dry year period* — generally considered to be the lowest average runoff for a consecutive multiple year period (three years or more) for a watershed since 1903. For example, 1928-1934 and 1987-1992 were the two multi-year periods of lowest average runoff during the 20th century in the Central Valley basin.

5.4.1 Basis of Water Year Data

Table 5.3 Basis of water year data (Guidebook Table 27)
2010 Urban Water Management Plan
City of Ukiah

Water Year Type	Base Year(s)
Average Water Year	1962
Single-Dry Water Year	1976-77
Multiple-Dry Water Years	1990-1992

Charts 5.1 and 5.2 provide annual precipitation and the 25% driest years of record for reference.

5.4.2 Supply Reliability - Historic and Current Conditions

The following analysis assumes a 50% reduction in supply as a conservative estimate, consistent with the supply reduction scenario provided in Section *10632* of the California Water Code. Note that during the dry water years described in Table 5.3 above, the City did not experience a reduction in supply availability.

Tables 5.4 and 5.5 below describe the scenario set forth in the code section, including multiple dry water years and resulting reduction in the City's water supply.

Table 5.4 Supply reliability historic conditions (Guidebook Table 28)
2010 Urban Water Management Plan
City of Ukiah

Average Water Year	Single Dry Water Year	Multiple Dry Water Years			
		Year 1	Year 2	Year 3	Year 4
21,0121	10,506	10,506	10,506	10,506	10,506
Percent of Average Year2:	50.0%	50.0%	50.0%	50.0%	50.0%

Units: Acre-feet per Year

Notes:

1 21,012 is based on water available in 2011, and does not include potential future supply from recycled water.2. A 50% reduction of water supply is based on the value California Water Code Section 10632. As described in Section 5.1 above, it is unlikely that the City will experience a reduction in groundwater or surface water supply due to legal, environmental, water quality or climatic changes. The City's appropriative rights and the extensive groundwater storage within the Ukiah Valley groundwater basin ensure water supply reliability for the City.

Table 5.5 Supply reliability — current water sources (Guidebook Table 31)
2010 Urban Water Management Plan
City of Ukiah

Water supply sources[1]	Average Year Supply[2]	Multiple Dry Water Year Supply[2]		
		Year 2011	Year 2012	Year 2013
Russian River	16,507	8,254	8,254	8,254
Project Water	800	400	400	400
Groundwater	3,705	1,853	1,853	1,853
Percent of normal year:	100.0%	50.0%	50.0%	50.0%

Units: acre-feet per year

[1]From Table 4.2, 2010 available water supply sources. Does not include future potential recycled water supply.

[2] The analysis above assumes a 50% reduction in supply, as specified in Code Section 10632. Section 5.1 above describes that, in the unlikely event that the City's surface water supply is interrupted, water is available for diversion from groundwater storage in the extensive Ukiah Valley Groundwater Basin. Accordingly, it is unlikely that the City will be faced with a 50% reduction in supply.

5.4.3 Projected Normal Year Supply/Demand

Table 5.6	**Projected Normal Year Supply/Demand (Guidebook Table 32)** **2010 Urban Water Management Plan** **City of Ukiah**				
	2015	**2020**	**2025**	**2030**	**2035 - opt**
Supply totals (from Table 4.2)	21,615	21,895	22,175	22,735	23,295
Demand totals (From Table 11)	3,848	3,595	3,778	3,971	4,173
Difference	17,767	18,300	18,397	18,764	19,122
Difference as % of Supply	82%	84%	83%	83%	82%
Difference as % of Demand	462%	509%	487%	473%	458%
Units are in acre-feet per year.					

5.4.4 Projected Single Dry Year Supply/Demand

Table 5.7	**Supply and demand comparison — single dry year (Guidebook Table 33)** **2010 Urban Water Management Plan** **City of Ukiah**				
	2015	**2020**	**2025**	**2030**	**2035 - opt**
Supply totals[1]	10,808	10,948	11,088	11,368	11,648
Demand totals[2]	3,848	3,595	3,778	3,971	4,173
Difference	6,960	7,353	7,310	7,397	7,475
Difference as % of Supply	64%	67%	66%	65%	64%
Difference as % of Demand	181%	205%	193%	186%	179%
Units are in acre-feet per year. [1]*Assumes 50% reduction in supply, as directed by California Water Code Section 10632.* [2]*Demand totals provided by Carollo Engineering.*					

5.4.5 Projected Multiple Dry Year Supply/Demand

Table 5.8	**Supply and demand comparison — multiple dry-year events (Guidebook Table 34)** **2010 Urban Water Management Plan** **City of Ukiah**					
		2015	**2020**	**2025**	**2030**	**2035 - opt**
Multiple-dry year first year supply	**Supply totals[1]**	10,808	10,948	11,088	11,368	11,648
	Demand totals[2]	3,848	3,595	3,778	3,971	4,173
	Difference	6,960	7,353	7,310	7,397	7,475
	Difference as % of Supply	64%	67%	66%	65%	64%
	Difference as % of Demand	181%	205%	193%	186%	179%
Multiple-dry year second year supply	**Supply totals[1]**	10,808	10,948	11,088	11,368	11,648
	Demand totals[2]	3,848	3,595	3,778	3,971	4,173
	Difference	6,960	7,353	7,310	7,397	7,475
	Difference as % of Supply	64%	67%	66%	65%	64%
	Difference as % of Demand	181%	205%	193%	186%	179%
Multiple-dry year third year supply	**Supply totals[1]**	10,808	10,948	11,088	11,368	11,648
	Demand totals[2]	3,848	3,595	3,778	3,971	4,173
	Difference	6,960	7,353	7,310	7,397	7,475
	Difference as % of Supply	64%	67%	66%	65%	64%
	Difference as % of Demand	181%	205%	193%	186%	179%

Units are in acre-feet per year.

[1]Assumes 50% reduction in supply, as directed in the DWR UWMP Guidelines and Code Section 10632.

[2]Demand totals provided by Carollo Engineering.

EVALUATION OF WATER SUPPLY RELIABILITY

SUPPORTING CHAPTERS 4 AND 5 OF THE

2010 URBAN WATER MANAGEMENT PLAN

INTRODUCTION

The source of the City of Ukiah's (City) water right is Russian River Underflow which has several components including, Russian River (West Fork), ungaged tributary inflow, groundwater accretion, return flow, percolation of direct precipitation and natural flow from the East Fork Russian River and Eel River imports.

This analysis evaluates water supply reliability in the Russian River to meet the City's projected demand. The City's projected demand is met in part with water regulated in Lake Mendocino, the southernmost dam on the Russian River. Management of Lake Mendocino changes the volume of water in the Russian River at the City's points of diversion. Accordingly, outflow and water surface elevation of Lake Mendocino is used herein as a marker to evaluate both water supply reliability and the impact of the City's projected increased diversion.

The assumptions and supporting documentation used to evaluate water supply are provided below.

ASSUMPTIONS AND SUPPORTING DOCUMENTATION

SECTION 1: PROJECTED WATER USE

Projected Increased Diversions By The 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 the attached Figure 1. Peak water use in the City typically occurs in July, as demonstrated by Figure 2, which provides average monthly water use. The recent (2004 through 2010) monthly water use pattern by the City was used to project annual water use corresponding to 20 cfs in July. 20 cfs is the maximum diversion rate authorized by the City's permit pursuant to Application 15704 issued by the State Water Right's Board (predecessor to the State Water Board). Based on 20 cfs use in July and the average monthly water use pattern, the projected maximum annual use would be 8,700 acre-feet. Although the City has a pre-1914 water right for 2.8 cfs and also pumps percolating groundwater from at least one of its wells, the analysis assumes an ultimate demand of 20 cfs. The attached Table 1 provides a calculation of total annual diversion based on a peak July demand of 20 cfs.

To determine the effect the City's increased water use will have on water supply in the Russian River basin, return flow and depletion were estimated, as described below.

Estimated Depletion Resulting from City of Ukiah Water Use

Ukiah diverts using an infiltration gallery adjacent to the Russian River commonly referred to as the Ranney Collector, and using five wells situated through the City. Water diverted via the Ranney collector has an immediate impact on the Russian River flow. Water diverted via the

wells has an immediate effect on the aquifer, but not necessarily on the river. The following describes the relationship between the river and the Ukiah Valley aquifer during the dry and rainy seasons.

During the rainy season, a seasonal rise in the water table occurs as precipitation percolates and recharges the aquifer. Due to the increased water surface elevation in the aquifer, groundwater drains to the river, and the Russian River become an "influent stream." During the dry season, the water surface elevation of the aquifer declines, and water is lost from the river to the aquifer. This seasonal decline in the aquifer level is partly natural and partly accelerated by groundwater pumping. As the water table falls below the bottom of the river, the hydraulic connection is broken, and the river becomes an "effluent stream," losing water to the aquifer. As an effluent stream, the water loss rate from the river is independent of the depth to the aquifer. Rather, river loss is a function of phreatophyte use and the permeability of the clogging layer at the bottom of the streambed.

When the Russian River functions as an effluent stream, the lack of hydraulic continuity ensures that depletions to the aquifer do not affect river flows. The impact to the river occurs during the wet season, as the transition from an effluent stream to an influent stream is delayed until the aquifer is recharged. Accordingly, pumping from the groundwater basin does not impact Russian River flows during the dry season.

Balance Hydrologics conducted a study for the City of Ukiah that evaluated groundwater flow conditions near the wastewater percolation ponds. Based on observations made near the percolation ponds, the river was an effluent stream during the months of June through October and an influent stream in the other months, however, conditions will differ elsewhere. For example, at the south (downstream) end of Ukiah valley, the bedrock rises to the bottom of the river forcing water from the aquifer to the river, and it may be possible that at that location, the river is an influent stream throughout the year. However, that is several miles from Ukiah's wells.

To demonstrate connection between Ukiah's wells and river flow at the south end of the valley, a history of well-positioned monitoring wells and development of a basin-wide groundwater model would be required. For the investigation described herein, it was assumed that the Ukiah valley aquifer was disconnected from the river during the months of May through October and that depletions accumulated in the aquifer during those months would result in an equal volume of depletion to the river during the months of November, December and January.

Table 2 illustrates the method and assumptions utilized to estimate Ukiah's impact on Russian river flows, and ultimate depletion. All the units are in terms of percent of annual use. As an example, assume the disposition of 100 acre-feet of annual use. In April, 6.3 acre-feet is pumped from the aquifer (row a). Because the aquifer is flowing to the river, it is assumed to result in an equal amount of reduced river flow (row b). Of the 6.3 acre-feet, 4.9 acre-feet was assumed to be used indoors (row c), corresponding to the observed wintertime usage. The indoor use is treated and (generally) returned directly to the river in the wet season (row d). Outdoor use is determined by subtraction (row e) and it is assumed that 15 percent of that returns to the aquifer by deep percolation (row f). A study of irrigated area in the Ukiah water service area may show a greater rate of municipal irrigation return flow. The depletion to the river (row g) is then

calculated as the sum of effects on the river due to pumpage minus return flow from wastewater treatment and irrigation.

In the months of June through October, the water removed and returned to the aquifer (pumping, percolation ponds, irrigation percolation) does not affect the river. Those depletions are summed and added to the later depletions felt by the river in November, December and January. Figure 3 illustrates the monthly pattern of water use by Ukiah and resulting depletion to the Russian River. On an annual basis, the depletion is about 37 percent of the amount diverted.

The depletion calculated as described above will have effects on water supply in the Russian River basin. The depletion calculation was used in the model in addition to projections of Russian River hydrology to determine the impact of the City of Ukiah's pumping.

SECTION 2: PROJECTED FUTURE RUSSIAN RIVER HYDROLOGY

The historical hydrology of the Russian River, including Eel River imports from the Potter Valley Project, Lake Mendocino operations and minimum required instream Russian River flows were used to establish a baseline condition. However, historical events will not be repeated because of two significant regulatory changes, which have resulted in changes to management of the Russian River system and Lake Mendocino.

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. Subsequently, the Federal Energy Regulatory Commission (FERC) amended the hydroelectric license for the Potter Valley Project and in so doing, changed the volume of water imported from the Eel River to the Russian River. Both D-1610 and the FERC relicensing have had a significant impact on management of Lake Mendocino, specifically with respect to releases.

Accordingly, the analysis herein incorporates historic data, and applies anticipated management decisions with respect to minimum instream flow in the Russian River and exports from the Eel River.

The following describes the assumptions and supporting information used to project Russian River hydrology.

Evaluation of Future Eel River Imports

The East Fork of the Russian River receives imports from the Eel River via the Potter Valley Project, a tunnel operated by PG&E which joins the Eel River downstream of Lake Pillsbury to the Russian River at Potter Valley, upstream of Lake Mendocino. The Potter Valley Project imports are shown in Table 3, excluding the portion delivered to the East and West canals of the Potter Valley Irrigation District on the Russian River. Historically, about 138,000 acre-feet per year is delivered to the Russian River and detained in regulatory storage in Lake Mendocino. Total Lake Mendocino monthly inflow as reported by the US Army Corps of Engineers

(USACE) averaged about 250,100 acre-feet per year, as shown on Table 4. Accordingly, imports from the Eel River have historically comprised just over half the inflow to Lake Mendocino. However, future imports from the Eel River are not likely to follow historical patterns due to conditions included in the FERC license issued for the Potter Valley Project.

In 2004, FERC amended the hydropower license for the Potter Valley Project, specifying new operating criteria for minimum streamflows on the Eel River and allowable exports through the Potter Valley Project tunnel. Minimum allowable exports range from 5 cfs to 75 cfs, depending on the season and water year type. Although the license appears to allow discretionary exports through the tunnel, Condition E5 directs that exports in excess of the minimum flow specified can only be made when the water surface elevation in Lake Pillsbury (at the headwaters of the Eel River) is above target storage curves specified in the FERC license. However, the target water levels in the license exceed the maximum storage allowed by the State Division of Safety of Dams during early March through mid-July. Accordingly, FERC license Condition E5 effectively eliminates the possibility of exporting discretionary flows through the tunnel from March 7 through July 16, and perhaps during the remainder of the year, since it requires that Pillsbury contents be above the FERC target. Figure 4 illustrates the Lake Pillsbury maximum allowable storage and FERC storage targets.

For purposes of estimating exports from the Eel River, we have assumed that Potter Valley Project exports will be replicated in the future as they were historically, except for the period of March 7 through July 16, when only the required minimum flow will be exported. This projection shows an average annual Potter Valley Project import to East Fork of the Russian River of about 102,300 acre-feet, or 26 percent less than historical.

Accordingly, supply reliability for the City of Ukiah was evaluated assuming average Eel River exports of 102,300 acre-feet per year. Figure 5 shows how the projected Potter Valley Project imports to the East Fork of the Russian River compare to the historical import on an annual basis.

Once exported, the water enters Lake Mendocino, and is subject to regulatory and operational constraints as described in the following section.

Lake Mendocino Operational Analysis

The Lake Mendocino operational analysis incorporates the existing regulations governing minimum instream flow requirements in the Russian River downstream of Lake Mendocino. As instream flow requirements below the confluence with Dry Creek (near Healdsburg), are met using water stored in Lake Sonoma, requirements below Healdsburg do not affect operation of Lake Mendocino. Accordingly, the Lake Mendocino operations model does not incorporate Lake Sonoma and the lower river reaches or the Russian River. Rather, the model evaluates the Lake Mendocino water surface elevation as impacted by minimum instream flow requirements in the Russian River above the confluence with Dry Creek.

Minimum Streamflow Requirements on the Russian River

State Water Resources Control Board Decision 1610 (D-1610) specifies minimum instream flows on the Russian River conditioned on inflow to and storage in Lake Pillsbury and on storage

in Lake Mendocino. Flow rates in D-1610 range from as low as 25 cfs in a critically dry month to as high as 185 cfs in the spring with high reservoir levels. D-1610 was issued pursuant to permits for diversion held by the Sonoma County Water Agency (SCWA), and has been in effect since 1986. However, SCWA was directed by the September 24, 2008 Biological Opinion (BO) issued pursuant to the Endangered Species Act for anadromous salmonids in the Russian River to file a petition with the State Water Board to amend D-1610.

As a directed in the BO, SCWA has filed a Petition and an Urgency Petition with the State Water Board for the purpose of reducing minimum flows for the Russian River above Dry Creek. The Petition requests that minimum instream flows during the months of June through October of an average water year be reduced from 150 or 185 cfs (depending on hydrological conditions) to 125 cfs. The State Water Board has not yet acted on this Petition, however, with respect to operation of Lake Mendocino and minimum instream flows, SCWA has been directed to operate under the terms of the BO.

This analysis uses historical inflow to Lake Pillsbury and historical contents in Lake Pillsbury and Lake Mendocino to calculate required minimum streamflows in the Russian River upstream of Dry Creek under both D-1610 and as requested in the BO. This calculation was applied to the full study period of 1961 through 2009, as if D-1610, signed April, 1986, was in effect for the entire period.

Lake Mendocino Flood Control Operations

USACE operates Lake Mendocino to reduce flood damages downstream by minimizing the amount and duration of water stored in the reservoir above the top of conservation pool. The top of conservation pool has been defined since 2002 as follows:

- 68,400 acre-feet from the first of November through the end of February and
- 86,400 acre-feet from the first of April through the middle of October.

Figure 6 illustrates the historical content and top of conservation pool in Lake Mendocino since January 2000. Note that occasional encroachment of storage above the top of conservation pool is allowed to ameliorate flooding downstream of the reservoir. Note also the greater conservation storage allowed prior to 2002. For many years prior to 2002, the top of conservation pool was 72,300 acre-feet during the flood season and 91,000 acre-feet outside of the flood season. Finally, note that since the beginning of April 2010, the reservoir content has been far above the 86,400 acre-feet top of conservation pool. This higher summertime storage volume is in response to a request from SCWA, as indicated in Water Control Diagram found in the 2004 USACE Water Control Manual for Coyote Valley Dam. Insufficient information exists to determine whether this deviation from prior operations is a permanent change.

In the modeling, the 2002 – 2009 evaluation implements the top of conservation storage rule. Because encroachment of storage into the flood control space is a discretionary action, it was not modeled. This approach does not affect the objectives of this evaluation, since the flood flows cannot be held to bolster supplies in the dry season, but will be passed downstream within days.

Dry Season Release from Lake Mendocino

Water is released from Lake Mendocino to satisfy the following:

- senior water right holders,
- D-1610 minimum streamflow requirements,
- SCWA water intake below Dry Creek,
- river losses in meeting the above described objectives.

An evaluation of historical releases from Lake Mendocino to cover Russian River losses and required minimum river flow is included below to properly model future dry season releases from Lake Mendocino.

Historical River Loss

The Russian River flows through the Ukiah Valley, Sanel Valley, and Alexander Valley on its way from the Forks to the confluence with Dry Creek. During the dry season, the water surface elevation of the aquifers beneath the valleys declines, and water is lost from the river to the aquifer. To replace the river water lost to the aquifer and maintain the required minimum instream flow from the Fork to Dry Creek, SCWA releases water from Lake Mendocino.

River losses are approximated by comparing USGS gage records at the Fork (the sum of two gages), Hopland, Cloverdale and Healdsburg, and calculating loss between the gages. Figure 7 shows the average daily river loss from the Forks to Healdsburg over the last two decades (since D-1610 was signed). The total average loss (i.e., the summation of the area under the curve) is about 16,000 acre-feet. The analysis uses daily historical river loss to project future river losses.

In addition to releases necessary to replace river losses, excess dry season releases are required to meet minimum instream flow requirements as described below.

Excess Dry Season Release from Lake Mendocino

Excess dry season releases from Lake Mendocino are required because the D-1610 minimum instream flow rate is considered an instantaneous rather than running mean requirement. Accordingly, additional water is released to ensure that the instantaneous instream flow meets the D-1610 minimum requirement.

The historical excess flow satisfied through Lake Mendocino was evaluated by examining the historical record of gaged river flow and comparing that against the concurrent D-1610 flow requirement. As previously described, SCWA diversions downstream of Dry Creek are met principally from Lake Sonoma releases, and accordingly, this analysis does not consider dry season releases from Lake Mendocino greater than the minimum streamflow requirement above the confluence with Dry Creek plus the river loss. The following describes the results of the evaluation of river flow data.

Figure 8 provides exceedence curves for each month, May through November, showing the flow in the Russian River in excess of the D-1610 requirement attributable to Lake Mendocino

releases. The highest flow rates corresponded to wet conditions when water needed to be evacuated from the reservoir. The times of zero excess actually represent deficit, i.e., the minimum flow requirement was not met. It can be seen that there are many days of excess release in the 10 to 40 cfs range. Because the D-1610 flow rate requirement is considered an instantaneous requirement rather than a running mean requirement, there is a need to release more than exact requirement.

Figure 9 demonstrates the historical consecutive day change in river loss between the Forks and Healdsburg. This is an indication of the rate of change that needs to be anticipated. The higher values correspond to the falling limb of storm hydrographs. The rate of river loss through the bed of the river channel will not change dramatically from day to day. Thus, the dry month curves (August, September) show the least change in net loss from one day to the next. Based on this figure, it was decided that 30 cfs was ample allowance for excess release from Lake Mendocino.

Summary of Downstream Demand Used in the Lake Mendocino Operational Analysis

The Lake Mendocino operational analysis incorporates the following components into the estimate of downstream demand for the dry season of May through November:

1. The required minimum streamflow,
2. The historical river loss experienced on that day,
3. The historical excess release on that day capped at no more than 30 cfs.

A portion of the downstream demand is met by West Fork flows; the balance is met by modeled release from Lake Mendocino. Figures 10 and 11 summarize the modeled average monthly downstream demand.

EVALUATION OF WATER SUPPLY RELIABILITY

The evaluation of water supply reliability incorporates the following assumptions, summarized below:

1. Potter Valley Project imports to the East Fork of the Russian River were incorporated as follows:
    a. The July 17 through March 6 imports are based on historical import values, as provided in Table 2
    b. The March 7 through July 16 imports are based on the minimum rate required by the FERC license during the period
2. The model applied the top of conservation storage from the period 2002 through 2009 at Lake Mendocino.
3. The model applied a downstream demand during the dry season that included the following:
    a. Minimum required streamflow,
    b. The historical river loss, and

c. The historical excess release from Lake Mendocino (up to 30 cfs).

Available Water: Lake Mendocino Projected Outflow

Lake Mendocino projected outflow was estimated based on the components described in Section 2. For the purpose of determining whether sufficient water is available in Lake Mendocino to meet the City's projected increase in demand, the existing demand and the projected demand are compared using anticipated future operations of Lake Mendocino.

Scenarios modeled are described below:

Scenario	Streamflow Requirements	Ukiah Water Use
A	D-1610	Existing Max (4,200 af/yr)
B	D-1610	Projected (8,700 af/yr)
C	Biological Opinion	Existing Max (4,200 af/yr)
D	Biological Opinion	Projected (8,700 af/yr)

The Scenarios are shown on the Figure 12, and indicate that sufficient water is available to the City to meet projected increases in demand regardless of the streamflow requirements.

The determine the impact of the increased demand on the Russian River system, as demonstrated by reduction in water surface elevation in Lake Mendocino, as more water is released to satisfy the City, and additional evaluation was conducted, as described below.

Impact of Increased City Diversion on the Russian River System

As flows in the Russian River system are controlled to some degree by releases from Lake Mendocino, a significant reduction in water surface elevation and storage in Lake Mendocino could result in reduced flows in the Russian River. Accordingly, existing water use and projected water use were evaluated with respect to the Russian River hydrology to determine whether a change in water surface elevation would result from the City's increased diversion.

The four Scenarios evaluated are described below:

Scenario	Streamflow Requirements	Ukiah Water Use
A	D-1610	Existing Max (4,200 af/yr)
B	D-1610	Projected (8,700 af/yr)
C	Biological Opinion	Existing Max (4,200 af/yr)
D	Biological Opinion	Projected (8,700 af/yr)

The results of the evaluation are provided on Figure 13, and indicate no change in water surface elevation, except during the month of November. When comparing Scenarios C and D, a difference of two-tenths of a foot (0.2 ft) occurs in November, as a result of the City's increased water diversion. At the projected Lake elevation, 0.2 ft represents about 0.6 percent of the reservoir volume.

Accordingly, the model demonstrates that the impact on lake storage attributable to Ukiah's increased water use is negligible.

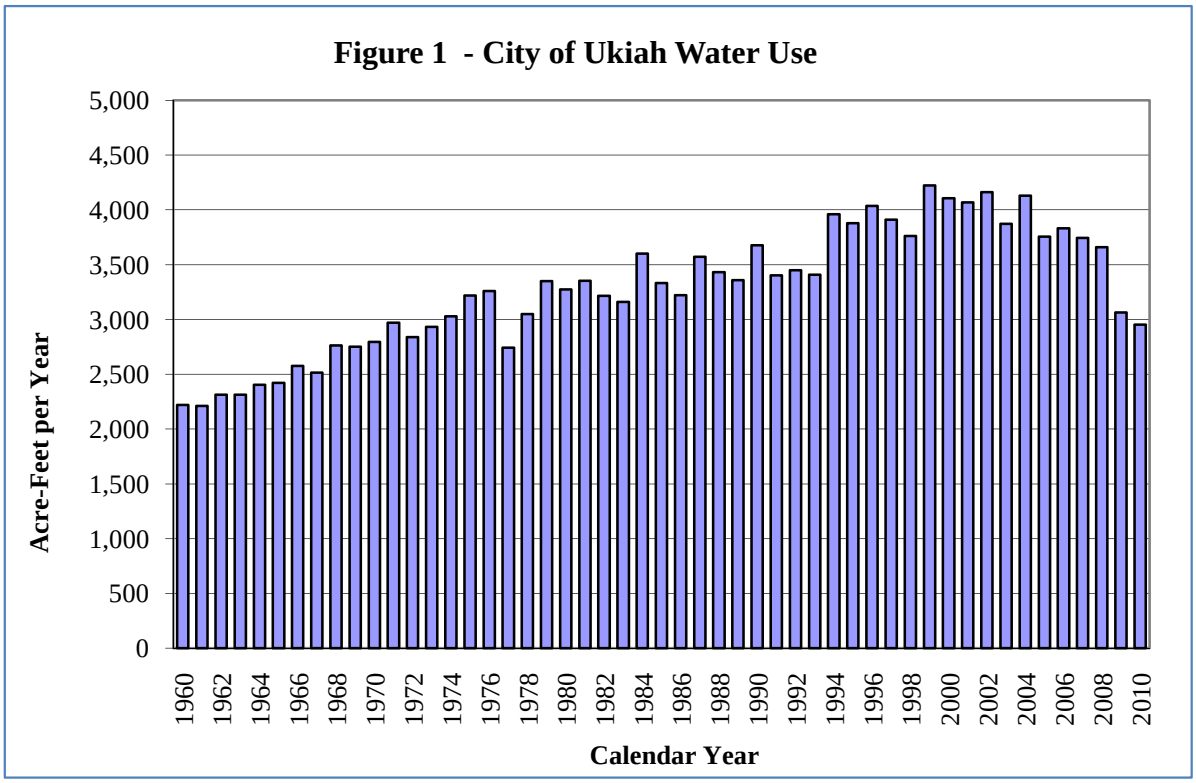


Figure 1 - City of Ukiah Water Use
Acre-Feet per Year
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Calendar Year

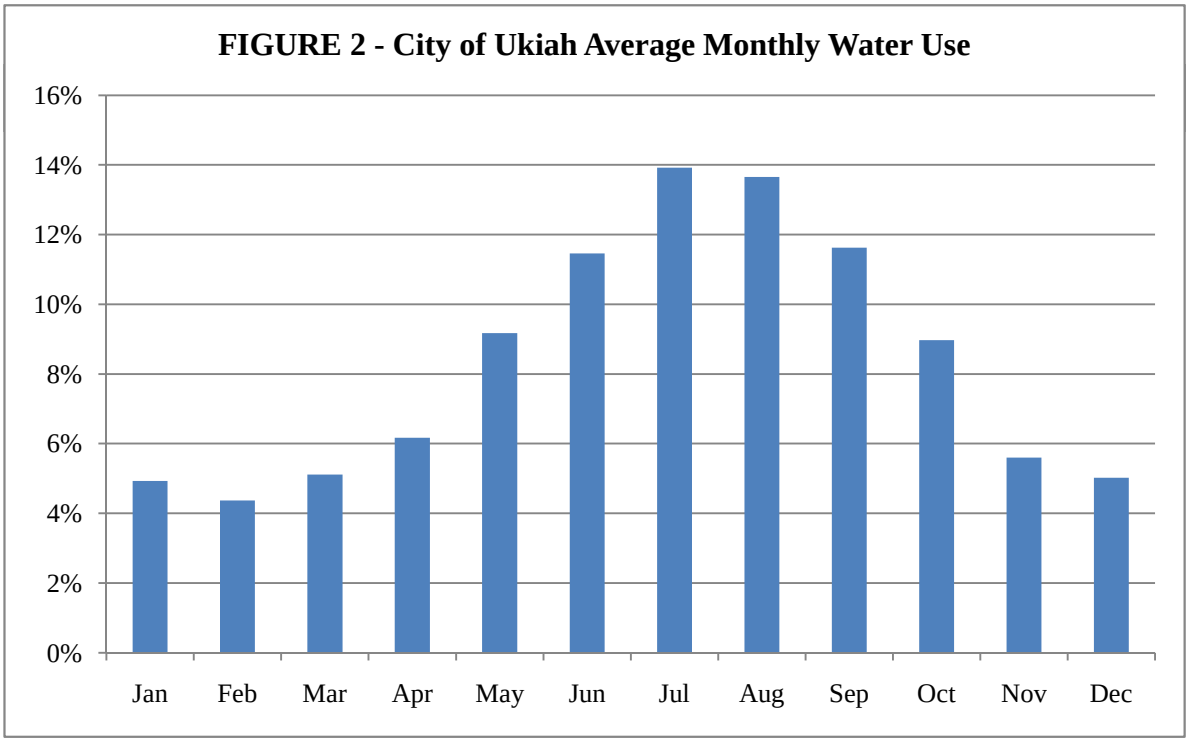


FIGURE 2 - City of Ukiah Average Monthly Water Use
16%
14%
12%
10%
8%
6%
4%
2%
0%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

Figure 3 - City of Ukiah Monthly Pattern of Pumping and Resulting Depletion to Russian River

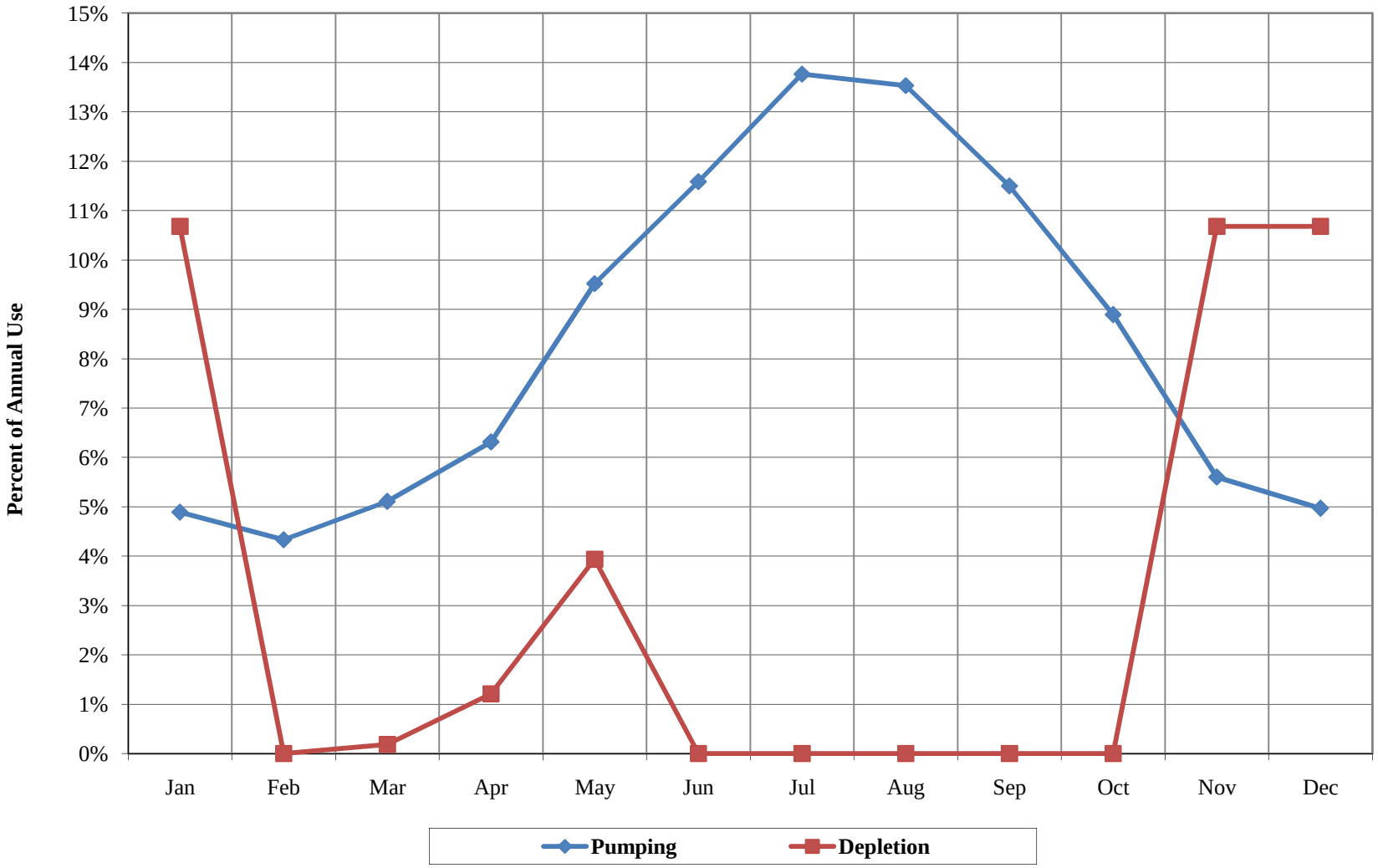
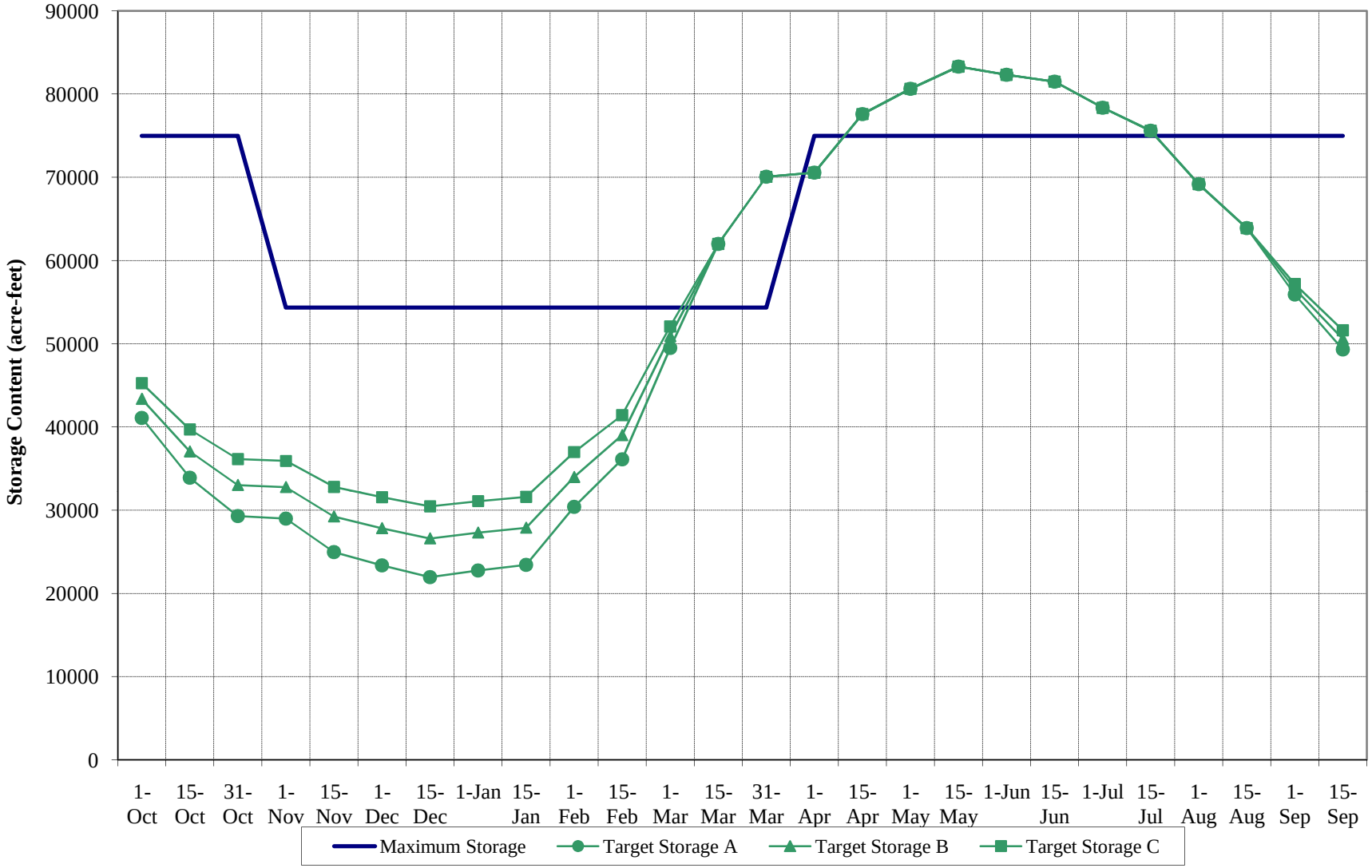


Figure 4 - Lake Pillsbury Target and Maximum Storage



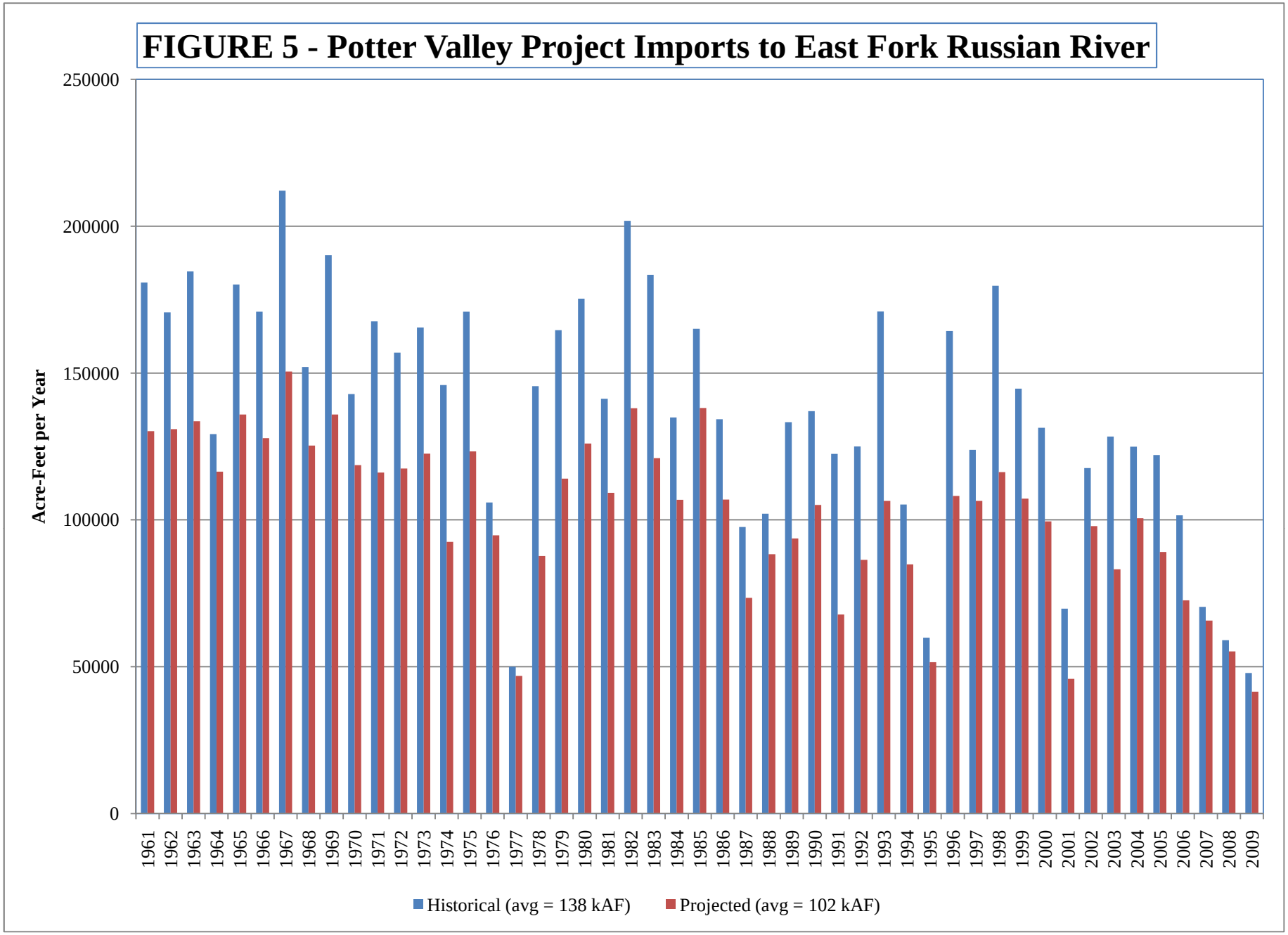
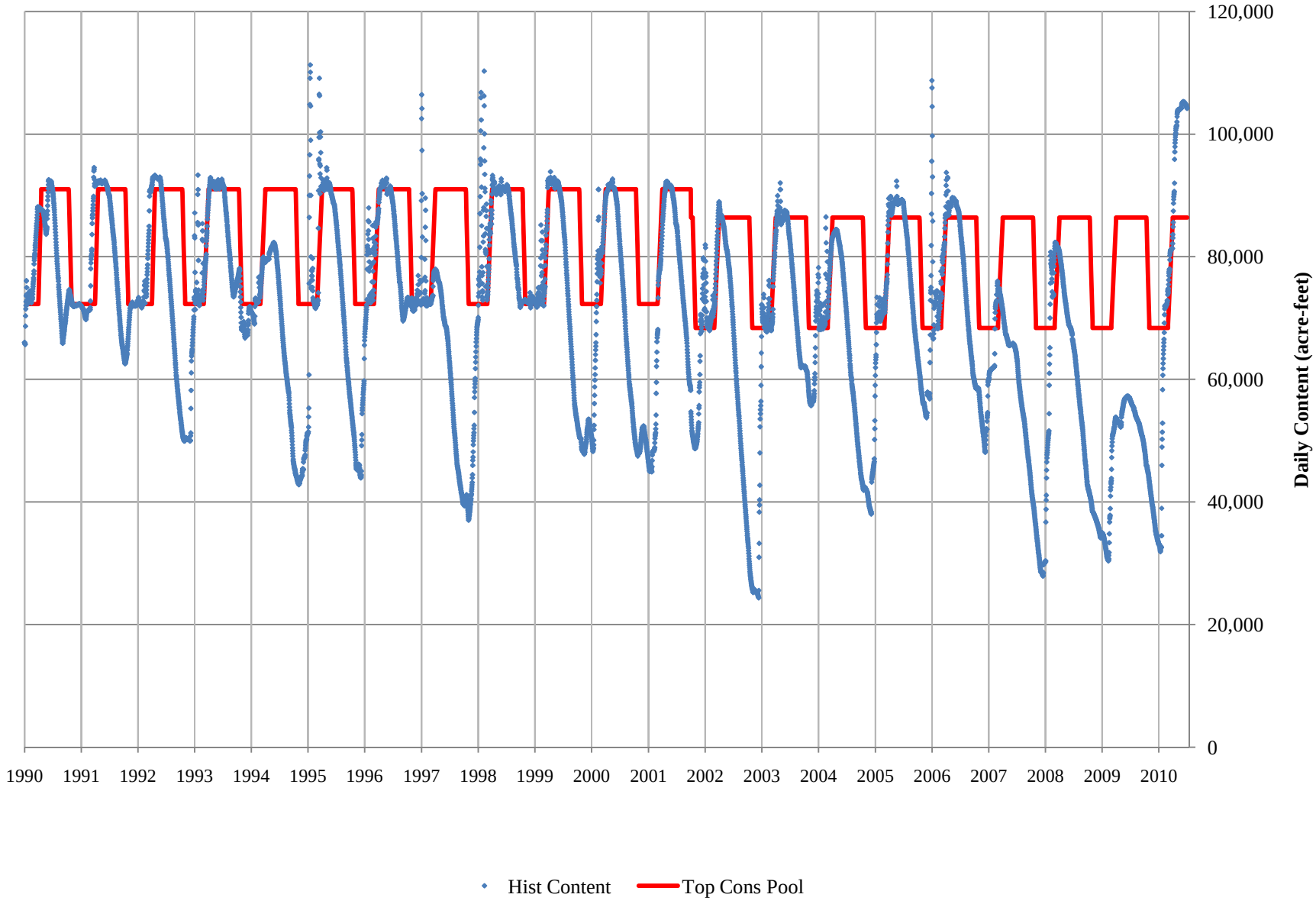


FIGURE 5 - Potter Valley Project Imports to East Fork Russian River
Acre-Feet per Year
250000
200000
150000
100000
50000
0
1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009
Historical (avg = 138 kAF)
Projected (avg = 102 kAF)

FIGURE 6 - Historical Lake Mendocino Content



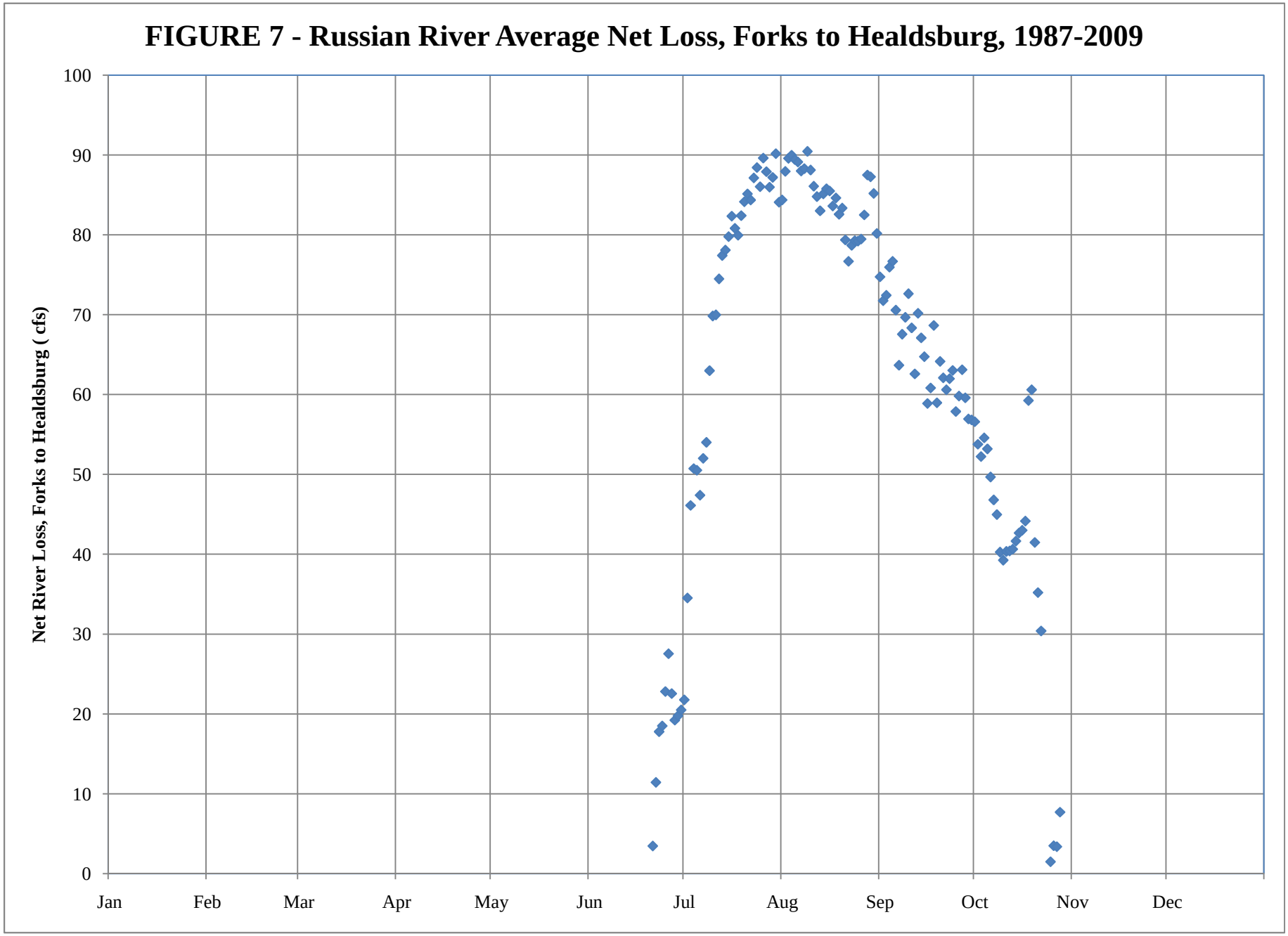
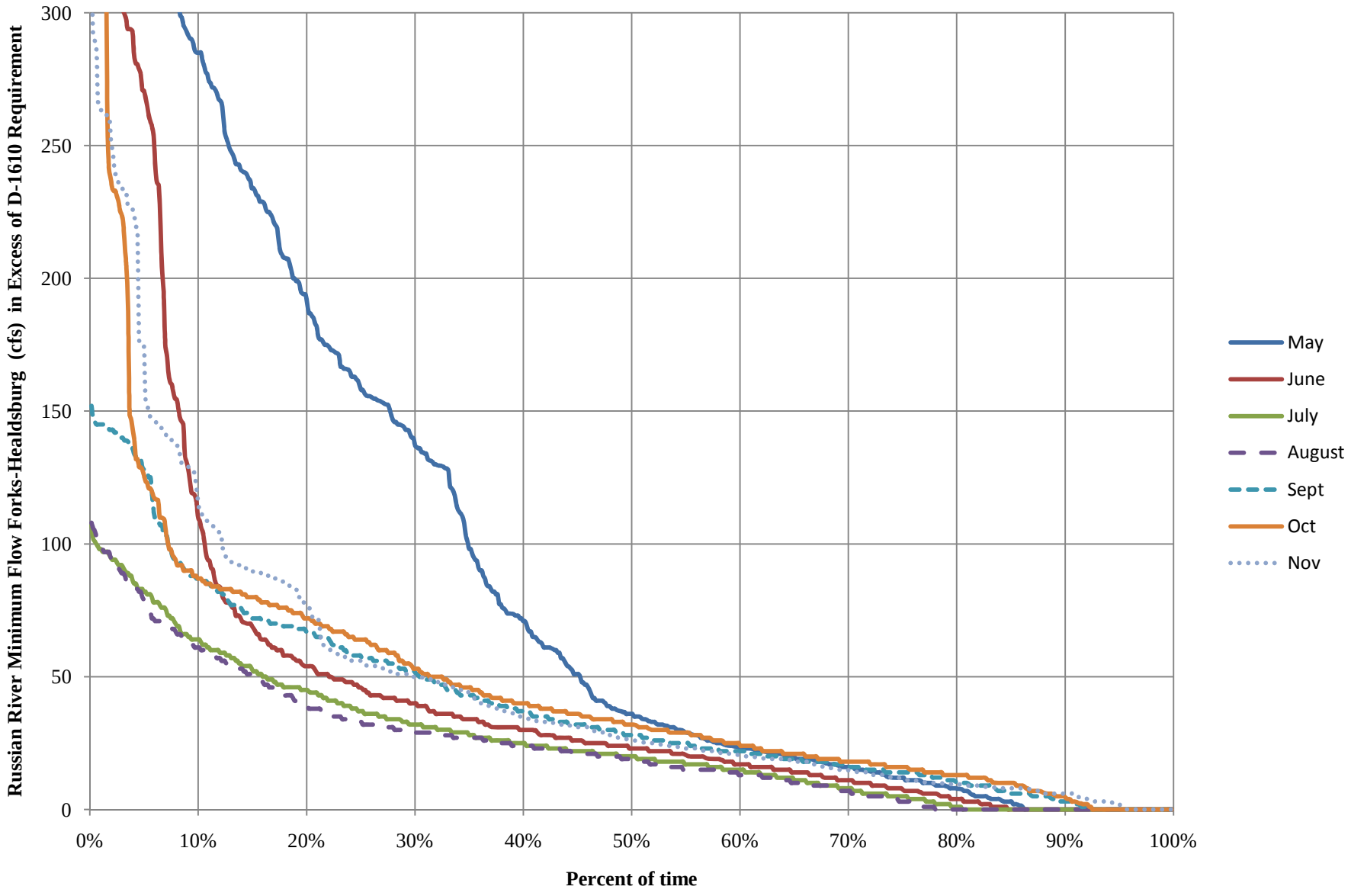


FIGURE 7 - Russian River Average Net Loss, Forks to Healdsburg, 1987-2009
Net River Loss, Forks to Healdsburg (cfs)
100
90
80
70
60
50
40
30
20
10
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

FIGURE 8 - Historical Russian Minimum River Flow in Excess of D-1610 Requirement Attributable to Release from Lake Mendocino, 1988-2006



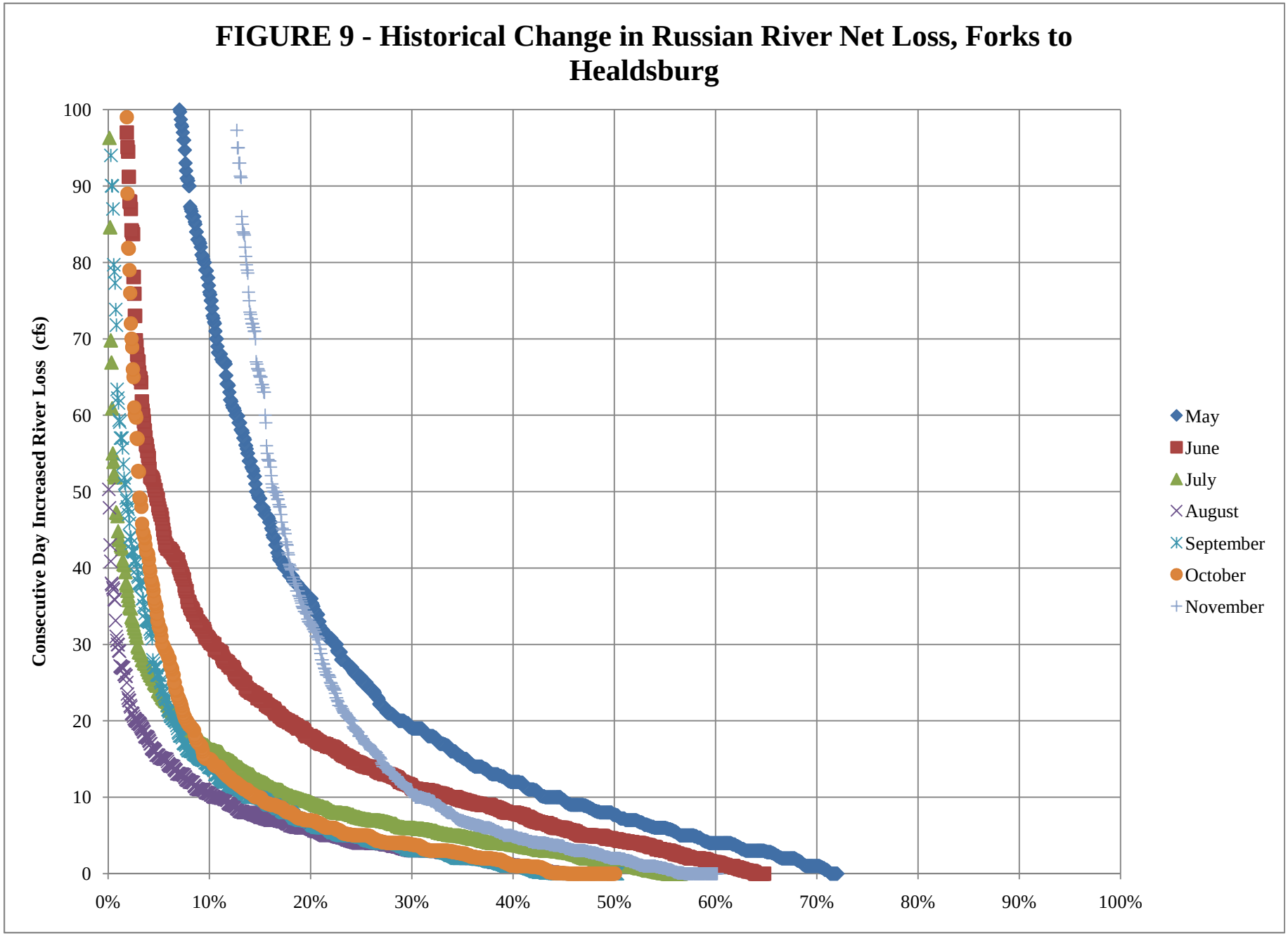


FIGURE 9 - Historical Change in Russian River Net Loss, Forks to Healdsburg
Consecutive Day Increased River Loss (cfs)
100
90
80
70
60
50
40
30
20
10
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
May
June
July
August
September
October
November

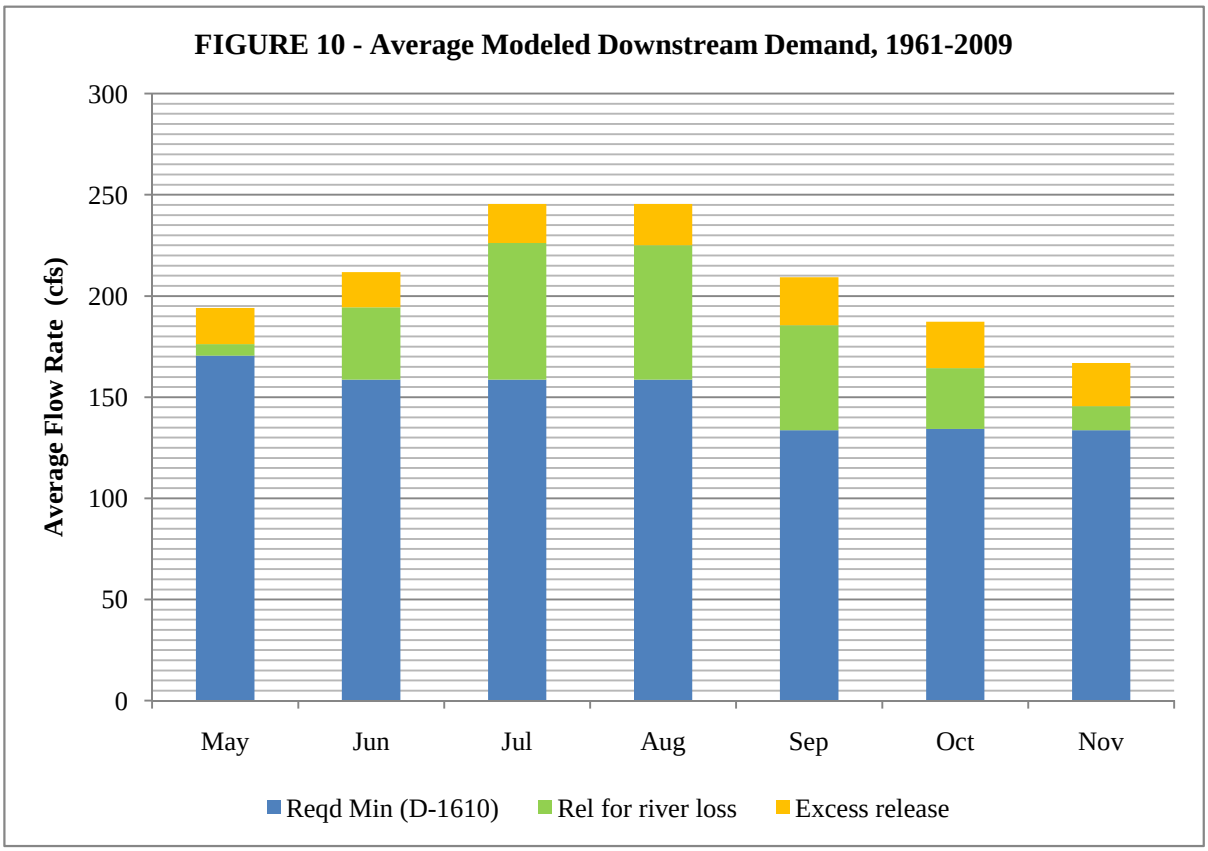


FIGURE 10 - Average Modeled Downstream Demand, 1961-2009
Average Flow Rate (cfs)
300
250
200
150
100
50
0
May
Jun
Jul
Aug
Sep
Oct
Nov
Reqd Min (D-1610)
Rel for river loss
Excess release

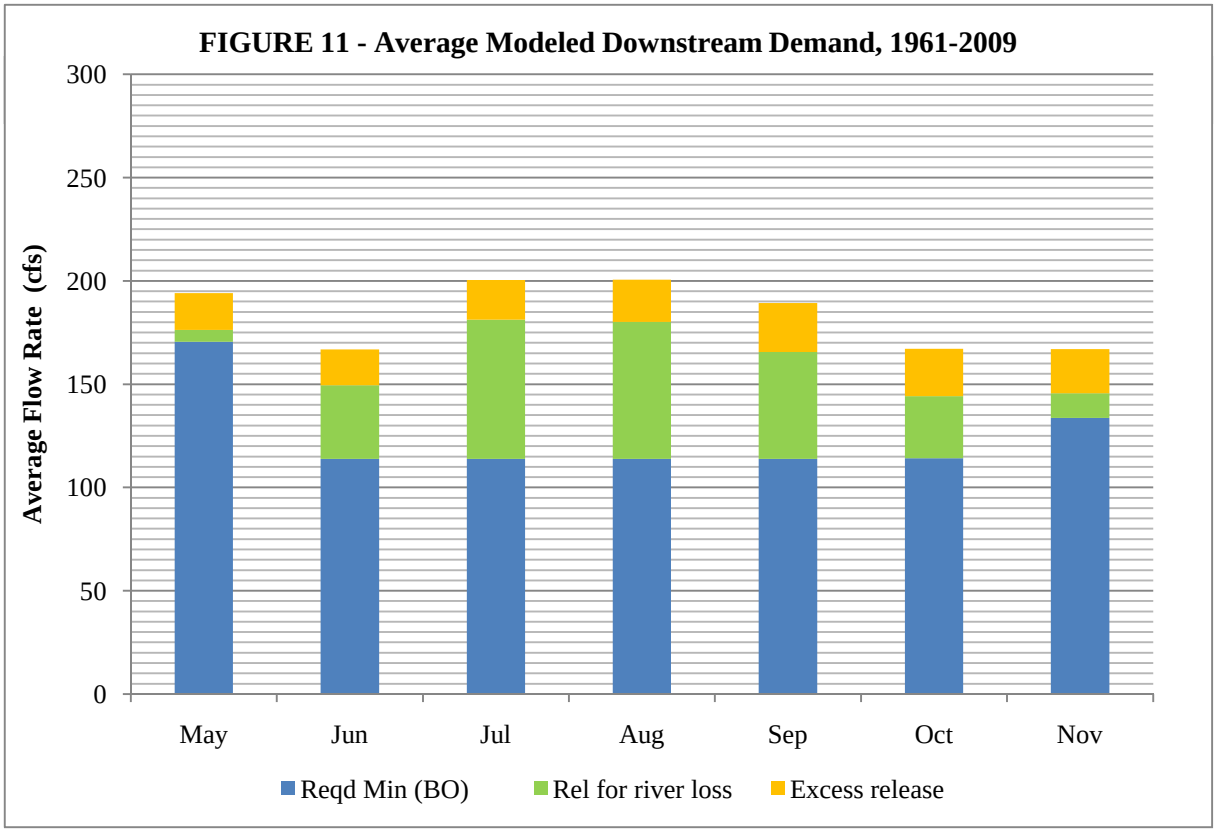


FIGURE 11 - Average Modeled Downstream Demand, 1961-2009
Average Flow Rate (cfs)
300
250
200
150
100
50
0
May
Jun
Jul
Aug
Sep
Oct
Nov
Reqd Min (BO)
Rel for river loss
Excess release

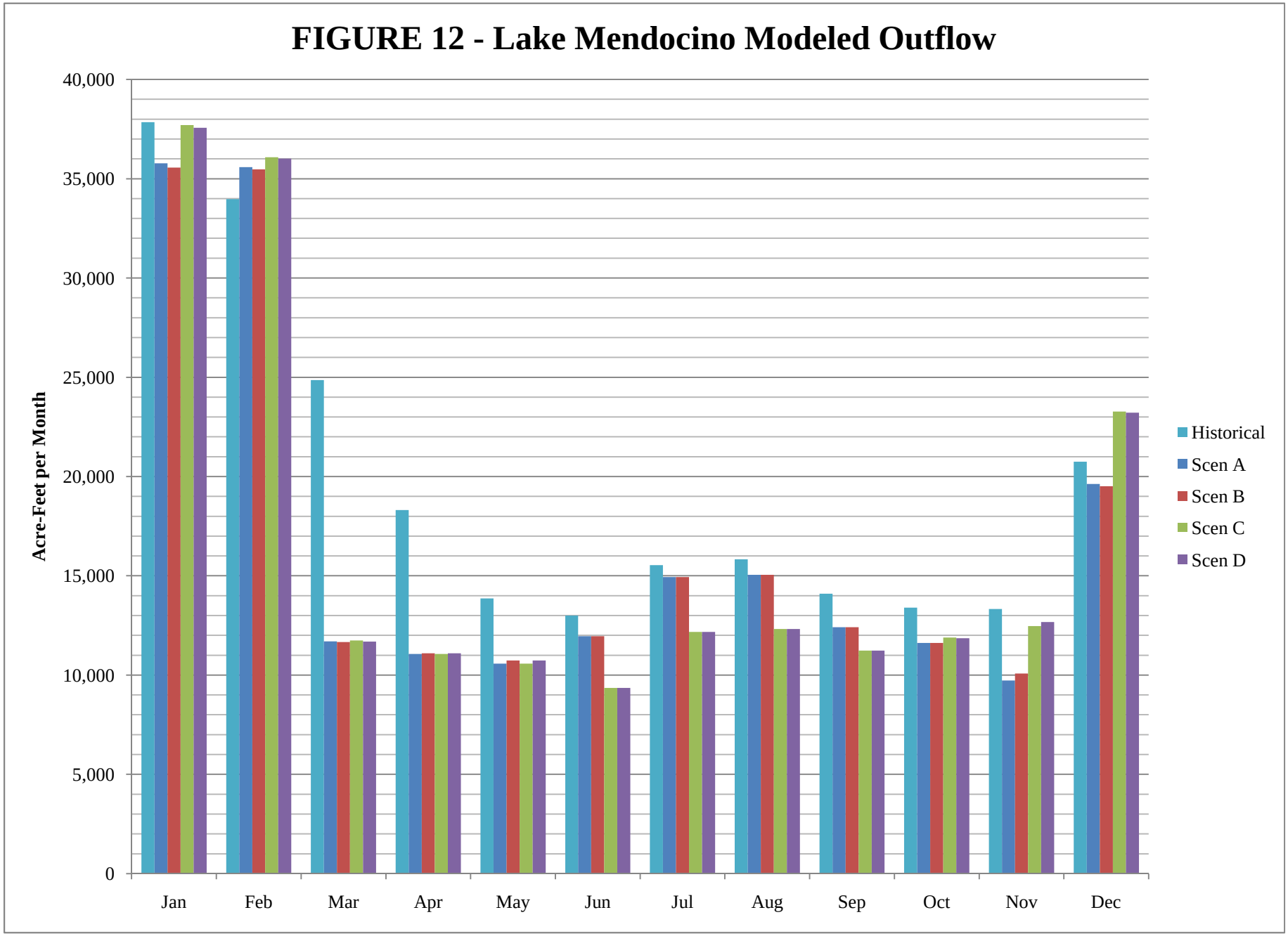


FIGURE 12 - Lake Mendocino Modeled Outflow
Acre-Feet per Month
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Historical
Scen A
Scen B
Scen C
Scen D

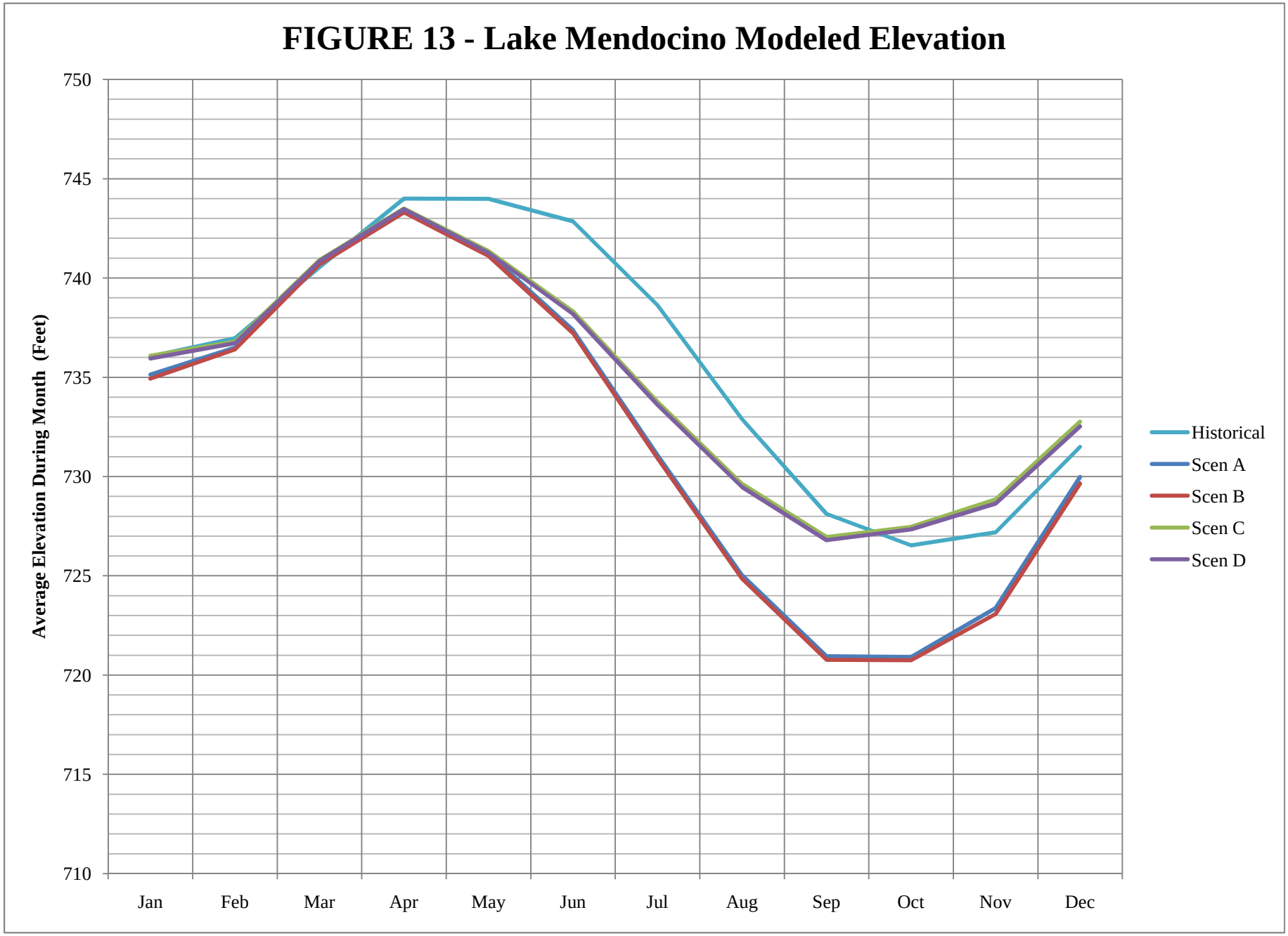


FIGURE 13 - Lake Mendocino Modeled Elevation
Average Elevation During Month (Feet)
750
745
740
735
730
725
720
715
710
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Historical
Scen A
Scen B
Scen C
Scen D

Table 1

Projected Total Annual Diversion
Pursuant to Permit 12952 (Application 15704)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Avg. Monthly Water Use (%)	4.9%	4.4%	5.1%	6.2%	9.2%	11.5%	13.9%	13.7%	11.6%	9.0%	5.6%	5.0%	100.0%
Diversion Rate (cfs)	7.1	6.3	7.4	8.9	13.2	16.5	20	19.6	16.7	12.9	8.1	7.2	--
Diversion Volume (af)	435	349	452	528	811	980	1,230	1,206	994	793	479	444	8,700

Table 2 - Estimated Annual Depletion

	Action	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Note
a	Pumped from Aquifer (% of annual use)	4.9%	4.4%	5.1%	6.2%	9.2%	11.5%	13.9%	13.7%	11.6%	9.0%	5.6%	5.0%	100.0%	
b	Pumping Effect on River	24.8%	4.4%	5.1%	6.2%	9.2%	0.0%	0.0%	0.0%	0.0%	0.0%	25.5%	24.9%	100.0%	Jun-Oct delayed to Nov-Jan
c	Indoor Use (% of annual use)	4.9%	4.4%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	58.6%	'a' in January
d	Indoor Use Return to River (% of annual use)	12.3%	4.4%	4.9%	4.9%	4.9%	0.0%	0.0%	0.0%	0.0%	0.0%	12.3%	12.3%	56.1%	Jun-Oct delayed to Nov-Jan; 10% loss in perc ponds
e	Outdoor Use (% of annual use)	0.0%	0.0%	0.2%	1.2%	4.2%	6.5%	9.0%	8.7%	6.7%	4.0%	0.7%	0.1%	41.4%	a - c
f	Outdoor Use Return to Aquifer (% of annual use)	1.7%	0.0%	0.0%	0.2%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%	1.8%	6.9%	15% return flow; Jun-Oct delayed to Nov-Jan
g	Depletion to River (% of annual use)	10.7%	0.0%	0.2%	1.1%	3.6%	0.0%	0.0%	0.0%	0.0%	0.0%	10.7%	10.7%	37.0%	b - d - f

TABLE 3

Historical Potter Valley PowerHouse Import to East Fork of the Russian River[1]

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1961	15,810	18,001	18,570	18,175	16,336	18,466	17,829	17,504	10,781	6,025	6,130	17,236	180,865
1962	18,543	13,426	18,458	18,871	16,693	18,466	16,645	7,289	8,691	11,764	11,976	9,871	170,694
1963	16,941	18,319	18,415	18,397	16,759	16,066	17,514	17,254	11,563	10,808	11,585	10,959	184,578
1964	12,896	16,176	18,022	18,568	17,102	14,729	3,693	3,064	2,345	6,500	7,233	8,904	129,232
1965	16,498	18,146	15,536	18,496	16,878	9,346	17,291	17,623	10,880	11,726	12,164	15,568	180,154
1966	17,398	10,770	13,613	18,506	16,812	17,794	17,962	13,170	6,189	10,800	11,843	16,040	170,897
1967	18,821	17,317	18,794	18,826	16,907	17,798	17,716	17,859	16,482	16,996	17,272	17,302	212,089
1968	15,723	10,414	17,834	18,621	17,421	18,474	11,057	3,590	5,148	11,230	11,319	11,244	152,076
1969	16,657	17,638	17,907	17,745	16,019	17,770	16,802	17,438	13,471	11,292	11,522	15,838	190,098
1970	17,817	14,901	12,940	17,842	16,362	17,685	5,980	4,700	6,449	6,535	7,130	14,511	142,853
1971	16,850	15,956	18,772	18,687	17,110	18,740	16,556	17,855	13,554	4,558	2,284	6,666	167,587
1972	9,552	10,506	15,182	18,479	13,218	17,970	15,520	13,850	4,182	13,345	9,437	15,733	156,973
1973	16,727	17,787	12,268	16,810	16,796	16,869	18,144	13,713	6,945	7,380	7,273	14,785	165,499
1974	6,254	1,445	18,829	15,700	13,600	17,718	17,849	17,833	14,734	4,708	3,780	13,466	145,917
1975	17,240	17,158	16,318	15,529	14,247	17,100	16,284	16,173	11,469	7,011	6,509	15,870	170,910
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	4,439	10,974	16,279	19,206	18,191	19,446	15,256	5,934	3,208	4,843	9,899	7,186	134,861
1985	18,770	18,126	18,437	18,861	17,227	19,414	12,107	2,749	5,809	9,163	7,725	16,705	165,093
1986	18,490	9,667	15,656	14,291	13,946	19,240	10,603	5,658	6,055	6,033	5,678	8,951	134,268
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
2007	10,586	2,646	8,153	9,701	6,605	4,312	3,227	5,026	5,098	5,478	5,133	4,409	70,376
2008	3,160	2,396	2,646	9,116	7,700	4,080	2,495	4,336	6,050	5,935	5,968	5,135	59,017
2009	3,828	2,608	2,555	2,428	1,521	4,796	3,001	5,336	5,693	5,760	5,786	4,518	47,830
Average	12,678	11,821	13,216	14,177	13,676	15,259	12,601	11,073	8,535	7,431	7,319	10,210	137,996

Notes:

Source: Water Year 1976-83, 1987-2009 USGS Gage #11471099

Water Year 1961-1975, 1984-86 estimated as USGS #11471000 reduced to reflect portion to Potter Valley Irrigation District

TABLE 4

Lake Mendocino Historical Inflows (acre-feet)

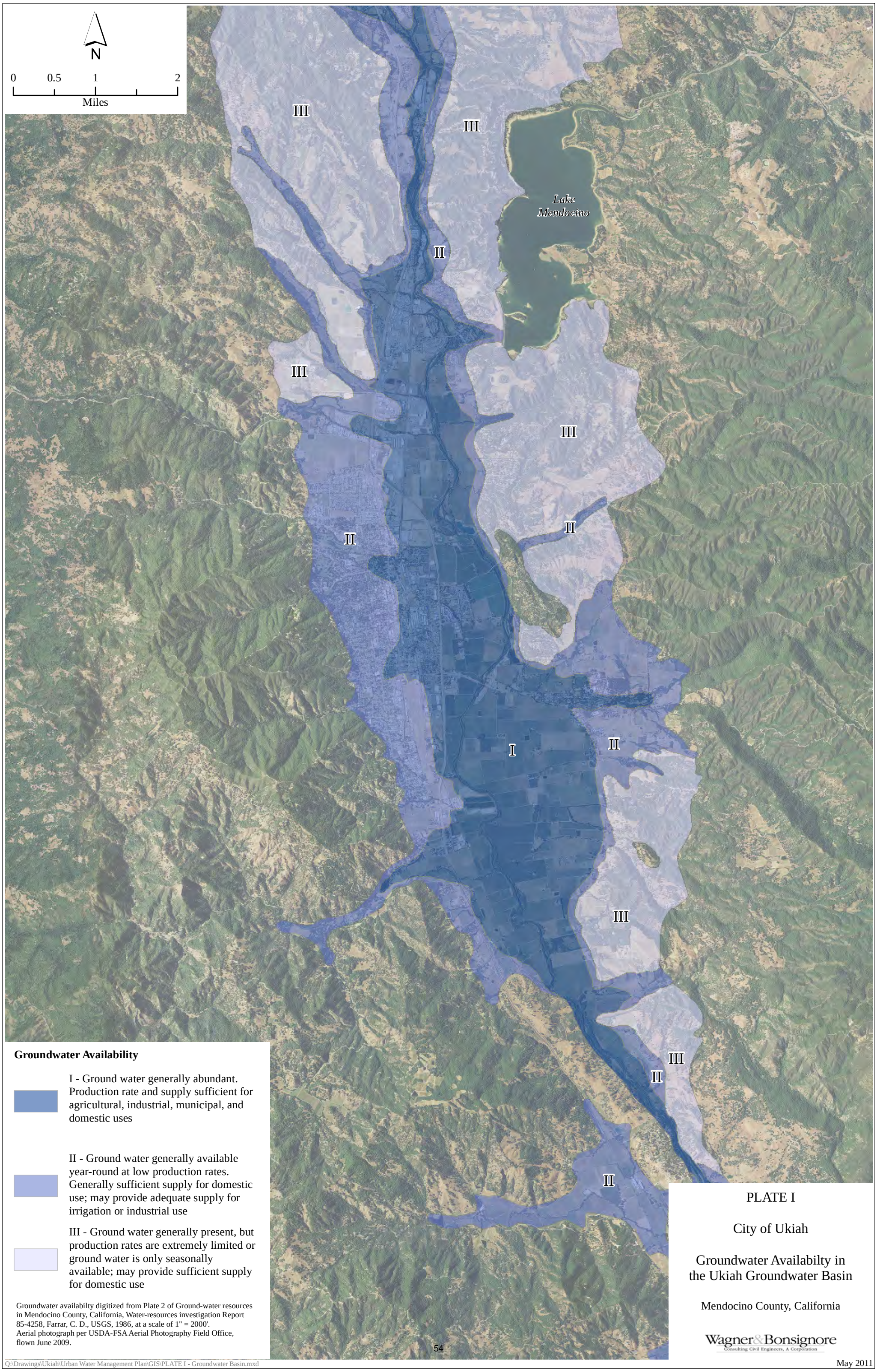
Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1961	15,291	19,353	35,969	21,350	41,842	42,435	22,203	20,265	9,826	4,320	4,985	16,132	253,971
1962	17,572	14,573	26,744	23,752	47,408	43,770	20,896	7,835	7,942	10,217	10,630	8,803	240,140
1963	22,237	19,067	30,506	23,463	37,885	29,104	52,604	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

TABLE 4

Lake Mendocino Historical Inflows (acre-feet)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
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.



Groundwater Availability

I - Ground water generally abundant. Production rate and supply sufficient for agricultural, industrial, municipal, and domestic uses

II - Ground water generally available year-round at low production rates. Generally sufficient supply for domestic use; may provide adequate supply for irrigation or industrial use

III - Ground water generally present, but production rates are extremely limited or ground water is only seasonally available; may provide sufficient supply for domestic use

Groundwater availabilty digitized from Plate 2 of Ground-water resources in Mendocino County, California, Water-resources investigation Report 85-4258, Farrar, C. D., USGS, 1986, at a scale of 1" = 2000'.
Aerial photograph per USDA-FSA Aerial Photography Field Office, flown June 2009.

PLATE I

City of Ukiah

Groundwater Availabilty in the Ukiah Groundwater Basin

Mendocino County, California

Wagner&Bonsignore
Consulting Civil Engineers, A Corporation

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May 2011

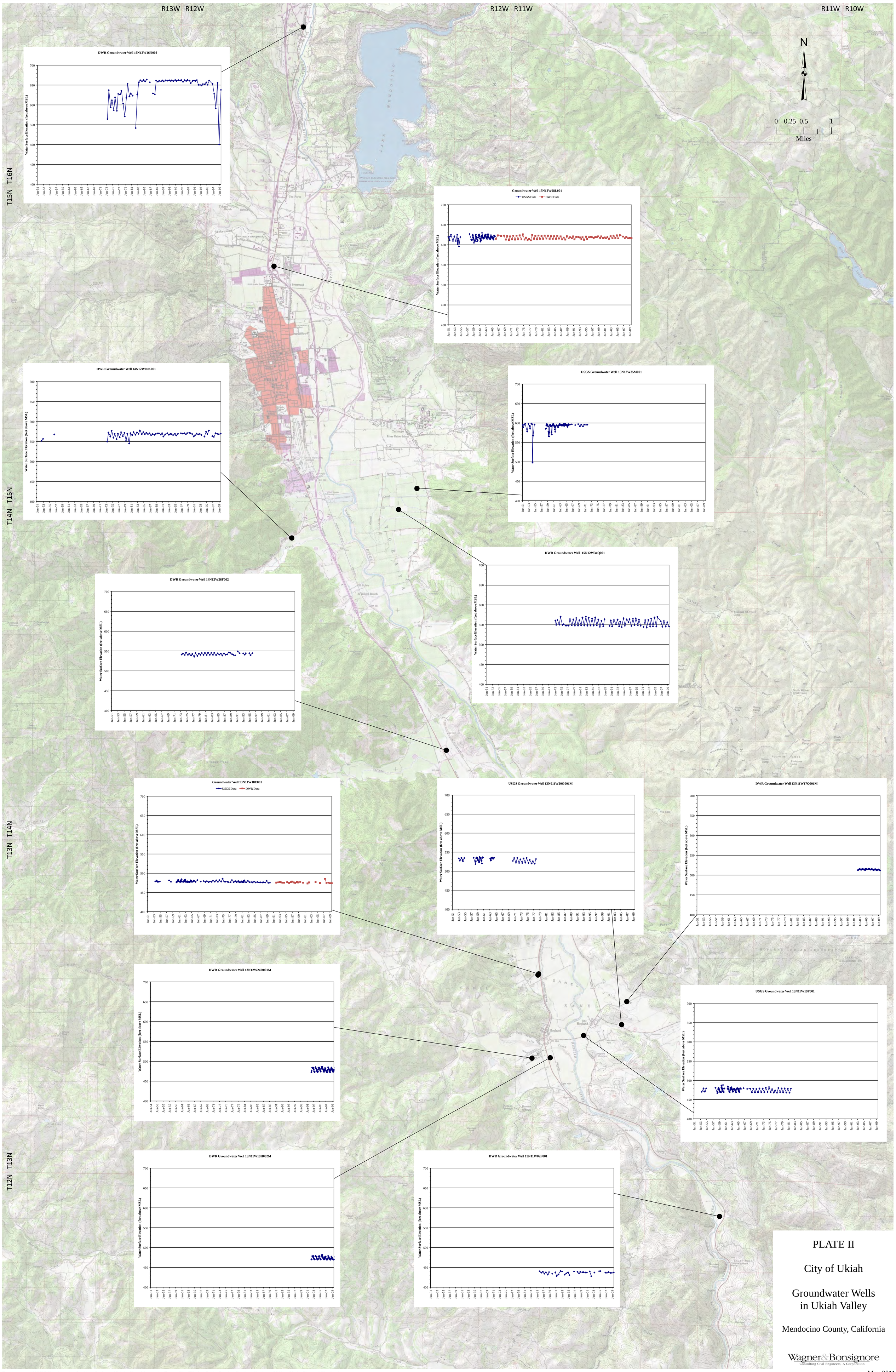


PLATE II

City of Ukiah

Groundwater Wells in Ukiah Valley

Mendocino County, California

Wagner&Bonsignore
Consulting Civil Engineers, A Corporation

Base map per USGS Quadrangles for Orrs Springs, Ukiah, Cow Mountain, Boonville, Elledge Peak, Purdys Garden, Ornbaun Valley, Yorkville, and Hopland.

Q:\Drawings\Ukiah\GIS\Groundwater Well Spider Map.mxd

May 2011

APPENDIX D – RESOLUTION TO ADOPT THE 2010 URBAN WATER MANAGEMENT PLAN

APPENDIX E – VERIFICATION OF PLAN SUBMITTAL

APPENDIX F – WATER SHORTAGE EMERGENCY PLAN

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 G – RESOLUTION NO. 2009-17, STAGE I WATER EMERGENCY

ATTACHMENT 1

RESOLUTION NO. 2009-17

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF UKIAH DECLARING A LOCAL EMERGENCY PURSUANT TO THE EMERGENCY SERVICES ACT AND A STAGE I WATER EMERGENCY UNDER SECTION 3602 OF THE UKIAH CITY CODE

WHEREAS,

1. Lake Mendocino and the Russian River are one current source of water for the City of Ukiah and the primary source of water for other domestic and agricultural users of water in Mendocino and Sonoma Counties; and

2. Average rainfall through March for the area contributing run-off to Lake Mendocino is 42 inches and the rainfall total through March 2009 is 23 inches; and

3. There have been below average rainfall and reduced storage in Lake Mendocino in 2004, 2007 and 2008; and

4. Average rainfall for April – June is 4.8 inches; and

5. Even average rainfall for the remainder of the rainy season cannot compensate for the extremely low rainfall this year; and

6. Lake Mendocino held approximately 53,000 acre feet on April 1, 2009, with a Lake level of 727.63 feet; and

7. The average Lake storage in April is 84,448 acre feet, the Lake storage in April 2007 was 66,617 acre feet and the average Lake storage in October is 55,854 acre feet, more water at the end of the dry summer season than is currently stored in the Lake; and

8. The historically low water storage level in Lake Mendocino this year is part of a statewide water shortage caused by inadequate rainfall which has prompted Governor Schwarzenegger to declare a statewide emergency under the Emergency Services Act due to these drought conditions; and

9. Mendocino County has declared a local emergency due to drought conditions under the Emergency Services Act; and

10. On April 6, 2009, the State Water Resources Control Board ("SWRCB") has approved an Urgency Change Petition filed by the Sonoma County Water Agency ("SCWA") to reduce in-stream flows in the Russian River to 75 cfs from April 6-June 30, 2009 and to as low as 25 cfs for the period July 1-October 2, 2009, if cumulative total inflow to Lake Mendocino is equal to or less than 25,000 acre feet for the period April 1-June 30, 2009; and

11. The order approving temporary changes to the minimum in-stream flows required by the appropriative rights permits issued to SCWA is subject to several conditions, including a condition requiring the SCWA to submit a plan by May 6, 2009, to the SWRCB to "obtain the cooperation and participation of agricultural and municipal Russian River water users to reach a water conservation goal of 25 percent in Sonoma County and 50 percent in Mendocino County for the period of April 6, 2009 until the expiration of this order (October 2, 2009)"; and

12. A local emergency under the California Emergency Services Act (Government Code §8550 et seq.) is defined in Section 8558(c) as the duly proclaimed existence of conditions of disaster or of extreme peril to the safety of persons and property within the territorial limits of the City caused by such conditions as drought which are or are likely to be beyond the control of the services, personnel, equipment, and facilities of individual local governments and which require the combined forces of other political subdivisions to combat; and

13. The historically low rainfall and water storage in Lake Mendocino qualifies as a local emergency under the statutory definition; and

14. In a declared local emergency, local agencies may provide mutual aid as needed pursuant to agreements or resolutions, state agencies may provide mutual aid to local agencies pursuant to agreement or at the direction of the Governor, costs incurred by the City in providing mutual aid pursuant to agreements or resolution constitute a charge against the state, when approved by the Governor in accordance with adopted regulations, and the City Council may promulgate orders and regulations for the duration of the emergency to provide protection for life and property (see Government Code §§ 8631-86-34); and

15. In a declared local emergency, the City Council must review the state of the emergency not less than every 21 days after first declaring the emergency; and

16. Under Ukiah City Code Section 3602, the City Council may by resolution declare a water emergency, specify the degree of emergency and place into effect the appropriate provisions of Division 4, Chapter 1, Article 11 of the Ukiah City Code pertaining to a Water Shortage Emergency; and

17. In a Stage I water emergency 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; and

18. The City Council has already authorized the development of a groundwater well on an emergency basis to provide the City with an additional water source this summer that does not rely on the Russian River or water stored in Lake Mendocino; and

19. Stage II and III water emergencies impose various mandatory conservation measures on City residents, including a prohibition on "nonessential water use" in a Stage II water emergency and a limit on the daily use of water by different classes of water user in a Stage III emergency; and

20. The City can declare a Stage II or Stage II emergency, if voluntary measures or less sever mandatory measures does not achieve an adequate reduction in the use of Russian River water or in water use generally to meet the available supply;

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Ukiah hereby:

1. Declares a local emergency due to drought under the Emergency Service Act.

2. Declares a Stage I Water Storage Emergency under Ukiah City Code Section 3602.

3. Directs the City Manager:

a. to identify and encourage the use as a Russian River water user of voluntary measures to reach a water conservation goal of 50 percent for the period of April 6, 2009 to October 2, 2009 ("Conservation Period"), and to report back to the City Council at each City Council meeting held during that same time period on the measures identified, the means used to encourage their use, the amount of water use reduction, and the status of the emergency conditions;

b. to notify the City Council, if the City Manager determines that a Stage I Water Emergency is not reducing water use to match the available supply and to recommend a Stage II or III emergency, if necessary to achieve that level of water use;

c. at City Council meetings during the Conservation Period to recommend temporary rules or orders to supplement or modify mandatory conservation measures in a Stage II or III Water Storage Emergency to reduce water use to the available supply and to achieve the conservation goals in Order WR 2009-0027-DWR issued by the Division of Water Rights of the State Water Resources Control Board;

c. to work with other local governments in the County, including the incorporated cities and county water districts, to preserve as much water as possible for use during the dry summer months and for the fall return of Chinook Salmon to the Russian River; and

d. to coordinate mutual aid efforts to address the local emergency between and among political subdivisions in Mendocino and Sonoma Counties and state agencies.

PASSED AND ADOPTED on April 15, 2009, by the following roll call vote:

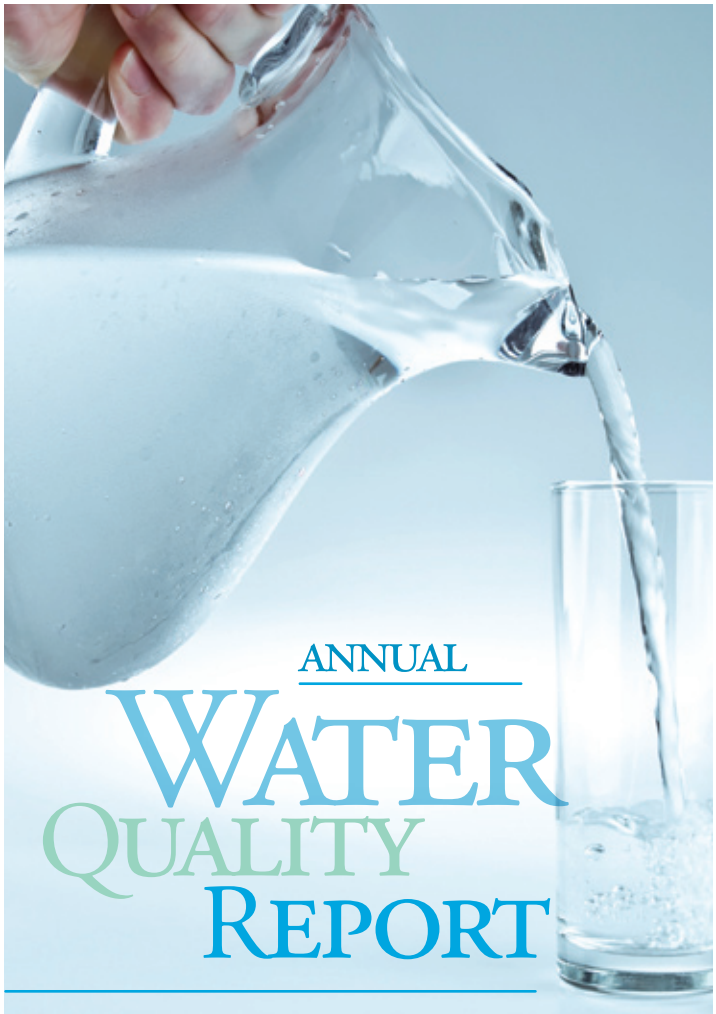
AYES: Councilmembers Landis, Thomas, Crane, Rodin, and Mayor Baldwin
NOES: None
ABSTAIN: None
ABSENT: None

Philip E. Baldwin, Mayor

ATTEST:

Linda C. Brown, City Clerk

APPENDIX H – 2009 ANNUAL WATER QUALITY REPORT



ANNUAL

WATER QUALITY REPORT

Water testing performed in 2009

City of Ukiah

Presented By:
CITY OF UKIAH

PWS ID#: CA2310003

2009 Executive Summary

The City of Ukiah, Public Works Department, Water Division, is responsible for providing a safe and reliable water supply to its customers. The Water Division consistently meets and exceeds State and Federal standards for drinking water quality.

During the drought of 2009, Ukiah's water conservation program and the community as a whole were able to reduce water consumption by 35 percent over the summer and 20 percent for the entire year. We are continuing to see a significant reduction in the unnecessary use of water.

Due to the drought and the low water levels in Lake Mendocino, the City of Ukiah believed it prudent to locate and develop new water sources. A new ground water well was added to the water system in 2009, and a second ground water well will be added in 2010. These new wells will enhance Ukiah's water system reliability, flexibility, and redundancy. They will also address new drinking water regulations and environmental concerns regarding the Russian River.

The new EPA Ground Water Rule requires increased source water monitoring for fecal coliform bacteria and additional regulations to ensure safe drinking water. The City's ongoing sewer system inspection and repair program is also helping to address and prevent inadvertent contamination of surface and ground water sources.

The Long Term 2 (LT2) *Cryptosporidium* and Giardia sampling and the Unregulated Contaminant Monitoring Regulation 2 (UCMR2) sampling programs were completed in 2009. The test results have shown the City's water to be of excellent quality.

We ask that you take a few minutes to read through this report to learn more about the quality of your drinking water. After all, well informed customers are our best allies. Regularly scheduled Ukiah City Council meetings convene on the first and third Wednesday of each month at 6 p.m. at the Ukiah Civic Center, 300 Seminary Ave., Ukiah, CA. These meetings provide citizens an opportunity to express concerns regarding the City's drinking water.

Questions?

For more information about this report, or for any questions relating to your drinking water, please call Paul Smith, Water Treatment Plant Supervisor, at (707) 467-2842.

Where Does My Water Come From?

The City of Ukiah supplies its customers with water that is considered underflow from the Russian River as well as three ground water sources. The percentages delivered from each source, and when they are in use, is dependent on both the demand on the system and the time of year. There are times of emergency when the City may have to purchase water from our neighboring water systems. These systems would be Millview County Water District and Willow County Water District.

LT2 Rule

The U.S. EPA has created the Long Term 2 Enhanced Surface Water Treatment Rule (LT2) for the sole purpose of reducing illness linked with the contaminant *Cryptosporidium* and other disease-causing microorganisms in drinking water. The rule will reinforce existing regulations and provide a higher level of protection of your drinking water supply.

Sampling of our water source has shown the following:

Cryptosporidium: 0–4.3 oocysts

Giardia lamblia: None detected

E. coli: 0–12.2 colonies

It is important to note that these results are from our raw water source only and do not reflect the quality of our treated drinking water supply. For more information, contact the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

Lead and Drinking Water

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high-quality drinking water but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.epa.gov/safewater/lead.

Source Water Assessment

In June of 2001, the City of Ukiah completed a Source Water Assessment. This study considered the topography, type of vegetative cover, soil type, type of animal life, and climate conditions of our watershed. Combined with human related recreation, industry, and life style, several areas were considered to have influence on our raw waters. The influence was considered to be minimal and several areas of concern have been mitigated. These include the closing of the landfill, the replacement of leaking underground storage tanks, and bulk fuel containment. The City is continually upgrading its system and monitors for a variety of possible hazards. The City's water is still considered safe and reliable. The summary from that report is as follows.

Vulnerability Summary

According to the results of the vulnerability analysis, the surface water source is considered most vulnerable (vulnerability score* of 15) to the following activities not associated with any detected contaminants: Gas stations; Plastic synthetic producers; Historic gas stations; Historic waste dumps/landfills; Historic mining operations; Confirmed leaking tanks; Wastewater treatment and disposal facilities; Managed forests; Septic systems—high density (>1/acre); Chemical/petroleum processing/storage.

The above list of the PCAs includes several activities that can contaminate the drinking water source by releasing deleterious chemicals. Therefore, this list corroborates the conclusion in the 2001 Update Report of Watershed Sanitary Update (Page 3): "The greatest potential threat of drinking water quality is that of a spill of deleterious material (e.g., petroleum products, hazardous or toxic substances) that could enter Lake Mendocino or the Russian River. The potential threat is great because the water treatment systems used by the City, the RVCWD, and the MCWD were not designed to remove these types of substances."

Further, the comparison of the above list of PCAs and that of "potential contaminant sources" delineated in the 2001 Update Report (Page 2) shows that some activities appear in both lists: (1) wastewater treatment and disposal facilities, (2) septic systems—high density, and (3) releases from industrial activities. The category of "releases from industrial activities" in the 2001 Update Report list encompasses some specific activities in the PCAs list, including gas stations, historic gas stations, confirmed leaking tanks, plastic synthetic producers, and chemical/petroleum processing/storage. Other activities in the 2001 Update Report list also ranked high in the Vulnerability Score, including septic systems—low density (vulnerability score of 13), grazing animals (13), non-body and body contact recreation (13), spills from traffic or railroad accidents (11), and pesticide/herbicide use in agriculture (11).

*The drinking water source is considered Vulnerable to all PCAs with Vulnerability Score greater than or equal to 11 (California Drinking Water Source Assessment and Protection Program). The apparent discrepancies between the two lists, such as managed forests, historic mining operations, and historic waste dumps/landfills, may be attributable to the fact that surface protection zones were not established in this assessment.

If you would like to view the entire report, a copy is available at City Hall or through the local CDHS field office in Santa Rosa.

Substances That Could Be in Water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material and can pick up substances resulting from the presence of animals or from human activity.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (U.S. EPA) and the State Department of Public Health (Department) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. Department regulations also establish limits for contaminants in bottled water that must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk.

Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;

Inorganic Contaminants, such as salts and metals, that can be naturally occurring or can result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;

Pesticides and Herbicides, that may come from a variety of sources, such as agriculture, urban stormwater runoff, and residential uses;

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production and which can also come from gas stations, urban stormwater runoff, agricultural applications, and septic systems;

Radioactive Contaminants, that can be naturally occurring or can be the result of oil and gas production and mining activities.

More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

Distribution System Disinfection By-Products

Total Trihalomethanes (ppb)	MCL	2008 2nd Qtr.	2008 3rd Qtr.	2008 4th Qtr.	2009 1st Qtr.	2009 2nd Qtr.	2009 3rd Qtr.	2009 4th Qtr.	Source
Site #1	80	3.4	13.5	7.5	10.5	2.4	17.3	14.2	By-product of drinking water disinfection.
Site #2	80	0	7.8	4.1	14	0	5.2	14.2	
Site #3	80	5.9	24.4	15	12.5	5.1	18.3	13.3	
Site #4	80	1.3	14.2	17.9	13.3	4	19.4	14.1	
Site #1a (collected annually)	80	NA	2	NA	NA	NA	0	NA	
Quarterly Average	80	3	15	12	13	3	15	14	
Running Annual Average	80	10	10	12	10	11	10	11	

Total Haloacetic Acids (ppb)	MCL	2008 2nd Qtr.	2008 3rd Qtr.	2008 4th Qtr.	2009 1st Qtr.	2009 2nd Qtr.	2009 3rd Qtr.	2009 4th Qtr.	Source
Site #1	60	0	10.3	4.9	11.6	0	13.8	5.6	By-product of drinking water disinfection.
Site #2	60	4.6	7.7	2.8	15.8	0	7.3	5.7	
Site #3	60	0	10.8	4.5	15.5	0	11.4	5.8	
Site #4	60	0	10	5	14.9	2.5	11.9	6	
Quarterly Average	60	1	10	5	15	1	11	6	
Running Annual Average	60	5	6	7	8	7	8	8	

Important Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791 or www.epa.gov/safewater/hotline/.

Sampling Results

During the past year we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic, or synthetic organic contaminants. The table below shows only those contaminants that were detected in the water.

The state requires us to monitor for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

REGULATED SUBSTANCES

				Surface Water		Ground Water		Distribution System			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Arsenic (ppb)	2009	10	0.004	ND	NA	1.4[1]	ND–2.8[1]	ND	NA	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Barium (ppm)	2009	1	2	ND	NA	0.05[1]	ND–0.1[1]	ND	NA	No	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits
Chlorine (ppm)	2009	[4.0 (as Cl2)]	[4 (as Cl2)]	NA	NA	NA	NA	0.48	0.26–0.74	No	Drinking water disinfectant added for treatment
Nitrate [as nitrate] (ppm)	2009	45	45	ND	NA	5.6	2.4–7	2.1[1]	NA	No	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Turbidity[2] (NTU)	2009	TT	NA	0.064	0.015–0.064	NA	NA	NA	NA	No	Soil runoff
Turbidity (Lowest monthly percent of samples meeting limit)	2009	TT	NA	100	NA	NA	NA	NA	NA	No	Soil runoff

Tap water samples were collected for lead and copper analyses from sample sites throughout the community

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	MCLG	AMOUNT DETECTED (90TH%TILE)	SITES ABOVE AL/TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper[3] (ppm)	2007	1.3	0.3	0.59	0/30	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead (ppb)	2007	15	2	6.9	0/30	No	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits

SECONDARY SUBSTANCES

				Surface Water		Ground Water		Distribution System			
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	SMCL	PHG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2009	500	NS	4.7	NA	7.65[1]	6.6–8.7[1]	6.4	NA	No	Runoff/leaching from natural deposits; seawater influence
Color (Units)	2007	15	NS	NA	NA	ND	ND–6	NA	NA	No	Naturally occurring organic materials
Corrosivity (Units)	2009	Non-corrosive	NS	10.54	NA	10.71[1]	10.46–10.96[1]	10.93	NA	No	Natural or industrially influenced balance of hydrogen, carbon, and oxygen in the water; affected by temperature and other factors
Specific Conductance (micromhos)	2009	1,600	NS	200	NA	320[4]	240–330[4]	230	NA	No	Substances that form ions when in water; seawater influence
Sulfate (ppm)	2009	500	NS	10	NA	18[1]	14–22[1]	11	NA	No	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (ppm)	2009	1,000	NS	74	NA	185[1]	150–210[1]	130	NA	No	Runoff/leaching from natural deposits
Turbidity (NTU)	2009	5	NS	NA	NA	0.123	0.028–1.0	NA	NA	No	Soil runoff

OTHER UNREGULATED SUBSTANCES

		Surface Water		Ground Water		Distribution System	
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH	AMOUNT DETECTED	RANGE LOW-HIGH
Bicarbonate Alkalinity (ppm)	2009	100	NA	185[1]	130–190[1]	120	NA
Boron (ppb)	2004	130	120–140	110	110–460	NA	NA
Calcium (ppm)	2009	18	NA	25.5[1]	22–29[1]	19	NA
Hardness as CaCO3 (ppm)	2009	85	NA	140[1]	114–148[1]	89	NA
Magnesium (ppm)	2009	9.5	NA	18[1]	13–18[1]	10	NA
Sodium (ppm)	2009	8.8	NA	14[1]	11–16[1]	14	NA

[1] Sampled in 2007.
[2] Turbidity is a measure of the suspended particles in the water. Monitoring is essential to indicate the effectiveness of the filtration system.
[3] The sample sites used were single family residences that were plumbed with copper pipes and lead solder, installed prior to 1983.
[4] Sampled in 2008.

Definitions

AL (Regulatory Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

µS/cm (microsiemens per centimeter): A unit expressing the amount of electrical conductivity of a solution.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs (SMCLs) are set to protect the odor, taste, and appearance of drinking water.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

micromhos: A measure of electrical conductance.

MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not applicable.

ND (Not detected): Indicates that the substance was not found by laboratory analysis.

NS: No standard.

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

PDWS (Primary Drinking Water Standard): MCLs and MRDLs for contaminants that affect health, along with their monitoring and reporting requirements and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

APPENDIX I – ECONOMIC ANALYSIS OF DEMAND MANAGEMENT MEASURES 1, 2, 6, AND 14

Demand Management Measures
Cost-Benefit Analysis
ASSUMPTIONS COMMON TO ALL DMMS

General Assumptions

1) Each DMM is implemented by itself e.g. not combined with other DMMs
2) When unavailable in the 2005 UWMP, values were derived (as noted) from the ***BMP Cost and Savings Study, A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices*** , Prepared for the California Urban Water Conservation Council, A & N Technical Services, March 2005

Specific Assumptions

	Value	Units	Comments
Avoidable Supply Acquisition Costs	0	$/AF	No Additional Supplies Needed per City
Avoided Water Capacity Expansion Cost	0	$/AF	No Additional Capacity Needed per City
Avoided Wastewater Capacity Expansion Cost	0	$/AF	No Additional Capacity Needed per City
Annual Water Chemical Costs	42,000	$	Per City
Annual WW Chemical Costs	120,000	$	Per City
Annual Energy Costs for Water System	350,000	$	Per City
Environmental Benefits per AF of water saved	50	$/AF	Estimate
Agency Discount Rate	2.5	%	Estimate
Social Discount Rate	2	%	Estimate
Staff Hourly Rate including Overhead	75	$	Estimate

Values highlighted in orange on the following pages were assumed due to lack of data

DMM 1 Residential Surveys
Step 1 - Annual Costs

Administration Costs						
1. Staff hours to administer the survey program		200	hrs/yr			
2. Staff hourly rate, including overhead	$	75	/hr			
3. Administration costs (Line 1 x Line 2)	$	15,000	/yr			
Field Labor Costs		Single Family Surveys			Multi Family Surveys	
4. Field labor hours		73	hrs/yr		14	hrs/yr
5. Field labor hourly rate, including overhead		$ 75.00	/hr		$ 75.00	/hr
6. Field labor cost (Line 4 x Line 5)		$ 5,437.50	/yr		$ 1,031.25	/yr
Materials Costs		Single Family Surveys			Multi Family Surveys	
7. Unit cost of materials[1] (e.g., retrofit kits, lawn kits, nozzles)		$ 55.00	/unit		$ 55.00	/unit
8. Number of surveys[2]		58	/yr		11	/yr
9. Total materials cost (Line 7 x Line 8)		$ 3,190	/yr		$ 605	/yr
Publicity Costs						
10. Marketing collateral cost (e.g., brochure design, printing, web services)	$	4,000	/yr			
11. Advertising cost (i.e. newspaper, radio, TV, web)	$	1,000	/yr			
12. Total publicity costs (Line 10 + Line 11)	$	5,000	/yr			
Evaluation and Followup Costs						
13. Labor & Consultant costs	$	5,000	/yr			
14. **Total Costs** (Line 3 + Line 6 + Line 9 + Line 12 + Line 13)	$	35,264	/yr			
Program Cost Sharing						
15. Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$	-	/yr			
16. **Net Agency Cost** (Line 14 - Line 15)	$	35,264	/yr			

Notes:
1) Per 2005 UWMP
2) Requirement of 1.5% of all residential customers per year; 3,814 SFR accounts and 673 MFR accounts in 2010
SFR: 0.015 x 3,814 = 58 surveys
MFR: 0.015 x 673 = 11 surveys

DMM 1 Residential Surveys
Step 2 - Customer Water Savings

	Single Family Surveys		Multi Family Surveys	
1. Reduction in Avg. Use[1] (gallons per day per residential unit)	32.00	gpd	32.00	gpd
2. Savings Decay[2]	25.00	%/yr	25.00	%/yr
3. Number of Surveys (from STEP 2 Line 8)	58.00		11.00	
4. Lifetime Savings	**8.31**	**AF**	**1.58**	**AF**

Notes:
1) Per 2005 CUWCC BMP Cost Savings Study Update - targeting high users
2) Per 2005 CUWCC BMP Cost Savings Study Update

DMM 1 Residential Surveys
Step 3 - Agency Benefits

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)			
1. Marginal Source of Suppy[1] (List name)		None	
2. Avoidable Supply Acquisition Cost[2]	$	0	/AF
Avoided Treatment & Distribution Capacity Costs			
3. Avoided capacity expansion costs[2] (dollars per AF of water saved by conservation)	$	0	/AF
Avoided Wastewater Capacity Costs (*if service provided by agency*)			
4. Avoided capacity expansion costs[2] (dollars per AF of water saved by conservation)	$	0	/AF
Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency)*			
Avoided chemical costs			
5. Total annual chemical costs[2]	$	42,000.00	/yr
6. Annual fixed costs for chemicals	$	-	/yr
7. Annual chemical costs not related to water production	$	-	/yr
8. Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$	42,000.00	/yr
9. Average annual treated water use		2952	AF
10. Unit Cost of Chemicals (Line 8 ÷ Line 9)	$	14.23	/AF
Avoided energy costs			
11. Annual energy costs[2]	$	350,000.00	/yr
12. Annual fixed costs	$	-	/yr
13. Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$	-	/yr
14. Avoidable energy costs (Line 11 - Line 12 - Line 13)	$	350,000.00	/yr
15. Average annual water use (from Line 9 above)		2,952.00	AF
16. Unit Cost of Energy (Line 14 ÷ Line 15)	$	118.56	/AF
17. Avoided Treatment & Distribution Variable Costs[2]	$	160.00	/AF
18. Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$	160.00	/AF
Environmental Benefits			
19. Environmental benefit per AF saved[2] (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$	50	/AF

Notes:
1) No new supply sources needed
2) As described in "Assumptions for all DMMs"

DMM 1 Residential Surveys
Step 4 - Other Benefits & Costs

OTHER BENEFITS

Avoided Customer Energy Costs		Single Family Surveys	Multi Family Surveys
1. Hot water use as a percent of meter water savings		2 %	2 %
2. Percent of residential hot water heated with gas[1]		90 %	90 %
3. Marginal cost per therm	$ 1.5 /therm		
4. Marginal cost per KWh	$ 0.12 /KWh		
5. Customer Energy Benefit		$ 47.02 /AF	$ 47.02 /AF

Avoided Wastewater Utility Variable Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

6. Avoided energy & chemical costs	$ 0 /AF of conserved water

Avoided Wastewater Utility Capacity Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

7. Avoided wastewater capacity expa	$ 0 /AF of conserved water

OTHER COSTS

Customer participation costs	Single Family Surveys	Multi Family Surveys
8. Average customer expenditures per survey (e.g., change landscaping, appliances, etc)	$ 100 /Survey	100 /Survey
9. Number of surveys (from Line 8 of STEP 1)	58.00 /yr	11.00 /yr
10. Total customer costs (Line 8 x Line 9)	$ 5,800.00 /yr	$ 1,100.00 /yr

Notes:
1) Source: http://websafe.kemainc.com/RASSWEB/DesktopDefault.aspx; data is for SCE)

DMM 1 Residential Surveys
Step 5 - Discounting Information

Discount Rates (required)		
1. Agency Discount Rate	2.5	%
2. Social Discount Rate	2.0	%
Annual Escalation Rates (optional)		
3. Avoided cost of water and wastewater	-	%/yr
4. Environmental benefits	-	%/yr
5. Energy cost	-	%/yr

DMM 1 Residential Surveys
Step 6 - Review Results

Program Present Value Costs	**Agency Perspective**		**Society Perspective**	
1. Total surveys	69		69	
2. Total water savings	9.9	AF	9.9	AF
3. Agency program costs	$35,264		$35,264	
4. Customer program costs	NA		$6,900	
5. Cost share	$0		NA	
6. Net Program Cost	$35,264		$42,164	
Program Present Value Benefits				
7. Agency supply & wastewater bene	$1,474		$1,494	
8. Environmental benefits	$461		$467	
9. Customer program benefits	NA		$439	
10. Other utility benefits	NA		$0	
11. Total benefits	$1,935		$2,400	
12. Net Present Value (Line 11 - Line 6)	**($33,329)**		**($39,764)**	
13. Benefit-Cost Ratio (Line 11 ÷ Line 6)	0.05		0.06	
14. Simple Unit Supply Cost (Line 6 ÷ Line 2)	$3,568	/AF	$4,266	/AF
15. Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$3,827	/AF	$4,515	/AF

This BMP is not cost-effective to implement from the Agency Perspective
This BMP is not cost-effective to implement from the Society Perspective

DMM 2 Residential Plumbing Retrofit
Step 1 - Annual Costs

Administration Costs			
1. Staff hours to administer the retrofit program	100 hrs/yr		
2. Staff hourly rate, including overhead	$ 75.00 /hr		
3. Administration costs (Line 1 x Line 2)	$ 7,500 /yr		
Field Labor Costs		Single Family Plumbing Retrofits	Multi Family Plumbing Retrofits
4. Field labor hours[1] (e.g. kit distribution, direct installation)		191 hrs/yr	34 hrs/yr
5. Field labor hourly rate, including overhead		$ 75.00 /hr	$ 75.00 /hr
6. Field labor cost (Line 4 x Line 5)		$ 14,325 /yr	$ 2,550 /yr
Materials Costs		Single Family Plumbing Retrofits	Multi Family Plumbing Retrofits
7. Unit cost of materials (e.g., plumbing retrofit kits, nozzles, etc.)		$ 20.00 /unit	$ 20.00 /unit
8. Number of kits distributed[2]		191 /yr	34 /yr
9. Total materials cost (Line 7 x Line 8)		$ 3,820 /yr	$ 680 /yr
Publicity Costs			
10. Marketing collateral cost (e.g., brochure design, printing, web services)	$ 2,000 /yr		
11. Advertising cost (i.e. newspaper, radio, TV, web)	$ 1,000 /yr		
12. Total publicity costs (Line 10 + Line 11)	$ 3,000 /yr		
Evaluation and Followup Costs			
13. Labor & Consultant costs	$ 5,000 /yr		
14. **Total Costs** (Line 3 + Line 6 + Line 9 + Line 12 + Line 13)	$ 36,875 /yr		
Program Cost Sharing			
15. Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$ - /yr		
16. **Net Agency Cost** (Line 14 - Line 15)	$ 36,875 /yr		

Notes:

1) Assuming 1 hour per kit for assembling materials, delivery, and installation

2) Required 5% of all residences per year for 10 years per 2005 UWMP; 3,814 SFR accounts and 673 MFR accounts in 2010.

SFR: 0.05 x 3814 = 191 surveys
MFR: 0.05 x 673 = 34 surveys

DMM 2 Residential Plumbing Retrofit
Step 2 - Customer Water Savings

	Single Family Plumbing Retrofits		Multi Family Plumbing Retrofits	
1. Reduction in Avg. Use[1] (gallons per day per residential unit)	13.70	gpd	13.70	gpd
2. Savings Decay[2]	40	%/yr	40	%/yr
3. Number of Kits Distributed (from STEP 1 Line 8)	191		34	
4. Percent of Kits Installed	100	%/yr	100	%/yr
5. Lifetime Savings	**7.33**	**AF**	**1.30**	**AF**

Notes:
1) From 2005 UWMP; Similar to results of indoor retrofits in the 2005 CUWCC BMP Cost Savings Study
2) Per 2005 CUWCC BMP Cost Savings Study Update

DMM 2 Residential Plumbing Retrofit
Step 3 - Agency Benefits

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)		
1. Marginal Source of Supply[1] (List name)	None	
2. Avoidable Supply Acquisition Cost[2]	$ 0	/AF
Avoided Treatment & Distribution Capacity Costs		
3. Avoided capacity expansion costs[2] (dollars per AF of water saved by conservation)	$ 0	/AF
Avoided Wastewater Capacity Costs (*if service provided by agency*)		
4. Avoided capacity expansion costs[2] (dollars per AF of water saved by conservation)	$ 0	/AF
Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency*		
Avoided chemical costs		
5. Total annual chemical costs[2]	$ 42,000.00	/yr
6. Annual fixed costs for chemicals	$ -	/yr
7. Annual chemical costs not related to water production	$ -	/yr
8. Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$ 42,000.00	/yr
9. Average annual treated water use	2952	AF
10. Unit Cost of Chemicals (Line 8 ÷ Line 9)	$ 14.23	/AF
Avoided energy costs		
11. Annual energy costs[2]	$ 350,000.00	/yr
12. Annual fixed costs	$ -	/yr
13. Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$ -	/yr
14. Avoidable energy costs (Line 11 - Line 12 - Line 13)	$ 350,000.00	/yr
15. Average annual water use (from Line 9 above)	2,952.00	AF
16. Unit Cost of Energy (Line 14 ÷ Line 15)	$ 118.56	/AF
5. Avoided Treatment & Distribution Variable Costs[2] (Line 10 + Line 16)	$ 160.00	/AF
6. Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$ 160.00	/AF
Environmental Benefits		
7. Environmental benefit per AF saved[2] (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$ 50	/AF

Notes:
1) No new supply sources needed
2) As described in "Assumptions for all DMMs"

DMM 2 Residential Plumbing Retrofit
Step 4 - Other Benefits & Costs

OTHER BENEFITS

Avoided Customer Energy Costs		Single Family Plumbing Retrofits	Multi Family Plumbing Retrofits
1. Hot water use as a percent of total plumbing device water savings		2 %	2 %
2. Percent of residential hot water heated with gas[1]		90 %	90 %
3. Marginal cost per therm	$ 1.50 /therm		
4. Marginal cost per KWh	$ 0.1204 /KWh		
5. Customer Energy Benefit		$ 47.05 /AF	$ 47.05 /AF

Avoided Wastewater Utility Variable Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

6. Avoided energy & chemical costs $ 0 /AF of conserved water

Avoided Wastewater Utility Capacity Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

7. Avoided wastewater capacity expansion $ 0 /AF of conserved water

OTHER COSTS

Customer participation costs	Single Family Plumbing Retrofits	Multi Family Plumbing Retrofits
8. Average customer expenditures per kit installed (e.g., change landscaping, appliances, etc)	$ 0 /kit	0 /kit
9. Number of kits distributed (from Line 8 of STEP 1)	191 /yr	34 /yr
10. Percent of Kits Installed (from Line 4 of STEP 2)	100 %/yr	100 %/yr
11. Total customer costs (Line 8 x Line 9 x Line 10)	$ - /yr	$ - /yr

Notes:
1) Source: http://websafe.kemainc.com/RASSWEB/DesktopDefault.aspx; data is for SCE)

DMM 2 Residential Plumbing Retrofit
Step 5 - Discounting Information

Discount Rates (required)		
1. Agency Discount Rate	2.5	%
2. Social Discount Rate	2.0	%
Annual Escalation Rates (optional)		
3. Avoided cost of water and wastewater	-	%/yr
4. Environmental benefits	-	%/yr
5. Energy cost	-	%/yr

DMM 2 Residential Plumbing Retrofit
Step 6 - Review Results

Program Present Value Costs	**Agency Perspective**		**Society Perspective**	
1. Total devices distributed	225		225	
2. Total water savings	8.6	AF	8.6	AF
3. Agency program costs	$36,875		$36,875	
4. Customer program costs	NA		$0	
5. Cost share	$0		NA	
6. Net Program Cost	$36,875		$36,875	
Program Present Value Benefits				
7. Agency supply & wastewater benefits	$1,332		$1,341	
8. Environmental benefits	$416		$419	
9. Customer program benefits	NA		$394	
10. Other utility benefits	NA		$0	
11. Total benefits	$1,748		$2,155	
12. Net Present Value (Line 11 - Line 6)	**($35,127)**		**($34,720)**	
13. Benefit-Cost Ratio (Line 11 ÷ Line 6)	0.05		0.06	
14. Simple Unit Supply Cost (Line 6 ÷ Line 2)	$4,272	/AF	$4,272	/AF
15. Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$4,429	/AF	$4,398	/AF

This BMP is not cost-effective to implement from the Agency Perspective
This BMP is not cost-effective to implement from the Society Perspective

DMM 6 High Efficiency Washing Machine Rebate Programs
STEP 1 - Annual Program Costs

Administration Costs

1.	Staff hours to administer the rebate program	100	hrs/yr
2.	Staff hourly rate, including overhead	$ 75.00	/hr
3.	Administration costs (Line 1 x Line 2)	$ 7,500	/yr

Washing Machine Rebate Costs

4.	Rebate (or utility incentive cost)[1]	$ 75	/rebate
5.	Number of rebates distributed[2]	38	/yr
6.	Total rebate cost (Line 4 x Line 5)	$ 2,850	/yr

Rebate Processing Costs

7.	Average rebate processing cost (if not included in Admin. Costs)	$ 20	/rebate
8.	Total rebate processing cost (Line 5 x Line 7)	$ 760	/yr

Publicity Costs

9.	Marketing collateral cost (e.g., brochure design, printing, web services)	$ 4,000	/yr
10.	Advertising cost (i.e. newspaper, radio, TV, web)	$ 1,000	/yr
11.	Total publicity costs (Line 9 + Line 10)	$ 5,000	/yr

Evaluation and Followup Costs

12.	Labor & Consultant costs	$ 5,000	/yr
13.	**Total Costs** (Line 3 + Line 6 + Line 8 + Line 11 + Line 12)	$ 21,110	/yr

Program Cost Sharing

14.	Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$ -	/yr
15.	**Net Agency Cost** (Line 13 - Line 14)	$ 21,110	/yr

Notes:
1) Per 2005 UWMP
2) Per 2005 UWMP: One percent of all SFR customers

DMM 6 High Efficiency Washing Machine Rebate Programs
Step 2 - Water Savings Worksheet

	High-Efficiency Washing Machines		
1. Savings per machine (gallons per year per machine)	5,250.00	gpy/machine	◉ Use CUWCC Reliable Savings Estimat ○ Use Own Estimate
2. Useful Life[1]	12	yrs	
3. Number of Rebates Distributed (from STEP 1 Line 5)	38		
4. Percent Free-riders[2]	35	%/yr	
5. Lifetime Savings	**4.77**	**AF**	

Notes:
1) Per 2005 UWMP
2) Per 2005 CUWCC BMP Cost Savings Study Update

DMM 6 High Efficiency Washing Machine Rebate Programs
Step 3 - Agency Benefits

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)

1. Marginal Source of Suppy[1]		None	
2. Avoidable Supply Acquisition Cost[2]	$	0	/AF

Avoided Treatment & Distribution Capacity Costs

3. Avoided capacity expansion costs[2] (dollars per AF of water saved by conservation)	$	0	/AF

Avoided Wastewater Capacity Costs (*if service provided by agency*)

4. Avoided capacity expansion costs[2] (dollars per AF of water saved by conservation)	$	-	/AF

Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency)*

Avoided chemical costs

5. Total annual chemical costs[2]	$	42,000.00	/yr
6. Annual fixed costs for chemicals	$	-	/yr
7. Annual chemical costs not related to water production	$		/yr
8. Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$	42,000.00	/yr
9. Average annual treated water use		2952	AF
10. Unit Cost of Chemicals (Line 8 ÷ Line 9)	$	14.23	/AF

Avoided energy costs

11. Annual energy costs[2]	$	350,000.00	/yr
12. Annual fixed costs	$	-	/yr
13. Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$	-	/yr
14. Avoidable energy costs (Line 11 - Line 12 - Line 13)	$	350,000.00	/yr
15. Average annual water use (from Line 9 above)		2,952.00	AF
16. Unit Cost of Energy (Line 14 ÷ Line 15)	$	118.56	/AF
17. Avoided Treatment & Distribution Variable Costs (Line 10 + Line 16)	$	132.79	/AF
18. Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$	132.79	/AF

Environmental Benefits

19. Environmental benefit per AF saved[2] (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$	50	/AF

Notes:
1) No new supply sources needed
2) As described in "Assumptions for all DMMs"

DMM 6 High Efficiency Washing Machine Rebate Programs
Step 4 - Other Benefits and Costs

OTHER BENEFITS

Avoided Customer Energy Costs	High Efficiency Clothes Washer	
1. Percent of residential hot water heated with gas[1]	89.5	%
2. Percent of residential dryers using gas[1]	61.8	%
2. Marginal cost per therm of gas	$ 1.50	/therm
3. Marginal cost per KWh of electricity	$ 0.12	/KWh
5. Customer Energy Benefit	$ 45.77	/Yr

Avoided Wastewater Utility Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

6. Avoided energy & chemical costs	$ 0	/AF of conserved water
7. Avoided wastewater capacity expansion	$ 0	/AF of conserved water
8. Total avoided wastewater utility costs (Line 6 + Line 7)	$ -	/AF of conserved water

Notes:
1) Source: http://websafe.kemainc.com/RASSWEB/DesktopDefault.aspx; data is for SCE)
2) As described in "Assumptions for all DMMs"

DMM 6 High Efficiency Washing Machine Rebate Progra
Step 5 - Discounting Information

Discount Rates (required)

1. Agency Discount Rate	2.5	%
2. Social Discount Rate	2.0	%

Annual Escalation Rates (optional)

3. Avoided cost of water and wastewater	-	%/yr
4. Environmental benefits	-	%/yr
5. Energy cost	-	%/yr

DMM 6 High Efficiency Washing Machine Rebate Programs
Step 6 - Summary of Costs & Benefits

Program Present Value Costs	**Agency Perspective**	**Society Perspective**
1. Total rebates distributed	38	38
2. Total water savings	4.8 AF	4.8 AF
3. Agency program costs	$21,110	$21,110
4. Customer program costs	NA	NA
5. Cost share	$0	NA
6. Net Program Cost	$21,110	$21,110
Program Present Value Benefits		
7. Agency supply & wastewater benefits	$542	$559
8. Environmental benefits	$204	$210
9. Customer program benefits	NA	$18,392
10. Other utility benefits	NA	$0
11. Total benefits	$746	$19,161
12. Net Present Value (Line 11 - Line 6)	**($20,364)**	**($1,949)**
13. Benefit-Cost Ratio (Line 11 ÷ Line 6)	0.04	0.91
14. Simple Unit Supply Cost (Line 6 ÷ Line 2)	$4,421 /AF	$4,421 /AF
15. Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$5,172 /AF	$5,017 /AF

This BMP is not cost-effective to implement from the Agency Perspective
This BMP is not cost-effective to implement from the Society Perspective

DMM 14 ULFT Replacement Programs
Step 1 - Annual Costs

Administration Costs

1. Staff hours to administer the rebate program	200	hrs/yr
2. Staff hourly rate, including overhead	$ 75.00	/hr
3. Administration costs (Line 1 x Line 2)	$ 15,000	/yr

ULFT Costs

	Single-Family		Multi-Family	
4. ULFT Cost (or incentive cost)	$ 100	/ULFT	$ 100	/ULFT
5. Number of ULFTs (or incentives) distributed	50	/yr	50	/yr
6. Total ULFT replacement cost (Line 4 x Line 5)	$ 5,000	/yr	$ 5,000	/yr

Incentive Processing Costs

7. Average rebate processing cost (if not included in	$ 10	/ULFT
8. Total rebate processing cost (Line 5 x Line 7)	$ 1,000	/yr

Publicity Costs

9. Marketing collateral cost (e.g., brochure design, printing, web services)	$ 1,000	/yr
10. Advertising cost (i.e. newspaper, radio, TV, web)	$ 4,000	/yr
11. Total publicity costs (Line 9 + Line 10)	$ 5,000	/yr

Evaluation and Followup Costs

12. Labor & Consultant costs	$ 5,000	/yr
13. **Total Costs** (Line 3 + Line 6 + Line 8 + Line 11 + Line 12)	$ 36,000	/yr

Program Cost Sharing

14. Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$ -	/yr
15. **Net Agency Cost** (Line 13 - Line 14)	$ 36,000	/yr

DMM 14 ULFT Replacement Programs
Step 2 - Customer Water Savings

	Single-Family		Multi-Family	
1. Avg. Persons Per Household[1]	2.5		2.5	
2. Avg. Savings per ULFT[1] (gallons per day per ULFT)	36.5	gpd	49.0	gpd
3. Toilet Natural Replacement Rate[1]	4.0	%/yr	4.0	%/yr
4. Number of ULFTs Distributed (from STEP 1 Line 5)	50		50	
5. Percent Free-riders	35	%	35	%
6. 25-Year Savings	**21.2**	**AF**	**28.5**	**AF**

○ Use CUWCC Reliable Savings Estimat
◉ Use Own Estimate

Notes:
1) Per 2005 UWMP

DMM 14 ULFT Replacement Programs
Step 3 - Agency Benefits

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)

1. Marginal Source of Suppy[1] (List name)		None	
2. Avoidable Supply Acquisition Cost[2]	$	0	/AF

Avoided Treatment & Distribution Capacity Costs

3. Avoided capacity expansion costs[2] (dollars per AF of water saved by conservation)	$	0	/AF

Avoided Wastewater Capacity Costs (*if service provided by agency*)

4. Avoided capacity expansion costs[2] (dollars per AF of water saved by conservation)	$	0	/AF

Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency)*

Avoided chemical costs

5. Total annual chemical costs[2]	$	42,000.00	/yr	
6. Annual fixed costs for chemicals	$		/yr	
7. Annual chemical costs not related to water production	$		/yr	
8. Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$	42,000.00	/yr	
9. Average annual treated water use		2,952	AF	Source: 2005 UWMP
10. Unit Cost of Chemicals (Line 8 ÷ Line 9)	$	14.23	/AF	

Avoided energy costs

11. Annual energy costs[2]	$	350,000.00	/yr
12. Annual fixed costs	$		/yr
13. Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$		/yr
14. Avoidable energy costs (Line 11 - Line 12 - Line 13)	$	350,000.00	/yr
15. Average annual water use (from Line 9 above)		2,952.00	AF
16. Unit Cost of Energy (Line 14 ÷ Line 15)	$	118.56	/AF
17. Avoided Treatment & Distribution Variab (Line 10 + Line 16)	$	132.79	/AF
18. Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$	132.79	/AF

Environmental Benefits

19. Environmental benefit per AF saved (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$	50	/AF

Notes:
1) No new supply sources needed
2) As described in "Assumptions for all DMMs"

DMM 14 ULFT Replacement Programs
Step 4 - Other Benefits & Costs

OTHER BENEFITS

Avoided Wastewater Utility Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

1. Avoided energy & chemical costs	$ 0	/AF of conserved water
2. Avoided wastewater capacity expansion	$ 0	/AF of conserved water
3. Total avoided wastewater utility costs (Line 6 + Line 7)	$ -	/AF of conserved water

OTHER COSTS

Customer Participation Costs	Single Family ULFTs	Multi Family ULFTs
4. Average customer expenditures per ULFT (e.g., installation, disposal of old toilet)	$ 125 /ULFT	$ 125 /ULFT
5. Number of ULFTs distributed (from Line 5 of STEP 1)	50	50
6. Percent of Freeriders (from Line 5 of STEP 2)	35 %	35 %
7. Total customer costs (Line 4 x Line 5 x (1 - Line 6))	$ 4,062.50	$ 4,062.50

DMM 14 ULFT Replacement Programs
Step 5 - Other Benefits & Costs

Discount Rates (required)

1. Agency Discount Rate	2.5	%
2. Social Discount Rate	2.0	%

Annual Escalation Rates (optional)

3. Avoided cost of water and wastewater	-	%/yr
4. Environmental benefits	-	%/yr
5. Energy cost	-	%/yr

DMM 14 ULFT Replacement Programs
Step 6 - Review Results

Program Present Value Costs	**Agency Perspective**		**Society Perspective**	
1. Total ULFTs distributed	100		100	
2. Total water savings	49.8	AF	49.8	AF
3. Agency program costs	$36,000		$36,000	
4. Customer program costs	NA		$8,125	
5. Cost share	$0		NA	
6. Net Program Cost	$36,000		$44,125	
Program Present Value Benefits				
7. Agency supply & wastewater benefits	$5,122		$5,375	
8. Environmental benefits	$1,929		$2,024	
9. Other utility benefits	NA		$0	
10. Total benefits	$7,051		$7,398	
11. Net Present Value (Line 10 - Line 6)	**($28,949)**		**($36,727)**	
12. Benefit-Cost Ratio (Line 10 ÷ Line 6)	0.20		0.17	
13. Simple Unit Supply Cost (Line 6 ÷ Line 2)	$723	/AF	$887	/AF
14. Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$933	/AF	$1,090	/AF

This BMP is not cost-effective to implement from the Agency Perspective
This BMP is not cost-effective to implement from the Society Perspective