

4. East Bay Municipal Utility District serves a population of approximately 1.34 M under its various water rights.

5. (i) Amounts directly diverted and collected to storage is the sum of natural runoff to Briones Reservoir plus precipitation at Briones Reservoir plus Direct Diversion at San Pablo Reservoir minus releases from Briones Reservoir.

(ii) Local waters are given priority over Mokelumne supplies when calculating direct diversion, diversion to storage and withdrawal from storage quantities.

(iii) Withdrawal from storage under Briones License (License 10797) is the sum of amount drafted to Orinda Filter Plant minus direct diversion credited towards Briones License (License 10797), up to the monthly withdrawal amounts from Briones Reservoir.

(iv) Amounts directly diverted and collected to storage, and amounts used, are estimated values and subject to change.

8. Spanning four decades, EBMUD's long-standing water conservation program continually makes an aggressive push for its customers to conserve while analyzing which programs bring the greatest level of cost-effective water savings. To ensure that vital water conservation objectives are met, EBMUD continually monitors water demand, new technology, market transformation of water-efficient products, and changing consumer preferences to enhance its water conservation services. These efforts are coordinated with other local, regional, state and national water utilities, industry organizations and researchers to incorporate available information. EBMUD's water conservation program addresses both supply-side (water supplier) and demand-side (customer) measures. Demand-side water conservation measures improve customer water use efficiency and include incentives for residential and non-residential customers, education and outreach activities, market support activities and regulatory programs. Supply-side water conservation measures, which improve water use efficiency before and after use by the customer, include distribution system leak detection and repair programs and water recycling programs. Highlights of EBMUD's water conservation efforts and actions are chronicled in the attached table.

EBMUD's array of demand side water conservation programs and services covers all customer categories, including single- and multi-family residential, commercial, institutional, industrial, and landscape irrigation accounts. Programs and services include free water surveys and water saving devices, incentives for installing water-saving plumbing fixtures, appliances, and process and irrigation equipment, lawn conversion, plan review for water efficiency, and education and outreach programs. EBMUD has been a leader in developing commercial irrigation landscape water budget services and has recently expanded its programs to include single family residential water budgets. EBMUD continues to advance the testing and deployment of advanced metering infrastructure (AMI) to collect and provide more granular water use information to customers. AMI pilots are providing customers with more frequent meter reads down to every hour and have enhanced customer behavioral response and increased demand side conservation. EBMUD is also field testing new water meter technologies to research the

level of customer use at very low flows to improve registration and leak identifications. EBMUD continually monitors these programs to ensure that vital objectives in water conservation are being met. The importance of water conservation is emphasized throughout the year whether or not there is a drought, as EBMUD relies on water conservation and water recycling to stretch limited resources as a crucial part of its water supply.

### **WATER CONSERVATION MASTER PLAN (WCMP)**

EBMUD's WCMP includes existing and planned efforts in support of meeting long-term water conservation planning goals to the year 2040. The WCMP is designed to achieve cost-effective and sustained water savings going forward, while maintaining high-quality savings achieved from past EBMUD conservation efforts implemented since the 1970s. The established and future water conservation approach includes identified conservation measures, implementation strategies, and budgetary resources required to meet the need-for-water including drought management program goals to minimize customer rationing during a water shortage. Conservation measures include greater customer outreach, expanded water use surveys, increased technical and financial incentives, device distribution, and new water efficiency regulations among others.

The WCMP is a second tier master plan detailing water conservation programs and methodologies and goals that are established in water supply planning and mandated by regulation or statute. The primary purpose of the WCMP is to define the implementation strategies, objectives, and tactics required to achieve long term water conservation savings. The WCMP was recently updated in 2011 to outline implementation strategies to achieve a goal of an additional 17 million gallons per day (MGD) conservation savings through the year 2020, with an ultimate goal of an additional 39 MGD of savings by the year 2040.

Senate Bill No. 7 established the Water Conservation Act of 2009 program that is often referred to as "20x2020." The legislation calls for a 20 percent reduction in per capita water use statewide by the year 2020. All urban water agencies are required to report their baseline per capita water use and reduction targets in their 2010 UWMP. To comply with SBx7-7, EBMUD will achieve and may possibly exceed its target water use by implementing recommendations for conservation programs as outlined in the WCMP.

Existing and expanded EBMUD water conservation programs include water use surveys, water-saving device distribution, financial incentives, landscape water budgets, targeted education and outreach, market support, new technology research, and regulatory activities. To be eligible for water service, new EBMUD customers must meet rigorous indoor and outdoor water-efficiency standards for plumbing fixtures, appliances, landscaping, and for commercial processes that use water. Additional savings are expected to result from "natural replacement." Natural replacement occurs through EBMUD-supported market advancement in technology, standards and codes, and water use practices such as the installation of increasingly efficient hardware (toilets, showerheads, and faucets) and landscape conversions.

Key EBMUD water conservation program accomplishments in Fiscal Year 2013 include:

- 16,543 irrigation account landscape water budgets were distributed.
- 10,214 rebates totaling more than \$0.6 million were distributed to EBMUD customers;
- 6,475 free water-saving devices (e.g. showerheads, faucet aerators, hose nozzles, etc.) were distributed;
- 5,662 water use site surveys, home self-survey kits, high bill inquiries, landscape consultations and water waste calls were conducted;
- 45,655 single family residential customer water consumption reports distributed as part of EBMUD's Home Water Report Pilot Study.
- EBMUD sold and distributed an additional 1,375 copies of its award-winning book *Plants and Landscapes for Summer Dry Climates*, bringing the total sold to date to 34,796.

Water savings from conservation programs, especially those that rely on customer behavioral changes, diminish or "depreciate" at varying levels over time. Despite EBMUD's efforts to encourage water-saving behavior, customer behaviors are expected to change over time and savings from hardware replacements can degrade with product wear. EBMUD reports on total conservation savings efforts that include both total and depreciated water savings estimates. Water savings estimates are summarized by program participation according to individual customer accounts, and also aggregated by customer class levels. Methods of water savings estimates are based on previous EBMUD research, pilot studies, and water consumption monitoring. Savings calculations include measuring site-specific savings from implemented conservation measures, using standard industry values from scientifically established savings rates for each fixture or appliance, and applying a percentage reduction in actual (average) pre-intervention consumption.

Water conservation is a central component of EBMUD's long-term water supply planning efforts which seek to address issues that impact the reliability of EBMUD's water supply now and in the future. EBMUD is committed to continue investing in water conservation programs to meet EBMUD's water conservation goals and provide a reliable water supply. Looking at water demand and supply projections, the contribution of conservation to water supply is evident. Conservation and water recycling are expected to account for 26 percent of projected future demand not met by Mokelumne River, Freeport Regional Water Project, and Bayside supplies. In normal rainfall years, conservation will play an important role in the future reliability of supply and will reduce the frequency of shortages.

## **DROUGHT MANAGEMENT**

Northern California's water resources, including EBMUD's supplies, have been stressed by periodic drought cycles. Historical multi-year droughts have significantly diminished the supplies of water available to EBMUD's customers. During the early stages of a drought and throughout the drought period, EBMUD imposes drought management programs to reduce customer demands, thereby saving water for the following year in case drought conditions continue.

Supply-side conservation is part of EBMUD's standard operating practices, and includes maintaining aggressive water distribution system leak detection and repair programs, regularly testing and replacing meters, and implementing on-going pipeline replacement projects. During droughts and water shortages, EBMUD expands potential supply-side programs during droughts by including system pressure management and visible conservation strategies at District facilities, such as limiting irrigation and use of water features.

#### Drought Management Program

EBMUD's Drought Management Program (DMP) is designed to minimize drought impacts on EBMUD customers while continuing to meet stream flow release requirements and obligations to downstream water users. The DMP provides guidelines to manage demand so that customer needs can be met in the following year with carryover storage at no more than 15 percent deficiency in the system. The DMP guided EBMUD in successfully managing demand during mandatory and voluntary rationing periods in calendar years 1976-1978, 1987-1994, and 2007-2010 when supplies were limited.

### **DEMAND SIDE CONSERVATION**

#### ***Residential Water Conservation Programs***

EBMUD's array of demand-side water conservation programs and services covers all customer categories. Single family and multi-family residential water conservation programs are designed to offer customers water conservation incentives and to educate them about water supply, water use habits, and water-saving technologies and behaviors. Programs and services include free water surveys and water-savings devices, incentives for installing water-saving plumbing fixtures, appliances, and irrigation equipment, landscape consultations, lawn conversion, water-efficiency plan review requirements for new water services, and education and outreach programs. EBMUD continually monitors these programs to ensure that conservation objectives are being met. The importance of water conservation is emphasized to customers not only during droughts, but also every year, whether or not a drought is occurring, as water conservation stretches limited resources and plays a crucial part in EBMUD's water supply portfolio.

#### Water Conservation Survey Programs

##### *Single-Family Water Surveys*

Water surveys for single-family residential customers include measuring and assessing indoor and outdoor end uses of water and offering customized recommendations on how to save water in and around the home. Targeting high water use customers is key to maximizing water savings from delivery of this service. WSMP 2040 Level D conservation program implementation identifies a target of 2,500 surveys annually. To achieve this target, staff will expand existing delivery mechanisms and develop outreach initiatives to enlist customer participation. Existing delivery mechanisms include self-survey kits, telephone surveys, and in-person surveys.

### *Home Water Use Do-It-Yourself Survey Kits*

In advance of a scheduled in-person survey, EBMUD provides customers with free self-survey kits to help guide them through a step-by-step self-assessment of their water use. Customers who return completed self-surveys identifying high-water using devices, such as showerheads or faucet aerators, may request free first-time water-efficient replacements from EBMUD. Self-surveys are currently made available to customers in print and online via the EBMUD WaterSmart Center as downloadable files. The customer is directed to check for indoor and outdoor leaks, take inventory of water-using hardware and equipment, and measure flow rates. While potentially more cost-effective than in-person surveys, this survey delivery mechanism limits the customization of water saving recommendations and results in only minimal data collection for the small percentage of customers that complete and return survey forms.

Self-guided surveys will be expanded through development of an interactive web-based user interface comprised of simple step-by-step instructions for completing a home water uses assessment. Development of an online interactive self-survey via the EBMUD WaterSmart Center will help customers assess their water usage, compare personal usage to benchmarks, and view available technical information, water conservation tips, rebates, and incentives based on their individual responses. The online service will also include an irrigation scheduling calculator that incorporates imagery of individual parcels and a measurement tool to allow customers to measure irrigated areas and establish landscape water budgets.

An automated online service will give customers access to water services during all days and times rather than just during EBMUD business hours and automate program data collection and entry. Envisioned future development of online applications for mobile devices would allow customers to move throughout their home/ site while conducting self-surveys. Development of a self-guided user interface and functionality requires a robust database and the integration of existing EBMUD information systems. Therefore, it is a substantial software application development project dependent upon the availability of EBMUD information system development resources. In the near term, the existing manual self-survey process will be updated and marketed and will serve as a basis for developing online content and automation.

### *Water Consumption Reporting and Engagement*

The District continually explores ways to enhance customer conservation services and invests in new capabilities, programs, and technologies that allow for more effective and efficient customer engagement and communication. In 2012 and 2013, EBMUD launched a one-year pilot project to study what effect targeted, personalized consumer education would have on reducing residential water use. The *Water Consumption Reporting and Customer Engagement* service delivered individualized home water reports to EBMUD single family residential customers with comparisons of their household water use to similar homes and customized messaging and recommendations for taking water conservation actions. Approximately 10,000 households received innovative and personalized residential home water reports. Findings from an independent pilot program evaluation confirmed that customers who received more information regarding their water use via home water reports reduced their water use by an average of five percent,

equivalent to 45 million gallons per year for the study participants. Customers were also more than twice as likely to participate in other District conservation programs.

#### *Telephone Surveys*

EBMUD customers can currently obtain telephone consultation and advice regarding their water consumption and conservation tips. Most of these interactions are initiated by customers as high bill complaints and are handled by a Customer Service Representative in EBMUD's Contact Center. Customers needing additional consultation are referred to Water Conservation staff for more detailed consultation where staff assists the customer in reviewing and assessing their water consumption and end uses of water. EBMUD plans to enhance services by including separate tracking of customer contacts generated in the Contact Center and revising the process for conducting telephone surveys to improve data collection, documentation of outcomes, and following up within EBMUD's Customer database.

#### *In-Person Surveys*

Currently, EBMUD customers can schedule free in-person water surveys with EBMUD staff. A site visit, which typically lasts up to one hour, includes a meeting with a resident/homeowner to review water consumption history, a test for leaks, an assessment of indoor water using fixture flow rates, and outdoor landscape irrigation. Recommendations for water-efficiency improvements and informational brochures are provided as needed. While all EBMUD customers are eligible for in-person surveys, a number of customers are initially directed to self or telephone surveys. As online and telephone survey delivery mechanism are further developed, higher-cost in-person services will be de-emphasized in favor of more cost-effective and interactive delivery mechanisms.

#### *Landscape Consultations*

Landscape consultations are in-person surveys with additional emphasis on efficient landscape irrigation scheduling, irrigation hardware efficiency, automatic irrigation controller programming, and sustainable landscape design and maintenance. Landscape consultations are scheduled at sites with high dry-season water and automatic irrigation systems. While available to all customers, the majority of sites that benefit from this service are in communities with low-density housing on large lots with installed landscapes. Development of interactive online tools to assess outdoor use will automate and improve the ability to assess landscape water use efficiency by customers but will not completely replaced the need for in-person services. This service will be increasingly targeted to high-water use sites with pre-identified irrigation usage.

#### *Multi-Family Water Surveys*

Multi-family water surveys target existing multi-family residential customers at sites with five or more units. WCMP water conservation planning targets approximately 200 accounts comprised of approximately 3,400 dwelling units each year. Surveys are provided in-person through scheduled appointments with property managers and apartment building owners. The survey includes the same elements as single-family audits. At each site, representative samples of dwelling units are inspected and assessed for indoor water use efficiency. Outdoor water use served by mixed-use (indoor and outdoor) water meters is also assessed. Sites with high-water use and multiple sites under the same ownership or

manager are targeted for this service. On-site surveys are required for high volume water-saving device distribution, and free devices are delivered as part of this service.

#### Conservation Rebate and Incentive Programs

Incentives and rebates for indoor water-efficient appliances, plumbing fixtures, and outdoor irrigation systems (irrigation controllers and drought-tolerant landscaping), and distribution of devices (clothes washers, high-efficiency toilets, free water-efficient showerheads, faucet aerators, and quick-closing toilet flappers) are offered to residential customers. These rebates to residential customers totaled more than \$0.6 million in FY13.

#### *Residential Landscape Consultations and Rebate Program*

Implemented in February 1998, the Residential Landscape Program promotes outdoor water use efficiency in the single-family residential sector. EBMUD offers residential customers free on-site landscape consultations to help with new plantings and improvements to their landscape irrigation efficiency. The consultations emphasize proper irrigation scheduling, low water use plant selection, and other sustainable landscape practices such as mulching and proper maintenance. In FY13, EBMUD continued to offer rebates to qualifying residential customers for converting lawns to sustainable landscaping and coordinated an online mulch coupon offer with local retailers. There is a strong educational component to the program; pre- and post-conversion site visits include in-person education regarding water conservation, water-efficient landscape design, irrigation scheduling, and maintenance practices.

#### *Residential High-Efficiency Clothes Washer Rebate Program*

EBMUD's Residential Clothes Washer Rebate Program, one of the first such programs offered in the nation, has been available to EBMUD's residential customers since 1996. EBMUD continues its participation in a regional initiative with Pacific Gas and Electric and with Bay Area water agencies to offer combined water and energy efficiency rebates for high-efficiency clothes washers and increase program visibility regionally among customers and appliance retailers. EBMUD is among the first water agencies to enhance its clothes washer rebate with tiered rebates based on the water-efficiency level of eligible clothes washer models. Tiered rebates influence consumers to purchase appliance models that meet or exceed higher efficiency standards. In FY13 EBMUD customer participation remained high with 7,480 clothes washers rebated with estimated water savings of more than 51 million gallons of water annually. EBMUD has rebated more than 100,000 clothes washer purchases since the program began in 1996. EBMUD also offers rebates for the installation of family-sized clothes washers in multi-family housing.

#### *High-Efficiency Toilet Rebate Program*

Since 1995, EBMUD has offered its residential customers rebates and free installations of new toilets to support replacement of higher water-volume models. The current program rebates the purchase of high-efficiency toilet (HET) models that use 20 percent less water than the standard 1.6 gallons per flush ultra-low-flow toilets. As a United States Environmental Protection Agency (USEPA) WaterSense Partner, EBMUD promotes WaterSense labeled products through home improvement retailers, manufacturers, and distributors throughout its service area. EBMUD and other water agencies working directly with manufacturers, distributors, and retailers encourage expanded production and

distribution of water-efficient toilets. In FY13, HET retrofits were popular with customers, with households receiving 2,560 rebates that are projected to save an estimated 55,285 gallons of water or more every day or more than 20 million gallons annually.

#### *Device Distribution Program*

EBMUD has been distributing free low-flow showerheads, faucet aerators, and other water-saving devices to customers since the 1980s. The devices are distributed primarily during customer water use surveys, through direct mail, and over the counter at EBMUD offices. A Market Penetration Study completed in FY02 found that EBMUD's service area was effectively "saturated" with low-flow showerheads and faucet aerators. Much of this high saturation can be attributed to EBMUD's ongoing free distribution program. A combined total of 6,475 water-efficient showerheads, faucet aerators, hose nozzles and other devices were distributed to EBMUD customers during FY13.

#### *Non-Residential Water Conservation Programs*

EBMUD tailors an array of demand-side water conservation programs to commercial, industrial, institutional and landscape irrigation customers to assist with improving their indoor and outdoor water use efficiency. Non-residential water conservation programs include free water surveys, water-saving device distributions, technical consultations, plan reviews, and life-cycle cost and savings estimates. Financial incentives support the installation of water-efficient appliances, plumbing fixtures, and process equipment. In FY13, 458 non-residential customer surveys and 186 conservation rebates saved an estimated 60,000 gallons per day (GPD) or nearly 22 million gallons annually.

#### Water Conservation Survey Programs

##### *Commercial, Industrial, and Institutional Surveys*

Commercial, Industrial, and Institutional (CII) surveys are designed to help businesses and institutional customers use water more efficiently. CII water surveys consist of free on-site visits conducted by EBMUD staff. Staff works with consultants and landscape and facility managers to identify opportunities to increase water use efficiency and achieve associated benefits in reduced energy use, wastewater discharge, chemicals, and downsized treatment facilities. Irrigation water surveys include a review of current and past water use efficiencies, on-site inspection of irrigation equipment, tests for system leaks and sprinkler uniformity, training of landscape personnel in principles of efficient irrigation systems, assistance with irrigation scheduling, and recommendations for improving irrigation system efficiency. If the surveyor determines that existing devices are not efficient, first-time free water-efficient devices are provided, which include quick-closing toilet flapper valves, water-conserving showerheads, low-flow faucet aerators, and commercial dishwashing spray valves.

Businesses with relatively simple end uses of water have successfully used self-survey kits. Small metering devices are available for loan to verify water use characteristics before implementing conservation measures. This approach allows the customer and EBMUD to identify the most cost-effective measures, including opportunities that may qualify for rebates.

### *Irrigation Water Surveys*

EBMUD offers free surveys and incentives for business customers to improve irrigation efficiency. Irrigation audits include an evaluation of current and past water use, on-site inspection of irrigation systems, tests for sprinkler uniformity, training landscape personnel on principles of efficient irrigation, and recommendations for increasing water use efficiency. Irrigation water surveys are targeted at nearly 5,000 EBMUD irrigation accounts where landscape irrigation comprises most or all of the use at the site.

Homeowners associations (HOA) continue to represent a large participant sector. Two strategies have proven successful in helping to secure customer participation in both the water use survey and irrigation system upgrade programs: targeted presentations by EBMUD staff and telephone contacts via high-water consumption billing inquiries.

### Conservation Rebate and Incentive Programs

EBMUD offers non-residential customers financial incentives in the form of customized rebates, free water-efficient device distributions, and fixed rebates for water-efficient products, including plumbing fixtures, commercial appliances, process and cooling equipment, and irrigation system upgrades.

### *Toilet/ Urinal Replacement Program*

EBMUD administers both a fixed and customized rebate program for the purchase of qualifying high-efficiency toilet (HET) and high-efficiency urinal (HEU) models. EBMUD continued a long-term assessment of HEU products through installation within its own facilities.

### *Commercial Clothes Washer Rebates*

EBMUD offers rebates for the installation of commercial-grade units in common area laundries, businesses or institutions with on-premise laundry facilities, and coin laundry stores.

### *Commercial Landscape Irrigation Upgrade Program*

This program seeks to minimize customer water consumption and utility costs, and to introduce customers to new efficient irrigation technology to help large-landscape irrigators improve the efficiency of their existing irrigation systems.

### *Irrigation Reduction Information System*

EBMUD's Irrigation Reduction Information System (IRIS) continues to be a leader in landscape water budget programs across the state. The Geographic Information System (GIS) based program is designed to inform EBMUD irrigation customers on how much water should have been used during a billing period. Water use estimates are based on actual irrigated landscape areas and real time weather data from local weather stations. The IRIS program includes preparation of custom water budget reports for each water account. The information helps customers improve management of their irrigation systems by reducing water use and increasing cost savings. In FY13, more than 16,500 landscape water budgets were printed on water bills for more than 3,400 irrigation customers.

### *Device Distribution Program*

Since the early 1980s, EBMUD has been distributing free low-flow showerheads, faucet aerators, high-efficiency hose nozzles, “water brooms,” and low-volume toilet flush valve retrofit kits. Devices are provided to customers primarily through water use surveys. Some water-efficient hardware and devices are loaned to customers for testing in their business settings.

### *Water-Efficient Fixtures and Appliance Incentives*

EBMUD provides rebates to business customers for purchasing water-efficient plumbing fixtures such as high-efficiency gravity and pressurized toilets, low or zero-water using urinals, commercial-grade clothes washers, and pre-rinse dishwashing spray valves.

### *Custom Financial Incentives*

EBMUD offers custom financial and technical assistance to businesses that undertake specialized water-efficiency projects. Rebates offset a portion of the initial costs of installing water-saving equipment and systems, and they shorten the payback period for the customer’s investment in equipment upgrades. Rebate values are based on estimated water savings and may be up to 50 percent of the costs of implementing hardware or process changes that demonstrate improved water use efficiency. Incentives covered multiple technologies and practices, such as boiler-less food steamers, air-cooled ice machines, and recirculating cooling systems, dishwashing, water treatment, wash down equipment, and others.

On a case-by-case basis, EBMUD also partners with business and industrial customers on joint research to develop new technologies and water management practices that demonstrate and promote cost-effective water savings. Each customer project is required to enter into a performance contract with EBMUD and achieve a project-defined water budget to be eligible for EBMUD financial assistance.

### *Education, Outreach and Research Activities*

Education and outreach activities support all other conservation programs and increase both customer awareness and acceptance of EBMUD conservation efforts. EBMUD has a long history of providing customers with educational services including publications, newsletters, school curricula, public workshops and events, and demonstration projects. To make its water conservation programs and services more visible, EBMUD works cooperatively with other agencies and organizations by participating in trade shows and community events. Outreach activities include general and targeted marketing, community presentations and workshops, and participation in regional and statewide conservation organizations.

#### Education

Publications are a valuable educational tool for promoting conservation practices. In 2004 EBMUD published its award-winning *Plants and Landscapes for Summer-Dry Climates of the San Francisco Bay Region*. The book is a modern, updated reference on low water use and drought adapted plants for Mediterranean climates and further establishes EBMUD as a leader in outdoor conservation education. The book describes over 630 plants adapted to

summer-dry climates and features over 540 stunning color photographs of plants and landscapes. Charts provide quick reference, and lists identify plants for special situations such as hot, dry sites, and dry shade. Articles contributed by notable horticulturists bring to life the weather, seasons, and design principles that shape the summer-dry landscape. The publication is both part of a growing awareness of climate compatible and resource-conserving landscaping and an educational tool to further the application of a cutting-edge garden aesthetic within and beyond EBMUD's communities. Book sales continued to be strong to customers and wholesale distributors throughout FY13 and total sales to date have reached 34,796 copies.

Recognizing its many educational benefits, EBMUD promotes school outreach programs to help increase water-efficiency and save water and money; provided school community outreach and support; and educated students on responsible water use and environmental protection. Since 1974, EBMUD has provided water conservation curricula and supplemental materials to teachers and students as part of its Project WATER (Water Awareness Through Education and Research) school program. The program is free to public and private schools within the EBMUD service area and includes K-12 curricula and watershed service learning with EBMUD Rangers/ Naturalists. In 2000, EBMUD also initiated a School Garden Grant Program in partnership with the nonprofit Watershed Project to support local Kids in Gardens projects. These projects were popularized by the California Department of Education's initiative to create "a garden in every school." Through workshops sponsored by both EBMUD and other agencies, educators and their students learn how to reduce water and pesticide use in the garden.

### Outreach

EBMUD continues to market its water conservation programs in two overarching ways: general and specific. The "general" or broad-based marketing approach communicates the value of water and the importance of efficient water use. The "specific" approach includes interactions with individual customers or groups of customers and marketing of EBMUD conservation programs, technologies, and services tailored to them. Examples of marketing tools that EBMUD has used include:

- web-based resources;
- bill inserts;
- newspaper and magazine ads;
- billboards;
- AC Transit posters;
- BART billboards;
- promotional items at community events;
- theater ads;
- cable television;
- EBMUD WaterSmart™ Business Certification Program; and
- support of WaterSense product labeling initiatives.

EBMUD initiated a strong public information campaign to spread the word about ways with which the customers could save water in their homes and businesses. EBMUD's online *WaterSmart Center*, a one-stop education resource, provides online water savings

tips and videos highlighting what customers can do in their own homes and yards to save water.

In 2003, EBMUD initiated its long-term strategic Marketing Plan to enhance the branding and marketing of EBMUD's water conservation and recycling programs. The WaterSmart program is designed to brand water conservation services that inform customers and retailers of the best available technology and management practices to help EBMUD achieve its conservation goals.

In FY09, EBMUD formally launched its WaterSmart Business Certification Program following development and focus group testing. Mirrored closely to other green business certification programs, EBMUD's program is designed to heighten awareness of water (and energy) conservation benefits by recognizing businesses that implement water-efficiency measures and reach or exceed defined efficiency benchmarks. EBMUD staff work one-on-one with businesses, green business certification programs, and the local energy provider to promote changes that not only help customers save money by lowering water use, but also save energy and chemical costs. In FY13, 12 businesses received WaterSmart Certification. The WaterSmart Certification Program was developed specifically to:

- improve branding of water-efficient EBMUD services;
- promote water-efficient products and technologies through product labeling, analogous to the USEPA's WaterSense and ENERGY STAR programs; and
- register and recognize those businesses and customers that meet or surpass EBMUD demand management goals and objectives.

In FY09, EBMUD partnered with the CUWCC to conduct WaterSmart Guidebook training workshops in northern and southern California. In FY13, EBMUD continued to market its WaterSmart Business Development Guidebook to promote the latest water-efficient technologies, products, and best practices to city planners, water professionals, and commercial, industrial, and institutional customers. EBMUD staff also served on the statewide Commercial, Industrial and Institutional (CII) Task Force established to prepare best management practices for CII water users that were included in a report to the Legislature in 2013.

Support activities are those that support the implementation of the water conservation program. These activities include database monitoring, studies/ research, committee and association work, identification of funding sources, cooperative efforts, and the submittal of internal and external reports.

EBMUD regularly partners with a number of California, U.S., and international water agencies, energy utilities, green business organizations, and other research entities to study water use and pilot new water-efficiency programs and technologies. EBMUD is active in statewide water conservation venues and is represented in all significant industry-related discussions involving state and federal agencies, public interest groups, and professional associations. For example, EBMUD is a member of the Bay Area Water Agencies Coalition (BAWAC) established by several Bay Area water agencies to act in a unified manner on water planning activities. EBMUD also remains an active in the CUWCC,

California Urban Water Agencies (CUWA), and the national Alliance for Water Efficiency.

### *Partnerships*

EBMUD recognizes that partnerships broaden the visibility of conservation programs, create cost-sharing opportunities and potential economies of scale, and can expand customer benefits by addressing multiple conservation areas such as water, energy, wastewater, and solid waste. In FY13, EBMUD continued its co-sponsorship with Pacific Gas and Electric, and the U.S. Green Building Council of the annual Water Conservation Showcase at the Pacific Energy Center in San Francisco. The FY13 event set a new record in attendance- with the highest number of vendor exhibitors showcasing water-efficient technologies and services.

### *Research and Development*

#### *National Multi-Family Residential Sub-Meter Study*

EBMUD actively supports research and technical studies to enhance understanding of water use patterns, conservation potential, and the impacts of conservation measures and programs. In June 2004, EBMUD completed a National Multi-Family Residential Sub-Meter Study. The study was conceived, organized and administered by EBMUD, and was developed in cooperation with the USEPA, nine water utilities in seven states, and two national apartment associations. The study represents a nationwide assessment of conservation potential and other policy issues associated with metering and/ or submetering within the multi-family sector.

In FY13, EBMUD continued implementation of a pilot study to provide incentives for the installation of individual unit submeters in master-metered multi-family residential properties including apartments, condos and mobile home parks.

#### *Residential End-Use Studies*

EBMUD has completed a number of residential end-use studies to quantify end uses of water by sector, water-using technology, and climate and consumer demographics. These studies help quantify current demand and future potential conservation savings from applied technology retrofits and behavioral change. In 2003 EBMUD monitored water use at 33 single-family homes to assess end uses of water, and measured the impacts of conservation retrofits. The study found that while indoor per capita single-family use varied, the average use could be reduced approximately 20-25 percent to approximately 55 GPD. Study findings will be used to estimate water savings more accurately from incentives programs, to assist in marketing customer benefits from conservation measures, and to prioritize EBMUD conservation budgeting.

In 2011, EBMUD completed its participation in a statewide study to evaluate the current water use patterns and the current state of water-efficiency in single-family homes. The study will be used to make generalized projections of the remaining potential for water conservation and to better facilitate water supply planning efforts. 120 participating EBMUD customers were selected at random to represent water usage patterns typically found in the service area. These homes were equipped with datalogger devices which were

used to help determine the end uses within each home and how much water was used in each application. Participants were also asked to complete surveys describing the types of appliances they have within their homes. The California Department of Water Resources (DWR) co-sponsored this program along with ten participating water agencies.

#### *Advanced Metering Studies*

EBMUD is conducting several small advanced metering infrastructure (AMI) pilot studies in its service area to test new metering technologies that can collect, record, and remotely transmit monthly, daily, and hourly water consumption data to improve customer water-efficiency practices. The pilot studies are co-funded by grants from DWR and the United States Bureau of Reclamation (USBR).

Water meters are designed to be accurate in a specific operating range where most of the water usage is predicted to be, typically 1/4-15 gpm (for 5/8" positive displacement). However, recent studies indicate that customer leaks account for a portion of water usage and many of these leaks are below the design or in-place accuracy of deployed meters. These potentially unmeasured leaks may represent a significant amount of water and associated revenue loss.

New to the residential market are meters based on different technology such as fluid oscillating, magnetic, or ultrasonic which can measure lower flow rates more accurately while maintaining the same level of accuracy as positive displacement meters at higher flow rates. Another advantage of these new residential meters is that they have no moving parts and are warranted to maintain their accuracy over the lifetime of the meter.

In FY13, EBMUD conducted an evaluation of meter accuracy to estimate and reduce loss from unmeasured meter flow due to: (1) flows at rates below the accuracy level of EBMUD's current meter stock; and (2) the inaccuracy of current meter stock within design and field operating ranges. The study is anticipated to be completed in 2014. Specific study goals include:

1. Improve the accuracy of the estimates of unmeasured flow in water supply audits.
2. Evaluate the cost effectiveness of using newer advanced metering technology which can more effectively measure low flows and better maintain accuracy over time therefore increasing metered consumption and revenue in comparison to replacing positive displacement meters more frequently.
3. Obtain accurate cost estimates of revenue loss from unmeasured meter flow for use in evaluating the business case for advanced metering infrastructure (AMI) implementation.
4. Improve estimates of customer leak loss rates for use in evaluating water conservation programs.
5. Evaluate the accuracy of current in-place meters and determine if there is a correlation with meter age, brand or total throughput.

#### *Other Studies*

EBMUD conducted numerous market saturation studies (1995, 1998, and 2001) to collect data on water conservation attitudes and behaviors, determine the types and market

saturation of water-conserving hardware, assess water conservation potential for identified market sectors, and compare current and previous study findings.

EBMUD partnered with other water utilities, such as the USEPA and the California Urban Water Conservation Council. They completed the study conducted by the American Water Works Association Research Foundation on the efficacy of water budget-based rate structures as a tool to provide a meaningful price signal to increase water use efficiency and manage drought response.

### ***Regulatory Programs***

EBMUD's Water Service Regulations include a number of water-efficiency requirements to enhance supply reliability. A number of these regulations govern all water use.

#### ***Water-Efficiency Requirements***

In 2007, EBMUD adopted a new water service regulation, Section 31 which established water-efficiency requirements for water service and a procedure for notifying applicants that water-efficiency measures are required. Water service shall not be furnished to any applicant for new or expanded service unless all the applicable water-efficiency measures described in this regulation are installed at the applicant's expense. Applicants for expanded service may be required to retrofit existing water service facilities or uses to comply with these requirements. Applicants are required to maintain design documents and construction and installation records and furnish a copy of said documents and records to EBMUD upon request. EBMUD may inspect the installation of water-efficiency measures to verify that the items are installed and performing to the required water use levels.

Effective January 1, 2009, EBMUD adopted a new water service regulation requiring a multi-family and multi-space commercial/ industrial developments of three stories or less in height to be individually metered by EBMUD at an approved metering site. EBMUD will require individual metering of each separate unit in a structure of three stories or less in height, whenever it is feasible in the opinion of EBMUD to do so. Individual metering of each unit or space would be required regardless of their number in the structure or how the hot water is supplied. For example, if the hot water to each apartment or commercial space is supplied by a common boiler, then the cold water supply for each unit must be metered by EBMUD at the approved metering site and the hot water will be metered separately as a "house" or landlord meter.

#### ***Landscape Plan Review***

EBMUD's services complement the DWR's 2009 Updated Model Water Efficient Landscape Ordinance, which is codified in Title 23 of the California Code of Regulations (Sections 490-495) and required by the Water Conservation in Landscaping Act. From 1995-2000, EBMUD has offered voluntary plan review for non-residential new construction projects at the time new service connections are requested. All projects with new service connections of three inches or larger are encouraged to submit plans to the Water Conservation Division for review and comment. Since 2007, as part of its review and approval of proposed new water service to landscape projects, EBMUD determines

compliance with water-efficiency requirements, such as minimized overspray and run-off, appropriate use and groupings of plants, and required automatic irrigation systems and schedules.

EBMUD works with cities and counties within its water service area to support local and state landscape ordinances through landscape plan review requirements and services for all new water service accounts. EBMUD also provides voluntary plan review for existing customers upon request. All plans are reviewed for irrigation system efficiency and scheduling, if provided, and for plant selection and planting design. Comments are returned to the jurisdiction that submitted the plan for EBMUD's review.

## **SUPPLY-SIDE CONSERVATION**

### ***Distribution and Raw Water System Loss Accounting***

EBMUD's water distribution system includes approximately 4,200 miles of pipe. EBMUD implements best practices to manage water losses for the supply-side of the distribution and raw water systems. Modeled after the American Water Works Association (AWWA) Water Audits standards, EBMUD has a protocol for identifying and assessing water losses. The supply-side management program is integral to operating and maintaining the water system and is critical to ensuring efficient management of EBMUD's limited water supply. A standardized procedure to account for all losses in the distribution and raw water systems helps EBMUD understand the nature of those water losses such that it can take appropriate action to reduce them. EBMUD has also identified and made staff accountable for measuring, collecting, assessing, retrieving, validating, and reporting data on District water supply losses.

The difference between the volume of water produced at the treatment plants (also called Distribution System Input) and the sum of all billed and unbilled authorized consumption (also called Authorized Consumption) is termed Distribution Water Losses. Distribution Water Losses consist of all apparent losses and all real losses in the distribution system. Apparent losses are the total losses of treated water from unauthorized consumption (theft), inaccuracies associated with customer metering, and systematic data handling errors. All real losses are the total physical losses of treated water from storage system overflows or draining, main and service line breaks, and background leakages.

Raw water losses consist of apparent losses and real losses in the raw water system. Raw water apparent losses are the total losses of raw water due to raw water meter errors, unauthorized use from theft, and transmission line blow-offs and flushings. Raw water real losses are the total physical losses of raw water that include overflows and leakage up to and at the water treatment plants, such as leaks and breaks from aqueducts, transmission lines, or other parts of the raw water distribution system, and water treatment plant losses.

Distribution water losses and raw water losses are part of non-revenue water. The benefits of managing and minimizing non-revenue water include:

- reducing demand on scarce water supplies and minimizing the need to develop an additional supply;
- reducing water and revenue losses;
- reducing pumping and treatment costs;
- increasing knowledge of the distribution system; and
- reducing property damage through improved maintenance.

#### *Leak Detection*

EBMUD controls water loss using a variety of efforts. The first is to identify the magnitude and source of that loss. The second is to review accuracy of meters used to measure system inflow and outflow. The third is to develop an appropriate leak detection program. The fourth is to have a reasonable program to respond to identified leaks. The final step is a pipe replacement program that helps to ensure a tight distribution system. Techniques used to locate leaks include visual inspections, sonic leak detection (in both the pipe and externally connected devices), and customer reports. EBMUD crews are equipped with electronic sound detection equipment to routinely detect leaks in the field.

#### *Pipe Replacement*

Many conditions affect the rate of deterioration of pipelines in the distribution system, including pipe type and size, soil conditions, and ground movement. As a result of systematic replacement of the most troublesome pipes in the system, use of cathodic protection, and improved leak detection methods, the system has a relatively stable leak rate where the rate of overall system deterioration has been stabilized to minimize impacts over time. The Pipeline Replacement Program identifies potential main failures and renews those pipelines in need of replacement based on maintenance histories and leak records.

#### *Corrosion Control*

EBMUD's corrosion control program has been active since its inception in 1923. The corrosion control program extends the useful life of EBMUD pipelines by installing and upgrading cathodic protection systems. The program, covering the Mokelumne Aqueducts and distribution piping and facilities, effectively reduces corrosion and related deterioration of EBMUD's infrastructure, resulting in substantial leak reduction and reduced loss of water. The Mokelumne Aqueduct pipelines have an extensive corrosion control system with 44 individual impressed current cathodic protection systems and approximately 650 test locations to monitor the levels of corrosion control. The distribution system pipelines are protected from corrosion by 155 impressed current cathodic protection stations and over 1,300 galvanic anode stations. These systems are continually monitored to ensure proper operation. This program has resulted in a continual reduction in leaks on both cast iron and steel pipes. Internal corrosion in these pipelines is controlled with lime additions to the water system to raise pH levels. Designs for all structures are carefully reviewed to select proper coatings, materials, and other corrosion control measures to maximize the life of EBMUD facilities and pipelines.

## **BEST MANAGEMENT PRACTICES**

EBMUD is a founding author of the “Memorandum of Understanding Regarding Urban Water Conservation in California” (MOU), administered by the California Urban Water Conservation Council (CUWCC) and first adopted September 1991 and last amended June 2010. As a long-standing member of the CUWCC, EBMUD has remained in compliance with the MOU in the implementation of water conservation Best Management Practices (BMPs). A BMP is a policy, program, practice, rule, regulation or ordinance, or the use of devices, equipment, or facilities that results in the efficient use or conservation of water as an established and generally accepted practice among water suppliers.

The CUWCC 14 BMPs instituted before the 2010 MOU amendment are now organized into five new categories. Two categories, Utility Operations and Education, are “Foundational BMPs”. The remaining three categories, 1) Residential, 2) Commercial, Industrial, and Institutional (CII), and 3) Landscape, are “Programmatic BMPs”.

EBMUD currently implements all of the identified BMPs as well as a number of additional conservation measures that go beyond the BMPs. On-going upgrades to the CUWCC reporting database preclude the use of the CUWCC reporting format. Overall, EBMUD has self-certified compliance with the 2009 and 2010 Urban Water Conservation MOU coverage requirements for programmatic BMP implementation. EBMUD’s water conservation achievements to date are on-track, ahead of schedule or have reached 100% completion for all established BMP, *Flex Trak* or gallon per capita per day (GPCD) coverage requirements. In FY13, EBMUD served as a member of the CUWCC Board of Directors.

9. In accordance with Water Code Section 1011, the total amount of water conserved system-wide by EBMUD in 2013 in lieu of appropriated water is approximately 81,298 acre-feet. This savings was determined based on the difference in 1976 and 2013 unit water consumption rates and the current number of accounts; 1976 was the year EBMUD and its customers initiated significant water conservation efforts (beginning with the 1976-77 drought). EBMUD reserves the right to amend this report in order to reflect the outcome of future analysis.
  
11. In accordance with Water Code Section 1010, EBMUD recycled approximately 13,365 acre-feet of water system-wide in lieu of appropriated water in 2013. EBMUD reserves the right to amend this report in order to reflect the outcome of future analysis.



**EBMUD Water Conservation Program Implementation (Continued)**

<b>Conservation Program Elements</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Educational/Informational</b>													
School Program	*	*	*	*	*	*	*	*	*	*	*	*	*
Speaker's Bureau	*	*	*	*	*	*	*	*	*	*	*	*	*
Demonstration Gardens	*	*	*	*	*	*	*	*	*	*	*	*	*
Publications	*	*	*	*	*	*	*	*	*	*	*	*	*
Landscape Conference/Workshops	*	*	*	*	*	*	*	*	*	*	*	*	*
Single-Family Residential Audits	*	*	*	*	*	*	*	*	*	*	*	*	*
Multi-Family Residential Audits	*	*	*	*	*	*	*	*	*	*	*	*	*
Large Turf Audits	*	*	*	*	*	*	*	*	*	*	*	*	*
Community Events	*	*	*	*	*	*	*	*	*	*	*	*	*
CIMIS Weather Station and ET Hotline	*	*	*	*	*	*	*	*	*	*	*	*	*
Community Displays	*	*	*	*	*	*	*	*	*	*	*	*	*
Landscape Advisory Committee	*	*	*	*	*	*	*	*	*	*	*	*	*
Industrial Audits	*	*	*	*	*	*	*	*	*	*	*	*	*
Commercial Audits	*	*	*	*	*	*	*	*	*	*	*	*	*
Institutional Audits	*	*	*	*	*	*	*	*	*	*	*	*	*
Water Conservation Achievement Awards	*	*	*	*	*	*	*	*	*	*	*	*	*
Irrigation Water Budgets	*	*	*	*	*	*	*	*	*	*	*	*	*
WaterSmart (Business) Guidebook								*	*	*	*	*	*
WaterSmart Business Certification Program									*	*	*	*	*
Advanced Metering Infrastructure Pilot Study										*	*	*	*
Water Consumption Reporting												*	*
<b>Incentive</b>													
Device Distribution (e.g. showerheads, aerators, etc.)	*	*	*	*	*	*	*	*	*	*	*	*	*
Meter Discount	*	*	*	*	*	*	*	*	*	*	*	*	*
Irrigation Upgrades and Rebates	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Lawn conversion</i>											*	*	*
<i>Drip irrigation</i>											*	*	*
<i>Mulching</i>											*	*	*
<i>Weather-based irrigation controllers</i>											*	*	*
<i>High-efficiency sprinkler nozzles</i>												*	*
<i>Pressure regulators</i>												*	*
<i>Landscape submetering</i>												*	*
ULFT/HET/HEW Toilet & Urinal Rebates	*	*	*	*	*	*	*	*	*	*	*	*	*
Commercial, Industrial, Institutional Rebate	*	*	*	*	*	*	*	*	*	*	*	*	*
Residential Clothes Washer Rebate	*	*	*	*	*	*	*	*	*	*	*	*	*
Residential Landscape/Lawn Conversion Rebate	*	*	*	*	*	*	*	*	*	*	*	*	*
Commercial Clothes Washer Rebate	*	*	*	*	*	*	*	*	*	*	*	*	*
Water Broom Rebate			*	*	*	*	*	*	*	*	*	*	*
Zero Water Urinal Rebate						*	*	*	*	*	*	*	*
Submetering Incentive Program								*	*	*	*	*	*
<b>Regulatory</b>													
Landscape Standards and Plan Review	*	*	*	*	*	*	*	*	*	*	*	*	*
Water Waste Regulation	*	*	*	*	*	*	*	*	*	*	*	*	*
Plan Check Review	*	*	*	*	*	*	*	*	*	*	*	*	*
New Service Water Efficiency Requirements							*	*	*	*	*	*	*
Multi-Family Residential/Commercial Unit Metering									*	*	*	*	*