Mammoth Community

Water District

2010 URBAN WATER MANAGEMENT PLAN

November 2011

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Scope and Purpose of the 2010 Urban Water Management Plan

This Executive Summary presents an overview of the Mammoth Community Water District's 2010 Urban Water Management Plan (2010 UWMP). The 2010 UMWP is an important long term planning document for the District and the community it serves, which is primarily the incorporated area of the Town of Mammoth Lakes (Town). The conclusions and recommendations from the 2010 UWMP will determine key aspects of long term capital investment by the District for water supply and treatment, and influence future land use planning and development levels within the Town, to the extent these are influenced by the practical and regulatory requirements linking water supply reliability and land use decisions.

The 2010 UWMP's planning horizon is 20 years, through 2030, which is the same approximate horizon for build-out of the Town. The 2010 UWMP has been prepared to comply with California Water Code, Section 10610 - 10657, the Urban Water Management Planning Act (UWMPA, or Act), and the Water Conservation Bill of 2009. The Act requires all urban water suppliers providing water for municipal purposes to more than 3,000 customers, or supplying more than 3,000 acre-feet of water annually, to prepare and submit to the Department of Water Resources (DWR) an urban water management plan every five years. The purpose of the Act is to ensure water resources are managed efficiently to provide a reliable supply to residents and business in the state of California. The District's last UWMP was updated in 2005. This new 2010 UWMP serves as a complete, independent document from the 2005 UWMP. The Water Conservation Bill of 2009 requires a statewide 20 percent reduction in urban per capita water use by December 31, 2020. To meet this goal, every urban retail water supplier must develop and report a baseline daily per capita water use and a future 2020 compliance daily per capita water use to achieve the 20% reduction in per capita water use.

This UWMP presents information, analysis, and conclusions regarding past, current, and projected water demand, current and future water supplies to meet projected demands, supply reliability under future demand conditions, District plans for potential water shortages, actions by the District to reduce water demand, and future potential impacts of climate change on local water supplies.

District Service Area Description

The following summarizes key characteristics of the District's service area, including geography, climate, service area population and related water use drivers, and District infrastructure. The District's service area lies entirely within the 24 sq. mi. Town of Mammoth Lakes' incorporated boundary. Most of the 3,640 acre (5.7 sq. mi.) service area is within the much smaller approximately 6 square miles of the Town's urban growth boundary. There are approximately 2,500 acres of private lands within the service area. Most of the lands outside of the Town urban growth boundary are publicly owned federal lands managed by the USFS's Inyo National Forest, see Figure ES -1.

Geography and Climate

The Mammoth Creek watershed (or Basin) is located just east of the crest of the Sierra Nevada mountain range. Winter season snowfall is the source of most precipitation, accumulating through the winter and running off through the spring and summer. The April 1 snowpack water content, measured

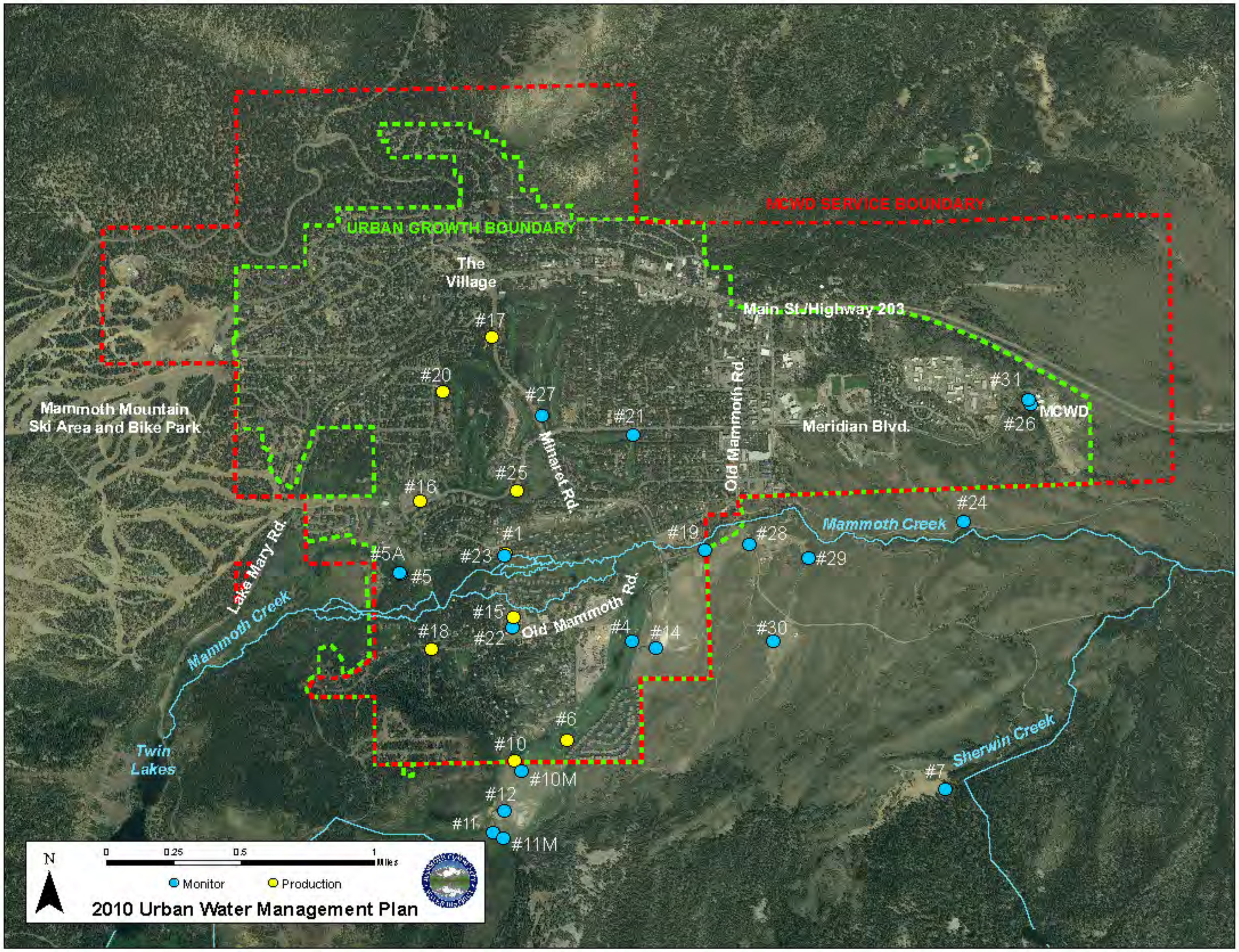


Figure ES -1 MCWD Service Area and the Town of Mammoth Lakes

at Mammoth Pass, is a key metric for the resulting water supply year type (dry, normal, wet). The Basin has a wide range of elevation-influence precipitation extremes, with average annual precipitation ranging from about 42.5 inches at Mammoth Pass (9,500 ft) at the western boundary of the Basin to 10 inches at the Crowley Lake dam at the eastern boundary. Average annual precipitation for the Town of Mammoth Lakes is approximately 23 inches. The winter season is characterized by periodic storms off the Pacific, with mostly sunny skies between storms. Winter high temperatures average 40°F and low temperatures average 16°F. Summers are mild with temperatures averaging 75°F for a high and 44°F for a low

Population

The District's service area permanent population (resident population) in 2010 was 8,234. This represents an increase of 16% since 2005. The Town's economy is primarily tourism based. Therefore water demand is influenced by both large fluctuations in visitors and seasonal employees residing in the service area. The peak population (permanent residents, visitors and seasonal workers) in 2003 was estimated at 34,265. This short-duration, peak population condition is referred to as "People at One Time," or PAOT. The future build-out PAOT estimate is approximately 52,000. To capture the significant influence of the transient population on water demands, an "effective annual population" term was developed using historical data and future estimates for permanent population, PAOT, and annual average transient housing and lodging occupancy rates.

Seasonal water demand is lowest during the winter, with the exception of the transient peak visitor periods, and highest during the summer irrigation season. Landscaped areas in developments serving transient populations such as condominiums and second homes are irrigated regardless of occupancy. The per capita water demand for the District's service area in this UWMP is based on the effective annual population. Table ES-1 shows the projected service area resident population, the transient peak combined resident and visitor / transient populations, and the effective annual population through build-out. The resident and PAOT populations both increase by approximately 49%, and the effective annual population increases by approximately 45%. The build-out population and timeline represent an average annual resident and effective annual population growth of 2%.

Table ES-1 Current and Projected Service Area Population

	2010	2015	2020	2025	2030
Resident Population	8,234	9,094	10,041	11,086	12,300
People at One Time	36,578	40,434	44,289	48,145	52,000
Effective Annual Population	16,739	18,496	20,315	22,204	24,210

(DWR Table 2)

Infrastructure

The District has 3,660 water service connections, and relies on a mix of water supplies from Mammoth Creek (diverted and stored at Lake Mary), the Mammoth groundwater basin, and reclaimed water. The District has three water treatment plants: one surface water treatment plant supplied from Lake Mary, and two centralized groundwater treatment plants. Groundwater is produced from nine production wells. Treated water is stored in 10 distribution system storage reservoirs, with a combined capacity of 7,500,000 gallons. The water distribution system includes 81 miles of pipelines, seven booster pump stations, and five pressure zones. The recycled water system includes an advanced wastewater treatment plant producing Title 22 quality recycled water, two booster pump stations, and 21,000 feet of distribution mains.

Water System Demands

The 2010 UWMP includes a review and analysis of past, current and future water demands. In compliance with the 2009 Water Conservation Act, it also establishes specific water use metrics to support the State's target of a 20% reduction in average per capita daily water demand by 2020. Key water use metrics for meeting the Act's requirements include the *base daily per capita water use,* the *compliance daily per capita use,* and the *interim per capita water use target*. The base daily per capita water use was established from the last 10 years of actual total and per capita water use. In accordance with DWR guidelines, the future compliance daily per capita use (to be achieved by or before 2020) was calculated as 80% of the 10-year average per capita use (base daily per capita water use), see Table ES -2. The District's base daily per capita water use is 176 gallons per capita per day (GPCD). The compliance daily per capita use is 141 GPCD. The interim per capita use target, to be met no later than 2015, is 159 GPCD. As the ten year trend in Table ES -2 shows, the District has had a steadily declining per capita water demand. Per capita water use has declined approximately 39% in the last ten years, due to a combination of a 70% decrease in water distribution system losses and demand management (conservation) measures.

Figure ES-2 shows the ten year population growth and declining total water use. Based on the compliance methodology established by DWR, the District has met and will continue to meet, both the interim and compliance daily per capita water use targets required under the 2009 Water Conservation Act.

Table ES -2 Base Daily Per Capita Water from 2001 Through 2010

	Year	Effective population	Average daily system gross water use (mgd)	Annual average daily per capita water use (gpcd)
1	2001	15,350	3.0	195
2	2002	15,523	3.2	206
3	2003	15,626	3.1	198
4	2004	15,665	2.9	185
5	2005	15,800	3.0	190
6	2006	15,826	2.8	177
7	2007	15,930	2.9	182
8	2008	16,172	2.7	167
9	2009	16,417	2.3	140
10	2010	16,737	2.0	119
10-year average annual daily per capita water use				176
2020 Compliance Urban Water Use Target - 80% of 10 year average annual daily per capita water use				141

Table ES-3 lists the recent customer water deliveries for 2010 and the breakdown by general water use category. Table ES-4 shows the projected growth in customer water demands, for the same water use categories, through 2030. Table ES -5 shows the total water demand (net customer deliveries, distribution and treatment system losses) through 2030. Total District water demand is projected to increase approximately 40% between 2015 and 2030, to a total of 4,180 ac-ft. This updated water demand projection at build-out is 9% below the 2005 UWMP build-out projection. This decrease in projected future water demand is due primarily to lower system losses (760 vs. 240 acre-feet) based on the last five years trend in actual system losses with completion of the pipeline replacement program, and water conservation efforts implemented by the District. This 2010 UWMP was also able to utilize an updated 2007 Town General Plan and 2009-10 Town traffic model for build-out land use projections.

Figure ES-2 Change in Gross Water Use and Effective Population

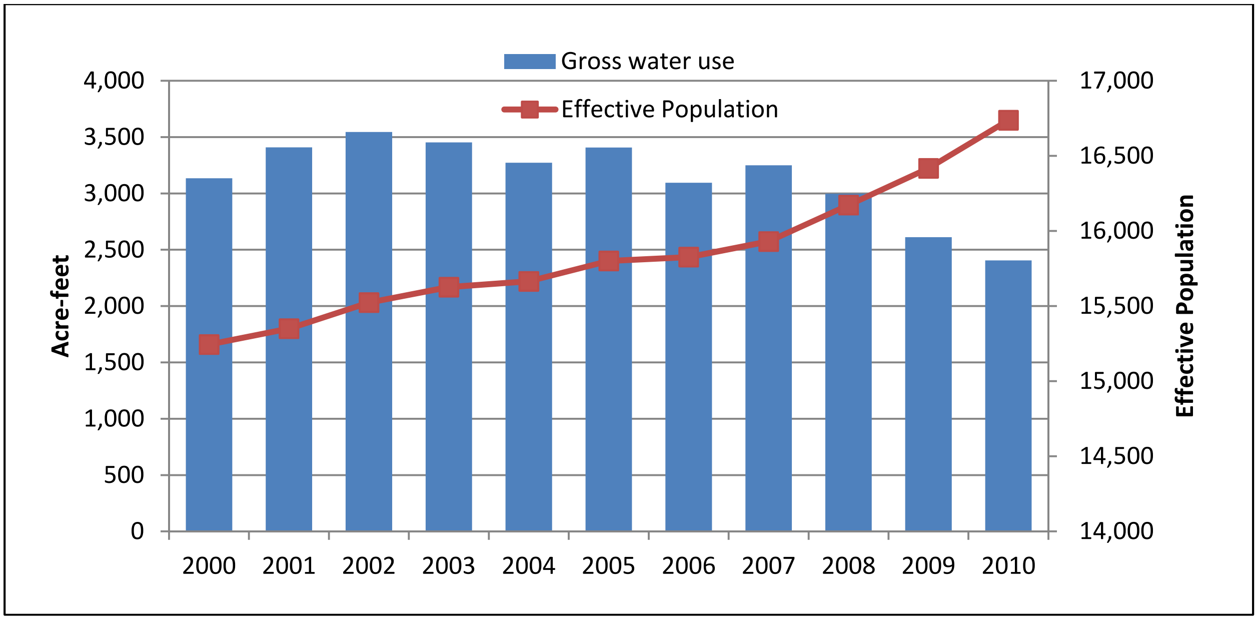


Table ES-3 Customer Water Delivery in 2010

Water use category	# of units	Acre-feet/year
Single-family residential	2,227	450
Multifamily	6,429	926
Motel/Hotel	1,852	131
Commercial (1,000 sq ft)	1,616	230
Industrial and Agriculture	Not applicable	
Institutional	48	84
Irrigation (includes golf courses)	42	348
Other (process water, fire, line cleaning, etc)	Not applicable	
Total		2,169

Table ES-4 Projected Customer Water Demand, 2015-2030 (acre-feet per year)

	2015		2020		2025		2030	
Water use category	**units**	**AFY**	**units**	**AFY**	**units**	**AFY**	**units**	**AFY**
Single-family	2,363	498	2,499	545	2,635	593	2,771	640
Multifamily	7,062	1,064	7,694	1,203	8,327	1,341	8,959	1,480
Motel/Hotel	2,885	212	3,917	293	4,950	374	5,982	455
Commercial	1,825	261	2,034	292	2,242	324	2,451	355
Institutional (accts)	48	89	48	94	48	99	47	103
Irrigation (includes golf courses)	41	441	41	533	41	626	41	718
Industrial & Process water	Not applicable in MCWD service area.							
AFY Totals	**2,565**		**2,961**		**3,357**		**3,751**	

Table ES -5 Total Water Demand, Past, Current, and Projected (acre-feet per year)

Water Use	2005	2010	2015	2020	2025	2030
Total water deliveries (from Tables 3-3, 3-4, and 3-6)	2,564	2,169	2,565	2,961	3,357	3,751
Additional water uses and losses (Table 3-7)	857	420	424	426	428	429
Total	**3,421**	**2,589**	**2,989**	**3,387**	**3,785**	**4,180**

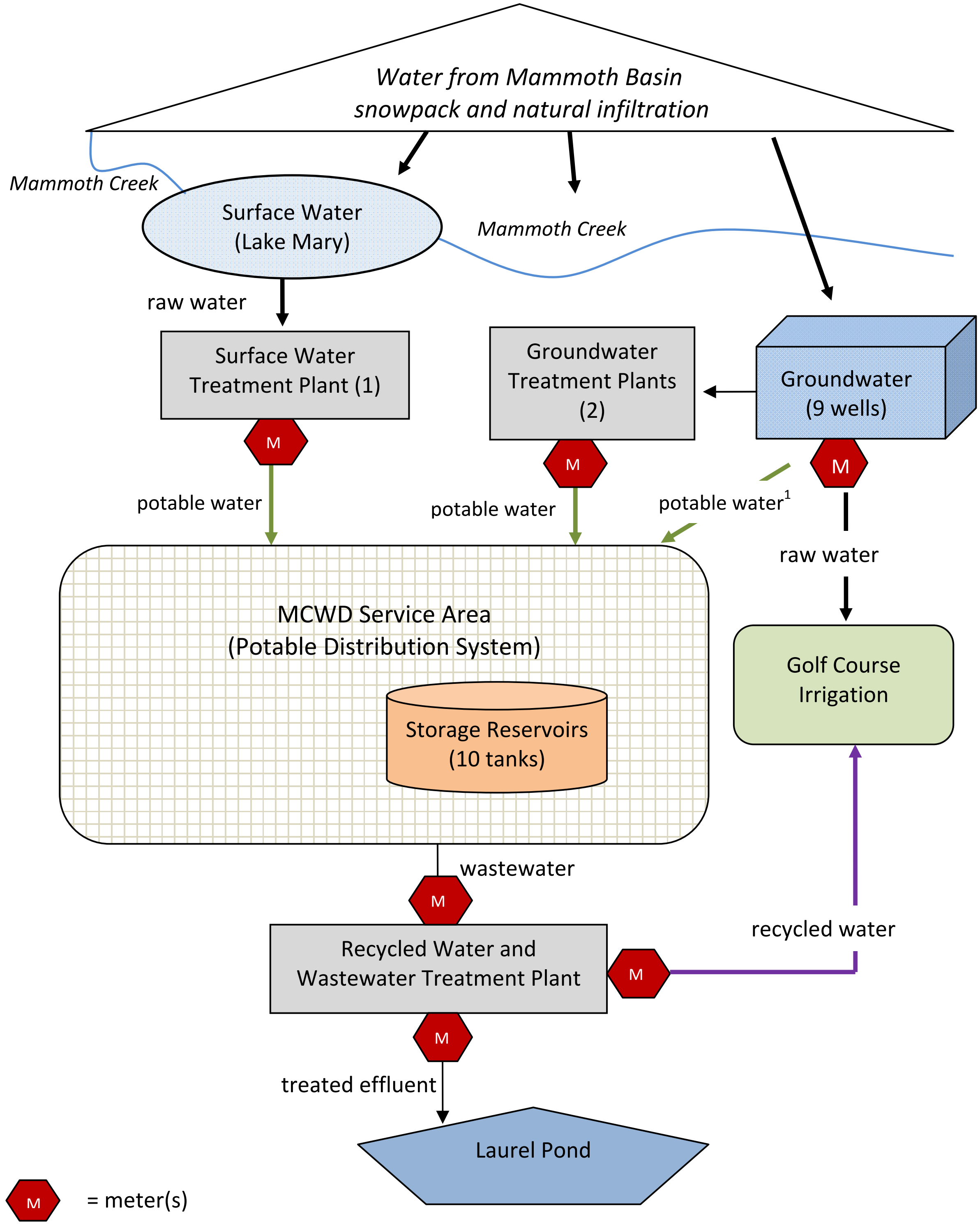
System Supplies

<u>Overview</u>

The District's existing sources of water include surface water, groundwater, recycled water, and savings from water conservation (demand management) measures. The District stores and diverts Mammoth Creek surface water at Lake Mary. Groundwater supply comes from nine production wells within the Mammoth groundwater basin. Delivery of recycled water meeting Title 22 water standards for unrestricted irrigation use began in 2010. Table ES-6 displays the water supply from each source and average annual use, in terms of exceedence frequency. Figure ES-3 displays a schematic of the Water District's water system and its source connections to the Mammoth Basin hydrologic system.

The groundwater and surface water supply estimates are based on modeling of a 50-year hydrologic record for the Mammoth Basin. The quantity of each source used in any given year varies based on surface water and groundwater supply conditions (hydrology). The quantity and frequency of use are characterized based on exceedence probability analysis of the annual supply available under the historical hydrology. For example, the 75% frequency value indicates that this quantity or greater is available in 3 out of 4 years on average, while the 90% frequency is that quantity, or greater, available in 9 out of 10 years on average. The groundwater and surface water supply values do not change over the planning horizon because there are no new anticipated sources of surface or groundwater supply, with the exception of one planned back up well (Well 11). The recycled water quantities reflect the existing and planned increased use at the Sierra Star and Snowcreek golf courses only. The potential future

Figure ES-3 Schematic of Raw, Potable, and Recycled Water Distribution Systems



1. Two groundwater production wells have wellhead treatment allowing treated water to go directly into potable distribution system.

Table ES-6 Water Supply Sources – Quantity and Frequency of Use (acre-feet per year)

Water Supply Sources		2010	2015	2020	2025	2030
Surface water						
	90%	1,667	1,667	1,667	1,667	1,667
	75%	2,042	2,042	2,042	2,042	2,042
	50%	2,610	2,610	2,610	2,610	2,610
	10%	2,760	2,760	2,760	2,760	2,760
Groundwater						
	90%	814	814	814	814	814
	75%	814	814	814	814	814
	50%	1,186	1,186	1,186	1,186	1,186
	10%	2,328	2,328	2,328	2,328	2,328
Recycled Water	100%%	64	480	640	640	640
Total (*Using 50% Frequency for Groundwater and Surface Water Supply*)		**3,895**	**4,276**	**4,436**	**4,436**	**4,436**

(DWR Table 16)

supply of imported groundwater from the Dry Creek watershed, which was included in the 2005 UWMP, was not included in the 2010 update because the project is no longer deemed financially feasible and the updated supply vs. demand assessment does not indicate the need for an out-of-basin future supply source.

Surface Water

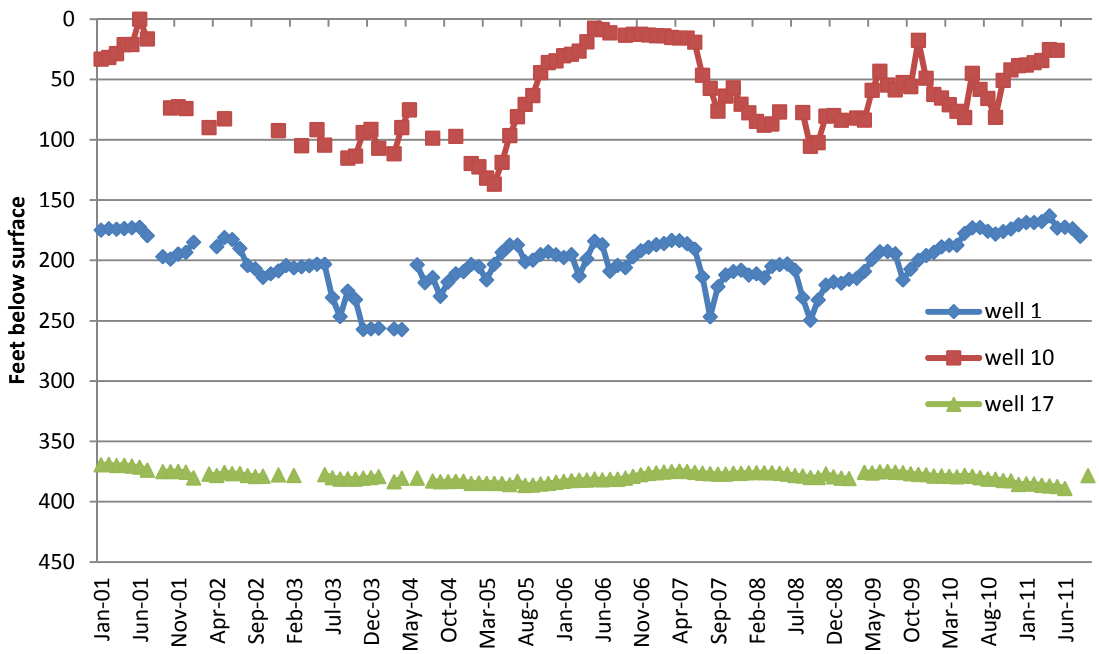
The District utilizes surface water as the primary water source when it is available because less energy and chemicals are required to divert, treat, and deliver water from the Lake Mary WTP. The surface water quality is excellent, requiring minimal treatment, and the supply is gravity-fed to almost the entire service area. The District has two water right licenses and one permit issued by the SWRCB that entitle the District to both store and divert Mammoth Creek surface water at Lake Mary. The District's licenses and permits allow up to a maximum annual surface water diversion of 2,760 ac-ft. However, actual diversions are typically significantly lower due to the combined influence of natural variability in snowpack runoff quantity and timing, limited storage to manage the variable runoff, mismatch between the seasonal trends in supply availability and community water demands, and compliance with the monthly minimum Mammoth Creek fishery bypass. For example, over the past five years, the District has diverted an average of 1,444 ac-ft per year, even though total service area demands were substantially higher, with the difference made up by groundwater supply.

Groundwater

The District utilizes groundwater from nine production wells in the Mammoth Basin. During the past five years, the District pumped an average of 1,682 acre-feet per year. Surface water supplies serve as the primary water supply. Thus, annual groundwater production is based on the difference between annual service area demands and each year's surface water supply. Groundwater supply is limited by the capacity of the nine wells, groundwater level drawdown impacts on well production, and the ability of the two GWTP's to effectively treat and remove naturally occurring drinking water contaminants such as arsenic, iron, and manganese. The District has a State-approved Groundwater Management Plan in compliance with AB-3030, and will be providing long term monitoring data for the State's CASGEM program to Mono County.

Groundwater modeling results indicate the District's current and future groundwater production is sustainable, under conjunctive management of both surface and groundwater supplies. Figure ES-4 shows typical long term groundwater level trends at three of the District production wells. In years with average and above surface water supplies, groundwater production is reduced and natural recharge is increased, leading to replenishment of the groundwater basin.

Figure ES-4 Water Table Levels in Three Production Wells, 2001-2011



<u>Water Reuse</u>

The District has made significant progress on the recycled water program in the last five years. In 2007, the District's Board of Directors certified the EIR for the recycled distribution system. Improvements to the wastewater treatment plant necessary to produce treated water that meets the state's Title 22 standards was completed in 2009. In 2009, the Lahontan Regional Water Quality Control Board issued a master permit to the District for recycled water supply within the District service area. Construction of the distribution system pump stations and pipelines to serve the Sierra Star and Snowcreek golf courses was completed in 2010. Sierra Star completed the on-site work to comply with Title 22 regulations and began using recycled water for irrigation in late summer of 2010. Table ES-7 lists the planned and potential recycled water uses. The golf course irrigation for Snowcreek and Sierra Star (320 ac-ft per year each), along with minor amounts of construction-use water, are the only established long term uses for recycled water. Snowcreek's use of the full 320 ac-ft is planned to begin by 2020, but is dependent on the timing and completion of the Snowcreek Phase VIII resort development, which is uncertain given the current severe downturn in the regional and national economy.

Table ES-7 Recycled Water - Planned and Potential Future Uses (acre-feet per year)

User type	Description	Feasibility	2015	2020	2025	2030
Landscape irrigation	Shady Rest Park and three public schools	med	0	0	0	0

User type	Description	Feasibility	2015	2020	2025	2030
Commercial irrigation		med	0	100	100	100
Golf course irrigation	Agreements in place for golf course turf and housing project common area at Snowcreek.	high	480	640	640	640
Wildlife habitat	Already supplying wildlife pond with secondary treatment water.	low	0	0	0	0
Wetlands	Existing and future WWTP effluent supports waterfowl habitat at Laurel Pond	low	0	0	0	0
Industrial reuse	NA	low	0	0	0	0
Groundwater recharge	NA	low	0	0	0	0
Geothermal Energy Production Process	Cooling system for power generation cycle at Casa Diablo geothermal power complex.	med	0	275	275	275
Indirect potable reuse	NA	low	0	0	0	0
	Total	0	480	1,015	1,015	1,015

(DWR Table 23)

Water Supply Reliability and Water Shortage Contingency Planning

The 2010 UWMP compares projected water supplies and service area demands over the 20 year planning horizon. It assesses the reliability of future supplies, including limitations to supplies and the impacts of drought and/or emergency conditions that severely curtail supply. Drought conditions considered include both a severe one-year drought and a sustained multi-year drought, based on hydrologic records for the Mammoth Basin. The 2010 UWMP also describes responses to be implemented by MCWD to reduce service area demands during emergency short term and sustained drought shortage conditions. Data presented in Table ES-8 utilized the actual historical water years' hydrology to develop the water shortage and supply scenarios. These scenarios were then used to compare water demands and assess the supply reliability. It lists each supply source and its available quantity during the three planning scenarios of normal (average) water year, a severe one year drought, and a sustained multi-year drought. Table ES-9 to Table ES-11 show the detailed supply and demand balance results for the normal, single dry year (severe), and multiple dry year supply conditions, over the 20-year planning horizon.

Table ES-8 Water Supply by Source for Planning Scenarios at Town Build-Out (acre-feet)

	Water Sources			
Water Year Type	Surface Water	Groundwater	Recycled Water	**Total Supply**
Average	2,221	1,463	640	**4,324**
Single Dry Year	337	3,360	640	**4,337**
Multiple Dry Years				
Year 1	948	2,702	640	**4,290**
Year 2	337	3,360	640	**4,337**
Year 3	2,760	814	640	**4,214**

(DWR Table 28)

Table ES-9 Supply and Total Demand Comparison - Normal Year (in acre-feet)

Planning Horizon Year	2010	2015	2020	2025	2030
Supply Total	3,783	4,164	4,324	4,324	4,324
Demand Total	2,589	2,989	3,387	3,785	4,180
Difference	1,194	1,175	937	539	144
Difference as % of supply	32%	28%	22%	12%	3%
Difference as % of demand	46%	39%	28%	14%	3%

(DWR Table 32)

Table ES-10 Supply and Demand Comparison - Single Dry Year (in acre-feet)

Planning Horizon Year	2010	2015	2020	2025	2030
Supply totals	3,796	4,177	4,337	4,337	4,337
Demand totals	2,589	2,989	3,387	3,785	4,180
Difference	1,207	1,188	950	552	157
Difference as % of supply	32%	28%	22%	13%	4%
Difference as % of demand	47%	40%	28%	15%	4%

(DWR Table 33)

Table ES-11 Supply and Demand Comparison - Multiple Dry Year Event (in acre-feet)

		2010	2015	2020	2025	2030
Multiple-dry year first year supply	Supply totals	3,749	4,130	4,290	4,290	4,290
	Demand totals	2,589	2,989	3,387	3,785	4,180
	Difference	1,160	1,141	903	505	110
	Difference as % of supply	31%	28%	21%	12%	3%
	Difference as % of demand	45%	38%	27%	13%	3%
Multiple-dry year second year supply	Supply totals	3,796	4,177	4,337	4,337	4,337
	Demand totals	2,589	2,989	3,387	3,785	4,180
	Difference	1,207	1,188	950	552	157
	Difference as % of supply	32%	28%	22%	13%	4%
	Difference as % of demand	47%	40%	28%	15%	4%
Multiple-dry year third year supply	Supply totals	3,673	4,054	4,214	4,214	4,214
	Demand totals	2,589	2,989	3,387	3,785	4,180
	Difference	1,084	1,065	827	429	34
	Difference as % of supply	30%	26%	20%	10%	1%
	Difference as % of demand	42%	36%	24%	11%	1%

(DWR Table 34)

<u>Conclusions from Analysis of Build-Out Water Supply Quantity and Frequency of Use</u>

The water supply reliability analyses shown above support the following general conclusions. Under current conditions (2010), MCWD has adequate water supply to meet community needs under the full range of water year types, including both the severe one year and sustained multi-year droughts. This is primarily due to the availability of local groundwater resources, which provide 40% of supply under average conditions, nearly 90% of the supply in a severe one year drought, and 60% of the supply over a three year sustained drought.

During the intermediate planning horizons and through 2030 (Town build-out), the combined use of Mammoth Creek surface water, local groundwater, and recycled water results in a supply mix that can reliably meet the community needs under the full range of water year types. However, this is a long range projection which could be significantly impacted by future changes to both demands and supply.

On the demand side, this analysis is largely dependent on the Town land use policies and the actual type and density of development which occurs between now and build-out. Town policies on development type, density, and enforcement of effective landscape practices will influence water demands significantly.

The District's surface water supply is limited by a number of factors. One is the peak production, treatment and distribution capacity of the water system infrastructure. Short term peak demands versus supply, treatment, and distribution capacity are not addressed in the scope of the 2010 UWMP. The maximum annual quantities of surface water supply used in the supply reliability evaluations are based on quarterly annual time step (90 days) modeling and reflect an ideal seasonal timing match in system demands and surface water runoff. Under actual operating conditions, two factors can significantly limit the actual surface water effectively available to meet demands: very limited surface water storage capacity in Lake Mary and seasonal mismatch in the timing of runoff generated supply and community demands. The net result of these limitations is that available surface water is not utilized by the District when available and surface water is not always available later in the irrigation season when needed.

The District's surface water supply could be impacted by climate change impacts to snowpack water content and watershed runoff patterns, which cannot be adapted to without significantly increased surface water storage. Legal challenges to MCWD's water rights from the City of Los Angeles could, if the City prevails, reduce or eliminate access to local surface water supply. Similarly, local groundwater supplies could be impacted by the major expansion of geothermal energy production planned by ORMAT Corporation at the Casa Diablo power plant complex, or natural changes from seismic or volcanic activity causing changes to the local hydrogeologic characteristics. Finally, the planned expansion of recycled water use for Snowcreek golf course and its related future development remains a major variable, since recycled water will make up about 15% of future supply. Each of these potential influences on future water supply and demand will need to be re-evaluated in the 2015 UWMP update to confirm the conclusions presented in this 2010 UWMP update.

Demand Management Measures

California has identified measures to be implemented and reported on in UWMPs by water supplier to ensure the efficient use of water (CWC 10631(f)(g)). The following table shows the implementation status of the measures and provides brief comments.

Table ES-12 Implementation Status and Comments on Demand Management Measures

Demand Management Measure	Implemented (Y/N)	Comments
Water Survey Programs for Single-Family and Multi-Family Residential Customers	Y	The District implements this program through the 6th grade LivingWise program. About 100 indoor surveys are conducted each year. Outdoor surveys are conducted through the Large Landscape Conservation Program and Incentives DMM.
Residential Plumbing Retrofit	Y	This program is implemented through community events and the LivingWise Program. The District provides free showerheads and aerators for kitchen and bathroom faucets. The program has saved an average of 556,000 gallons a year. The fixtures are expected to last at least 10 years.

Demand Management Measure	Implemented (Y/N)	Comments
System Water Audits, Leak Detection, and Repair	Y	This program has been the most effective water demand reduction measure implemented by the District. The 2005 UWMP projected losses to be 760 acre-feet in 2010; however, unaccounted water was 233 acre-feet in 2010, an annual saving of over 172 M gallons of water.
Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	Y	All District customers are metered.
Large Landscape Conservation Programs and Incentives	Y	The District is providing water audits for the top water users, recipients of landscape rebates and on request. The audits demonstrate potential financial savings if irrigation practices followed MAWA water budgets.
High-Efficiency Washing Machine (HECW) Rebate Programs	Y	This program has been in place since 2009. A method to determine water savings from this program will be adopted in 2011. Since 2009, 23 machines have been installed through this program.
Public Information Programs	Y	This measure is in the District Code Book and has be implemented.
School Education Programs	Y	School programs have been limited to the 6th grade LivingWise program.
Conservation Programs for Commercial, Industrial, and Institutional Accounts	Y	The rebate program offers higher incentives for larger landscapes and shared fixtures. Based on indoor fixture replacements, the program has saved over 170,000 gallons since 2007. This estimate only includes single year savings.
Conservation Pricing	Y	Residential customers are billed on an increasing block rate. This measure will be updated with a new rate study underway in FY 2011. There is no method to determine water savings from this measure.
Water Conservation Coordinator	Y	The District has filled this position for over 10 years.
Water Waste Prohibition	Y	The District Code Book contains prohibitions against and enforcement provisions for discouraging water waste.
Residential Ultra-Low Flush Toilet Replacement Programs	Y	This ongoing rebate program was revised to only accept 1.28 gpf toilets (2010) with the WaterSense label (2011). Since 2006, water savings total over 1M gallons. This estimate only includes single year savings, it is not cumulative.

Potential Climate Change Impacts to Water Supply

Federal and state resource agencies have begun to evaluate and plan for potential water supply and demand impacts expected to result from global and regional climate shifts. These shifts and associated impacts to hydrologic systems are modeled using a group of common climate models. These models have a range of greenhouse gas (GHG) emission scenarios and inherent uncertainties and variability in their projection results. However, a consistent result for California and the Sierra Nevada specifically is for increased average temperatures, reduced precipitation as snowfall (with increase in precipitation as rain), and increased intensity of extreme weather events. For the Mammoth Basin area, the State's most recent forecasts show a range of average temperature increases between +5.4 °F to +7.2 °F for the low and high GHG emissions scenarios, respectively, and a decrease in annual snowpack water content of between 49% (high emissions) to 33% (low emissions). These changes in long term climate patterns and regional hydrology are forecast to occur over the next approximately 60 years.

The Mammoth Basin's hydrology, like much of the Sierra Nevada, is driven by the winter snowpack that is often described as "the most important reservoir of water in California," with the ability to store and slowly release about 15 million acre-feet of winter season precipitation for when it is needed to meet municipal and irrigation water demands. Long term shifts in the amount and type of precipitation, and the seasonal runoff pattern, would have potentially major impacts on the management of local water supplies. Following DWR's recommendations, the 2010 UWMP includes both adaptation strategies (measures to change water supply and management infrastructure, and changes to customer use characteristics to respond to the effects of climate change) and mitigation strategies (changes implemented to reduce greenhouse gas emissions and their contribution to the mechanisms driving climate change). These adaption and mitigation strategies can be updated as additional information about climate change impacts are developed.

Adaptation

Ten climate change adaptation strategies were proposed by DWR in a 2008 white paper on adaptation strategies for California's water. Not all of these strategies are applicable to water districts. The five applicable strategies and supporting District actions include the following:

Water Use Efficiency – Water use efficiency has been an ongoing focus at the District. Efficiency projects include water line replacements, use of recycled water for irrigation, and customer incentives and education programs. Distribution system losses have dropped from 16% in 2004 to 5% in 2010. The overall impact of these efforts has been a 39**%** reduction in per capita water use.

Integrated Regional Water Management – The District has supported the Inyo-Mono Integrated Regional Water Management Group since its inception in early 2008. The Group's objectives include the promotion of integrated regional water management to identify opportunities for cooperative actions to mitigate the impacts of long term regional climate and hydrology changes.

Ecosystem Enhancement – The integrity of the Mammoth Basin ecosystem is important to the District. A well managed ecosystem has a higher capacity to absorb precipitation and flood events and maintain higher water quality. District actions to support this strategy include regular coordination with the Town and USFS on land use issues, and a 10 year commitment to funding habitat enhancement projects within the Mammoth Creek watershed.

Expanded Storage and Conjunctive Water Management – The District does not currently have plans for expanded surface water storage. Based on the projections of snowpack runoff pattern changes, increased surface water storage would have significant benefits for maintaining water supply reliability under changing hydrologic patterns. The District does conjunctively manage surface and groundwater supplies, which utilizes the natural groundwater storage of the basin.

Resource Monitoring and Data Collection – Stream flows, lake level and groundwater aquifers are monitored intensively by the District. The results of this monitoring are shared with local and regional resource management agencies.

Mitigation

The District has been reducing its greenhouse gas emissions through several programs. These include the following: optimized use of surface water supply, which requires less energy to treat and distribute than groundwater; construction of a 1 MW solar PV power system to power the wastewater and recycled water treatment plant and the pumps that will eliminate the annual emission of 1,626,000 pounds of carbon dioxide, 1,190 pounds of sulfur dioxide and 1,390 pounds of nitrous oxide to the atmosphere annually; timing of pumps and water and wastewater treatment plant operations to run during off-peak energy demand periods; rehabilitating major pump loads with high efficiency motors and variable frequency drives (VFDs); and reduced per capita water demand which reduce GHEs through energy savings. Future actions the District will be evaluating include: installation of micro-turbines at the largest pressure reducing valve (PRV) stations to generate renewable local power for feed-in to the SCE grid; geothermal heating of District buildings to off-set propane and diesel heating systems; and pumped storage energy generation systems to optimize daily use and generation of energy.

Purpose and Background

The Mammoth Community Water District's 2010 Urban Water Management Plan (UWMP) has been prepared to comply with California Water Code, Section 10610 - 10657, the Urban Water Management Planning Act (UWMPA, or Act). The Act requires that all urban water suppliers providing water for municipal purposes to more than 3,000 customers, or supplying more than 3,000 acre-feet of water annually, must prepare and submit to the Department of Water Resources (DWR) an urban water management plan every five years.

The purpose of the Act is to ensure water resources are managed efficiently to provide a reliable supply to residents and businesses in the state of California. The UWMP is developed by the responsible local water agency and must be updated at least every five years; this plan is an update of the District's 2005 UWMP and serves as an independent and complete document.

In 2009, the Act was modified to incorporate provisions of the Water Conservation Bill of 2009. The Water Conservation Bill requires a statewide 20 percent reduction in urban per capita water use by December 31, 2020. To meet this goal, every urban retail water supplier must develop and report a baseline daily per capita water use and a future 2020 compliance daily per capita water use. An interim target daily per capita water use for 2015 is also required to measure progress towards the 2020 goal.

The Mammoth Community Water District's 2010 UMWP will serve as a guide for District strategic planning to ensure long term water supply reliability for the Town of Mammoth Lakes (Town). The planning horizon is 20 years (through 2030), and is divided into 5-year increments. The 2010 UWMP presents information, analysis, and conclusions regarding past, current and projected water demand (Chapter 3); current and future water supplies to meet projected demands (Chapter 4); supply reliability under future demand conditions and District plans for potential water shortages (Chapter 5); actions undertaken by the District to reduce water demand (Chapter 6); and future potential impacts of climate change on local water supplies (Chapter 7).

For ease of reading and clarification, Appendix A contains a list of definitions and abbreviations used in this document.

Public Participation and Agency Coordination

The California Water Code (CWC) mandates that urban water purveyors notify the city or county they serve that the UWMP will be updated and to solicit comments from pertinent agencies. Table 1-1 lists agency notifications of the District's plan to update the 2005 UWMP and which agencies provided feedback or were contacted for assistance. A sample form letter used to notify agencies is provided in Appendix B.

Table 1-1 Agency Notification and Coordination

Coordinating agencies	Received Notice of Preparation	Contacted for assistance	Attended public meeting	Commented on draft	Notice of intent to adopt
Inyo-Mono IRWMP Group	Verbal & meeting summary (1/26/2011)				X
Town of Mammoth Lakes	Mailed 2/9/10	X			X
Mono County	Mailed 2/9/10				X
LADWP	Mailed 2/9/10		X	X	X
State Water Resources Control Board	Mailed 2/9/10				
Inyo National Forest Service	Mailed 2/9/10				
Public	Press release sent 3/14/11 to all local media outlets. Radio announcements ran May – June on the local radio station.		X	X[1]	X

(DWR Table 1)
1. One comment letter received.

Plan Adoption, Submittal, and Implementation

The UWMPA guidelines require that prior to adoption of the 2010 UWMP, the District provide a draft for public inspection and hold a public hearing. Following the public hearing, the MCWD Board of Directors will consider adoption of the 2010 UWMP. After adoption, a copy of the final 2010 UWMP is filed with the Department of Water Resources (DWR) within 30 days. The draft UWMP was made available to the public for review at the Mammoth Lakes branch of the Mono County Public Libraries and at the District office and website. Hardcopies of the draft were provided to the Planning Departments for the Town of Mammoth Lakes and Mono County. Announcements of its availability for public review and comment, and noticing of the public hearing, in English and Spanish, were made through paid advertisements in the two local newspapers and news releases were provided to the local radio stations. The Notice of a Public Hearing is provided in Appendix C.

Following the public hearing the Board adopted the 2010 UWMP at the November 17, 2011 monthly meeting with minor editorial revisions. DWR and the State Library will have a the final 2010 UWMP by December 17, 2011. In addition, copies will be provided to the Town and Mono County. An electronic copy will be posted on the District's website: www.mcwd.dst.ca.us and a hardcopy can be viewed at the District's office located at 1315 Meridian Boulevard in Mammoth Lakes, California during regular office hours. Subsequent to adoption, any amendments or changes to the adopted 2010 UWMP will result in another public hearing such that new revisions and/or amendments shall be heard and adopted by the Board of Directors.

Plan Implementation

The 2010 UWMP will be implemented by including elements of the plan in the District's annual and long-range strategic planning. Example elements are identified in the table below.

Table 1-2 UWMP Implementation Tasks and Responsible Entities

Actions	Responsible Entity
Water Auditing	Operations and Maintenance Supervisors
Demand Auditing	Environmental Specialist
Water Conservation	Environmental Specialist
Groundwater monitoring	Operations Supervisor
Recycled Water	Operations and Engineering Supervisors
Water shortage planning	Operations and General Manager
Financial preparedness for water shortages	Finance Manager

The Mammoth Community Water District was formed in 1958 to provide water and wastewater services to the community of Mammoth Lakes in Mono County, California. The District serves a resident population of 8,237 people (US Census Bureau 2010) and a “people at one time” population of approximately 35,000 during peak transient visitor periods (Town of Mammoth Lakes 2007a). The District has 3,660 metered connections and relies on a mix of water supplies from Mammoth Creek (Lake Mary), the Mammoth groundwater basin, and reclaimed water. The District has three water treatment plants; one plant receives surface water from Lake Mary and the remaining two treat water from the groundwater production wells. Groundwater is produced from nine production wells. Treated water is stored in 10 distribution system storage reservoirs. The water distribution system also includes 81 miles of pipelines, seven booster pump stations, and five pressure zones. The District also provides wastewater collection, treatment, and water recycling within its service area.

Service Area

The District’s service area includes 3,640 acres of land within the incorporated area of the Town of Mammoth Lakes. The Town encompasses a 24 square mile incorporated area, but most of this is public land administered by the Inyo National Forest (USFS). The smaller Town urban growth boundary is approximately six square miles and includes most of the District service area. There are 2,500 acres of privately owned land in the developed portion of the Town’s incorporated area, with the remaining lands publicly owned and managed by the Inyo National Forest. See Figure 2-1 for a map of the District service area. The Town of Mammoth Lakes is located at an elevation of approximately 7,800 feet and is located east of the Sierra Nevada crest in the Mammoth Lakes watershed. The watershed extends over 70 square miles, from the 12,500 foot peaks of the Sierra crest at its western boundary to the 7,000 foot terrain of the Great Basin region to the east.

Climate

Mammoth Lakes is located in the rain shadow of the Sierra Nevada; however, a low point in the crest, Mammoth Pass, allows moisture from the west to flow into the area. Mammoth Mountain is located just east of the crest and thus captures a significant amount of snow fall each winter; however, precipitation events may occur during any month of the year. Annual precipitation varies considerably within the service area, depending on elevation and distance from Mammoth Pass. To demonstrate the elevation gradient of precipitation extremes, average annual precipitation ranges from about 42.5 inches at Mammoth Pass (9,500 ft) at the western boundary of the Basin to 10 inches at the Crowley Lake dam (CDEC, LADWP records) in the easternmost part of the Mammoth Basin. Average annual precipitation for the Town of Mammoth Lakes is approximately 23 inches. See Table 2-1 for average monthly climate data. In Town, the winter season is characterized with mostly sunny skies and high temperatures average 40°F and low temperatures average 16°F. In contrast, summers are mild with temperatures averaging 75°F for a high and 44°F for a minimum.

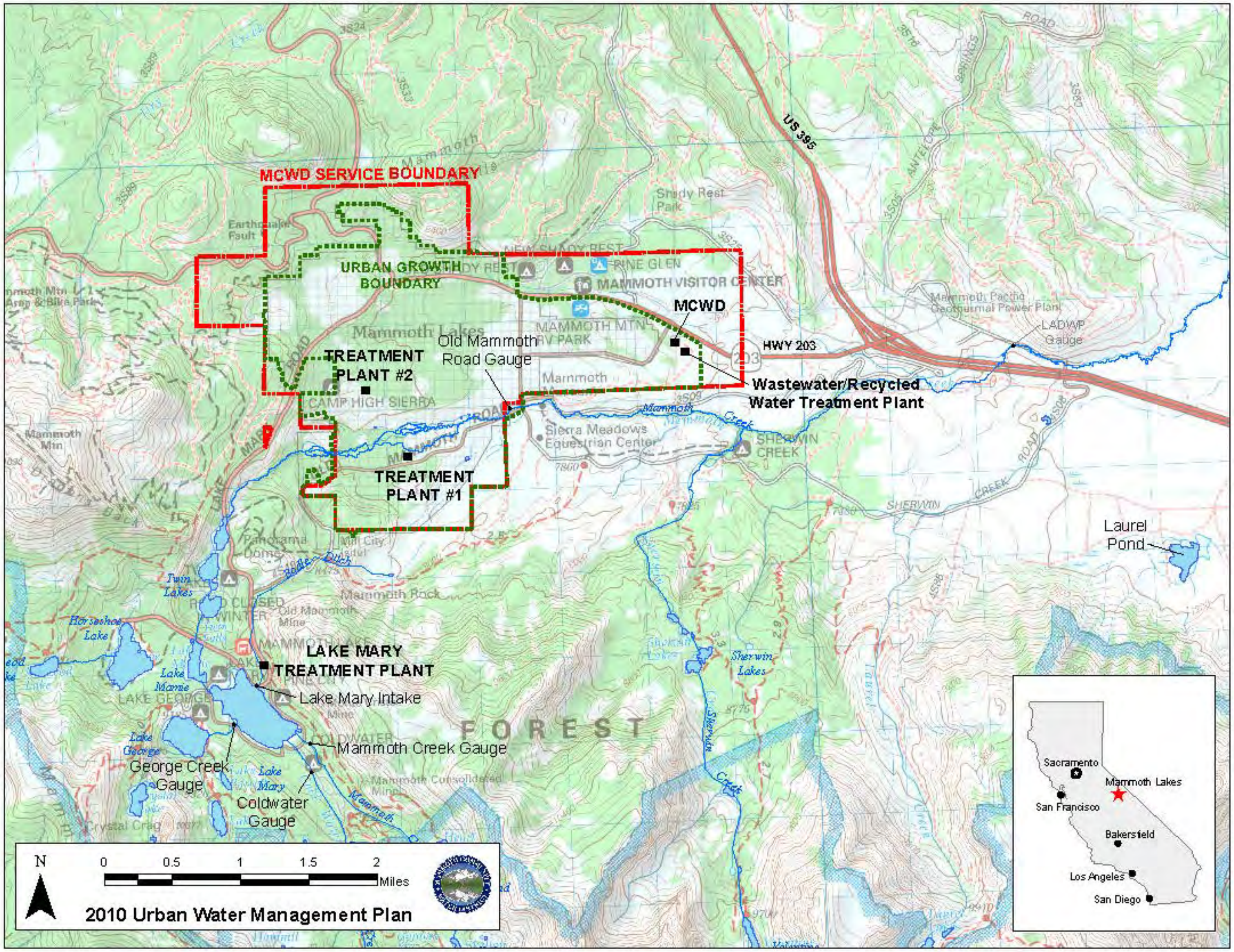


Figure 2-1 Location of Service Area and District Facilities

Table 2-1 Average Temperature and Precipitation Recorded at the USFS Station in Mammoth Lakes

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Max. Temperature (F)	39.9	39.3	45.2	49.0	60.3	69.8	78.3	77.0	70.7	59.9	48.4	41.1	56.6
Avg. Min. Temperature (F)	15.9	16.1	20.4	24.5	33.1	40.3	46.5	44.9	37.7	28.4	21.8	16.0	28.8
Avg. Total Precipitation (in.)	4.65	4.00	2.36	1.56	1.21	0.54	0.53	0.32	0.36	1.52	2.09	4.37	23.51
Avg. Total Snowfall (in.)	44.2	45.6	29.9	17.3	4.1	0.5	0.0	0.0	0.0	6.8	14.9	47.9	211.2
Avg. Snow Depth (in.)	22	29	25	9	0	0	0	0	0	1	2	12	8

Period of Record, 12/1/1993 to 12/31/2010. Data source: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5280. Accessed 7/11/2011.

The District's water supply in any given year is heavily dependent on the winter season precipitation (primarily snowfall) and the subsequent amount and rate of surface water runoff within the watershed. Groundwater resources also vary with the precipitation received; however, the groundwater basin responses typically lag the preceding surface water conditions by one to two years.

Population

The District serves the Town of Mammoth Lakes. The 2010 U.S. Census Bureau population report of 8,234 residents for the Town appropriately represents the District's service area population. This represents a population increase of 16% since 2005. However, the Town's economy is primarily tourism based, with visitation drawing from the adjacent major population centers of southern California. Therefore water demand is influenced by both large fluctuations in visitors and transient seasonal employees residing in the service area. The Town estimated that the peak visitor periods, such as major holidays, include a total "people at one time" (PAOT) of 34,265 people in 2003. PAOT includes permanent residents, seasonal workers, second homeowners, and visitors. The future build-out PAOT estimate is approximately 52,000. To capture the significant influence of transient population on water demands, an "effective annual population" term was developed using historical data and future estimates for permanent population, PAOT, and annual average transient housing and lodging occupancy rates.

Seasonal water demand is lowest during the winter, with the exception of the short term peak visitor periods and highest during the summer irrigation season. Landscaped areas in developments serving transient populations and second homes are irrigated regardless of occupancy.

The per capita water demand for the District service area is based on the effective annual population. Permanent (or resident) population projections were developed by applying the ratio (approximately 1.05) of current permanent population to current housing units (single-family and multi-family units) and applying the ratio to the Town's projected number of housing units used in their Traffic Analysis Zone model for build-out. In addition, build-out was assumed to occur at 2030 instead of 2024 as described in the Town's 2007 General Plan. This change to the build-out planning horizon is based on the rapid drop in local development and resident population growth resulting from the severe economic downturn since 2007. This method resulted in a resident population estimate of 12,300 in 2030, representing an annual average growth rate of approximately 2%. This average annual growth rate was applied for intervening years and reported in 5-year intervals in Table 2-2.

PAOT projections are from the Town's 2005 General Plan Update (Mammoth Lakes (2007a) and annual occupancy rates are from a recent economic study for the Town (EPS, Inc 2011). Occupancy rates were reported as ranging from 30% to 40% with an average occupancy of 36% for 2001 – 2010. For estimating the visitor's contribution to effective annual population, a conservative occupancy rate of 30% was applied to the transient portion of PAOT for 2001-2010.

Population data presented in Table 2-2 Current and Projected Service Area Population determine per capita water use compliance targets in Chapter 3. DWR recognizes that water purveyors in the state may have unique and complex service area populations. Therefore, DWR allows supplier "to supplement … data with additional local data sources … These refinements are acceptable as long as they are consistently applied over time, and as long as they build upon population data resources of the DOF or the US Census Bureau" (DWR 2011).

Table 2-2 Current and Projected Service Area Population

	2010	2015	2020	2025	2030
Resident Population	8,234[1]	9,094	10,041	11,086	12,300
People at One Time[2]	36,578	40,434	44,289	48,145	52,000
Effective Annual Population	16,739	18,496	20,315	22,204	24,210

(DWR Table 2)

1. Data from 2010 US Census Bureau

2. A PAOT of 34,265 was developed in 2003 by the Town (Town of Mammoth Lakes, 2007a) and was used to represent PAOT from 2001-2007. PAOT for build-out is from Town of Mammoth Lakes Resolution certifying the Final Program EIR for the 2005 General Plan update (Town of Mammoth Lakes 2007b). PAOT values were estimated based on linear interpolation for intermediate years.

Land use

The tourism based economy of Mammoth Lakes has resulted in a large portion of the service area land being developed to serve visitors, second home owners, and seasonal workers. Over 60 percent of the residential units in Mammoth are second homes or dedicated to rental lodging. The 2007 General Plan for Mammoth Lakes shows that development to house visitors and transient employees comprises 90% of the build-out land area, while commercial and light industry uses fill the remaining 10 percent. There is no agriculture or large industrial developments in the Urban Growth Boundary (Town of Mammoth Lakes 2007a).

This chapter presents analysis required to meet provisions of the 2009 Water Conservation Act to reduce daily per capita water use by 20 percent by the year 2020. Key water use metrics for meeting the Act's requirements include the *base daily per capita water use,* the *compliance daily per capita use,* and the *interim per capita water use target*. Each of these terms is defined in Appendix A and explained in the following sections. This chapter also presents water system demands under current and future conditions, including a breakdown by customer use categories, for a twenty year planning horizon.

Base, Interim, and Compliance Daily Per Capita Water Use

The UWMP must include an estimate of historical base daily per capita water use, establish a compliance water use target for the year 2020, and establish an interim water use target for 2015 that will support the objective of the Water Conservation Act of 2009 to achieve a state-wide 20% reduction in per capita water use by the year 2020.

Determination of the base daily per capita water use, measured in gallons per capita per day (GPCD), used annual population figures (Table 2-2 Current and Projected Service Area Population), gross water use, and a 10-year and five-year continuous period of record as specified by the DWR guidelines (Tables 3-1 and 3-2). Population data for this analysis relied on federal census data estimates developed by the State of California Department of Finance for non-census years, PAOT, and transient occupancy rates.

Gross water use includes all treated and raw water delivered to customers and water losses in the distribution system. Water treatment plant process water losses (such as filter backwash) and recycled water used for irrigation are excluded from gross water use. Water production data from effluent meters at the District's three water treatment facilities, meters on production wells supplying raw water for direct distribution to irrigation users, and customer meter billing data were used to develop the gross water figures. The 10-year baseline period used the most recent period of record, 2001 to 2010.

The resulting *compliance daily per capita water use* for 2020 is 141 GPCD for 2020 and the 2015 *interim water use target is* 159 GPCD. The *base daily per capita use* is 176 GPCD. To determine the compliance and interim target daily per capita water use, DWR provided four options (or "methods") to choose from. The District chose Method 1, a 20% reduction from the most recent 10 year average Base Daily Per Capita Water Use, shown in Table 3-1. The selected method's results must be compared against a 5% minimum reduction from the most recent 5-year average base daily per capita water use, shown in Table 3-2. The result from applying Method 1 to the 10-year baseline GPCD resulted in a lower compliance water use target than 95% of the 5-year baseline. Therefore, the compliance daily water use of 141 GPCD established from Table 3-1 meets these requirements.

Table 3-1 shows the significant downward trend in daily per capita water use over the past 10 years, which has decreased by 39**%.** The most recent year's actual water use (119 GPCD for 2010) is below the 2020 compliance and interim 2015 target daily per capita use levels. Based on the 10 year demand trend, the District has already met the requirements of the Water Conservation Act of 2009. The District will continue its demand management and conservation efforts as an integral part of its water supply strategy, to ensure future per capita water use remains below the compliance daily per capita use of 141 GPCD.

Table 3-1 Base Daily Per Capita Water Use Over a 10-Year Period of Record

	Year	Permanent population	Effective population	Average daily system gross water use (mgd)	Annual average daily per capita water use (gpcd)
1	2001	7,174[1]	15,350	3.0	195
2	2002	7,335[1]	15,523	3.2	206
3	2003	7,392[1]	15,626	3.1	198
4	2004	7,569[1]	15,665	2.9	185
5	2005	7,455[1]	15,800	3.0	190
6	2006	7,407[1]	15,826	2.8	177
7	2007	7,455[1]	15,930	2.9	182
8	2008	7,373[1]	16,172	2.7	167
9	2009	7,295[1]	16,417	2.3	140
10	2010	8,237[2]	16,737	2.0	119
10-year average annual daily per capita water use					176
Compliance Urban Water Use Target - 80% of average annual daily per capita water use					141

(DWR Table 14)
1. http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2001-10/view.php.
2. US Census Bureau population for Mammoth Lakes, CA, census tract 2.

Table 3-2 Base Daily Per Capita Water Use Over a 5-Year Period of Record

	Year	Resident population	Effective Population	Daily system gross water use (mgd)	Annual daily per capita water use (GPCD)
1	2006	7,407[1]	15,826	2.8	177
2	2007	7,455[1]	15,930	2.9	182
3	2008	7,373[1]	16,172	2.7	167
4	2009	7,295[1]	16,417	2.3	140
5	2010	8,237[2]	16,737	2.0	119
		5- year average annual daily per capita water use			157
		95% of average annual daily per capita water use			149

(DWR Table 15)
1. http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2001-10/view.php.
2. US Census Bureau population for Mammoth Lakes, CA, census tract 2.

Water Demand

Descriptions of past, current and future water demands are required elements in the UWMP. These demands are divided into customer use types as described in the California Water Code (10631(e)(1) and (2)).

Customer Water Demand – Past and Current

Customer water demand is defined as delivered water to customers and is based on meter readings and billing data. All District water service connections are metered. In 2005, customer water demand was 2,564 acre-feet as shown in Table 3-3. This amount dropped to 2,169 acre-feet in 2010, as shown in Table 3-4.

Table 3-3 Customer Water Demand in 2005 (in acre-feet)

Water use category	# units	2005 actual water delivered
Single-family residential (SFR)	2,018	549
Condominium	5,494	948
Multi-family residential (MFR)	964	140
Commercial/Industrial/Public (1,000 sq ft)	1,779	257
Motel/Hotel[1]	1,560	111
Public sector	1	296
Irrigation for golf courses	2	263
Other (process water)		NA
Total		2,564

(DWR Table 3)
1. The hotel/motel water-use sector includes only those units that are separately metered and does not include units that share water meters with other commercial uses such as adjacent restaurants. Commercial includes mixed uses such as restaurants, condo/hotel, retail, etc. Condominiums in 2005 were separated from multi-family units because many serve the visitor population.

Customer water delivery in 2010 is presented in Table 3-4 with slightly different water use categories than 2005. These changes were made in 2010 to better align with the Town's land use categories because future water demand projections were based on Town build-out estimates and land use categories. In addition, revising the 2010 categories to exactly match the 2005 categories was not possible because the District's accounting software was replaced in 2008, therefore the District only has limited data for the 2005 categories for years prior to 2008.

Table 3-4 Customer Water Delivery in 2010 (includes low-income housing accounts)

Water use category	# of units	Acre-feet/year
Single-family residential	2,227	450
Multifamily	6,429	926
Motel/Hotel	1,852	131
Commercial (1,000 sq ft)	1,616	230
Industrial and Agriculture	Not applicable	
Institutional	48	84
Irrigation (includes golf courses)	42	348[1]
Other (process water, fire, line cleaning, etc)	Not applicable	
Total		2,169

(DWR Table 6)
1. Includes delivered raw well water for irrigation, but does not include recycled water used for irrigation and construction (99 acre-feet).

Future Customer Water Demand

Projections of future customer water demand were developed using projections of future land use and development, related population increases, and customer water use category unit water demand. The District coordinated with the Town planning department staff to develop customer water use categories that corresponded to the land use categories reflected in the Town's Traffic Analysis Zone (TAZ) model and General Plan. These land use categories were also used to estimate future population by applying the current persons-per-housing unit ratio to build-out housing unit projections. Table 3-5 shows the relationship between the Town land use, District customer billing, and DWR water use categories. Table 3-6 shows the future customer water demands.

Table 3-5 Map of District Water Use Customer Categories to Town TAZ Categories

UWMP categories	MCWD customer categories	TOML TAZ categories	Growth projections[1]
SFR	SFR	SF Resident, SF Visitor	28%
MFR	MFR - (apts, duplex, triplex, etc.)	MF Resident	35%
	Mobile	Mobile Home	0%
	Condominiums - (perm. Res, mixed, vacation use, e.g. Summit, 1849, Ski Run, Mountain Back)	MF Visitor	47%
Motel/Hotel	Motels - (Quality Inn, Sierra Lodge and dorms)	Lodging Hotel	158%
	Resort Hotel /Condo -(e.g. Juniper Springs, Westin, Sunstone, Eagle Run, Mammoth View, future Snowceek VIII)	Resort Hotel	262%
Commercial	Resort Lodging/Mixed Retail - (e.g. The Village, Future Old Mammoth Place, Mammoth Crossing)	Retail/ Commercial	55%
	Commercial – (restaurants, retail)	Light Industrial	36%
Institutional	Institutional – (schools, Town, Cerro Coso, USFS offices, campgrounds)	Public Utility	0%
		High School	0%
		Public School	0%
		Church	0%
		College	0%
	Hospital	Hospital	57%
Irrigation	Irrigation – (dedicated irrigation accounts and golf courses)	NA	
Agriculture	NA	NA	
Industrial	NA	NA	

1. Growth projections are for Town build-out, developed as part of the Town's 2009-10 PAOT analysis and associated TAZ GIS data.

Customer water use category unit water demand was developed by averaging unit water demand for three years, 2008 – 2010, for each water use category (total water demand divided by the number of "units" served). The same percentage growth for each land use category, established by the Town land use projections, was then used to estimate the overall growth in water demand for those customer categories linked to each land use category. A percentage increase was applied instead of unit count increases because the Town and the District do not define "unit" in the same manner. The results in Table 3-6 show a long term increase of approximately 46% in customer water demand (excluding distribution and water treatment plant process losses) between 2015 and 2030 (build-out).

Table 3-6 Projected Customer Water Demand, 2015-2030 (acre-feet per year)

	2015		2020		2025		2030	
Water use category	**units**	**AFY**	**units**	**AFY**	**units**	**AFY**	**units**	**AFY**
Single-family	2,363	498	2,499	545	2,635	593	2,771	640
Multifamily	7,062	1,064	7,694	1,203	8,327	1,341	8,959	1,480
Motel/Hotel	2,885	212	3,917	293	4,950	374	5,982	455
Commercial	1,825	261	2,034	292	2,242	324	2,451	355
Institutional (accts)[1]	48	89	48	94	48	99	47	103
Irrigation (includes golf courses)[3]	41	441	41	533	41	626	41	718
Industrial & Process water	Not applicable in MCWD service area.							
AFY Totals	2,565		2,961		3,357		3,751	

(DWR Tables 5,6, 7)
1. Increased demand in this category results from an expansion of 21 beds at the hospital.
2. The Snowcreek Recycled Water Agreement allows an increase of 11 AFY of untreated groundwater and adds 320 AFY of recycled water to irrigate the future 9-hole golf course expansion and common areas for the Snowcreek VIII development.

In addition to serving customers, other water demands for water service are identified in Table 3-7 below. “Other” is used to quantify the water used at the water treatment plants to backwash filters and to maintain their ability to function properly. In addition, water is lost through leaking pipes, malfunctioning meters and normal meter read variability (collectively “system losses”). The District has been reducing system losses through a water main replacement project and auditing/replacement of customer meters. These measures have reduced system losses over 70% between 2005 and 2010. As depicted in Figure 3-1, over the past 10 years gross water use has decreased while population has increased.

Table 3-7 Additional Water Uses and Losses (acre-feet per year)

Water use[1]	2005	2010	2015	2020	2025	2030
Raw water	All raw water uses are accounted for in categories below and in Tables 3-3 and 3-4					
Recycled water	0	0	0	0	0	0
System losses[2]	751	233	237	238	239	240
Other (WTP operations)[3]	106	187	187	188	189	189
Total	857	420	424	426	428	429

(DWR Table 10)
1. Any water accounted for in Tables 3-3, 3-4, and 3-6 is not included in this table. For example, raw and treated raw water enters the distribution system for golf courses and the potable system but is not included in this table.
3. Assumed 6% of plant production for distribution system loss.
4. Assumed 3% and 10% of water demand for filter backwash use, for surface water treatment and groundwater treatment respectively.

Table 3-8 Total Water Demand, Past, Current, and Projected (acre-feet per year)

Water Use	2005	2010	2015	2020	2025	2030
Total water deliveries (from Tables 3-3, 3-4, and 3-6)	2,564	2,169	2,565	2,961	3,357	3,751
Additional water uses and losses (Table 3-7)	857	420	424	426	428	429
Total	3,421	2,589	2,989	3,387	3,785	4,180

(DWR Table 11)

Total water demand (i.e., customer use and distribution and treatment plant losses) is projected to increase approximately 40% between 2015 and build-out, to an average annual demand of approximately 4,180 ac-ft. The District does not have a program for saline water intrusion barriers, managed groundwater recharge, and does not supply water for agricultural use.

Feasibility of Projected Uses

The feasibility of the projected water use is determined primarily by whether the projected land use development types and overall rate of growth occur. There are no technical, fiscal, or regulatory issues impacting the feasibility of the projected water uses developing in correlation with the population growth. The Town is working with a consultant to assess the economic feasibility of their General Plan build-out projections and market-based viability of the already approved development projects being constructed in the future. For example, can the number of high-end visitor based lodging complexes be supported by the market based estimates of future visitor levels? The study has not been completed. After review and consultation with the Town, the final market study results will be incorporated as applicable into an amended UWMP or referenced in an addendum.

Lower Income Housing Projected Water Use

The California Water Code (10631(a)) requires water suppliers to project lower income household water demand for single-family and multifamily residential housing as identified in the housing element of any city, county, or city and county in the service area of the supplier. The Town of Mammoth Lakes Housing Element Report 2007-2014 (2010) and the 2005 General Plan Update EIR were used to develop the 2010 water demand and average unit water demand.

The Town of Mammoth Lakes low-income housing needs were determined by the California Department of Housing and Community Development's Regional Housing Need Allocation Plan (Town of Mammoth Lakes 2010). Based on the plan, the Town has a net remaining deficit of 43 units for low and lower income levels for the planning horizon of 2009 to 2014. The Housing Element report contains a projection of affordable housing to be built based on approved development plans or commitments during the 2009 to 2014 planning horizon. The report did not project beyond 2014, thus Table 3-9 relied on the approved plans and commitments from the report and discussions with planning staff on potential future construction of affordable housing. The final projections were provided to the Town's planning department prior to insertion in the 2010 UWMP. Although Town staff felt the estimates were high based on the current economic impacts on construction activity, these projections were deemed acceptable because they would serve to provide a long-range water demand target for low-income housing projects.

The estimated residential per unit water demand is 0.19 acre-feet/unit/year and 30 acre-feet/year is needed to supply these projected lower income housing units in 2030. Water demands for these units are included in future water demand projections for single family and multi-family homes listed in Table 3-4 and Table 3-6.

Table 3-9 Low-Income Housing Projected Incremental Water Demand (acre-feet per year)

Low-income water demands[1]	2015	2020	2025	2030
Multi-family residential	13	5	5	7

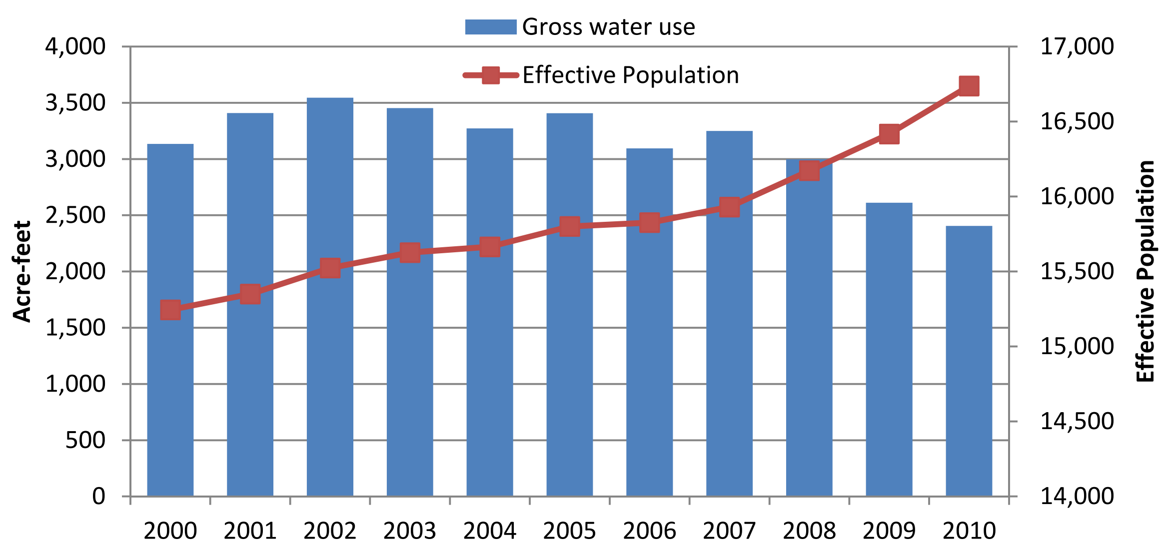
(DWR Table 8)

1. Town of Mammoth Lakes Housing Element 2007-2014, Adopted June 23, 2010. Average low-income water demand was derived from 2010 water demand data for existing deed restricted housing units.

Water Use Reduction Plan

This section provides an assessment of present and proposed future measures, programs and policies to help achieve the water use reductions required by the Water Conservation Bill of 2009. The 2020 compliance daily per capita use target was met by the District in 2010, and the 2015 interim target was met in 2009 and 2010, see Table 3-1. The District has made significant progress on increasing water efficiency and will ensure the current per-capita water use levels are sustainable by continuing the current programs for treatment and distribution system improvements and the existing customer demand reduction programs. See Chapter 6 for a detailed description of the District's demand management measures. No new water use reduction plans to meet the compliance urban water use target are needed.

Figure 3-1 Change in Gross Water Use and Service Area Effective Population Growth



This chapter describes the existing sources of water available to the District and potential future water supply projects. It describes each water source, source limitations, and water quality issues associated with those sources. In addition, there is a discussion of future water development opportunities.

Water Sources Summary

The District supplies water for municipal purposes only. Existing sources of water include surface water, groundwater, recycled water, and savings from water conservation (demand management) measures. The District stores and diverts Mammoth Creek surface water at Lake Mary. Groundwater supply comes from nine production wells within the Mammoth groundwater basin. Delivery of recycled water meeting Title 22 water standards for unrestricted irrigation use began in 2010. Table 4-1 displays the water supply from the various sources for general comparison purposes only. Figure 4-1 displays a schematic of the District's water system and its connections to the Mammoth Basin hydrologic system.

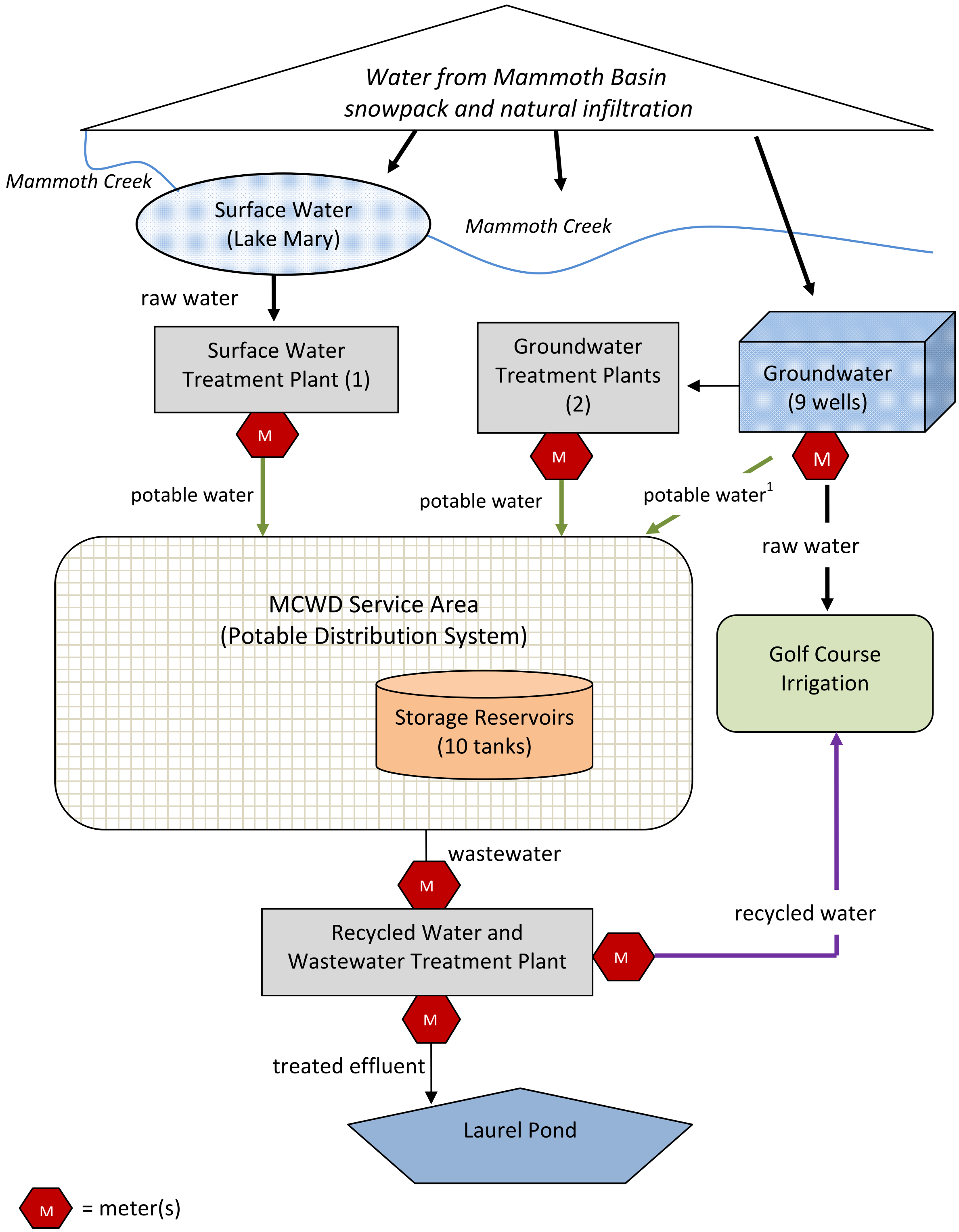
The groundwater and surface water supply estimates in Table 4-1, are based on modeling of a 50-year hydrologic record for the Mammoth Basin. The quantity and frequency of use are based on exceedence probability analysis of the annual supply available under the historical hydrology. For example, the 75% frequency value indicates that this quantity or greater is available in 3 out of 4 years on average, while the 90% frequency is that quantity, or greater, available in 9 out of 10 years on average. The values do not change over the 20 year planning horizon because there are no new anticipated sources of surface or groundwater supply. The groundwater quantities reflect the yield of one planned back up well (Well 11), as described under "New and Future Production Wells" below. The potential future supply of imported groundwater from the Dry Creek watershed, included in the 2005 UWMP, is not included in this update because the project is not financially feasible and the updated supply vs. demand assessment does not indicate the need for an out-of-basin future supply. The recycled water quantities reflect the existing and planned increased use at the Sierra Star and Snowcreek golf courses.

Table 4-1 Water Supply Sources – Quantity and Frequency of Use (acre-feet per year)

Water Supply Sources		2010	2015	2020	2025	2030
Surface water[1]						
	90%	1,667	1,667	1,667	1,667	1,667
	75%	2,042	2,042	2,042	2,042	2,042
	50%	2,610	2,610	2,610	2,610	2,610
	10%	2,760	2,760	2,760	2,760	2,760
Groundwater[1]						
	90%	814	814	814	814	814
	75%	814	814	814	814	814
	50%	1,186	1,186	1,186	1,186	1,186
	10%	2,328	2,328	2,328	2,328	2,328
Recycled Water	100%	64	480	640	640	640
Groundwater – future well(s)		0	0	0	0	
Total (*Using 50% Frequency for Groundwater and Surface Water Supply*)		**3,895**	**4,276**	**4,436**	**4,436**	**4,436**

(DWR Table 16)
1. Total volumes of surface water and groundwater pumping supply. Net supply to customers is reduced by treatment plant process and system losses.

Figure 4-1 Schematic of Raw, Potable, and Recycled Water Distribution Systems.



1. Two groundwater production wells have wellhead treatment allowing treated water to go directly into potable distribution system.

Surface Water

The District utilizes surface water as the primary water source when it is available because less energy and chemicals are required to divert, treat, and deliver water from the Lake Mary WTP, which can gravity feed to almost the entire District distribution system. The District has two water right licenses and one permit issued by the SWRCB that entitle the District to both store and divert Mammoth Creek surface water at Lake Mary. The licenses and permits specify limits and conditions on the storage and diversion of surface water that are intended to sustain a healthy Mammoth Creek fishery and support recreational uses at Lake Mary. These include a maximum diversion rate, a maximum storage quantity and timing of diversions to storage, maximum seasonal drawdown levels at Lake Mary, and fishery bypass flow requirements for Mammoth Creek. For example, the District may only divert stored water in Lake Mary (no direct diversions) when flows in Mammoth Creek are at or below specified mean daily flows. Nor can the District drawdown its Lake Mary storage more than 3 feet, out of a 5.7 foot storage pool depth, prior to September 15 without approval from the SWRCB and the USFS. Therefore, although the District's licenses and permits allow up to a maximum annual surface water diversion of 2,760 ac-ft, actual diversions are typically well below this due to the combined influence of natural variability in the Mammoth Basin snowpack runoff quantity and timing, limited storage to manage the variable runoff, mismatch between the seasonal trends in supply availability and community water demands, and compliance with the minimum fishery bypass flow requirements. Table 4-2 shows that over the past five years, the District has diverted an average of 1,444 ac-ft per year, even though total service area demands were substantially higher, with the difference made up by groundwater supply.

Table 4-2 Surface Water Production – Metered from Water Treatment Plant

	2006	2007	2008	2009	2010
Total surface water from treatment plant effluent	2,160	1,109	1,112	1,347	1,492
Surface water as a percent of total water supply	67%	31%	33%	46%	58%

The Mammoth Creek surface water quality is generally excellent, and requires minimal treatment (anthracite media filtration, chlorination). The only pending water quality improvement is the addition of pH control equipment in 2011-12 to comply with the State's lead/copper rule.

Lake surface water levels and stream flow rates are monitored at twelve locations throughout the Mammoth Basin watershed. These monitoring data are provided monthly to the SWRCB as a compliance measure in the District's permit and licenses.

Groundwater

Groundwater Monitoring and Modeling

The District utilizes groundwater from nine production wells in the Mammoth Basin to supplement surface water supplies. During the past five years, the District pumped 8,412 acre-feet of groundwater, averaging 1,682 acre-feet per year (Table 4-3). Surface water supplies serve as the primary water supply. Thus, annual groundwater production is based on the difference between annual service area demands and each year's surface water supply. Groundwater supply is also limited by the capacity of the nine wells, groundwater level drawdown impacts on well production, and the ability of the two GWTP's to effectively treat and remove naturally occurring drinking water contaminants such as arsenic, iron, and manganese.

Table 4-3 Mammoth Basin Groundwater Production - Metered Volume Pumped (acre-feet per year)

	2006	2007	2008	2009	2010
Total groundwater pumped[1]	1,066	2,425	2,261	1,562	1,098
Groundwater as a percent of total water supply	33	69	67	54	42

(DWR Table 18)
1. Total annual pumped groundwater is the total metered flow from all groundwater pumps. Data obtained from SCADA records. Pumping to collect water samples, flush water lines, and for water quality studies are included.
2. The 2010 quantity in this table reflects actual pumping totals, so it does not match the 2010 groundwater data in Table 4-1, which is based on long term trends and reliability focused statistical exceedence values.

The District adopted a Groundwater Management Plan (GWMP) in 2005, available to download at www.mcwd.dst.ca.us/ProjectsReports/GWMP. (A CD with the GWMP is provided on the back cover of the Final 2010 UWMP copies provided to DWR and to the State Library.) The GWMP was intended to inform future water resource planning and management efforts in the Mammoth Basin and to meet the requirements of AB-3030. Participants in the GWMP development included numerous local government and private entities. The GWMP includes a monitoring and operation plan for the long term use of local groundwater resources. A Local Groundwater Assistance grant from the California Department of Water Resources in 2004 provided funding to complete the GWMP, expand the groundwater monitoring program, and assist in the development of a groundwater model.

In 2009, the District developed a groundwater simulation model for the Mammoth Basin (Wildermuth 2009). The model incorporates the primary hydrologic and hydrogeologic features of the Mammoth Basin and District groundwater infrastructure and operations. It is used to simulate and evaluate current and future groundwater pumping scenarios, for determining sustainable groundwater use levels. The model development, calibration, and initial long term projections are presented in the 2009 study. The model has been updated for use in the 2010 UWMP, to reflect updated service area build-out water demands, and refined estimates of the annual variation in use of Mammoth Creek surface water supply.

The District maintains an extensive groundwater and surface water monitoring system to ensure sustainable management of the basin's water resources. Groundwater levels are monitored in nine production wells and 14 shallow and deep monitoring wells, shown in Figure 4-2. These data are used to produce an annual groundwater monitoring report that provides an evaluation of groundwater use, groundwater level trends, surface flows, and water quality. These annual reports have concluded that groundwater pumping has not had a detectable impact on surface water features such as Mammoth Creek or the springs at the U.C. Valentine Reserve. Annual reports from 1993 to present can be accessed and downloaded from the District's website: www.mcwd.dst.ca.us/ProjectsReports/GWMP. In addition, the District will be providing groundwater data to Mono County under the State's CASGEM groundwater monitoring program.

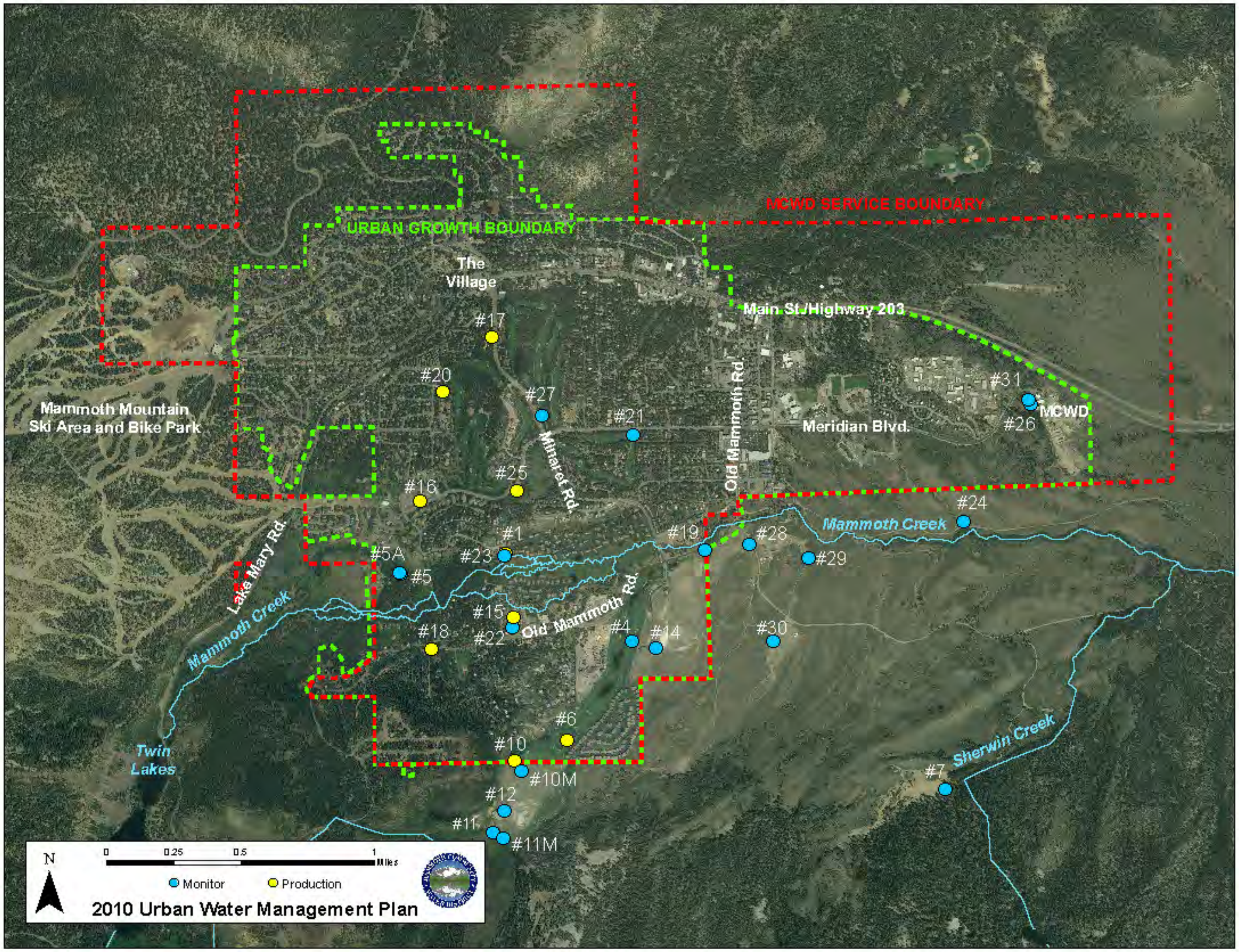


Figure 4-2 MCWD Groundwater Production and Monitoring Wells

New and Future Production Wells

The District recently completed Well 25, its newest production well. However, poor water quality has prevented its use. Future connection of Well 25 to the nearby GWTP 2 should allow limited use of the new well's potential yield beginning in 2013. This well will be used as a backup (redundant) well during periods of reduced surface water supply and/or temporary loss of existing wells due to mechanical failure or other problems. The District is also evaluating the potential for developing an additional groundwater well in the Mammoth Basin (Well 11). The well was drilled and pump tested in 1988, but was not developed and has served as a monitoring well only. In 2009, the District conducted an updated pump test on the well to evaluate the potential of developing the well to serve as a backup supply, similar to Well 25. The estimated yields from Well 11 and Well 25 are reflected in the future groundwater supply totals presented in this chapter.

The Mammoth Basin and Aquifer Characteristics

The Mammoth Basin (or watershed) and local groundwater basin are shown in Figure 4-3. The Basin is formed by elevated areas on the north and west that are comprised largely of extrusive igneous rocks; a central trough filled with alluvial and glacial debris; and an abrupt southern flank of igneous intrusive and metamorphic rocks. The central trough area opens and drains to the east to the Owens River and Lake Crowley. Mammoth Basin is the watershed of Mammoth Creek and is bounded on the south by the drainage divide of Convict Creek; on the west, by Mammoth Crest; on the north by the drainage divide of Dry Creek; and on the east extending along the watershed of Hot Creek. The Department of Water Resources has not identified the Mammoth Basin as a groundwater basin as defined in Bulletin 118 (DWR 2003).

The Mammoth Basin has not been adjudicated nor has it been identified by DWR as being over drafted. The District is the primary user of groundwater for municipal and domestic purposes, with a few private wells serving specific users such as the Mammoth-Yosemite Airport, which are outside of the District service area. By far the largest quantity of groundwater pumped in the Mammoth Basin is for geothermal power generation by ORMAT Corporation at the Casa Diablo geothermal power plant complex. ORMAT does not release public data on its groundwater (geothermal brine) pumping, brine re-injection operations, or related monitoring well data.

The complex geology, hydrology, and hydrogeology of the area appear to have developed multiple groundwater systems in the Mammoth groundwater basin (Wildermuth 2003). Wildermuth describes the presence of two distinct aquifer systems in the area where the District produces water. District production wells tap the deep system, consisting of fractured basalts and other water yielding rock, which is highly responsive to District groundwater production and responds slowly to recharge.
A shallow and generally highly transmissive system of glacial till and alluvium with interbedded volcanics lies over the deep system and seems to range from less than 100 feet to 200 feet in total thickness. This hydrostratigraphic layer consists of four distinct geologic units identified as: quaternary alluvial deposits comprised of clay, silts, sand, and cobbles; quaternary lake (lacustrine) deposits comprised mostly of unconsolidated fine-grained sediments that are of low permeability; quaternary glacial deposits within the Mammoth Basin tend to be slightly to moderately consolidated and consist of clay to boulder size glacial debris; and Quaternary and Tertiary igneous rock consist of lava flows, breccias, and tuffs

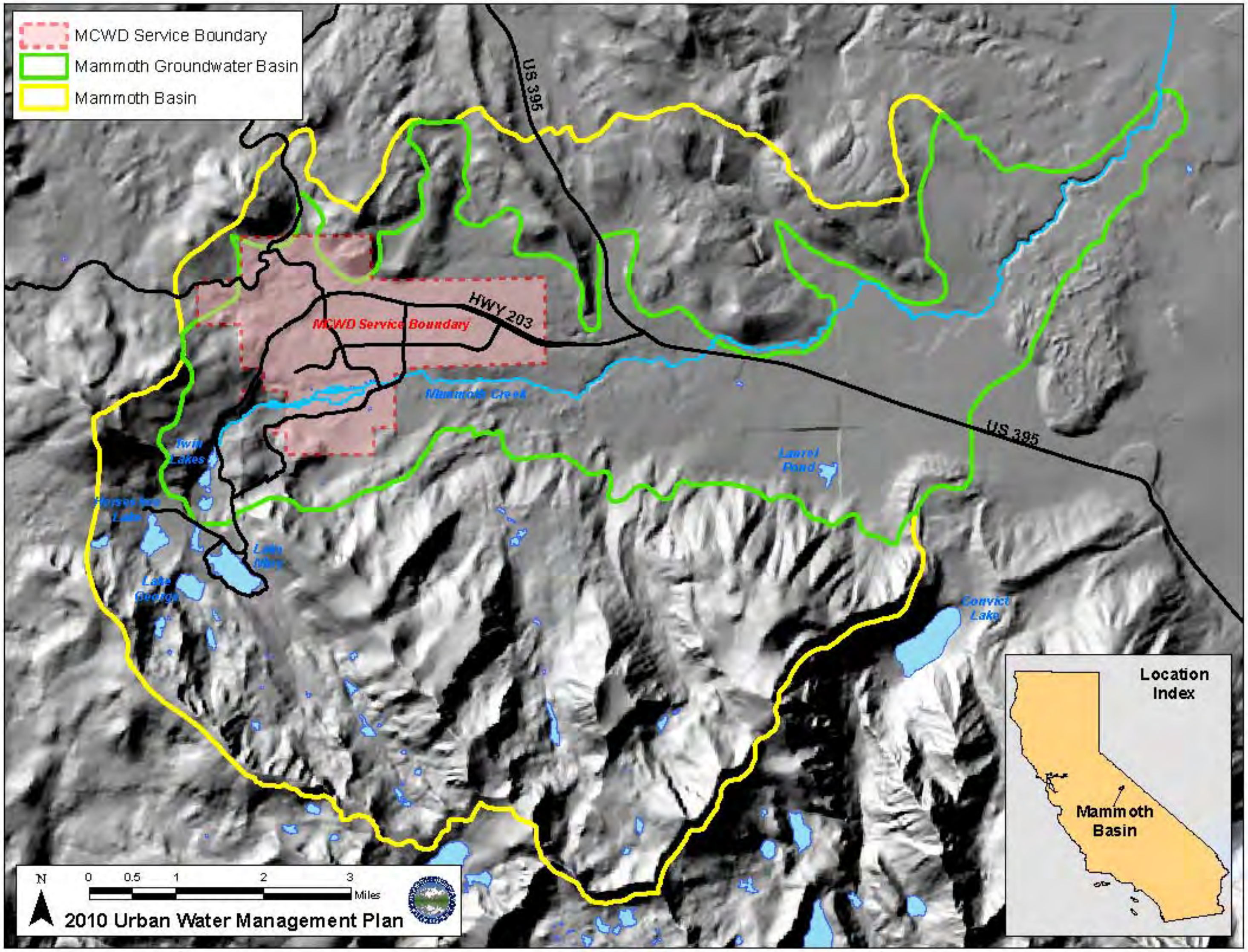


Figure 4-3 Location of the Mammoth Basin and Groundwater Basin

interbedded with glacial debris. The District's groundwater studies, modeling, and monitoring do not address the deeper geothermal aquifer layer where ORMAT's pumping and reinjection operations occur. ORMAT does not provide public information on its modeling for independent, public resource agency review.

Groundwater Quantity and Quality

Groundwater modeling results indicate the District's current and future groundwater production is sustainable, under conjunctive management of both surface and groundwater supplies. In years with average and above surface water supplies, groundwater production is reduced and natural recharge is increased, leading to replenishment of the groundwater basin. For example, in 2010, 42% of total supply was supply by groundwater wells. The 2010 snowpack and surface water runoff was slightly above normal, and was followed by a cool and wet spring allowing for a longer than normal period of surface water diversions. Through mid-2011, groundwater monitoring shows steadily increasing groundwater levels. Monitoring also indicates there is a one to two year lag in the groundwater levels' response to preceding annual surface water (snowpack) conditions. Table 4-4 lists the projected average annual groundwater production for the planning horizon of the UWMP. Figure 4-4 shows typical long term groundwater level trends at three of the District production wells.

Figure 4-4 Water Table Levels in Three Production Wells 2001-2011

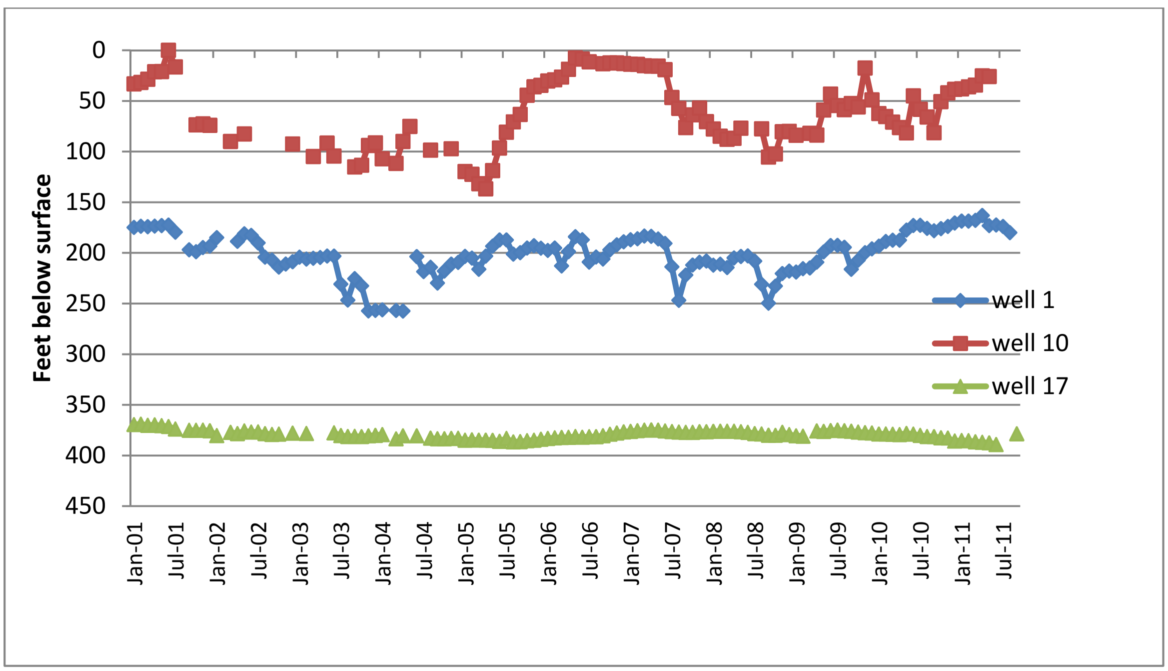


Table 4-4 Frequency of Groundwater Projected to be Pumped[1] (acre-feet per year)

Frequency Over 50 Year Simulation	2015	2020	2025	2030
90%	814	814	814	814
75%	814	814	814	814
50%	1,186	1,186	1,186	1,186
10%	2,328	2,328	2,328	2,328

(DWR Table 19)

1. Pumping projections based on modeling of 50 year historical hydrology trends, and resultant exceedence probability analysis. Groundwater supplies, based on well production and GWTP capacity, are not expected to change during the UWMP planning horizon.

Groundwater production can be reduced due to unscheduled mechanical failures and/or well bore-hole problems. Recent examples over the last three years have included pump and motor failures on four wells, and blockages within open-bore (no casing) portions of well sections drilled through fractured rock. Repairs can take weeks to months depending on the nature of the problem. The seasonal lowering of groundwater levels can also reduce well yields, because most wells are on fixed speed pumps operating against steady system pressure curves. These issues are being addressed through a two-part effort by the District: implementation of a scheduled well inspection and rehabilitation program to replace aging equipment ahead of failure; and a retrofit of major wells with variable speed drives (VFDs) to maintain targeted pumping rates under varying groundwater levels and system pressures.

Groundwater quality issues include naturally occurring high levels of minerals such as iron, manganese, and arsenic. Since the implementation of the new arsenic limit of 10 ppb in 2006, there have been periods when groundwater production was limited due to the inability to treat finished water to this standard. However, recent and pending improvements at both groundwater treatment plants will allow full production (based on raw water supply from wells) that meets all water quality standards by 2013. Secondary water quality issues based on color, odor, and elevated temperature do occur with several infrequently used wells, and are minimized by treating and blending with the higher quality groundwater from the remaining wells. These water quality issues are due to naturally occurring conditions related to the volcanic geology in portions of the Mammoth Groundwater Basin.

Transfer Opportunities

The District conducted a feasibility study of alternative sources of water supply in 1992. This study included an analysis of several exchange or transfer opportunities. The study analyzed the use of reclaimed wastewater for irrigation in the Laurel Creek and lower Mammoth Creek areas in exchange for local surface water supply, groundwater acquisition in adjacent watersheds and exchange/transfer options, and Central Valley supply acquisition/transfer/exchange opportunities. The study determined that no feasible transfer opportunities existed (Boyle Engineering Corp 1992). An updated review of current conditions did not identify any current or future feasible water transfer opportunities. This is due primarily to the relative geographic isolation of the Mammoth Basin.

Desalinated Water Opportunities

The water supply sources available to the District have not been limited by brackish or saline water quality. Therefore, the District has not investigated desalinated water opportunities.

Recycled Water Opportunities

The District has been investigating the feasibility of recycled water in the service area since 1987 (Brown and Caldwell 1987). The objective of the study was to determine the feasibility of recycling wastewater and/or sub-potable groundwater sources. Issues regarding economic feasibility and financial viability were included in the study. Uses of recycled water analyzed included landscape and agricultural irrigation, industrial process water, and water used for recreational purposes. As a result of this study, it was determined that the only feasible use of recycled water was for restricted landscape irrigation. Water reclamation and reuse was again analyzed in a 1991 Feasibility Study of Alternative Sources of Water Supply and Methods of Reducing Demand conducted for the District (Boyle Engineering Corp 1992). It was reaffirmed that restricted landscape irrigation uses, such as golf course irrigation, was the most feasible use of recycled water. Irrigation places a major demand on water supply during the spring and summer seasons, with peak season demands three to four times the annual average demand.

The District has made significant progress on the recycled water program in the last five years. In 2007, the District's Board of Directors certified the EIR for the recycled distribution system. Improvements to the wastewater treatment plant necessary to produce treated water that meets the state's Title 22 standards were completed in 2009. In 2009, the Lahontan Regional Water Quality Control Board issued a master permit to the District for recycled water supply within the District service area. Construction of the distribution system pump stations and pipelines to serve the Sierra Star and Snowcreek golf courses was completed in 2010. Sierra Star completed the on-site work to comply with Title 22 regulations and began using recycled water for irrigation in late summer of 2010.

Wastewater Treatment

MCWD is the primary collection and treatment facility for wastewater in the Mammoth Lakes area. This includes wastewater generated in the Town of Mammoth Lakes, USFS campgrounds and USFS permittees in the Mammoth Lakes Basin with the exception of 10 private cabins on the south end of Lake George. No other sources of wastewater are available for reclamation. Table 4-5 lists the historical and projected future annual wastewater generation volumes, and the maximum amount of recycled water supply based on the current recycled water treatment system.

Table 4-5 Recycled Water - Wastewater Collection and Treatment (acre-feet per year)

Type of Wastewater	2005	2010	2015	2020	2025	2030
Wastewater collected and treated in service area[1]	1,924	1,432	1,666	1,888	2,110	2,330
Volume that meets recycled water standard	0	99	480[2]	640	640	640

(DWR Table 21)

1. Projections of ww to be collected applied the average ratio of collected wastewater to total water demand for 2005 and 2010. This ratio was then applied to projected water demand for 2015-2030.
2. Assumed full agreement delivery to Sierra Star and half the agreement amount to Snowcreek in 2015 and full amount in 2020.

Treated wastewater is discharged to Laurel Pond, located approximately 5 ½ miles southeast of Mammoth Lakes on USFS land. Laurel Pond is a terminal surface water feature which, prior to initiation of treated effluent discharge, dried up during sustained drought periods. The District has an obligation to maintain a minimum of 18 acres of water surface area at Laurel Pond as a mitigation measure for the recycled water project. Improvements at the wastewater treatment plant and installation of the recycled water distribution system allowed the first delivery of recycled water to begin in 2010. Treated wastewater is also utilized for construction water use, and is provided at no charge via a filling station at the wastewater treatment plant.

Table 4-6 WWTP Effluent Not Planned for Recycled Water Use (acre-feet per year)

Method of Disposal	Treatment level	2010	2015	2020	2025	2030
Laurel Pond	Secondary[1]	1,333	1,145	1,216	1,447	1,677

(DWR Table 22)
1. Regular WWTP effluent meets Title 22 standards for construction water use only. It does not meet Title 22 standards for unrestricted irrigation use.

Recycled Water – Current and Future

As described above, in 2010, the District completed the recycled water distribution line and finalized regulatory requirements to begin delivery to Sierra Star Golf Course. The District has an agreement in place to deliver an annual maximum of 320 acre-feet of recycled water to Sierra Star. The District also completed an agreement with the owner of Snowcreek Resort to deliver up to 320 ac-ft/yr of recycled water. The initial phase of the agreement targets recycled water delivery of up to 80 ac-ft to irrigate an existing a 9-hole golf course by April 2012. The Snowcreek recycled water agreement provides for a future annual maximum of 320 acre-feet of recycled water for irrigation of the future 9-hole golf course expansion and common landscape areas of a 400+ unit residential condominium and hotel complex. Delivery of recycled water to Snowcreek is dependent on the developer completing improvements and regulatory actions to receive the recycled water, and the timing of the future golf course and resort development. Due to the severe economic downturn, the timing of the future development is uncertain. In addition to landscape irrigation, recycled water is made available to local construction water trucks. Conceptual level long term plans for recycled water delivery include Shady Rest Park, a local park with numerous sport fields; however, the feasibility and timing of initiating recycled water service to the park will depend on funding for design and construction and development of a long term service contract with the Town of Mammoth Lakes.

Developing additional uses of recycled water is limited by the availability of seasonal storage. The highest production potential occurs during the winter season when transient population and related wastewater generation peaks, while the highest demand for recycled water occurs during the summer irrigation season. Table 4-6 lists the planned and potential future recycled water uses.

Table 4-7 Recycled Water – Planned and Potential Future Use (acre-feet per year)

User type	Description	Feasibility[1]	2015	2020	2025	2030
Landscape irrigation[2]	Shady Rest Park and three public schools	med	0	0	0	0
Commercial irrigation[3]		med	0	100	100	100
Golf course irrigation	Agreements in place for golf course turf and housing project common area at Snowcreek.	high	480	640	640	640
Wildlife habitat	Already supplying wildlife pond with secondary treatment water.	low	0	0	0	0
Wetlands	Existing and future WWTP effluent supports waterfowl habitat at Laurel Pond	low	0	0	0	0
Industrial reuse	NA	low	0	0	0	0
Groundwater recharge	NA	low	0	0	0	0
Geothermal Energy Production Process[4]	Cooling system for power generation cycle at Casa Diablo geothermal power complex.	med	0	275	275	275

User type	Description	Feasibility[1]	2015	2020	2025	2030
Indirect potable reuse	NA	low	0	0	0	0
	Total	0	480	1,015	1,015	1,015

(DWR Table 23)
1. Technical, regulatory, and economic feasibility.
2. Includes parks, schools, cemeteries, churches, residential, or other public facilities.
3. Includes commercial building use such as landscaping, toilets, HVAC, etc. and commercial uses such as car washes, laundries, and nurseries.
4. Geothermal power plant cooling assumed to use 1 MGD for 90 days per year, during peak summer ambient temperatures. ORMAT CD-4 expansion project NEPA/CEQA and related technical feasibility evaluations expected to be complete in 2012.

In the 2005 UWMP, the District projected that 500 acre-feet of recycled water would be delivered for irrigation in 2010. However, the time required to complete the environmental and permitting process, execute long term supply contracts with users, and construct the necessary infrastructure took longer than anticipated.

Table 4-8 Recycled Water - 2005 UWMP Projection Compared to Actual (acre-feet per year)

Use type	2010 actual use	2005 projected for 2010[1]
Turf irrigation/Construction	99	500

(DWR Table 24)
1. Table 6, page 13, 2005 UWMP

Planning and Incentives for Increased Future Recycled Use

The District has nearly completed implementing its current recycled water plans to deliver the full allocation of recycled water to Sierra Star Golf Course (320 acre-feet) and to Snowcreek Golf Course and common areas (320 acre-feet). The District has provided financial incentives, in the form of a construction loan, to Snowcreek to construct a storage pond that will receive the recycled water. Implementation of the recycled water project for the existing 9-hole course will utilize approximately 160 acre-feet of recycled water each year. Delivery of the full recycled water allotment to Snowcreek will depend on the developer's decision to compete the full build-out of the project. Until specific conditions are met, this allotment of recycled water is reserved for the Snowcreek project.

The District does not yet have an updated recycled water master plan that goes beyond the current and pending Sierra Star and Snowcreek irrigation uses. The District is currently scoping a long term recycled water plan update to assess expanded recycled water use under Town build-out conditions. This plan update will identify potential future uses, identify new treatment plant and distribution system improvements and costs (including seasonal storage at Laurel Pond), evaluate the cost/benefits of the potential use, and establish an implementation plan for funding, construction, user incentives, and other key elements. The District is also working with the Town to integrate opportunities for recycled water use as part of new and redevelopment construction, for both irrigation and indoor non-potable uses. Table 4-7 reflects the District's best estimates of opportunities and quantities for increased future recycled water use.

Future Water Projects

The District does not have any future water projects, beyond those already discussed previously in this chapter. The Dry Creek groundwater supply, described as a possible future supply in the 2005 UWMP, is no longer under active consideration due to its high cost and the lack of need based on the updated future supply and demand conditions.

Introduction

This chapter compares projected water supplies and service area demands over the 20 year planning horizon of the UWMP. It assesses the overall reliability of future supplies, including limitations to supplies and the impacts of drought and/or emergency conditions that severely curtail supply. Drought conditions considered include both a severe one year drought and a sustained multi-year drought, based on hydrologic records for the Mammoth Basin. This chapter also describes responses to be implemented by MCWD to reduce service area demands during emergency short term and sustained drought shortage conditions.

Water Supply Reliability- Factors Limiting Sources

The quantity and quality of MCWD's water supplies depend primarily on the water content of the annual snowpack in Mammoth Basin and the timing of the resultant surface water runoff and groundwater recharge. As shown in Figure 5-1, the annual snowpack water content conditions are highly variable. Table 5-1 summarizes factors which limit each supply. The District completed and certified an environmental impact report (EIR) on fishery bypass flows for Mammoth Creek in May 2011; however, final project approval is still pending (MCWD 2011). Approval of the project and acceptance of the project terms by the State Water Resources Control Board (SWRCB) will establish, on a long term basis, the fishery bypass flows and change other surface water management requirements. The analysis in this UWMP is based on approval of the revised terms and conditions, including fishery bypass flow requirements, pending the final consideration of the permit and license amendments by the SWRCB.

Figure 5-1 Mammoth Pass April 1 Snowpack Water Content as measured by LADWP, 1931 – 2010.

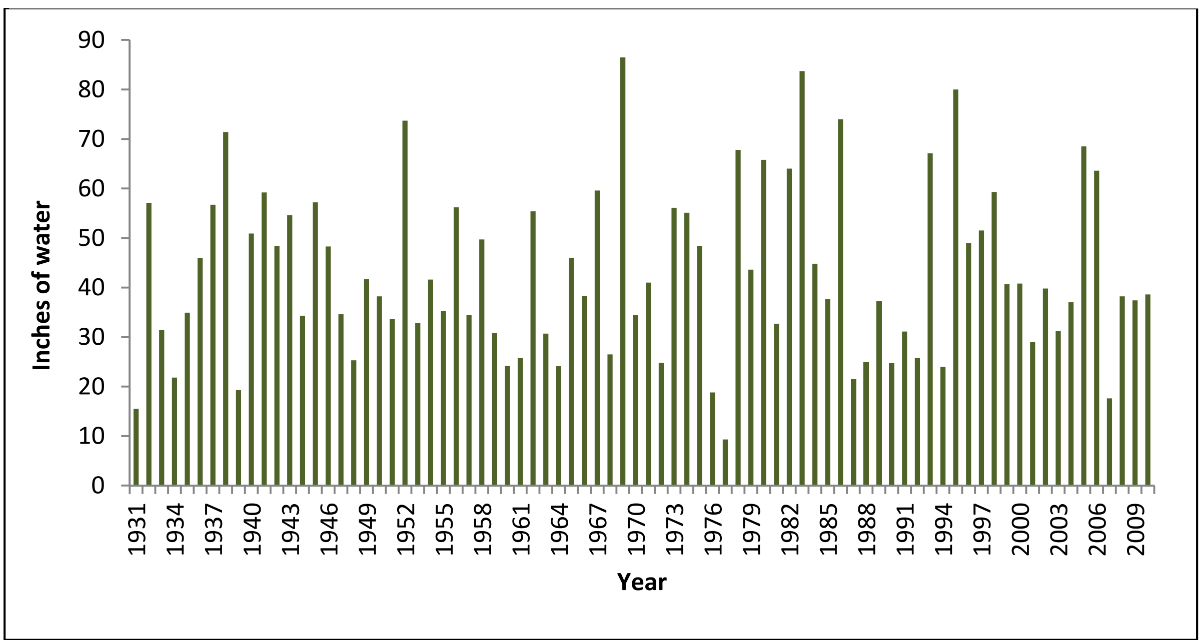


Table 5-1 Factors Resulting in Inconsistency of Supply

Water supply source	Limitation quantification	Issue – Legal, Environmental, Water Quality, Climatic
Mammoth Creek Surface Water	Minimum diversion of 337 acre-feet under 1977 drought conditions. Maximum diversion of 2,670 ac-ft under permit and license terms.	SWRCB water right permit 17332 and licenses 5715 and 12593: Requirements include ceasing diversions when creek flows are at or below specified mean daily fishery bypass flow rates that vary by month; diversion to Lake Mary storage limited to April 1 through July 1; seasonal storage drawdown is limited to 3 feet prior to September 15 without state and federal permission: maximum diversion to storage is limited to 606 acre-feet between April 1 – July 1 and 54 acre-feet between September 1 – September 30: maximum diversion rate limited to 5.0 cfs; total annual diversions are limited to maximum of 2,760 acre-feet. Climate – Annual surface water supply is dependent on annual snowpack water content. Precipitation as rain and above normal temperatures can cause earlier and larger runoff rates that cannot be captured in Lake Mary's minor storage pool (660 ac-ft).
Groundwater Wells	Limitations on annual yield are highly variable. No set quantity restrictions identified.	Groundwater production can be limited by decreases in groundwater pumping levels due to inter-annual hydrologic conditions; the total pumping and treatment capacity; poor water quality; and mechanical failures. Decreased groundwater levels lower yield from each well. The nine wells and two treatment plants have a maximum capacity based on facility size and features. Poor water quality limits production from some wells due to high arsenic levels. Measures to maximize the groundwater supply within these constraints include use of variable speed drive motors, pending GWTP improvements for arsenic removal, and conjunctive management of surface and groundwater supplies to minimize demands on the local aquifer.
Recycled water	640 acre-feet	The District has two recycled water agreements to deliver a total of 640 acre-feet/year. Half of this amount depends on the future completion of a reservoir at the Snowcreek golf course to receive recycled water, and construction of the Snowcreek Phase VIII development (9- to 18-hole golf course expansion, hotel, and housing). Expansion of the RW supply beyond the 640 ac-ft/year is contingent on a pending updated RW Master Plan to identify remaining feasible uses, seasonal storage needs, increased treatment and conveyance systems capacity, and cost/benefit analysis.

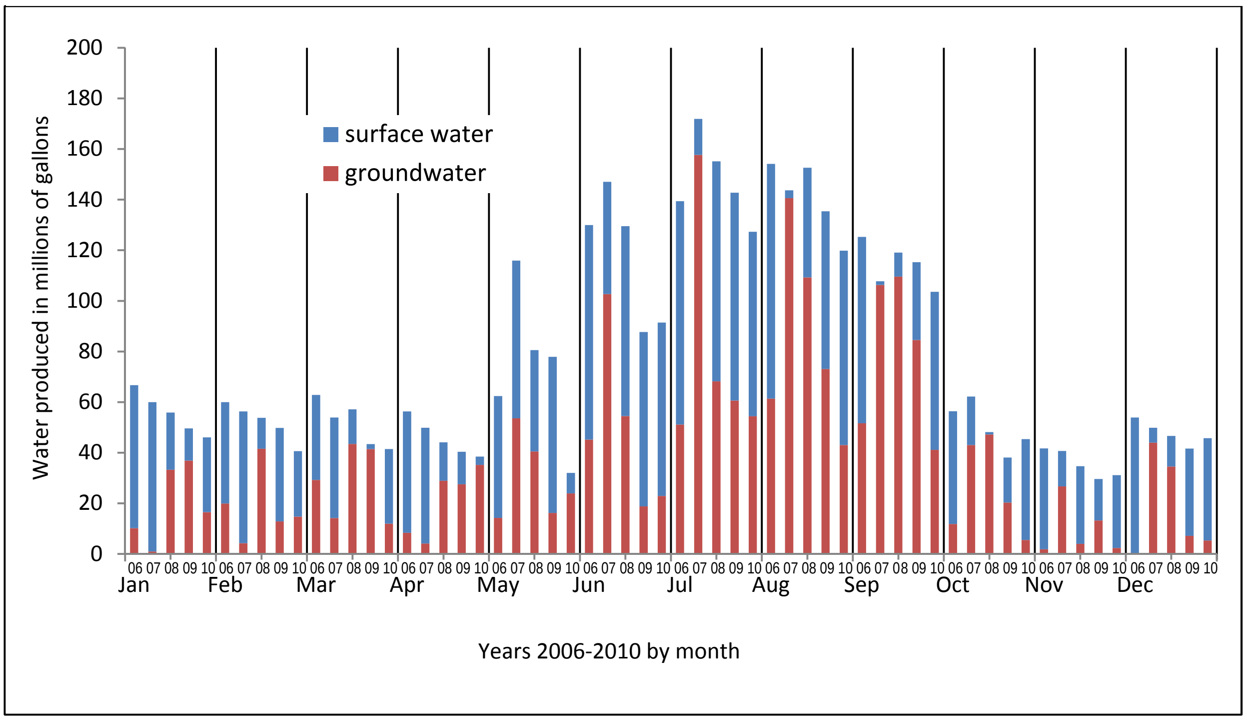
(DWR Table 29)

Annual groundwater production is variable, depending on the current water year type (wet, dry, normal) and the preceding one to two water years, which influence recharge trends and groundwater basin levels. Groundwater production can also be limited by water quality (ability to treat raw water to required standards) and mechanical failures of pumps and motors. To increase redundancy and reliability of groundwater supply, MCWD's groundwater production capacity may be improved with an additional new well (Well 11). Well 11 would provide redundancy in the system during mechanical failures, production limits due to water quality concerns, and periods of severely reduced surface water supply. MCWD has been investigating the feasibility of developing this new well, as described in Chapter 4. If Well 11 is developed into a production well, environmental analysis under CEQA and NEPA will be conducted. Given the lead times for the CEQA and NEPA compliance, engineering design, and construction, Well 11 is not anticipated to be operational before 2014.

The Mammoth Community Water District utilizes specific management strategies to maximize water supply reliability. For example, the District primarily utilizes surface water when it is available. Quarterly forecasts of surface water supply and total system demands are used to set approximate targets for conjunctive use of surface and groundwater supplies. Maximizing surface water supply use when available allows the groundwater aquifer to recharge, thus increasing the reliability of the groundwater resource when surface supplies are reduced. In 2012-13, MCWD is planning on evaluating the feasibility of increasing the filter capacity at the Lake Mary WTP to allow maximum production rates under the 5 cfs diversion limit, which is currently greater than the plant's steady state capacity of about 4.3 cfs (2.8 MGD). This project may provide a net increase in annual surface water supply under normal and above normal surface water runoff conditions. MCWD has also increased water supply reliability through implementation of its recycled water project and an ongoing program of demand reduction management measures. The most significant of these is the water line replacement program, which has reduced distribution system losses in the last 10 years from over 20% to an average of 5% to 7%. These measures are described in detail in Chapter 6.

Figure 5-2 illustrates annual and monthly variations in the District's use of surface and groundwater and the significant increase in water demand during the irrigation season. The onset, duration and severity of summer conditions and its relationship to irrigation demand can also be observed. The reduced distribution system losses over the past five years are most apparent in months that do not include irrigation demand.

Figure 5-2 2006-2010 Surface and Groundwater Supply by Month



Water Shortage Contingency Planning

The District maintains updated plans to respond to emergency situations that may impact staff, District facilities, and water and wastewater services. To address both short term and sustained water shortages, the District has four levels of water use restrictions that can be implemented after a declaration of an existing or potential water shortage.

Emergency Response Plan for Short-term Supply Disruptions

MCWD has an emergency response plan (2009) to respond to events that could impact water supplies such as floods, snowstorms, power outages, civil disturbance, explosions or industrial hazards, hazardous substance releases, earthquake, and volcanic eruption. The emergency response plan contains actions to maintain service or restore service in instances of disruption. Some of these actions are described in the table below. In addition, the plan includes estimates of water requirements for types of emergencies and the capability of the system to meet these requirements.

Table 5-2 Actions Described in the District's Emergency Response Plan Pertinent to Water Supply

Emergency	Response
Loss of power at the surface water treatment plant	Stop flow to the treatment plant and place both groundwater treatment plants (GWTP) into service. Set appropriate booster pumps to deliver water from the GWTPs to zones and storage tanks normally served by the surface water treatment plant.
Loss of power at the groundwater treatment plant(s)	Shut down main electrical service breaker. Use surface water treatment plant and/or other groundwater treatment plant to supply storage tanks and service zones as needed.
Loss of access and power to Lakes Basin facilities: surface water treatment plant and wastewater (ww) lift stations.	Emergency standby power used to operate the water treatment plant. SCADA used to monitor the status of the treatment plant and all ww lift stations. Notify businesses in the Basin to minimize ww until electricity is functioning. Maintain contact with the Town Road Dept. for safe access into the Lakes Basin to conduct inspection of District facilities. Have necessary equipment available for immediate dispatch on notice of safe access.
Loss of power and access in Old Mammoth area: GWTP No. 1, 4 production wells and 1 sewer lift station impacted.	Monitor status of water storage tanks, water pressure in impacted service zone. Maintain contact with the Town Road Dept. for safe access to area to conduct inspection of District facilities. Have necessary equipment available for immediate dispatch on notice of safe access.
Chlorine gas leak at water treatment or wastewater plant.	Inspect the affected plant to determine risks and perform emergency repairs if possible. If gas plume present, evacuate immediate area. Notify Town police and fire department to assist in evacuation notification procedures. Evacuate additional areas according to wind direction.
Major earthquake and/or volcanic eruption: loss of power, treatment facilities, water storage tanks, underground pipe breakage, and release of hazardous chemicals.	Investigate operational status of all water and ww facilities through SCADA or physical inspection unless hazards exist. Staff to report to District headquarters and follow assigned procedures to perform inspections as safety allows. Inspection to follow prioritized list contained in plan. If necessary, isolate sections of the water distribution system to prevent loss of water and conserve supplies. Notify the public to conserve water. If present, volcanic ash may contaminate the surface water supply and foul air filters disabling vehicles and other motorized equipment.
Wildfire consideration	Fire fighting would require up to 2,000 gallons of water per minute. If mains are damaged, fire fighting supply may not be available. District storage tanks have a total capacity of 7,500,000 gallons. Priority for water supply is: fire safety, potable water for customers, sanitary needs for customers, and irrigation use.

Actions to Reduce Water Demands: Short Term and Sustained Water Shortage Conditions

The District has planned for potential water shortages resulting from short term emergencies or naturally occurring drought conditions. Water supply shortages have been categorized into three main types: a one-year severe drought, a three year sustained drought, and a shortage resulting from a short-term catastrophic event. To address these scenarios, the District's Code contains four levels of mandatory prohibitions for water use during periods of water shortages; the higher the number, the more severe the restrictions. Any level of restriction can be imposed, based on the District's discretion, to address the severity of the shortage. A copy of the ordinance is provided in Appendix D. Table 5-3 lists the prohibitions contained in the District's ordinance to address water shortages emergencies.

Table 5-3 Water Shortage Contingency - Mandatory Prohibitions

Prohibitions	Stage when implemented
No cleaning of outdoor hard surfaces with water	Levels 1-4
No irrigation variances for newly planted or installed turf after declaration of water shortage.	Levels 1-4
No more than five percent of turf area may be replaced or reseeded.	Levels 1-4
Irrigation is only allowed 3 days/week w/in prescribed hours, 5 pm to 10 am	Level 1
Water for general construction and maintenance activities must be obtained using fire hydrant meter or reclaimed water from the District.	Level 1
Owners of golf courses, parks, and playing fields must submit a water conservation plan to the District, unless utilizing recycled water for irrigation, showing how the targeted use reduction will be achieved.	Level 1
Irrigation prescribed hours reduced to 8 pm to 10 am	Level 2
Water for general construction and maintenance activities must be reclaimed water from the District.	Level 2
Owners of golf courses, parks, and playing fields must submit a water conservation plan to the District, documenting further reduction in water use from Level 1, unless utilizing recycled water for irrigation.	Level 2
Irrigation prescribed hours reduced to 12 am to 10 am	Level 3
Washing of motor vehicles, motorbikes, boats, or other vehicles from the District's water system is prohibited	Level 3
Owners of golf courses, parks, and playing fields must submit a water conservation plan further reducing water use from Level 2 to the targeted level 3 value, unless utilizing recycled water for irrigation.	Level 3
No residential / business outdoor irrigation is allowed	Level 4
No vehicle washing allowed	Level 4
Owners of golf courses, parks, and playing fields must submit a water conservation plan further reducing water use from Level 3 to the District unless utilizing recycled water for irrigation.	Level 4

(DWR Table 36)

The District has the ability to monitor the effectiveness of implementing the four stages of water restrictions. Water production is monitored on a daily basis through source meters located at each of the three water treatment facilities and one well that pumps water directly into the system. This daily record of water production allows the District to monitor water demands and establish baseline data for various seasons, peak tourist periods, and irrigation periods. Through its SCADA system the District has the ability to monitor water demand on an hourly basis by tracking total production and net change in the total volume in the storage reservoirs.

Water meters are installed on all service connection, and each meter includes a remote read radio unit. The meters are remotely read by a unit installed on a meter reading vehicle, which can read all meters in one working day. This would allow the District to read meters and track actual use on a weekly or monthly basis, and compare usage against target reductions for each customer, e.g. reduce usage by 25% over last year's average for the same period.

Implementation of Level 1 through 4 restrictions on outdoor water use results in significant water demand reductions. The irrigation season occurs from roughly May through September, and irrigation water use accounts for about 40% percent of total annual water demand. The remaining months of the year consist primarily of indoor use. Thus, the most effective water demand reductions are achieved by reducing outdoor irrigation. Landscape irrigation creates the greatest demand for water, provides for reasonable monitoring and enforcement because of its visibility to District staff and the public, and does not impact the health and safety of District customers. During severe shortages, the District would impose a total ban on all outdoor irrigation and require a 10% reduction in indoor use.

Table 5-4 Estimated Demand Reduction from Implementation of Restrictions

Consumption	Stage when implemented	Projected reduction
Outdoor irrigation	Level 1 - 4	25 % - 40%
General indoor use	Voluntary. Incentivized through potential surcharges, customer outreach, and increased frequency of meter readings and review of billing data.	0% - 10%

(DWR Table 37 and DWR Table 35)

Enforcement of Water Restrictions

MCWD has adopted an ordinance regarding the enforcement of the District water restrictions as summarized in Table 5-5, below.

Table 5-5 Enforcement of Water Restrictions[1]

Penalties or charges	Stage when implemented
A verbal reminder is issued together with written confirmation of the verbal communication	First violation.
The District issues a written warning.	Second violation.
Irrigation meter disconnected if separately metered, if not, then a flow restrictor on the customer's meter is installed. Reconnection of meter or removal of flow restrictor requires payment of $200 per meter or restrictor.	After 3 violations during water shortage occurring at any level of restrictions.
Irrigation meter disconnected if separately metered, if not, then a flow restrictor on the customer's meter is installed. Reconnection of meter or removal of flow restrictor requires payment of $200 per meter or restrictor. Service is not restored and flow restrictors shall not be removed until the water shortage is over.	Upon 4th violation occurring at any level of restrictions.
Irrigation meter disconnected if separately metered, if not, then a flow restrictor on the customer's meter is installed. Reconnection of meter or removal of flow restrictor requires payment of $200 per meter or restrictor. Service shall not be restored for a period of 6 months from the date of disconnection or reduction in service.	Upon 4th violation of permanent water restrictions.

(DWR Table 38)
1. Chapter 12, Division 3, Section 3.35 of MCWD Code Book

Impacts on Revenues and Expenditures

The CWC requires that an UWMP include an analysis of the impacts of imposing water restrictions on the revenues and expenditures of the water supplier (10632(g)). Shortages to be included in the UWMP for consideration are: an up to 50% reduction of water supply, the driest three year historical sequence for the water supplier and a catastrophic interruption of water supplies. Customer water demand reduction would have the greatest impact on District revenues during the months of June, July, August, and September due to the focus on irrigation use reductions. The District currently maintains a water operations and maintenance (O&M) reserve of $804,000 in its annual budget. For comparison, the annual total water usage revenue is projected to average approximately $1.7M over the next five years. Table 5-6 shows the fiscal impacts from both reduced water use revenue and increased operating costs (due to increased groundwater pumping) utilizing sustained drought conditions that occurred in 1976-1978 and a potential single dry year event requiring a 50% reduction of water demand. The current operating reserve would be sufficient during a one year reduction in water use of about 25%; however, a second year of similar reductions or a one year reduction of 35% or greater would deplete the O&M reserves.

Under a condition of water shortages depleting the water O&M reserve through the combined impact of lower revenues and higher operating costs, it may be necessary to institute temporary water rate increases. One option the District could utilize would be to adopt a conservation incentive surcharge or rate increase over a specific time period while under water shortage conditions. Temporary charges of this type send an effective price signal to customers to reduce unnecessary water use. This measure would be consistent with the intent of the District’s water management ordinance and would allow the Board of Directors to implement the charge by resolution. The District Code does not currently address instituting a temporary surcharge for water shortages, so an update of the District Code would be needed and will be considered in the future.

Table 5-6 Financial Impacts of Demand Reduction on Revenue and Expenditures

Example % demand decrease[1]	Revenue reduction	Surface water available (ac-ft)	% of average surface water supply	Additional groundwater needed (ac-ft)[2]	Increased pumping cost	Total revenue and expenditure impact
1976 (23%)	$ 593,000	948	43%	307	$ 78,167	$ 671,167
1977 (35%)	$ 886,000	337	15%	612	$156,022	$1,042,022
1978 (0%)	$ 0	2,760	126%	0	$0	$ 0
50%	$1,280,000	0	0%	538	$137,190	$1,417,190

1. Used 3-yr average (2008-2010) demand of 2,672 acre-feet to determine demand reduction and groundwater needed to meet demand. Demand is gross water use.
2. Groundwater supply of 798 acre-feet is available on average. This supply is subtracted from groundwater needed to meet demand, i.e. actual pumping required is 798 plus “additional groundwater needed.” The average cost of groundwater pumping is $255/acre-foot.

Impacts to revenues and expenditures resulting from short term catastrophic events can vary widely in extent and duration. The District would make every effort and financial commitment to maintain and repair services as quickly as possible, as its first priority. The fiscal impacts to the water operations fund, to the extent they exceed existing reserves, would be addressed through some combination of funds transfers and possible customer surcharges depending on the circumstances. For context, MCWD currently has over $10M in combined operations and capital funds balances, and the current five year forecast shows a minimum combined balance of approximately $3M.

Water Quality

The raw water quality of MCWD's surface water supply is very good. Surface water treatment improvements to adjust pH, in compliance with the state/federal lead and copper standards, will be completed in 2011. Improvements for pH control and improved removal of arsenic, iron, and manganese are also scheduled for GWTP 1 and 2 in 2012 and 2013, respectively. To date, meeting public health water quality standards has not resulted in imposing any level of water restrictions.

Table 5-7 Current and Projected Water Supply Impacts Due to Water Quality

Source	Condition	2010	2015	2020	2025	2030
Groundwater	Arsenic	0	0	0	0	0
	Iron/Manganese	0	0	0	0	0

(DWR Table 30)

Drought Planning

<u>Water Year Conditions and Total Supply</u>
This section presents an assessment of MCWD's water supply reliability under three standard water supply conditions: average, severe one year drought, and sustained multi-year drought. This assessment is made for each of the five-year increments of the 20-year planning horizon. The selection of the drought conditions is based on actual hydrologic data for the Mammoth Basin going back to 1940, using Mammoth Pass snowpack water content records. Triggers, linked to forecasted water supply conditions, are presented for imposing each level of water use restrictions. Conclusions based on this assessment are presented regarding the reliability of MCWD's supply relative to future demands. Table 5-8 lists the actual water years used to determine the three standard supply conditions. Table 5-9 lists the total water supply available under each of the conditions (surface water, groundwater, recycled water). The supply data in Table 5-9 reflect the contribution of the Well 25 and the future Well 11 to groundwater, and the planned total recycled water use based on current contracts and build-out of the Snowcreek VIII development.

In selecting the years for the multiple dry year condition, the analysis looked at both the 3-year and 4-year running cumulative minimum surface water supply conditions, which are 1976-78 and 1987-1990 respectively. The three-year condition has the lowest annual average supply, approximately 9% lower than the 4-year period. Therefore the three-year condition was used for this analysis.

Table 5-8 Basis of Water Year Data

Water year(s) Type	Water Year(s) Based on Historical Hydrology
Average water year	2008
Single-dry year	1977
Multiple-dry water years	1976,1977,1978

(DWR Table 27)

Table 5-9 lists the water supplies from each source at Town build-out, under the three supply conditions listed in Table 5-8. The tables illustrate the conjunctive management practiced by MCWD to balance the supplies under varying hydrologic conditions. Surface water supply is normally maximized first due to its high quality and low production costs. Groundwater supply is then used to meet the remaining demands. Recycled water supplies a large portion of the total community irrigation demands at build-out through its use by the Sierra Star and Snowcreek golf courses. Note that the total supply values do not match the total build-out demand of 4,180 ac-ft (Table 3-8) due to slight variations in the total raw water used and varying treatment process loss rates for surface water and groundwater. The total supply values in Table 5-9, which represent raw water from the source (i.e. diversions from Lake Mary and well head yield) vary about 3% between the three water year conditions due to the influence of these treatment process losses on total supply utilized to meet the 4,180 ac-ft demand.

Table 5-9 Water Supply by Source for Planning Scenarios at Town Build-Out (acre-feet).

Water Year Type[1]	Water Sources			
	Surface Water	Groundwater	Recycled Water[2]	Total Supply
Average	2,221	1,463	640	4,324
Single Dry Year	337	3,360	640	4,337
Multiple Dry Years				
Year 1	948	2,702	640	4,290
Year 2	337	3,360	640	4,337
Year 3	2,760[3]	814	640	4,214

(DWR Table 28)
1. Based on historical hydrology.
2. Recycled water supply is the current maximum planned, with existing customers and infrastructure. The phased development of Snowcreek VIII's future building is expected to result in total recycled use of 99 ac-ft/yr in 2010, 480 ac-ft/yr by 2015, and 640 ac-ft by 2020 and beyond.
3. Utilizing this amount requires future water treatment plant improvements and demand occurring during available surface water supply.

Water Shortage Stages, Triggers, and Demand Reductions

The guidelines for writing the UWMP require the District to include a section describing the stages of action implemented to respond to a water supply shortage including up to a 50% reduction in supply. The stages to be implemented and percent water reductions are included in Table 5-3 and Table 5-4, respectively. The District Code contains specific trigger points based on water level measurements at Lake Mary to enact water conservation in the community; however, the Board may elect to implement the measures described in Table 5-3 at any time following the procedures contained in the Code. District staff is in the process of developing an operations plan to forecast potential water shortages by modeling the relationship between the snow water content (SWC) of the snowpack at Mammoth Pass and surface water availability. The degree of water conservation necessary during a shortage will be directly correlated with Mammoth Pass SWC April 1 measurements or anticipated shortages due to an emergency.

As described in earlier sections of this chapter, provisions for reducing water supplies by 50% and mechanisms for determining reductions have been described under the section "Actions to reduce Demand" in this chapter. All customers are metered and billing records can be tracked as necessary.

Supply Reliability in Future Years with Varying Water Year Conditions

The following section presents an analysis of the water supply and demand balance under the 20-year planning horizon of the UWMP. Service area demands and water supply are based on information presented in Chapters 3 and 4, respectively. The groundwater and surface water modeling tools used to estimate these supplies are discussed in Chapter 4. Tables 5-10, 5-11, and 5-12 summarize supply and demand conditions for a normal (average) water year, a single year severe drought condition, and a sustained three year drought condition respectively.

Table 5-10 Supply and Total Demand Comparison - Normal Year (in acre-feet)

Planning Horizon Year	2010	2015	2020	2025	2030
Supply Total	3,783	4,164	4,324	4,324	4,324
Demand Total	2,589	2,989	3,387	3,785	4,180
Difference	1,194	1,175	937	539	144
Difference as % of supply	32%	28%	22%	12%	3%
Difference as % of demand	46%	39%	28%	14%	3%

(DWR Table 32)

Table 5-11 Supply and Demand Comparison - Single Dry Year (in acre-feet)

Planning Horizon Year	2010	2015	2020	2025	2030
Supply totals	3,796	4,177	4,337	4,337	4,337
Demand totals	2,589	2,989	3,387	3,785	4,180
Difference	1,207	1,188	950	552	157
Difference as % of supply	32%	28%	22%	13%	4%
Difference as % of demand	47%	40%	28%	15%	4%

(DWR Table 33)

Table 5-12 Supply and Demand Comparison - Multiple Dry Year Event (in acre-feet)

		2010	2015	2020	2025	2030
Multiple-dry year first year supply	Supply totals	3,749	4,130	4,290	4,290	4,290
	Demand totals	2,589	2,989	3,387	3,785	4,180
	Difference	1,160	1,141	903	505	110
	Difference as % of supply	31%	28%	21%	12%	3%
	Difference as % of demand	45%	38%	27%	13%	3%
Multiple-dry year second year supply	Supply totals	3,796	4,177	4,337	4,337	4,337
	Demand totals	2,589	2,989	3,387	3,785	4,180
	Difference	1,207	1,188	950	552	157
	Difference as % of supply	32%	28%	22%	13%	4%
	Difference as % of demand	47%	40%	28%	15%	4%
Multiple-dry year third year supply	Supply totals	3,673	4,054	4,214	4,214	4,214
	Demand totals	2,589	2,989	3,387	3,785	4,180
	Difference	1,084	1,065	827	429	34
	Difference as % of supply	30%	26%	20%	10%	1%
	Difference as % of demand	42%	36%	24%	11%	1%

(DWR Table 34)

<u>Summary Conclusions from Analysis of Build-out Water Supply Reliability</u>

The water supply reliability analyses shown above support the following general conclusions. Under current conditions (2010), MCWD has adequate water supply to meet community needs under the full range of water year types, including both the severe one year and sustained multi-year droughts. This is primarily due to the availability of local groundwater resources, which provides 40% of supply under average conditions, nearly 90% of the supply in a severe one year drought, and 60% of the supply over a three year sustained drought.

During the intermediate planning horizons and through 2030 (Town build-out), the combined use of Mammoth Creek surface water, local groundwater, and recycled water results in a supply mix that can reliably meet the community needs under the full range of water year types. However, this is a long range projection which could be significantly impacted by future changes to both demands and supply. On the demand side, this analysis is largely dependent on the Town land use policies and the actual type and density of development which occurs between now and build-out. Town policies on development type, density, and enforcement of effective landscape practices will influence water demands significantly. On the supply side, the District's surface water supply could be impacted by climate change impacts to snowpack water content and watershed runoff patterns, which cannot be adapted to without significantly increased surface water storage. Legal challenges to MCWD's water rights from the City of Los Angeles could, if the City prevails, reduce or eliminate access to local surface water supply. Similarly, local groundwater supplies could be impacted by the major expansion of geothermal energy production planned by ORMAT Corporation at the Casa Diablo power plant complex, or natural changes from seismic or volcanic activity causing changes to the local hydrogeologic characteristics. Finally, the planned expansion of recycled water use for Snowcreek golf course and its related future development remains a major variable, since recycled water will make up about 15% of future supply. Each of these potential influences on future water supply and demand will need to be re-evaluated in the 2015 UWMP update to confirm the conclusions presented in this 2010 UWMP update.

This chapter discusses demand management measures (DMM) identified in the CWC (10631(f) and (g)) to be implemented and reported on in an urban water management plan. This chapter provides a comprehensive description of the District's implementation of the DMMs and an evaluation of their effectiveness.

Water Survey Programs for Single-Family and Multi-Family Residential Customers

This ongoing measure at the District includes indoor and outdoor water demand reductions through:

a. Indoor water surveys
b. Outdoor landscape water audits

The District has been a co-sponsor of the Mammoth Middle School sixth-grade classroom program, LivingWise, since the 2006/2007 academic year. This program educates students about energy and water resource efficiency. Students conduct an indoor water and energy audit and use this information to reduce those resource demands by making changes in the home. The survey results are used to develop measures of water and energy savings (see Appendix E for a copy of the student survey). Students also tour the Mammoth Lakes watershed, environmental monitoring stations, a water treatment plant, the laboratory, and the wastewater treatment plant.

The District does not conduct routine outdoor water surveys. As seen in Table 6-1, less than half of the students live in a single-family home. Instead of residential outdoor surveys, District staff conducts landscape water audits (see page 6-7 for DMM-Large Landscape Conservation Programs and Incentives). The audits are initiated in one of three ways: customer request, internally by high water use readings, or to follow-up on water use changes from the landscape rebate program. The audits result in a report showing the customer's Maximum Applied Water Allowance (MAWA) for their property, actual water use based on billing records, and potential financial savings if irrigation practices were consistent with MAWA.

The District also offers a rebate on purchases of weather-based irrigation controllers and irrigation system improvements. Rebate amounts for smart irrigation controllers were $400 in 2010 and irrigation improvements were $1,000 for landscaped areas greater than 5,000 square feet and $300 for smaller areas

<u>Steps necessary to implement the measure</u>

a) Every year the District partners with a local energy efficiency non-profit organization, High Sierra Energy Foundation, to provide funding assistance for the program. The program includes a field trip conducted by District staff in addition to staff participating in other program aspects as requested.

b) Outdoor landscape water audits require landscaped area measurements, determination of Maximum Applied Water Allowance (MAWA), and customer water use readings. Air photos and field verification are used to estimate the landscaped area and MAWA calculations. The customer's irrigation water use and costs are then compared to MAWA water use and costs. This information is compiled into a written report containing the graphs depicting actual irrigation use compared to MAWA and potential financial saving that can be realized with reduced irrigation. The District maintains a budget for a part-time employee to conduct audits during the growing season.

<u>Schedule of implementation</u>

Both of these programs are ongoing.

Method to evaluate effectiveness
a) The LivingWise program provides the results of the student-led surveys of the home water audits. (Surveys and quantification of water savings achieved through the program was not provided the first year.) These results are used to develop water savings based calculations provided in the program report (see DMM Residential Plumbing Retrofits, below).

b.) Evaluating effectiveness of landscape audits is more difficult. The audit report provides a clear financial incentive to improve landscape design and irrigation practices.

Estimate of water savings and ability to further reduce demand
a) The number of surveys resulting from the LivingWise program is provided in Table 6-1. This program is ongoing and reaches all 6th grade children in Mammoth Lakes' public school. Importantly, the program provides the information necessary for a lifetime of practicing resource conservation. It is expected that future water savings from this programs will be similar to those currently reported in Table 6-1.

Table 6-1 LivingWise Program Summary of Audits and Water Savings

Academic Year	Indoor water audits conducted	Estimate of annual water savings (gallons)	District costs
2007-2008	47 SF[1] 54 MF[2]	539,744	$3,500
2008-2009	48 SF 56 MF	426,069	$3,500
2009-2010	42 SF 48 MF	702,065	$3,500
2010-2011	Data pending		$4,000

1. SF = Single-family residence
2. MF = Multi-family residence

b) Water savings resulting from the landscape water audits and rebate program are difficult to track for several reasons: very few developments have separate irrigation meters; property mangers seem to have fairly high turnover and their management practices greatly influence outdoor water use; the District is improving the accuracy of meter reads as a result of implementing a meter improvement program resulting in incompatible year to year measurements for comparison purposes; and a significant amount of the District's historical water use data was lost when the District changed the software used for storing billing data.

Evaluation of measure
a) The LivingWise program is a cost effective measure for teaching students about resource conservation and providing the materials to make immediate changes in their home environment. Offering the program through the public school system, allows a broad spectrum of the local population to learn about resource conservation, e.g. English language learners. The field trip provides students with an understanding of the watershed and the processes and energy required to deliver safe potable water to their homes. In addition, the field trip is gaining popularity among the parents and more parents are joining the field trip to learn about the District's operations. The surveys found that over half of the students involved their entire family in the audit questions and in replacing fixtures. Youth involvement in water conservation will hopefully be sustained as students and their siblings move into their own homes as adults.

b) The outdoor landscape audits have been very effective at getting the attention of the Homeowner Associations and property managers because of the potential cost savings demonstrated in the audit report. This measure has also facilitated communication between the District and the customers receiving the audits and many customers receiving an audit apply for and receive rebates for irrigation improvements. This relationship is being used to understand needs in the community that can be addressed by the District. For example, a workshop on smart controllers and irrigation retrofit is planned for 2011.

Residential Plumbing Retrofit

This measure consists of:

a) Providing free showerheads and faucet-aerators that meet WaterSense Specifications.
b) Rebate program to replace older model toilets and clothes washers with high water-efficient models.

As described in the DMM above, the District has been a co-sponsor of the LivingWise program for 6th grade students in Mammoth Lakes since 2006. In addition to conducting home water and energy audits in the home, the program provides free showerheads and kitchen and bathroom faucet aerators that meet WaterSense Specifications to the students. The District has provided free water efficient fixtures and staffed a table at the local Earth Day Fair; however, in 2011 the event was cancelled. In 2009 and 2010 the District provided 30 water efficient showerheads and 50 kitchen faucet aerators at Earth Day for participants willing to take a water conservation quiz. See Table 6-2 for an accounting of showerheads and aerators distributed through the LivingWise Program and at community events.

Table 6-2 Water Conservation Fixtures Provided for Free

Academic Year	Showerheads	Aerators	
		kitchen	bathroom
2007/2008	101	101	101
2008/2009	134	154	104
2009/2010	120	140	90

The District reestablished its ULFT toilet rebate program in 2006; and in 2010 only high efficiency toilets (1.28 gallon per flush or lower) were eligible for rebates. This rebate program was expanded in 2009 to include high efficiency clothes washers (HECW) and outdoor irrigation supplies. Neither the District nor the Town has an ordinance requiring the replacement of existing high-flow water fixtures.

Steps necessary to implement the measure

a) The District annually budgets for the LivingWise program and for expenses related to community events.

b) The District annually budgets for the rebate program including costs for newspaper and radio advertisements. Applications for the program are made available on the District's website and at the District offices. The District must provide sufficient staff time to provide assistance to applicants, to process rebate checks, maintain the rebate program database, and to conduct pre and post inspections to validate the rebate. Pre-inspections were dropped in the 2010/2011 program.

Schedule of implementation

Both of these programs are ongoing.

Method to evaluate effectiveness

a) The LivingWise program calculates water savings resulting from installation of the water efficient fixtures based on student survey results. The District does not account for potential water savings from fixtures provided at community events because a large number of attendees are from outside the service area.

b) The District calculates the water savings based on the difference between the old and new toilets, and assumed household populations (2.4) and daily flush rates (5). Water savings from installation of (HECW) have not been estimated; however, based on literature searches, water savings from HECWs will be included in future reporting on HECW water savings.

Estimate of water savings and ability to further reduce demand
a) Water savings from installation of showerheads and aerators are provided through the LivingWise program, see Table 6-1. The fixtures provided in the program have a 10-year lifetime. Thus, these reported water savings are expected to continue at minimum of 10 years. As described above, it is expected that the students going through this program will continue to practice resource conservation. No savings are estimated from free fixtures provided at community events. The activity is conducted to raise people's awareness of the District in the community and that water conservation products are an easy way to save water without impacting lifestyle.

Table 6-3 Estimated water savings and costs for retrofit program

Year	Gallons of water saved	District costs
2007	539,744	$3,500
2008	426,069	$3,500
2009	702,065	$3,500
2010	Data pending	$4,000

Evaluation of measure
The District believes these activities are cost effective measures for reducing water demand for the reasons provided above.

System Water Audits, Leak Detection, and Repair

The District has a program to control water loss in the distribution system. This program consists of monthly water audits and evaluation of the audit results, and the development and implementation of cost-effective projects to reduce water losses. The monthly auditing system has been an effective mechanism for quickly responding to water losses. Since 2002, a high priority project to reduce water losses has been the replacement of miles of poor condition steel water distribution mains. When completed in 2012, this project will completely replace over 110,700 feet of steel water line with ductile iron pipe. The combined impact of the water loss reduction efforts has resulted in recent sustained distribution system losses below 6%, which by water utility industry standards is a relatively low loss rate.

Water losses are also controlled through review and comparison of the metering system and billing database for inconsistent water usage that may indicate leaks or failing meters. In 2010, the District began a master metering project for customers with multiple meters on their property. The master meters will capture potential water losses occurring on the customer's property. Leaks that occur on customers' properties between the lateral and meter may partially explain the higher summertime water losses seen in Figure 6-1.

The District also reviews monthly billing data to find potential leaks on the customer's property. These customers are contacted and assistance is provided to find the leaks. Customers may also contact the District regarding assistance to identify high water usage meter reads. Leaks on the customer side of the meter are the customer's responsibility to repair. The District has invested in underground pipeline leak detection equipment that allows routine leak detection surveys to locate leaks for repair before they appear on the surface.

The District continues to identify cost effective projects to reduce water losses. The District conducted a review of the meter database for models of water meters with high error rates. A meter replacement project for these meters will be initiated in 2011 and completed in 2012. Water meters in the database will also be categorized by age, model type, volume of usage, and customer use categories. A subset of meters within these categories will be sampled for accuracy. If significant issues are found, a replacement program may be initiated. In addition, staff has evaluated the installation of master meters in the distribution zones to improve the ability to find water losses. Implementation of these projects will depend on a determination of whether they will be cost-effective for the District.

Steps necessary to implement the measure
District staff will continue monthly water auditing. The audit consists of comparing water production against billing data. Water production meters are calibrated approximately every five years.

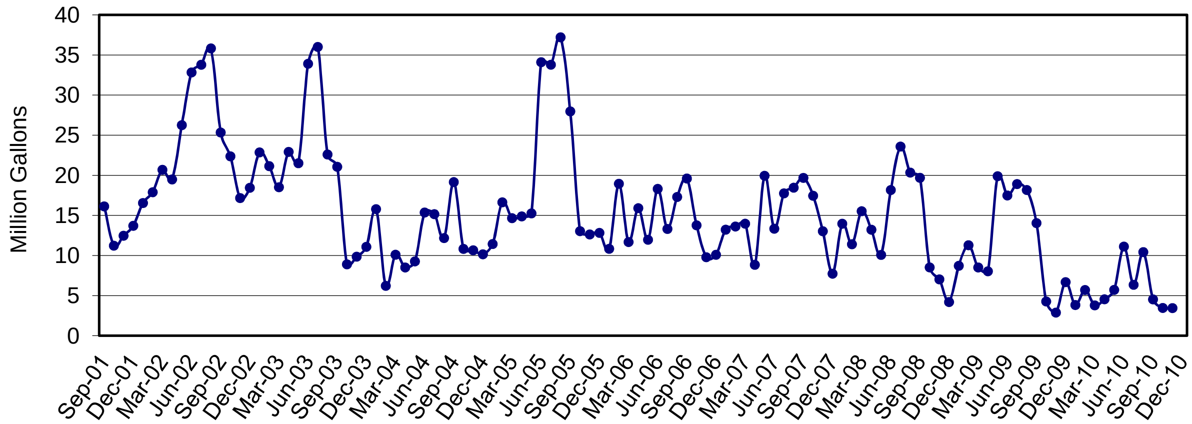
Annually a seasonal construction crew is hired during the construction season to continue the pipeline replacement project and improve the metering system.

Schedule of implementation
The water loss control program is implemented and is an ongoing District activity.

Method to evaluate effectiveness
Effectiveness can be evaluated through reductions in measured losses. In addition to the reduction in measured water losses, this activity has significantly reduced the number of emergency repair calls by finding and fixing leaks before they cause damage and/or become an emergency. A graph showing the monthly water losses and the significant improvements in reducing losses is provided as Figure 6-1.

Estimate of water savings and ability to further reduce demand
In 2010, over 200 million gallons of water were saved compared to 2002, largely attributed to the pipeline replacement project. The District has approximately 13,900 additional feet of pipe to replace. The monthly review of water losses and evaluation of projects to reduce losses is expected to continue the reduction water demand attributed to losses. The 2005 UWMP projected unaccounted water losses would be reduced through infrastructure improvements and estimates losses at 760 acre-feet in 2010. However, as shown in Table 3-7 Additional Water Uses and Losses (acre-feet per year), water losses in 2010 were measured as 233 acre-feet.

Figure 6-1 Total Monthly Unaccounted Water in Millions of Gallons



Evaluation of measure

The program to control water losses has been effective and current losses can likely be attributed to meter errors. Both the monthly evaluation and implementation of the pipeline replacement project have significantly reduced losses as depicted in Figure 6-1. Reducing losses has also allowed gross water use to decrease as population increased in Mammoth Lakes (see Figure 3-1 Change in Gross Water Use and Service Area Effective Population Growth, page 3-7).

Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

All District customers are metered per District ordinance and billed a monthly water fee and a quantity rate charge that increases with increased use. A rate study is planned for 2011 and potential implementation of recommendations is scheduled for 2012.

Invalid meter reads increase during the winter and spring because of flooding and snowpack access issues. Staff is currently reviewing the meter database and categorizing meters by type, age, usage, and customer class. A sample testing program will identify whether there are categories of meters that need replacement and whether a replacement program will be cost effective. If so, a meter replacement plan will be developed. Recent meter sampling indicated that turbine style meters installed 20-30 years ago were inaccurate; therefore, a program to replace all turbine meters was initiated and will be completed in 2011.

The District is installing master meters in areas with old meters or areas of suspected water losses. In addition staff has increased meter inspections and is developing a plan for a meter inspection and replacement program.

Steps necessary to implement the measure

Meters are read monthly and readings are reviewed for irregularities. Staff will complete a meter inspection and replacement plan.

Schedule of implementation

All customers are metered and commodity rates are in place.

Method to evaluate effectiveness
Metered water usage and volume based rates are already in place.

Estimate of water savings and ability to further reduce demand
Metered water usage and volume based rates area already in place.

Evaluation of measure
Metered water use is an important tool for encouraging reductions of water demand. An evaluation of water savings is not possible because there is no change to the District's operations from past practices.

Large Landscape Conservation Programs and Incentives

The District is targeting accounts showing high water use and large landscaped areas to conduct water audits. A landscape irrigation audit report is conducted regardless of whether the customer has a dedicated irrigation meter or mixed use meter. (The District has 40 sole irrigation dedicated accounts.) In 2010, the District developed and delivered irrigation water audit reports for 26 of the top water users. Water audits compared current irrigation water use with MAWA and included estimates of financial savings if water application matched MAWA amounts. Landscape water audits are also available on request.

The District has a landscape rebate program for weather based irrigation controllers and irrigation "tune-ups". Irrigation rebates for up to $1,000 are available for landscaped areas greater than 5,000 square-feet. Rebate applicants must obtain approval from District staff following an onsite visit to see the planned improvements. This personal contact allows the District an opportunity to explain the importance of pressure-reducing valves and landscape water conservation concepts.

The Town of Mammoth Lakes Municipal Code also contains detailed water-efficient landscape requirements including the provisions of MAWA calculations and limits on the percentage of landscaped area that may be covered with lawn.

Steps necessary to implement the measure
Data is developed by the District's billing department and examined by staff for usage patterns. The seasonal assistant uses the District's geographical information system to obtain meter information and to make initial irrigated area estimates using air photos. If the customer has a mixed-use meter, average water use data from winter is subtracted from summer use to estimate irrigation water. Staff then develops MAWA for the landscaped area. A field visit is also made to confirm the irrigated area and to discuss the initial results with the property manager. This data is then combined into a landscape water audit report. Finally, the final report is delivered to the property manager and HOA, if contact information is available. Personal contact with both the HOA and the property manager is made to explain the water audit and describe the irrigation rebate program

The District advertises on the local radio station and in the local newspapers about the rebate program. Applications for the program are available at the District office and on the District's website. Applications are also provided on request to customers as a hardcopy or as an electronic copy. Staff is available to walk applicants through the application process and to conduct the inspections required of every application. Mammoth Lakes has a high number of second homeowners; therefore, verification of the installation is considered an important aspect of the program.

Schedule of implementation
Landscape water auditing reports and a rebate program targeting landscape improvements are in place.

Method to evaluate effectiveness
Recipients of landscape water audits and landscape rebates will have their water use tracked.

Estimate of water savings and ability to further reduce demand
Landscape water audits started in 2010 and no estimates of actual water savings have been determined from this program or the rebate program. An evaluation of long term trends will be evaluated in the future because annual precipitation events can have a significant impact on irrigation water use and because changes in the accounting software have resulted in a limited data set available for comparison purposes.

Evaluation of measure
As described above, no actual water savings from the program have been estimated; however, both the audits and landscape rebate program make customers aware of the importance of unnecessary and costly overwatering practices. The practice of showing customers potential savings and providing rebates to make changes seems to be received as a positive method for encouraging outdoor water conservation.

High-Efficiency Washing Machine (HECW) Rebate Programs

The District implemented a HECW rebate program in 2009. The program rebate amounts are $200 to replace an older non-water efficient washer or $150 for purchasing a new HECW machine.

Steps necessary to implement the measure
Advertisements for the program are run in the local newspapers and on the local radio station. Water bills are printed to include messages about the availability of the rebate program. Applications are made available to customers at the District office and website, and are sent to customers on request. Annually, the program applications are reviewed and revised, if necessary, to improve ease of applying for the program. Staff is available to walk applicants through the application process and to conduct the inspections required of every application.

Schedule of implementation
A rebate program is in place.

Method to evaluate effectiveness
Staff is reviewing methods used by other organizations to estimate water savings resulting from implementing a HECW rebate program.

Estimate of water savings and ability to further reduce demand
As described above, the District does not have a method for estimating water savings but is reviewing methods for adoption in 2011.

Table 6-4 Summary of HECW Rebate Program

Year	Number HECWs installed	Rebated funds
2009	7	$1,200
2010	16	$2,900

Evaluation of measure
The District believes that the presence of a rebate program is an effective means to encourage the purchase of a HECW and the program serves as a constant reminder that water demand reduction is an ongoing effort in our community. Review of rebate programs offered by other water utilities indicates the District's program is average to above average for the rebate amount; however, customer response for this program has been slow. It is possible that the economic downturn may be affecting the ability of customers to replace their current washer.

Public Information Programs

The District has a public relations officer pursuant to the District's Code. The responsibilities of the position include promoting knowledge and understanding of the area's water situation in general and methods to conserve the water supply and keeping the public informed about all District Board meetings and other important District activities. The District uses the local newspapers and radio station and District's website to inform and remind the public about water conservation activities in the community, e.g. outdoor irrigation regulations, availability of the rebate program, the recycled water project, and the waterline replacement project. See DMM Water Conservation Coordinator on page 6-12.

Steps necessary to implement the measure
Staffing this position is ongoing.

Schedule of implementation
A public information program is in place.

Method to evaluate effectiveness
There is no described method to evaluate the effectiveness of this DMM.

Estimate of water savings and ability to further reduce demand
No estimate of water savings has been conducted for this DMM.

Evaluation of measure
This measure is considered an important tool to maintain communication with the public and convey important messages regarding our water resources and other relevant activities.

School Education Programs

The District has been a co-sponsor of the Mammoth Middle School sixth-grade classroom program, LivingWise since 2007. This program includes classroom discussions, home water and energy audits, and a "Resource Action Kit" containing supplies to educate students about water resource use and to reduce water and energy household demand. In addition, the District takes the students on a field trip to understand the processes required to deliver safe potable water to the community. The program identifies state education standards and benchmarks for educators (see the first and second DMMs, Water Survey Programs and Residential Plumbing Retrofit, in this chapter for additional information). The District does not have water conservation presentations in the other grade levels. Mammoth Lakes is a small community; and the District believes the annual sixth-grade program eventually reaches the almost all of the local student population.

Steps necessary to implement the measure
See the first and second DMM descriptions for Water Survey Programs and Residential Plumbing Retrofit, in this chapter for additional information.

Schedule of implementation
A school education program is in place for all 6th grade students in the public school. The District also provides field trips to other students and visitors on request.

Method to evaluate effectiveness
The program has been successful. At the beginning of the program, students are typically unaware of their water supply sources and the processes necessary to ensure high quality potable water. The program has students install water efficient fixtures in their homes.

Estimate of water savings and ability to further reduce demand
The installation of water-efficient fixtures in the students' homes insures long term water savings.

Table 6-5 Summary of School Program Water Savings

Academic Year	Estimate of annual water savings (gallons)
2006-2007	Not quantified
2007-2008	539,744
2008-2009	426,069
2009-2010	702,065
2010-2011	Data Pending

Evaluation of measure
See above. In addition, the program has been well-received by students and their parents. The District believes it is critical to inform the young members of the population about the intricate process of delivering water to the tap to instill the importance of using water conscientiously.

Conservation Programs for Commercial, Industrial, and Institutional Accounts

The District does not have any industrial accounts. Water conservation for commercial and institutional accounts is encouraged by:

a) The indoor and outdoor rebate program includes higher rebate amounts for shared fixtures and larger landscaped areas (see Table 6-6 Commercial Rebate Program).
b) Monthly service charges are based on meter size. Meter size is determined by fixture counts.
c) A District ordinance to increase water rates for commercial irrigation meters that exceed maximum applied water allowance (MAWA) calculated for each site is included in the District Code.

The District has not fully implemented increasing rates for landscape irrigation exceeding MAWA. Staff is evaluating how to best implement the ordinance and how to coordinate efforts with the Town.

Steps necessary to implement the measure
As described above, staff is evaluating how to implement a MAWA based water usage charge. It is anticipated a study to evaluate regional reference evapotranspiration rates (ETo) and determine an appropriate ETo for Mammoth Lakes will be completed in fiscal year 2011/2012.

Schedule of implementation
The provisions included in a) and b) above are in place and implementation of MAWA based charges is scheduled during the irrigation season of 2012 or 2013.

Method to evaluate effectiveness
The indoor and outdoor rebate program effectiveness can be determined using the same methods as described for residential housing. The District does not have a method to determine water savings based on meter size rates. MAWA based irrigation rates will be evaluated by tracking metered water usage.

Estimate of water savings and ability to further reduce demand
As described above, there is no method to estimate water savings from meter size and MAWA based irrigation rates. The table below shows the commercial rebate estimated water savings and rebate amounts. Commercial customers have been slow to respond to the rebate offer even though a higher rebate is provided for shared fixtures. No commercial high efficiency clothes washers have been installed at public laundry facilities through this program. The District does not have a long enough record to review data on the outdoor rebate program. Please see the discussion under the demand management measure, water survey programs for single-family residential and multi-family residential, on page 6-1.

Table 6-6 Commercial Rebate Program

Indoor rebate program			
	Number of toilets replaced	Est. annual water savings (gal)	Toilet rebate money expended
2007	1	14,892	$100
2008	0	0	$0
2009	9	141,694	$1,756
2010	4	15,287	$543.00
Total	**14**	**171,873**	**$ 2,399**
Outdoor rebate program			
	Number of applicants		Irrigation rebate money expended
2009	2		$2,951
2010	10		$15,558
Total	**12**		**$18,509**

Evaluation of measure
This measure is valuable for reducing water demand and alerting customers of the importance of water conservation. The rebate program, especially the irrigation portion, provides customers with a financial incentive to implement water efficiency improvements on their irrigation systems.

Conservation Pricing

This measure uses price signals to encourage the reduction of average or peak water use. All customers pay a monthly water fee which consists of a minimum service charge and a quantity rate charge. For example, residential customers pay a minimum service charge of $11.46 per month and a quantity rate charge that increases from $1.10 per 1,000 gallons for the first 4,000 gallons of metered water used and reaches a maximum of $7.70 per 1,000 gallons for usage over 30,000 gallons per billing period. Commercial users are not charged on an increasing block rate like residential customers are. Instead, they are charged a flat rate for each 1000 gallons used, multiplied by the rate factor of $2.33 per 1,000 gallons of metered use. The charges described above represent 2009/2010 rates. A rate study to evaluate the effectiveness of the rates to incentivize conservation will be conducted during the 2011-2012 fiscal year.

Steps necessary to implement the measure
The District has selected a consultant to conduct the rate study. Implementation of rate structure changes must comply with provisions contained in Proposition 218.

Schedule of implementation
The District's ordinances include tiered rate charges for water use and will be updated as described above.

Method to evaluate effectiveness
Effectiveness of the tier rates for conserving water is not measurable.

Estimate of water savings and ability to further reduce demand
See above.

Evaluation of measure
It is assumed that using price incentives through tiered pricing reduces water demand.

Water Conservation Coordinator

The District has regularly filled the position of Conservation Coordinator. The Coordinator develops public information for the local media outlets as described under DMM Public Information Programs. The Coordinator also works with the Town to encourage the inclusion of water conservation in development projects. A temporary assistant is hired during the irrigation season to assist with outdoor irrigation compliance checks, administer the rebate program, and perform landscape water audits.

Steps necessary to implement the measure
The Conservation Coordinator is a permanent year-round position with the District. A temporary employee is hired to assist with duties during the irrigation season.

Schedule of implementation
Staffing this position is ongoing.

Method to evaluate effectiveness
The District does not have a gauge to evaluate the effectiveness of the position.

Estimate of water savings and ability to further reduce demand
The District does not have a measure for determining an estimate of water savings from this DMM.

Evaluation of measure
This position fills the District's need to inform the public about water demand reduction programs, facilitate representation at public events, and develop and administer water conservation activities.

Water Waste Prohibition

The District has certain mandatory prohibitions that require the public to use water carefully. These water conservation measures are required for all District customers at all times and are contained in the District's Code, Chapter 12, Division III, section 3.33.

Steps necessary to implement the measure
District staff contacts offenders regarding non-compliance. Written notification is provided to the homeowner and property manager. The District may, after two warnings, disconnect the service for

failure to comply with the requirements. Disconnected service may be restored upon payment of the turn-on charge set by the Board of Directors and payment for the wasted water at the rate set by the Board of Directors.

Schedule of implementation
The prohibitions against water waste are always in effect.

Method to evaluate effectiveness
Customers have responded to communications regarding their non-compliance with the District's water waste prohibitions by correcting their actions.

Estimate of water savings and ability to further reduce demand
The District does not have a method for determining water saving resulting from this measure.

Evaluation of measure
Having regulations prohibiting water waste coupled with a procedure for implementing penalties is deemed an effective means to discourage water waste by District customers.

Residential Ultra-Low Flush Toilet Replacement Programs

The District replaced the ultra-low flush toilet program with a high-efficiency toilet rebate program in 2010. There is no per household limit on the number of toilets eligible for replacement.

Steps necessary to implement the measure
See the DMM, High-Efficiency Washing Machine, on page 6-8.

Schedule of implementation
This program is ongoing.

Method to evaluate effectiveness
A database of all applicants and replaced fixtures is maintained for the program. This database includes an estimate of the gpf of the replaced toilets. The estimate of the program's water saving is shown in Table 6-7. The following assumptions were applied to develop the estimate of savings, each household has 2.4 people and each person flushes 5 times a day for one year.

Estimate of water savings and ability to further reduce demand
Calendar year of estimated savings:

Table 6-7 Summary of Toilet Rebate Program

	Quantity replaced	Annual water savings (gal)	Toilet rebate money expended
2006	25	177,609	$2,500
2007	60	490,122	$5,953
2008	18	127,020	$1,800
2009	27	222,650	$2,700
2010	89	544,872	$15,845
Totals	**130**	**1,017,401**	**$10,253**

Evaluation of measure
The program provides an effective financial incentive to replace leaking, broken, or old toilet with a new high efficiency model.

The state and federal governments have begun to evaluate and plan for potential water supply and demand impacts that would result from global and regional climate change. Water utilities will need to develop strategies to manage the combined impacts of increasing population, increased water demands for both municipal and irrigation use, and changes to the quantity and seasonal distribution of precipitation. Water supplies in California rely heavily on the Sierra Nevada Mountains to capture and store precipitation, primarily as snowpack water content. The Sierra Nevada snowpack is considered "the most important reservoir of water in California" with the ability to store and slowly release about 15 million acre-feet of winter season precipitation, during the dry months of the year when urban and agricultural water demands are the greatest. However, climate change induced temperature increases will accelerate the timing of snowpack melting and runoff, and increase statewide water demands due to both longer irrigation seasons and increasing population. California's water supplies are also vulnerable to greater sediment loads from flood events and higher temperatures that may degrade water quality through changes to the natural aquatic processes in the major fresh water systems of the state. Competition for water supplies to meet environmental and urban / agricultural uses may also increase conflicts between local and regional stakeholders.

To encourage planning for climate change, DWR recommends water agencies include consideration of water supply and demand effects related to climate change in their UWMPs. These considerations should include adaptation strategies (measures to change water supply and management infrastructure, and changes to customer use characteristics to respond to the effects of climate change) and mitigation strategies (changes implemented to reduce greenhouse gas emissions and their contribution to the mechanisms driving climate change). Inclusion of adaption and mitigation strategies for addressing climate change in UWMPs provides an opportunity to review and update responses to climate change as additional information about climate change impacts are developed.

Climate Change in California

In the United States, climate change impacts are evidenced by several large scale trends, including record breaking droughts and increased extreme weather patterns. Six to twelve global climate models are generally used to simulate long term climate patterns and develop climate change predictions. These models are run with two greenhouse gas emission scenarios, mid- to high and low. Model projections have inherent uncertainties and demonstrate large variability in future climate shifts. One consistent result from multiple global climate model simulations is increases in average temperatures for California and the Eastern Sierra (LADWP 2010). California is also expected to experience reduced precipitation as snowfall and increased precipitation as rain, increases in the intensity of extreme weather events, and rising sea levels. The initial climate change impacts are expected to be extreme weather events such as heat waves, greater intensity of wildfires, more severe droughts, and floods (Drechsler D. M. et. al. 2006 as cited in CNRA 2009).

In 2008, the State of California moved to become better informed about climate change impacts and to prepare for the resulting impacts. State agencies were asked to develop strategies to identify and plan for expected impacts of climate change. The result of these efforts is the 2009 California Climate Adaptation Strategy report (CNRA 2009). This document describes the impacts, vulnerabilities and potential measures for implementation to prepare for climate change impacts. The report recommended the development of a website to "synthesize existing climate change scenarios and climate impact research and to encourage its use in a way that is beneficial for local decision-makers." This website, www.Cal-Adapt.org, is now available to the public. Two maps from the Cal-Adapt website demonstrate the types of information provided. Figure 7-1 shows modeled changes to average temperatures across the state. The website allows the user to focus on smaller quadrangles in the state to obtain regional results. Figure 7-2 shows the Mammoth Lakes area with an overlay of modeled results for snowpack changes. The model indicates a decrease in snowpack water content of between 49% (high future emissions) to 33% (low emissions scenario). This decrease is the projected change between a baseline period of 1961 to 1990 to an end of the century period 2070-2099, using a high and low CO_2 emissions scenario. The temperature model for Mammoth shows a range of increased temperatures from +5.4 °F to 7.2 °F for the low and high emissions scenarios, respectively.

Figure 7-1 Modeled temperature changes for California from Cal-Adapt website

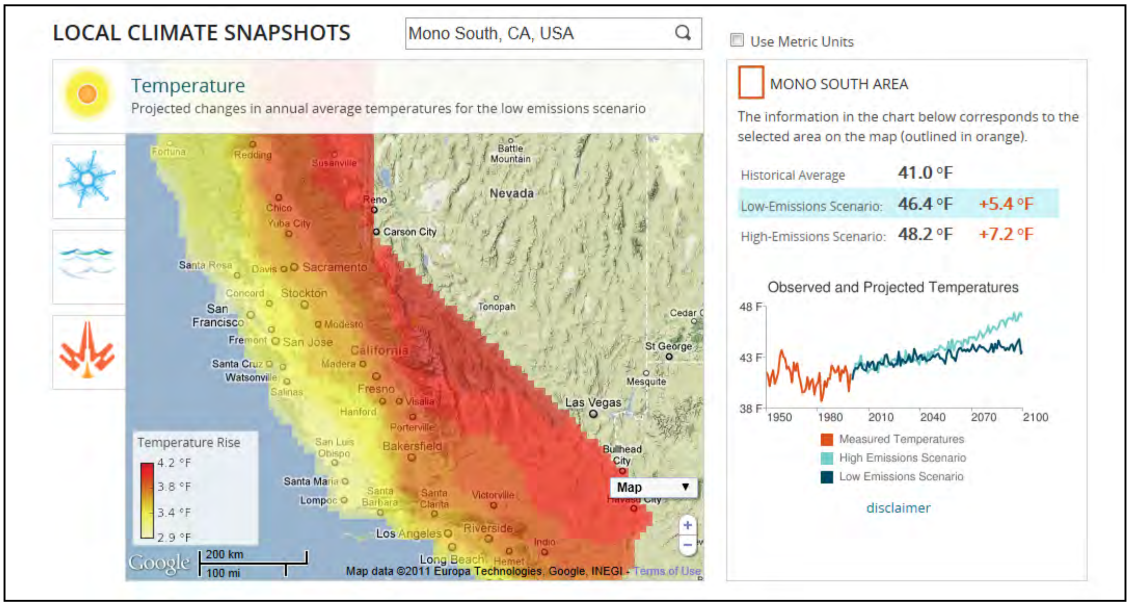
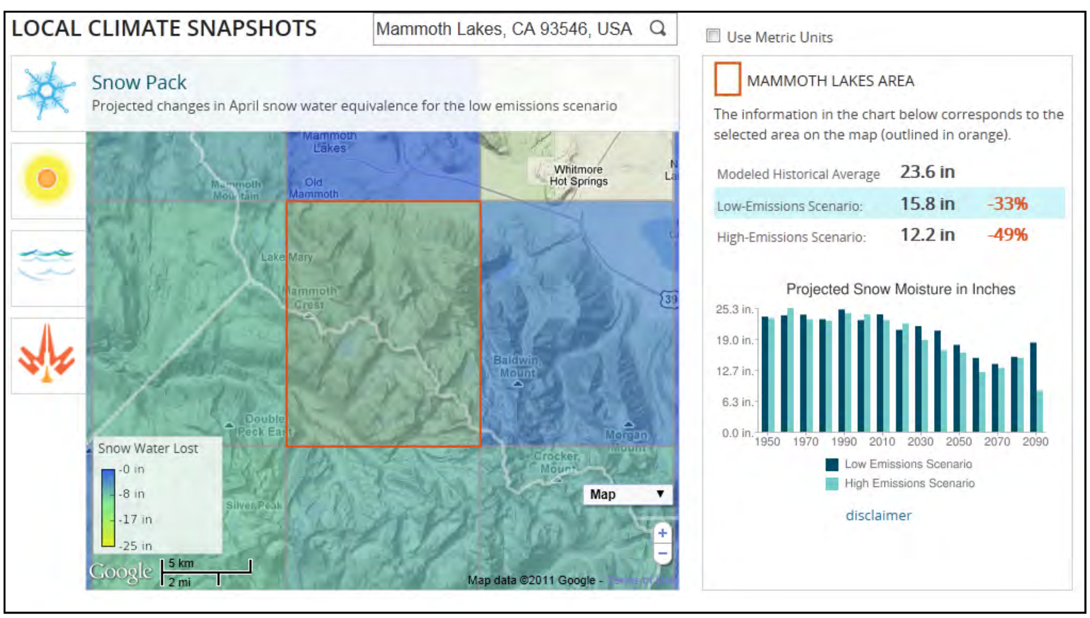


Figure 7-2 Modeled snowpack changes for Mammoth Lakes area from Cal-Adapt website



In summary, water management concerns identified in the 2009 California Climate Adaptation Strategy are:

- ◊ Higher temperatures resulting in earlier melting of snowpack, higher snowline, and overall reduction of snowpack water content. More precipitation will occur as rain instead of snow.
- ◊ Increase of intense rainfall events will occur with more frequent and/or more extensive flooding.
- ◊ Droughts are likely to become more frequent and persistent.
- ◊ Streams may experience longer low-flow conditions with higher temperatures and higher concentrations of contaminants.
- ◊ Higher temperatures in summer and over a longer growing season will increase evapotranspiration rates from plants, soils and open water surfaces.
- ◊ Non-irrigated agriculture and landscaped areas will suffer moisture deficits and irrigation will need to be increased. Even with conservation and efficiency measures, urban water use is expected to increase.
- ◊ Storms and snowmelt may coincide and produce higher winter runoff.

Although quantitative predictions for the Mammoth Lakes area of the Sierra Nevada are limited in their accuracy and subject to continued refinement, the common trends for all models show significant decreases in snowpack water content, earlier runoff of snowpack, and increased average temperatures, all of which would have severe consequences for the area's water supply under current water resource management practices, infrastructure systems, and water demand patterns.

Adaptation and Mitigation Strategies

Adaptation strategies are composed of steps the District can implement to effectively manage the impacts of climate change. Strategies should address reduced water supplies and increased flood threats. Not all climate change models agree on how precipitation will be affected, although there is agreement that increased average temperatures will cause the overall ratio of snow-to-rain to change.

Mitigation strategies are composed of steps to reduce MCWD contributions to greenhouse gas emissions. California AB32 (The Global Warming Solutions Act of 2006) established near and medium term greenhouse gas emission reduction targets, and established a mandatory greenhouse gas registry and a voluntary carbon emissions trading market.

<u>Adaptation</u>

Ten climate change adaptation strategies were proposed by DWR in a 2008 white paper on adaptation strategies for California's water. Not all of these strategies are applicable to water districts. The strategies are (reordered by relevance to the District):

1. Aggressively increase water use efficiency
2. Fully develop the potential of integrated regional water management
3. Enhance and sustain ecosystems
4. Expand water storage and conjunctive management of surface and groundwater resources
5. Preserve, upgrade and increase monitoring, data analysis and management

6. Practice and promote integrated flood management
7. Identify and fund focused climate change impacts and adaptation research and analysis
8. Provide sustainable funding for statewide and integrated regional water management
9. Fix Delta water supply, quality and ecosystem conditions
10. Plan for and adapt to sea-level rise

Water Use Efficiency – Water efficiency has been an ongoing program at the District. Efficiency projects consist of infrastructure improvements, including developing recycled water for irrigation, and customer based programs. Distribution system water losses have dropped significantly in the last ten years as a result of the water line replacement program and customer meter improvements. Losses in the system have dropped from 16% in 2004 to 5% in 2011. Customer programs have ranged from indoor and outdoor rebates to increase water efficiency to making free showerheads and faucet aerators available to residents. These programs are more fully discussed in Chapter 6, Demand Management Measures. As a result of these measures, water demand has decreased while resident and visitor population has increased.

Integrated Regional Water Management – The District has been an active participant in the Inyo-Mono Integrated Regional Water Management Group since its inception in early 2008. District staff serves on committees and participates in stakeholder meetings; in addition, the District has contributed financial assistance for staffing needs and to maintain momentum to complete the regional plan and to apply for planning and implementation grants. The District intends to remain actively involved with the group as it revisits the IRWM Plan, discusses regional impacts of climate change and continues regional outreach efforts. Unfortunately, one critical stakeholder, the City of Los Angeles Department of Water and Power (LADWP), has not joined the regional planning efforts being undertaken by the local Inyo-Mono IRWM Planning Group. The IRWM Planning Group's strategies to promote and practice integrated regional water management, especially as climate change impacts materialize, cannot be fully realized without the active participation of LADWP as the largest landowner and water user in the region.

Ecosystem Enhancement – The integrity of the Mammoth Basin ecosystem is important to the District. Compared to a highly disturbed system, a well managed ecosystem has a higher capacity to absorb precipitation and flood events, maintain higher water quality, and sustain the natural environment that draws the visitor population on which the Town's economy depends. To support environmental integrity, the District meets regularly with Town staff, the U.S. Forest Service and the IRWM Group to stay up to date and comment on proposed projects in the Basin. In a recently completed Environmental Impact Report regarding fishery by-pass flows and water management pertaining to the District's water right licenses and permits, the District, as the Lead Agency, developed the project to sustain a healthy fishery population and riparian corridor for Mammoth Creek. Completion and acceptance of the project terms by the State Water Resources Control Board will initiate a 10-year District commitment to fund trout enhancement activities on Mammoth Creek.

Expanded Storage and Conjunctive Water Management – The District does not currently have a plan to expand water storage in Lake Mary. However, based on the projections of snowpack runoff pattern changes, increased surface water storage would likely have significant benefits towards maintaining water supply reliability in the face of changing hydrologic patterns in the Mammoth Basin. The District does conjunctively manage surface and groundwater supplies now; and both are directly linked to the primary water source of natural precipitation within the Basin.

Resource Monitoring and Data Collection – Stream flows, lake levels and groundwater aquifers are monitored intensively by the District. Inflows to Lake Mary are measured daily between April 1 and

November 1 and weekly during the remaining calendar year. The level of Lake Mary, Mammoth Creek at Old Mammoth Road, and the groundwater monitoring wells are monitored continuously through SCADA or data loggers. Mammoth Creek near the crossing of highway 395 is measured daily. The District does not have any plans to increase the level of monitoring activities at this time.

The remaining half of the adaption strategies recommended by the State does not apply to the District. One program not listed that will be beneficial to counter potential increases in wildfires is an active fuel reduction program. To reduce the potential wildfire risk to the District campus and water treatment facilities, in 2009, the District consulted with the Mammoth Lakes Fire Department and the U.S. Forest Service to develop a fuel reduction plan around the campus and Lake Mary Water Treatment Plant. The campus fuel reduction plan was completed in 2009. The U.S. Forest Service already had plans in place for a future fuel reduction plan in the area of the water treatment plant. To raise the priority of this project with the Forest Service, the District provided cost reimbursements to the Forest Service to conduct resource surveys and implement the project. The project was delayed in 2010 by early snowstorms but is expected to be completed in 2011. Maintenance of the fuel reduction effort around the District campus and water treatment plant is an ongoing program.

Mitigation

The District has been reducing its greenhouse gas emissions through several programs. The most integrated mitigation action is the optimized use of surface water supply, which requires far less energy to treat and distribute than groundwater supplies, thus lowering regional energy demands and loads to greenhouse gas emitting power plants. In 2010, the District initiated construction of a 1 MW solar PV power system, expected to be operational in September 2011, to power the wastewater and recycled water treatment plant and the pumps delivering recycled water to the golf courses. The project will provide 80% of the annual electrical power needs for the facility and 30% of the District's overall electrical energy needs. It will also eliminate the emission of 1,626,000 pounds of carbon dioxide, 1,190 pounds of sulfur dioxide and 1,390 pounds of nitrous oxide to the atmosphere annually. The District also manages the timing of its pumps and water and wastewater treatment plants to run during mostly off-peak energy demand periods. Besides reducing power demand during periods of major electrical loads, this management strategy reduces energy costs. The District has also been rehabilitating all major pump loads with high efficiency motors and variable frequency drives (VFDs). The VFDs provide pumping rate control that minimizes energy use. Employees at the District also have the opportunity to reduce overall greenhouse gas emissions by participating in a van pool program. The District van is available for up to ten employees. In addition, measures to reduce water demand also reduce GHEs through energy savings from reduced groundwater pumping, water and wastewater treatment, and distribution system pumping. These water demand reduction programs are described in Chapter 6. Future actions that the District will be evaluating include the installation of micro-turbines at the largest pressure reducing valve (PRV) stations, to replace the PRVs and generate local power for feed-in to the SCE grid; pumped storage energy generation systems using existing or future reservoirs; and geothermal heating of District buildings to off-set propane and diesel heating systems.

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Appendix A — Definitions and Abbreviations

Acre-Feet – Also **ac-ft.** An acre-foot is the amount of water covering one acre with one foot of water. It is equivalent to 325,851 gallons.

Adaptation strategies – In relationship to responding to climate change, these are methods to undertake to respond to the effects of climate change.

Base daily per capita water use – The District's estimate of average gross water use, reported in gallons per capita per day and calculated over a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010. A second base period is a continuous five-year period, and is used to determine whether to 2020 per capita water use targets meets the legislation's minimum water use reduction requirement.

CASGEM – California Statewide Groundwater Elevation Monitoring. A new state requirement created by SBX7-7, establishing a statewide program to collect groundwater elevations and report the information to the public.

CDEC – The California Exchange Center. A website developed by DWR to share state hydrological data.

Compliance daily per capita water use – the gross water use during the final year of the reporting period, reported in gallons per capita per day (CWC § 10608.12 (e)).

Customer Water Demand – The amount of metered delivered water. This demand figure excludes water losses, water treatment plant process water and recycled water deliveries.

CWC – California Water Code.

District – Mammoth Community Water District.

DMM or Demand Management Measures – Water Conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies (CWC § 10611.5).

DWR – California Department of Water Resources.

Effective Population – An adjusted population measurement that accounts for both the full time resident population and the combined transient population of seasonal workers and tourism-based visitors. The community water use on a per capita basis is then calculated using the effective population. Effective population is calculated as (PAOT minus resident population)x(average annual occupancy rate for transient housing and lodging) + resident population.

GPCD – Gallons per capita day.

Gross water use – The total volume of water entering the potable water distribution system. Recycled water for irrigation and water used to backwash filters at the treatment plant is excluded. Water losses caused by meter reading errors and leaking pipes are included in this use category.

GWMP – Mammoth Community Water District's Groundwater Management Plan. The District's planning document to monitor and manage groundwater production in a sustainable manner. The plan can be accessed at www.mcwd.dst.ca.us/ProjectsReports/GWMP.

GWTP – Groundwater treatment plant.

HECW – High efficiency clothes washer. For the purposes of MCWD, a HECW has a water factor of 4.5 or less.

Interim urban water use target – the mid-point between the urban retail water supplier's base daily per capita water use and the urban retail water supplier's urban water use target for 2020 (CWC 10608.12(j)).

IRWM or Integrated Regional Water Management – A regionally based collaborative effort to manage all aspects of water resources within a region. This effort involves forming a group of water resource related stakeholders to develop an IRWM Plan.

Interim urban water use target - The midpoint between the base daily per capita water use and the urban retail water supplier's urban water use target for 2020.

LADWP – Los Angeles Department of Water and Power.

LMWTP – Lake Mary Water Treatment Plant.

Lower Income – Includes persons and families whose income does not exceed the qualifying limits for lower income families as established by Section 8 of the U.S. Housing Act of 1937. Lower income households includes very low income households as defined in Section 50105, and extremely low income households, as defined in Section 50106.

MAWA – Maximum Applied Water Allowance refers to the upper limit of annual water applied to an established landscaped area. Determining MAWA requires local evapotranspiration (ET) rates, an ET adjustment factor (adjusts for irrigation efficiency and plant water requirements), and the landscape area.

MCWD – Mammoth Community Water District.

MGD – Million gallons per day.

Mitigation strategies – In relationship to climate change, these are actions taken to reduce greenhouse gas emissions.

PAOT – People at One Time.

RWQCB – Regional Water Quality Control Board.

SCADA – Supervisory Control and Data Acquisition. This system allows District staff to access data regarding the water and wastewater systems and to control the processes as needed.

Service Area – A Mono County Local Agency Formation Commission boundary to ensure efficient community services and land use planning.

SWRCB – State Water Resources Control Board.

Target Method – One of four methods to calculate an urban retail water supplier's urban water use target pursuant to CWC 10608.20(a).

Town – The incorporated town of Mammoth Lakes.

Urban water use target - The District's targeted future daily per capita water use.

USFS – United States Forest Service.

UWMP – Urban Water Management Plan.

Urban Growth Boundary – A regional planning tool used to delineate urban growth boundaries from open space. The Town of Mammoth Lakes adopted an Urban Growth Boundary policy in 1993.

VFD – Variable frequency drive.

WW – Wastewater.

APPENDIX B NOTIFICATION OF UWMP UPDATE

Mammoth Community Water District
Post Office Box 597
1315 Meridian Blvd.
Mammoth Lakes, CA 93546
(760) 934-2596

February 9, 2011
[Addressee]

Dear Sir or Madam,

Subject: Water District Update of Urban Water Management Plan

The Mammoth Community Water District (District) will be updating its 2005 Urban Water Management Plan (UWMP) pursuant to the California Urban Water Management Planning Act (California Water Code Division 6, Part 2.6). This Act is intended to assist water suppliers with long term water resource planning to ensure adequate water supplies to meet existing and future demands for water. The District's UWMP will include a discussion of the following topics:

- A description of the District's water system;
- A description of existing and planned sources of water supply in relationship to the existing and projected water demand;
- Conservation efforts to reduce water demand;
- An assessment of reliability of future water supplies; and
- A water shortage contingency analysis.

Developing and updating the UWMP requires notification of cities and counties served by the District to solicit comments on the planning effort. Please provide any comments regarding information on land-use planning decisions that may impact water consumption over the next 20 years.

The UWMP is due in late spring of this year and will be considered for adoption following a public hearing in early July 2011. You will receive notification of the date and time of the hearing 60 days prior to its occurrence.

The MCWD 2005 Urban Water Management Plan is available on the District's website, www.mcwd.dst.ca.us

Sincerely,

Irene Yamashita
Environmental Specialist/Public Affairs

APPENDIX C NOTICE OF PUBLIC HEARING

The following notice of a public hearing was published October 21 through November 11 in The Sheet and The Mammoth Times on alternating weeks.

Mammoth Community Water District
Notice of Public Hearing Regarding the Intent to Adopt an Urban Water Management Plan
Aviso de audiencia pública sobre la intención de adopter un Urban Water Management Plan

The Mammoth Community Water District (District) will be holding a public hearing regarding a proposal to adopt the 2010 Urban Water Management Plan (UWMP) at 6:00 pm on November 17, 2011 in the conference room at the District offices located at 1315 Meridian Boulevard in Mammoth Lakes, California. This plan is an update of the 2005 UWMP.

The purpose of the plan is to ensure that the water supplier has an appropriate level of water supply reliability sufficient to meet the needs of its customers during normal, dry and multiple dry years within a 20-year planning horizon. The plan must describe water supply, water demand, and specific measures being implemented to reduce demand. A new state requirement for inclusion in the 2010 plan is to develop a compliance water use target for the District that reduces per capita water use by 20% by the year 2020. The Urban Water Management Plan must be updated and adopted every five years.

Copies of the Draft 2010 UWMP will be available for public inspection at the District office, on the District website, www.mcwd.dst.ca.us, and at the Mammoth Lakes Public Library at 400 Sierra Park Road in Mammoth Lakes by close of business day on October 25, 2011.

Comments, concerns, or suggested revisions that are relevant to the proposed plan may be submitted prior to the public hearing. Correspondence on the Draft 2010 UWMP may be transmitted by:

U.S. Mail: Mammoth Community Water District
Attn. Irene Yamashita
P.O. Box 597
Mammoth Lakes, CA 93546

Fax: (760) 934-4080
Attn: Irene Yamashita

E-mail: iyamashita@mcwd.dst.ca.us
Subject line: Draft 2010 UWMP

El Mammoth Community Water District (Distrito) llevará a cabo una audiencia pública sobre una propuesta para adoptar el Plan 2010 de Urban Water Management Plan (UWMP) a las 18:00 noviembre 17, 2011 en la oficina del distrito. El propósito del plan es asegurar que el proveedor de agua tiene un nivel adecuado de fiabilidad del suministro de agua suficiente para satisfacer las necesidades de sus clientes durante el año normal, seco, y seco por años múltiples dentro de un horizonte de planificación de 20 años. El plan debe describir el suministro de agua, la demanda de agua, y las medidas concretas se están implementando para reducir la demanda. Un requisito nuevo Estado para su inclusión en el plan de 2010 es el desarrollo de un agua de cumplimiento de los objetivos el uso para el Distrito, que reduce el uso per cápita de agua en un 20% para el año 2020. El Urban Water Management Plan debe ser actualizado y aprobado cada cinco años. Si necesita ayuda en la traducción en la audiencia pública o para revisar el plan, por favor llame al Distrito, 760/934-2596.

Copias del 2010 UWMP en ingles estará disponible para inspección pública en la oficina del distrito, en la página web del Distrito, www.mcwd.dst.ca.us, y en la Biblioteca Pública de Mammoth Lakes a 400 Sierra Park Road en Mammoth Lakes, al cierre de día laborable al siguiente día, 25 de octubre 2011.

APPENDIX D MCWD ORDINANCE FOR WATER RESTRICTIONS

WATER CODE

CHAPTER 12

Section 3.33 Water Management Requirements

A) In order to preserve our natural resources, water conservation must be practiced on a regular, year-round basis. The growing populations of California and Mammoth Lakes have historically experienced severe and extended drought periods, which have the potential to limit available water supplies. Therefore, it is critical that the public become water conscious and conserve water. The following water restriction measures apply to the District supplied water and shall be implemented by all District customers at all times.

1. Water allowed to pool, pond, or run-off of applied areas is considered a waste of water and as such is not permitted.
2. Leaks occurring on the customer side of the property line are considered a waste of water and as such are not permitted.
3. Any hose, including those used to wash vehicles, used in conjunction with the District customer's water service shall be equipped with an automatic shut-off device, except that no such shut-off device shall be required for irrigation purposes.
4. The watering of vegetation outside of any building shall not be permitted between the hours of 10:00 a.m. and 5:00 p.m. Customers with even numbered addresses are permitted to water outside vegetation only on even numbered days.
   Customers with odd numbered addresses are permitted to water outside vegetation only on odd numbered days.
5. The following are exempt from the watering days specified in A.4 above although the irrigation must occur only within the hours prescribed.
   a. Irrigation systems utilizing drip irrigation and hand-watering;
   b. Public parks and playing fields, and golf courses; and
6. Newly seeded areas and newly installed turf areas are exempt from watering days and hours for the 30-day period following installation provided that the customer in writing notifies the District in advance of planting any new seeded areas or installing any new turf areas. Exemptions for longer periods will require approval from the Board.
7. Restaurants are required to serve water to customers only upon request to minimize waste.

B) There shall be four levels of water restrictions, which may be implemented after the District Board of Directors by resolution has declared the existence or threatened existence of a drought, or other threatened or existing water shortage. The four levels are described in Section 3.33 (G) Water Restrictions. Whenever the Board has made such a declaration, and during the course of such drought, threatened drought, or other threatened or existing water shortage, the Board by motion may implement any level of restrictions as it deems necessary, and shall authorize the General Manager and District staff to enforce it. Any level of restrictions so implemented by the Board shall remain in effect until the Board by motion determines otherwise.

The purposes of implementing any or all of the restrictions are to achieve a savings in each customer's water use, and to provide sufficient water for human consumption, sanitation and fire protection.

C) Any customer may apply to the District for relief from the restrictions pertaining to the hours for outside watering if the customer can prove to the satisfaction of the Board that the requested relief will achieve comparable savings in water use as if the customer had complied with the outside watering restriction, that such relief is necessary to alleviate water pressure problems within the District's water system which would occur but for such relief, and that the customer has an automatic sprinkler system.

If such application is approved, the Board may, by appropriate action, suspend or modify the restriction from which the relief is requested as to the applying customer. Such Board decision shall be effective as of the date of the decision to approve the application and continue in effect until the restriction is removed. Any costs to the District to ensure that the customer complies with the Board decision shall be borne by that customer.

D) Whenever the Board has implemented restrictions, it may, if in the public interest, permit the irrigation of the Mammoth High School and Mammoth Elementary School playing fields and the Town's Shady Rest Park on days and during times fixed by motion of the Board.

E) Whenever the Board declares the existence or threatened existence of a drought, or other threatened or existing water shortage, the following water savings programs shall be in effect and shall be implemented by the General Manager and District staff:

1. Restaurants are requested not to serve water to a customer unless the customer specifically requests it.

2. Managers of motel units and condominium units used for temporary occupancy are requested to post announcements encouraging their guests not to waste water.

3. Water users exhibiting a high demand are to be contacted and assisted in developing methods for reducing their usage.

F) The Lake Mary surface level – trigger points are established as follows:

Date	Feet below measuring point
August 1	0.3
August 15	1.15
September 1	2.25
September 15	3.0

If the level of Lake Mary, after June 1 but before the date listed, is at or below an established trigger point, District customers will be required to conserve additional water especially during the critical summer months. The methods for additional conservation may vary and could include implementation of the next higher level of restrictions until Level 4 is reached.

G) The Board may enact the following measures at any time by motion after declaring the existence or threatened existence of a drought, or other threatened or existing water shortage. The following measures shall be in effect during all levels of restrictions. The water savings programs described in Section 3.33 (E) shall remain in effect during all levels of water restrictions.

<u>During all four levels of restrictions, the following shall be enforced:</u>

a. No hard surfaces including sidewalks, driveways, parking areas or decks may be washed or hosed down with water supplied through the District's water system unless required by health or safety requirements.
b. No washing of motor vehicles, motorbikes, boats, or other vehicles with hoses is permitted with District water supplies through the District's water system, except with hoses designed with an automatic shut-off device or at facilities designated on District billing records as a commercial vehicle wash.
c. Water from the District's water system used to irrigate newly planted lawn areas (whether by sod, seed, hydro mulch, or other means) is considered a waste of water and as such is not allowed. Newly planted lawn areas are those planted after the District institutes Level 1 or higher water restrictions in any year.
d. No more than five percent of turf area may be replaced or reseeded. Advance notice to and permission by the District is required.
e. Water from the District's water system allowed to pool, pond, or run-off of applied areas is considered a waste of water and as such is not permitted.
f. Leaks occurring on the customer side of each meter in the District's water system are considered a waste of water and as such are not permitted.

In addition to the above restrictions, the following measures shall be enforced:

<u>Level 1 Water Restrictions</u>

a. District water supplied through the District's water sytem, which is used for watering vegetation outside of any building shall not be permitted between the hours of 10:00 a.m. and 5:00 p.m. Water used for watering vegetation outside at even numbered addresses is permitted only on Monday, Thursday, and Saturday. Water used for watering vegetation outside at odd numbered addresses is permitted only on Tuesday, Friday, and Sunday. No watering is allowed on Wednesday. For those irrigated areas that do not have an address, the District will notify the customers of their watering days, which shall be three days a week. Irrigation systems utilizing drip irrigation and/or use of hand watering are exempt from the watering days detailed above although these provisions must continue to irrigate within the hours prescribed.
b. Water used for general construction and maintenance activities, including dust control, compaction and concrete curing may come from one of two sources. Such customers have the option to utilize either a fire hydrant meter, or reclaimed water, at no cost, from the District's wastewater treatment plant. The use of hydrant-metered water will be subject to inspection and possible termination if any pooling, ponding, or other waste of water occurs.

<u>Level 2 Water Restrictions</u>

a. The watering schedule as defined in section (a) of Level 1 Water Restrictions shall remain in effect. However, watering vegetation outside of any building from the District's water system shall not be permitted between the hours of 10:00 a.m. and 8:00 p.m.
b. Water from the District's water system used for general construction and maintenance activities, including dust control, compaction and concrete curing, is considered a waste of water and as such is not permitted. Reclaimed water from the District's wastewater treatment plant must be utilized for these purposes.

<u>Level 3 Water Restrictions</u>

a. The watering schedule as defined in section (a) of Level 1 Water Restrictions shall remain in effect. However, watering vegetation outside of any building from the District's water system shall not be permitted between the hours of 10:00 a.m. and 12:00 a.m.

b. Water from the District’s water system used for general construction and maintenance activities, including dust control, compaction and concrete curing, is considered a waste of water and as such is not permitted. Reclaimed water from the District‘s wastewater treatment plant must be utilized for these purposes.
c. Washing of motor vehicles, motorbikes, boats, or other vehicles from the District‘s water system is prohibited.

Level 4 Water Restrictions
a. Water from the District‘s water system used for watering vegetation outside is not allowed.
b. Washing of motor vehicles, motorbikes, boats, or other vehicles from the District‘s water system is prohibited.
b. Water from the District‘s water system used for general construction and maintenance activities, including dust control, compaction and concrete curing, is considered a waste of water and as such is not permitted. Reclaimed water from the District‘s wastewater treatment plant must be utilized for these purposes.

Golf Course, Park, and Playing Field Water Restrictions
Golf courses, parks, and playing fields shall be subject to only the following water restrictions for irrigation:

a. At Level 1 water restrictions, the owners of golf courses, parks, and playing fields shall submit a water conservation plan to the District that describes existing and planned methods for reducing water use. This water conservation plan shall be approved by the General Manager. Golf courses, parks, and playing fields utilizing recycled water for irrigation are exempt from this provision.
b. At Level 2 water restrictions, the owners of golf courses, parks, and playing fields utilizing the District‘s water system must submit a water conservation plan to the District that describes methods for reducing water use above Level 1. This water conservation plan shall be approved by the General Manager. Golf courses, parks, and playing fields utilizing recycled water for irrigation are exempt from this provision.
b. At Level 3 water restrictions, owners of golf courses, parks, and playing fields utilizing the District‘s water system must submit a water conservation plan to the District that describes methods for reducing water use above Level 2. This water conservation plan shall be approved by the General Manager. Golf courses, parks, and playing fields utilizing recycled water for irrigation are exempt from this provision.
c. At Level 4 water restrictions, owners of golf courses, parks, and playing fields utilizing the District‘s water system must submit a water conservation plan to the District that describes methods for reducing water use above Level 3. This water conservation plan shall be approved by the General Manager. Golf courses, parks, and playing fields utilizing recycled water for irrigation are exempt from this provision.
d. Subsections c and d under subsection G shall not apply to golf courses, parks, and playing fields.

H) The water restrictions set forth in subsection g shall not apply to the delivery of recycled water for any purpose.

Home Survey and Retrofits
Section 1 – Home Check-up

1. What type of home do you live in?
    a. Single family home
    b. Multi-family (2-4)
    c. Multi-family (5-20)
    d. Multi-family (21+ units)
2. Was your home built before 1992?
    a. Yes
    b. No
3. Is your home owned or rented?
4. How many kids live in your home?
5. How many adults live in your home?
6. What is the main source of heat in your home?
    a. Natural Gas Furnace
    b. Electric Heater
    c. Propane
    d. Wood
    e. Heating oil
    f. Other
7. Does your home have a programmable thermostat?
8. Does your home have a dishwasher?
9. How many half bathrooms are in your home?
10. How many full bathrooms are in your home?
11. How many toilets are in your home
12. How is your water heated?
13. How many incandescent bulbs (non CFLs) are in your home?

Section II – Home Activities

1. What is the flow rate of your old showerhead?
2. What is the flow rate of your old bathroom aerator?
3. What is the flow rate of your old kitchen aerator?
4. Did you install the high efficiency showerhead?
5. If you answered yes to question 4, what is the flow rate of your new showerhead?
6. Was your toilet leaking?
7. Did your family install the bathroom aerator?
8. If you answered yet to question 7, what is the flow rate of your new bathroom aerator?
9. Did your family install the kitchen aerator?
10. If you answered yes to question 9, what is the flow rate of your new kitchen aerator?
11. Did your home have any water leaks?
12. Did your family change the way they use water outdoors?
13. Did your family lower your water heater settings?
14. Did your family raise the temperature on your refrigerator?
15. Did your family turn down the thermostat in winter for heating?
16. Did your family turn up the thermostat in summer for cooling?
17. Did you install the FilterTone® Alarm?
18. What was the wattage of the incandescent bulb you replaced?
19. Did your family install the Compact Fluorescent Lamp (CFL)?
20. Did you work with your family on this program?
21. Did your family change the way they use water?
22. Did your family change the way they use energy?
23. How would you rate the LivingWise program?