

## **Section 4 Conservation and Demand Management**

### **4.0 Conservation and Demand Management**

#### **4.1 Introduction**

Water conservation is defined as any action taken to reduce water consumption or loss of available supply for use, such as leaks in the production and delivery system prior to the customer's meter. Demand management refers to a subset of conservation methods a water supplier may undertake to reduce demand on the water system. The Urban Water Management Planning Act requires a description of 14 specified conservation and demand management measures that are described in the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), known as the Best Management Practices or BMPs. For those measures not being currently implemented or planned for implementation, an evaluation of those measures and a comparison against expanded or additional water supplies must be made. Preference in the act is given to those measures offering lower incremental costs than expanded or additional supplies. The act also requires that economic and non-economic factors, including environmental, social, health, customer impact and technological, be considered in the evaluation. However no specific guidance on evaluation methodology is given.

#### **4.2 Summary of Measures Currently Under Implementation**

MCWD signed the MOU in 1991 and began implementing water conservation and demand management practices as part of its overall integrated water management program. **Table 4-1** summarizes MCWD's water conservation program and the status of implementation of each BMP.

**Table 4-1  
Summary of Conservation and Demand Management Actions**

Measure	Implementation Status		
	Currently Implemented	Planned Actions	Recommendation
BMP 1 - Water Survey Programs for Residential Water Customers	Yes; on-requested basis	MCWD will contact highest 20% users	
BMP 2 – Residential Plumbing Retrofits	Yes		Link to BMPs 1 & 14; expand public awareness
BMP 3 –System Water Audits, Leak Detection, Repair	Yes	Ord system audit upon completion of PRV replacement	Further analysis of system
BMP 4 – Metering with Commodity Rates	Yes	Evolution of Rate Structure	Add additional tiers; link to BMPs 1 & 5
BMP 5 –Large Landscape Conservation	Partial through site visits and education handouts	Offer Audits and water budgets	Expand program
BMP 6 - High-Efficiency Washing Machine Financial Incentives	Yes	Proposal to require in new construction	
BMP 7 – Public Information	Yes		Address under-represented communities
BMP 8 – School Education	Yes		
BMP 9 – Commercial Industrial and Institutional Water Conservation	Yes		Setting up water use budgets for customers
BMP 10 - Wholesale Agency Assistance ( <i>not applicable to District</i> )	—	—	—
BMP 11 - Conservation Pricing	Yes		Conduct site surveys in conjunction with BMP 1
BMP 12 - Conservation Coordinator	Yes		Adding staff – landscape expert
BMP 13 - Water Waste Prohibition	Yes		Expand public information
BMP 14 – Residential Ultra Low Flow Toilet Replacement	Yes		Set up database to track ULFT replacements.

### **4.3 Description and Status of Demand Management Measures**

The Urban Water Management Planning Act under California Water Code Section 10631 (f)(1) requires a description of a water supplier's water demand management measures that are being implemented or are scheduled for implementation. It also requires an evaluation of water demand management measures specified in the act that are not currently being implemented or scheduled for implementation. As noted above, preference is given to implementing measures that offer lower incremental costs than expanded or additional water supplies.

MCWD is continually seeking to improve its conservation program and features that are cost-effective or otherwise are a wise investment in resource management. To this end, MCWD secured a \$100,000 water conservation feasibility study grant from the State Department of Water Resources under Proposition 13, the Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection Act. This study, known as the *Urban Water Conservation Feasibility Study* was completed in 2004.

#### **BMP 1 - Water Survey Programs for Single-Family and Multi-Family Residential Customers.**

Program Description: These programs generally involve sending a qualified water auditor to customer locations to audit water use. The survey includes both indoor and outdoor components. The indoor component includes checks for leaks, including toilets, faucets and meters; checking showerhead, toilet, aerator flow rates and offering/suggesting replacement of high-flow devices. The outdoor survey includes checks of the irrigation system and control timers, and review or development of a customer's irrigation schedule. MCWD requires a survey to be conducted upon transfer of property ownership. MCWD provides residential customer surveys on an "as-requested" basis, in addition to directly contacting the top 20 percent of residential users and offering a survey. Any customer who is concerned about high water bills can request an on-site survey.

Evaluation of Economic and Noneconomic Factors: Surveys of this type have become common among agencies with demand management programs. Research on cost-effectiveness has shown that the long-term savings from these programs is much less than originally anticipated. Savings achieved through these measures decay over time due to equipment failure, failure of the customer to consistently follow recommendations, and customer turnover. Savings decay rates average about 15 percent per year. Single-family surveys can be expected to initially save 15 gallons per day (gpd) per survey and multi-family about 6.5 gpd. Surveys are estimated to cost \$125 for a single-family residence and \$330 per multi-family residences covering an average of 10 units per survey (\$33/unit) (CUWA 2000). Agencies generally target high use accounts for surveys and, while customers who feel their water use is unexplainably high often opt for surveys, many customers are reluctant to avail themselves of a survey.

Cost-Benefit Analysis Results: A cost-benefit analysis is not required for the BMPs MCWD is implementing. However, since MCWD has just begun implementing this BMP, an analysis has been performed. Utilizing the average costs as noted above and the California Urban Water Conservation Council's BMP cost-benefit evaluation tool for BMP 1, this BMP is cost effective from MCWD's perspective with a benefit/cost ratio of 1.79, compared against an avoided cost of water for desalination of \$1,600 per acre-foot<sup>1</sup>. Additional benefits will accrue to the MRWPCA in the form of reduced wastewater treatment expenses. Additionally, since water audits typically result in savings related to hot water use, customer energy savings can be substantial. Based on 28-40 percent of metered water used for hot water in single-family and multi-family homes, the benefit cost ratio for customers is over 11 to 1.

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<sup>1</sup> Appendix G, Regional Water Augmentation Project Environmental Impact Report, 2004.

Recommendation, Implementation and Schedule: MCWD plans to change its implementation of this BMP by contacting residences, with the goal of performing 200 audits per year.

## **BMP 2 - Residential Plumbing Retrofit**

Program Description: Single and multi-family residences constructed prior to 1992 are to be identified and retrofitted with high-efficiency water fixtures, such as showerheads, faucets and toilets, if needed. The BMP also recommends an ordinance requiring low-flow fixtures in new construction and retrofits.

MCWD currently provides low-flow showerheads and installation assistance. An ordinance that requires low-flow showerheads in both new and retrofit construction was enacted in 1993. MCWD requires all residences to be retrofitted upon resale, with MCWD providing inspection for this requirement.

Economic and Noneconomic Factors: Offering or installing retrofit kits to pre-1992 homes has been a common program among water agencies with active conservation programs. Issues that must be considered are relatively high natural replacement levels for fixtures such as showerheads, and recognition that replacements heads already meet the federal 2.5 gpm standard. Direct installation programs have a higher implementation rate than drop off – frequently called “hang and pray” -- distribution methods. However, direct installation programs are more costly and bring insurance and liability issues. It is estimated that these “hang and pray” types of retrofit programs provide average savings of 5.65 gpd per installation with a life expectancy of 10 years, even assuming that just over 50 percent of the kits are installed. Costs are relatively low at \$13 per kit distributed. All other factors being equal, retrofit programs, which reduce demands, are environmentally preferable over development of additional supplies or delivery of more water.

Cost-Benefit Analysis Results: Not required as this program is being implemented.

Recommendation, Implementation and Schedule: MCWD can further implementation of this BMP by associating it with other BMPs, particularly BMPs 1 and 3. This would reduce costs and increase participation. Increased outreach to expand public awareness of the program is also recommended.

### **BMP 3 - System Water Audits, Leak Detection and Repair**

Program Description: The BMP requires conducting annual audits of the water distribution system to detect and correct any abnormalities, including leaks, faulty meters and unauthorized water users. A prescreening audit that covers metered water sales, other verifiable uses and total supply to the distribution system is used to determine the need for a full-scale audit. A full-scale audit is indicated if the uses divided by the supply is less than 0.9 (indicating a greater than 10 percent loss rate). In addition to the audits, water suppliers should notify the customer when it is believed that the leak may exist on the customer's side of the meter, and help the customer find and fix the leak. MCWD performs an annual prescreening system audit and responds to leaks or known trouble spots to make repairs and replacements as needed.

Economic and Noneconomic Factors: Prescreening audits comparing gross system production vs. sales is an accepted industry practice generally done on an annual basis. If results from this prescreening note excessive unaccounted water then a more detailed audit focusing on loss possibilities (system leakage, undermetering, illegal connections, fire flow water, and system flushing, etc.) is conducted. No significant social, environmental or technological factors are relevant for this activity.

Cost-Benefit Analysis Results: Not required as this program is being implemented.

Recommendation, Implementation and Schedule: The Marina water system is audited annually. MCWD is in the process of replacing pressure regulatory valves throughout the Ord Community distribution system. This replacement project is expected to reduce leaks throughout the system. Upon completion of these replacements, a prescreening audit of the Ord Community distribution system will be conducted to determine if a detailed audit is required.

#### **BMP 4 - Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections**

Program Description: This BMP requires metering of all water services. Currently, the Marina service area is fully metered. The Ord Community is not fully metered, however which results in 39 percent of MCWD deliveries going unmetered. As part of redevelopment of the former Fort Ord, and in compliance with state law, MCWD is proceeding toward full metering of its deliveries. Water conservation is also promoted through a tiered pricing system. Based on a water use budget, customers know the amount of water use required by their property. MCWD has a two and a three-tiered residential pricing system in the Central Marina and Ord Community systems, respectively.

Economic and Noneconomic Factors: Meters are now required as a matter of state law and urban water providers such as the MCWD have until January of 2025 to be fully metered. Based on the pace of redevelopment and MCWD's capital improvement plans, MCWD expects to have metering completed well prior to this date.

Cost Benefit Analysis Results: Not required as this program is being implemented.

Recommendation, Implementation and Schedule: MCWD may consider additional consumption price tiers in future ratemaking. Schedules for metering

of Ord service area connections are driven by development proposals and individual negotiations with current uses not scheduled for redevelopment.

### **BMP 5 - Large Landscape Conservation Programs and Incentives**

Program Description: The purpose of this BMP is to provide a customer with a determination of how much water should be used to irrigate the land appropriately while maintaining conservation practices. The BMP is oriented toward three groups of customers who irrigate landscapes: those with dedicated irrigation meters, those with meters who serve a mix of irrigation and non-landscape uses, and new accounts with irrigation use. MCWD currently provides irrigation customers with education handouts and some site visits but has not systematically addressed this BMP to date.

Economic and Noneconomic Factors: The general public often views large landscapes as water conservation targets. Generally, however, and especially where dedicated irrigation meters exist, large landscapes are more efficiently managed than landscapes that are part of a mixed use setting. Large landscapes usually benefit from professional management and the owner's recognition of a direct correlation between the water bill and irrigation practices, which creates a financial incentive for conservation. Opportunity exists to improve irrigation efficiency. The California Irrigation Management Information System (CIMIS) operated by the California Department of Water Resources provides real-time evapotranspiration (ET) and other climatic data available on the Internet to help manage irrigation demands. CIMIS data can be combined with water budgets for each landscape to allow irrigation managers to apply only the amount of water needed. Newer irrigation controllers can either be programmed to modify irrigation schedules based on programmable ET factors, or query CIMIS stations for real-time data and be linked to soil moisture sensors and rain shut-off devices that can precisely provide only the amount of irrigation needed. These devices have been shown to produce from 25-45 percent in landscape water savings over traditional irrigation timers, which are often not reset to follow annual climate

changes <sup>2</sup>. Savings also accrue from the system's ability to automatically shut off irrigation zones when lines or sprinkler heads break or when there is significant rain. Such systems can also provide commercial or institutional customers with tremendous labor savings as they do not require human intervention to reset irrigation schedules to follow climate patterns or adjust for variations in precipitation. Savings can also accrue from lower fertilizer cost as off site runoff can be eliminated.

Cost-Benefit Analysis Results: A variety of program options exist for MCWD relative to this BMP. MCWD's Water Conservation Feasibility Study recommended consideration of developing a direct installation program whereby MCWD would purchase and install ET based controllers for the 200 large public accounts consisting primarily of schools and parks. It also recommended development of a rebate program where customers would receive a \$50 rebate for replacing standard irrigation controllers and/or installing ET based controllers. It was estimated that this rebate program could produce water savings at an initial cost of \$641 per acre-foot in the first year down to \$108 per acre-foot in the tenth year. The study also recommended adoption of an ordinance requiring ET based controllers for all new construction and residential remodels. The study did not provide a cost benefit to perform the direct installation program but an example analysis is provided here. Rather than stand-alone ET based controllers for each site, this analysis assumes use of a centralized ET controller system where irrigation controls at remote locations are linked to a centralized personal computer running system control software. These systems are readily available and offer hard-wire phone or wireless interfaces. A centralized location can handle over a hundred sites if necessary and each site is individually programmed. Normal operation only requires an operator to respond to exceptions, such as a system malfunction at a site. When such an exception is noted, these systems can often pinpoint the type of trouble, thus directing labor directly to the problem without time-consuming troubleshooting inherent in

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<sup>2</sup> California Urban Water Conservation Council, July 2003

manual systems. This example takes the nine largest irrigation demand nodes in the City of Marina as shown in **Table 4-2** and assumes that centralized irrigation control can effect a 30% savings, within the range of 25-45 percent cited in literature.

**Table 4-2**  
**Example Centralized ET Controller Demonstration Program**

Irrigation Site/Customer	Existing Demand AF/Yr
Locke Paddon Park/Pond	24
City Park	18
Marina Landing Shopping	8
Tate Park	15
Del Monte Blvd. Medians	5
Olson School	17
Monterey Dunes Development	67
Reservation Road Medians	5
Monterey Estates Park	10
<b>Total Demand</b>	<b>169</b>

Source: Regional Urban Recycled Water Distribution Project

This analysis also accounts for cost of installation of the equipment, labor costs (installation and programming) and labor savings (eliminated manual clock resets, system malfunction and manual rain shut-offs) and provides a \$1,000 allowance for each site to upgrade irrigation system equipment capitalized over ten years. Such upgrades are often necessary because efficient irrigation with an ET based controller depends on an efficiently designed irrigation system and proper irrigation distribution. If a system is poorly designed or unmaintained, implementation of ET based controllers can result in damaged landscapes as areas where the irrigation distribution is inefficient will tend to be under-irrigated.

Annualized costs for such a system are estimated at about \$7,200 per year with savings based upon the avoided cost of additional desalinated water of \$82,000 per year results in a benefit cost ratio of over 11 to 1, and is therefore highly cost-effective. With this ratio, even if the costs to upgrade or repair irrigation systems to benefit from ET controllers are ten-fold higher (\$10,000 vs. \$1,000 per site) it would still have a positive benefit cost ratio of over 5 to 1.

Recommendation, Implementation and Schedule: Expansion of this program is highly recommended as a large amount of water could be conserved through better management of irrigation systems, particularly for landscapes with dedicated irrigation meters. It is recommended that the MCWD identify a group of irrigation customers (such as Marina parks and/or schools) to participate in a centralized irrigation control system demonstration program where multiple sites are fitted to be controlled through one location, either run by the MCWD or one of the partners. The program need not include all large landscapes, but rather the logical and manageable subset that contains willing participants. Following evaluation to verify and refine water and labor savings, this program could be expanded to more dedicated landscapes either on a centralized or stand-alone ET controller basis.<sup>3</sup>

Consistent with the Urban Water Conservation Feasibility Study, the MCWD should further evaluate developing an ET controller rebate program for mixed meter users, providing an incentive for upgrading standard controllers of individual retail customers. This should be coupled with provision of ET based water budgets for those who retain standard automatic controllers to provide guidance on periodic adjustments these users should make to maximize irrigation efficiency, part of the basic BMP requirement. Finally, the MCWD should adopt a requirement that individual ET based irrigation controllers should

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<sup>3</sup> The City of San Diego Schools has recently installed centralized irrigation control for 70 of its school sites and expects to save \$156,000 on water costs annually.

be required for all new single-family homes and centralized controls required for multi-family developments.

### **BMP 6 - High-Efficiency Washing Machine Rebate Programs**

Program Description: Customers are provided with incentives to replace old washing machines with newer, more efficient models. MCWD provides a \$50 rebate to customers. In July 2002 the program was expanded to the Ord Community Service area. The goal is an annual average of 60 conversions and to have all new residential construction include high efficiency washing machines in each unit.

Economic and Noneconomic Factors: The incremental cost of high efficiency washers (front loading, horizontal axis) has been about \$400 per unit over that of traditional, top load models. Cost differentials are coming down over time. Typical customers can save between \$43 to \$106 per year in energy, water and waste water costs. Water savings range from 14 gallons per day in small single-family households up to over 100 gallons per day per unit in multi-family housing applications.<sup>4</sup>

Cost-Benefit Analysis Results: Not required as this BMP is under implementation.

Recommendation, Implementation and Schedule: MCWD should consider developing a separate rebate program with higher incentive levels for multi-family units and mandating the provision of high-efficiency washers in new multi-family construction.

### **BMP 7 - Public Information Programs**

Program Description: MCWD provides water conservation information to the public through a wide variety of public outreach tools: information booths at conferences, fairs and community events; flyers, newsletters and billing inserts;

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<sup>4</sup> California Urban Water Conservation Council, 2003

video; website; and printed material to the media. MCWD has also partnered with the Water Awareness Committee of Monterey and the Monterey Peninsula Water Management District to develop and distribute outreach material.

Economic and Noneconomic Factors: This BMP cannot be reduced to quantitative terms but is considered an essential complement to other BMP measures and developing a water conservation consciousness and ethic among urban water users such that it is considered an essential practice.

Cost-Benefit Analysis Results: Not applicable.

Recommendation, Implementation and Schedule: The public information program could be expanded through outreach to under-represented communities and by providing current program information in the major languages found within MCWD.

### **BMP 8 - School Education Programs**

Program Description: This BMP is intended to promote water conservation within the local schools. MCWD has a part-time education consultant that assists in the development of the educational programs. Presentations and information – which include program handouts, Internet links and classroom activities – are provided directly to teachers for their use in the classroom. The program has been fully implemented in Marina and the Ord Community Service area. A water-art program provides instruction in the importance of water conservation to all fourth grade classes in the service areas.

Economic and Noneconomic Factors: Like public information programs, school education programs are viewed as a basic element of a comprehensive urban conservation program.

Cost-Benefit Analysis Results: Not applicable.

Recommendation, Implementation and Schedule: Additional activities could be incorporated into the program. An example would be the establishment of an organic garden/outdoor classroom to teach students effective water management strategies as well as environmentally sound horticultural practices. The MCWD is developing water conserving (xeriscape) gardens which can provide a venue for such instruction.

### **BMP 9 - Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts**

Program Description: Under this BMP, conservation programs are to be tailored to the needs of CII customers' indoor and outdoor water uses. CII accounts often use water in ways and amounts substantially different than residential users. A water use survey is conducted and the customer is provided with an evaluation of water using apparatus and processes and recommended efficiency measures, expected payback period and available agency incentives. These customers are contacted within a year of the survey to discuss water use and water saving improvements based on the recommendations of the survey.

Economic and Noneconomic Factors: Commercial and industrial audits in other regions have found most of the savings opportunity in the replacement of high flow toilets, as these toilets receive relatively high usage rates. The literature reveals that surveys for this sector have resulted in about 1.27 AF of savings per year against an average cost of \$1,200 per survey. Industrial surveys are more complicated than commercial surveys.

Cost-Benefit Analysis Results: Based upon the averages above and avoided costs for new supply to MCWD, typical CII surveys would have a benefit cost ratio of just over 5 to 1, assuming savings decay over a five year span.

Recommendation, Implementation and Schedule: MCWD is working to expand this program to its full potential. MCWD is performing site surveys of CII accounts and setting up water use budgets for the customers. CII accounts are eligible for District programs/rebates relating to plumbing retrofits and ULFT replacements. However, the low number of CII accounts limits estimates of District water savings.

### **BMP 11 - Conservation Pricing**

Program Description: Water conservation is encouraged through a pricing system that rewards customers who use less water with financial incentives, while high water users are charged a higher rate. MCWD is implementing this BMP through its two and three-tiered pricing system. The program rewards customers with lower use, but may not address conservation as effectively as possible.

Economic and Noneconomic Factors: Conservation pricing is often cited as a way to use market mechanisms to provide incentives for conservation. Water consumption, however, has a relatively inelastic demand relative to price, meaning as unit prices go up, unit demand does not correspond in a 1:1 linear fashion. This is due to a variety of factors. Only a portion of water use for a residence can be considered discretionary, generally a portion of landscape irrigation, excess showering periods and the like. Most use is simply a basic function of existence. At the point discretionary use has been wrung out of the system due to marginal costs of water, another rate tier is unlikely to reap much conservation savings. Further, such tiers can be considered discriminatory against larger families, which could have a low per capita use but a large individual consumption relative to another household. Additionally, California's Proposition 218 requires water rates to be developed on a cost of service basis. In other words, the top tier of the water rate must have a reasonable relationship to the avoided cost of service for marginal supply. Since MCWD is

contemplating relatively expensive marginal supplies to meet new demands, meeting this test is not a concern at this point.

Cost-Benefit Analysis Results: Not required as this BMP is under implementation.

Recommendation, Implementation and Schedule: To better implement this program, site surveys could be conducted in conjunction with BMP 1 to establish site specific water demands that could be used to develop a more refined rate structure, with additional tiers.

### **BMP 12 - Conservation Coordinator**

Program Description: A water agency employee is assigned responsibility for oversight and implementation of water conservation practices. MCWD's water conservation coordinator works closely with local, regional and state boards to implement the BMPs that are effective for the community as well as the neighboring water districts to foster an effective working relationship and provide continuity among the programs.

Economic and Noneconomic Factors: Not applicable.

Cost-Benefit Analysis Results: Not required as this BMP is under implementation.

Recommendation, Implementation and Schedule: MCWD has recently hired additional staff to help implement conservation programs in addition to the current conservation coordinator.

### **BMP 13 - Water Waste Prohibition**

Program Description: In 1993 MCWD enacted an ordinance addressing water waste and establishing limitations on how and when watering/irrigation can occur, and how water can be used outside.

Economic and Noneconomic Factors: Not applicable.

Cost-Benefit Analysis Results: Not required as this BMP is under implementation.

Recommendation, Implementation and Schedule: The implementation of this BMP could be expanded through additional public information.

#### **BMP 14 - Residential Ultra-Low Flow Toilet (ULFT) Replacement Programs**

Program Description: MCWD's toilet replacement program offers a \$50 rebate for each toilet replaced in a residence. Over 3,000 toilets have been replaced under the program. Under the MCWD water waste ordinance, a residence must be completely retrofitted with ULFTs at the time of sale, and all new construction must install ULFTs. This program includes CII customers.

Economic and Noneconomic Factors: ULFT replacement programs have generally been the most successful of demand management measures statewide. A number of issues exist, however. Program cost-effectiveness varies by program design. Retrofits on resale ordinances are very inexpensive from MCWD's perspective as costs are shifted to the home buyers/sellers. This ordinance tends to be very unpopular with the real estate community and home sellers, however, as it can impede a sale due to timing and often requires replacing floor coverings around the toilet. Direct distribution programs have the highest cost-effectiveness but don't necessarily reach all potential customers. Rebate programs are generally effective but have a higher incidence of "free ridership" where some customers would be replacing a toilet anyway and receive the rebate. Regardless, savings for these programs have been shown to be 35-45 gallon per replacement per day. Higher savings are found in higher density housing and commercial/industrial settings. Savings also persist as toilet life is generally about 25 years.

Given that the revised plumbing code allows for only 1.6 gal/flush toilet models to be purchased, it should be recognized that natural turnover in the range of 3-4 percent per year will eventually replace all of the older, high water use models. ULFT incentive programs accelerate these savings and can help defer or eliminate other capital investment needs.

Customer acceptance issues often are raised with these programs. Complaints about the function of early models of ULFTs, bowl cleanliness, double flushing, etc., have been raised as reasons to avoid such programs. With the experience manufacturers have gained in recent years, however, such complaints have diminished and data shows that these toilets work as well or better than the older models

Cost-Benefit Analysis Results: Not required as this BMP is under implementation.

Recommendation, Implementation and Schedule: To assist with reporting requirements and grant applications, a database to track ULFT replacements could be developed. The database could show regions within MCWD where replacements are low, and thereby guide targeted public information to garner more retrofits.

#### **4.4 Funding and Legal Authority**

MCWD is committed to funding all cost-effective conservation programs. Additionally, MCWD will assess noneconomic issues in addressing its conservation program, such as direct and indirect environmental and economic effects of conservation on entities other than MCWD and its customers. As a county water district, MCWD has the legal authority to implement conservation programs of its choosing.

#### **4.5 Existing Conservation Savings, Savings Measurement, and Effects on Ability to Further Reduce Demand**

MCWD has been active in promoting conservation and taking action to assure its implementation. Review of per capita demands for water indicates these efforts and resulting behavior of MCWD customers is having an effect. Per capita demand rates since 1989 have been on a nearly consistent decline from a rate of 0.155 to today's rate of about 0.113, or about a 27 percent decline. Based upon an estimated population of 25,101, annual water savings are about 1,054 acre-feet.

The MCWD will continue to track per capita demand rates to assess overall savings, in addition to comparing water consumption of new residential development against households which have been retrofitted with conservation devices and unretrofitted households. The MCWD may attempt to track savings from individual conservation BMPs if warranted but this is difficult and expensive to separate the effect of one tactic from another over time without large control groups, submetering of numerous accounts and reasonably long time spans.

Conservation reductions have come primarily from improvements in water use technologies (low flow devices, irrigation controllers, etc.) and some from behavioral changes driven by increasing water rates and public education programs. These long-term savings reduce the ability of the MCWD to call upon water use reductions if necessary due to curtailment of supply from groundwater. This is known as demand hardening. Since long term improvements in efficiency have been effected, additional short-term savings would be harder to produce and would necessarily come from cutbacks in use that could have more pronounced economic and aesthetic effects, especially if shortages were pronounced. The MCWD recognizes this vulnerability and is therefore committed to acquiring additional supplies to insulate the community from such effects.