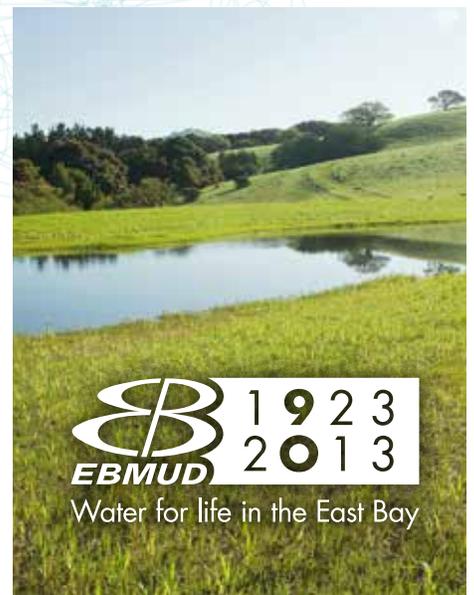
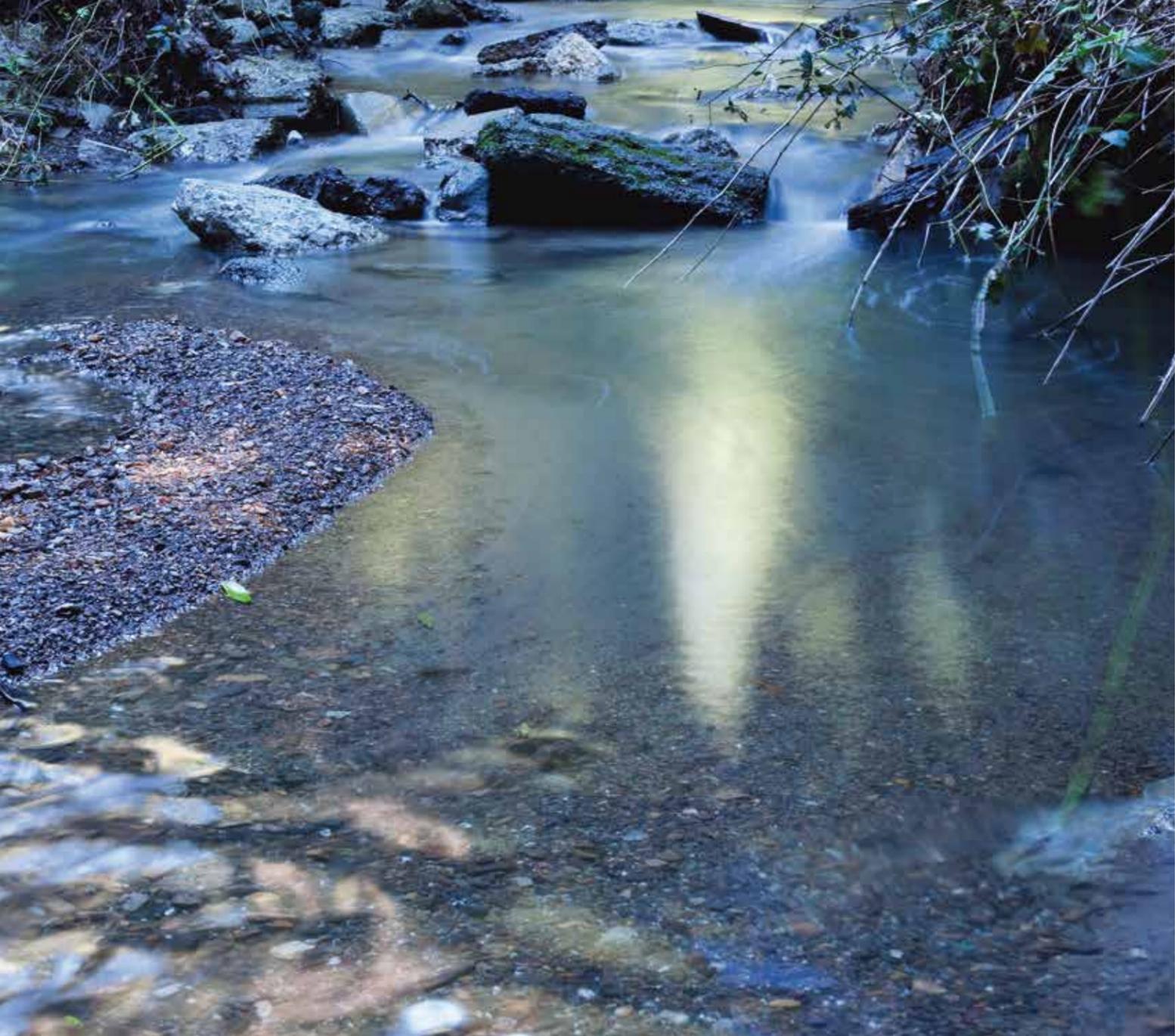


# All About EBMUD



**EBMUD** 1923  
2013  
Water for life in the East Bay



The East Bay Municipal Utility District is a California public utility that supplies high-quality drinking water, generates renewable energy, and provides pollution prevention and wastewater treatment services that protect San Francisco Bay.

EBMUD serves many communities on the eastern side of the San Francisco Bay. The District's water system supplies 1.3 million customers and spans a 332-square-mile area in Alameda and Contra Costa counties, extending from Crockett in the north, southward to San Lorenzo, eastward from San Francisco Bay to Walnut Creek, and south through the San Ramon Valley.

EBMUD's water system serves customers in 20 incorporated and 15 unincorporated communities. Places served include the cities and towns of Alameda, Albany, Berkeley, Danville, El Cerrito, Emeryville, part of Hayward, Hercules, Lafayette, Moraga, Oakland, Orinda, Piedmont, Pinole, part of Pleasant Hill, Richmond, San Leandro, San Pablo, San Ramon, part of Walnut Creek and the unincorporated communities of Alamo, Ashland, Blackhawk, Castro Valley,

*To manage the natural resources with which the District is entrusted; to provide reliable, high quality water and wastewater services at fair and reasonable rates for the people of the East Bay; and to preserve and protect the environment for future generations.*

—EBMUD Mission Statement

Cherryland, Crockett, Diablo, El Sobrante, Fairview, Kensington, North Richmond, Oleum, Rodeo, San Lorenzo and Selby.

The wastewater service area is smaller, covering an 88-square-mile area of Alameda and Contra Costa counties along the Bay's east shore, extending from Richmond in the north to Oakland in the south. It serves 650,000 customers. The service area includes the cities of Alameda, Albany, Berkeley, Emeryville, Oakland and Piedmont, and the Stege Sanitary District, which includes El Cerrito,

Kensington, and part of Richmond.

EBMUD was formed under the California Municipal Utility District Act, which permits formation of multi-purpose government agencies to provide public services on a regional basis. In 1923, voters elected to create EBMUD to provide regional water service. In 1944, voters elected to authorize EBMUD to provide regional wastewater treatment.

EBMUD is led by a Board of Directors whose seven members are publicly elected from wards (areas of comparable size) within the water service area.

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# Water Sources

EBMUD's primary water supply is from the Mokelumne River. Local runoff to East Bay reservoirs supplements that supply, and Sacramento River water is available when needed during dry years. By helping customers conserve and use recycled water, EBMUD stretches existing supplies.

## Central Sierra Supply

On average, 90 percent of the water used by EBMUD comes from the protected watershed of the Mokelumne River. The watershed is on the western slope of the Sierra Nevada and collects melted snow from Alpine, Amador and Calaveras counties. This area is primarily national forest, EBMUD-owned lands and other undeveloped lands little affected by human activity.

**Mokelumne Watershed** The Mokelumne River drains over 627 square miles of mountains and foothills above Camanche Dam. The watershed elevation ranges from 235 feet at the dam to 10,000 feet in the headwater region.

**Mokelumne Water Rights** EBMUD has water rights for up to 325 million gallons (997 acre-feet) daily from the Mokelumne River, a total of 364,000 acre-feet per year. EBMUD stores water in Pardee and Camanche Reservoirs, both in the Mokelumne River watershed.

**Pardee** Pardee Dam collects water from 578 square miles of the Mokelumne watershed in Pardee Reservoir near the town of Valley Springs. EBMUD is licensed to store 209,950 acre-feet per year of water supply in Pardee Reservoir. The reservoir has a capacity of 197,950 acre-feet, which is equivalent to a ten-month supply for EBMUD's 1.3 million water customers.

**Camanche** Camanche Dam, ten miles downstream from Pardee on the Mokelumne, works in tandem with Pardee. It stores water to meet the needs of fisheries, riparian habitat and downstream water-rights holders, and it provides flood control. Camanche Reservoir has a capacity of 417,120 acre-feet of water.

## Local/Emergency Supply

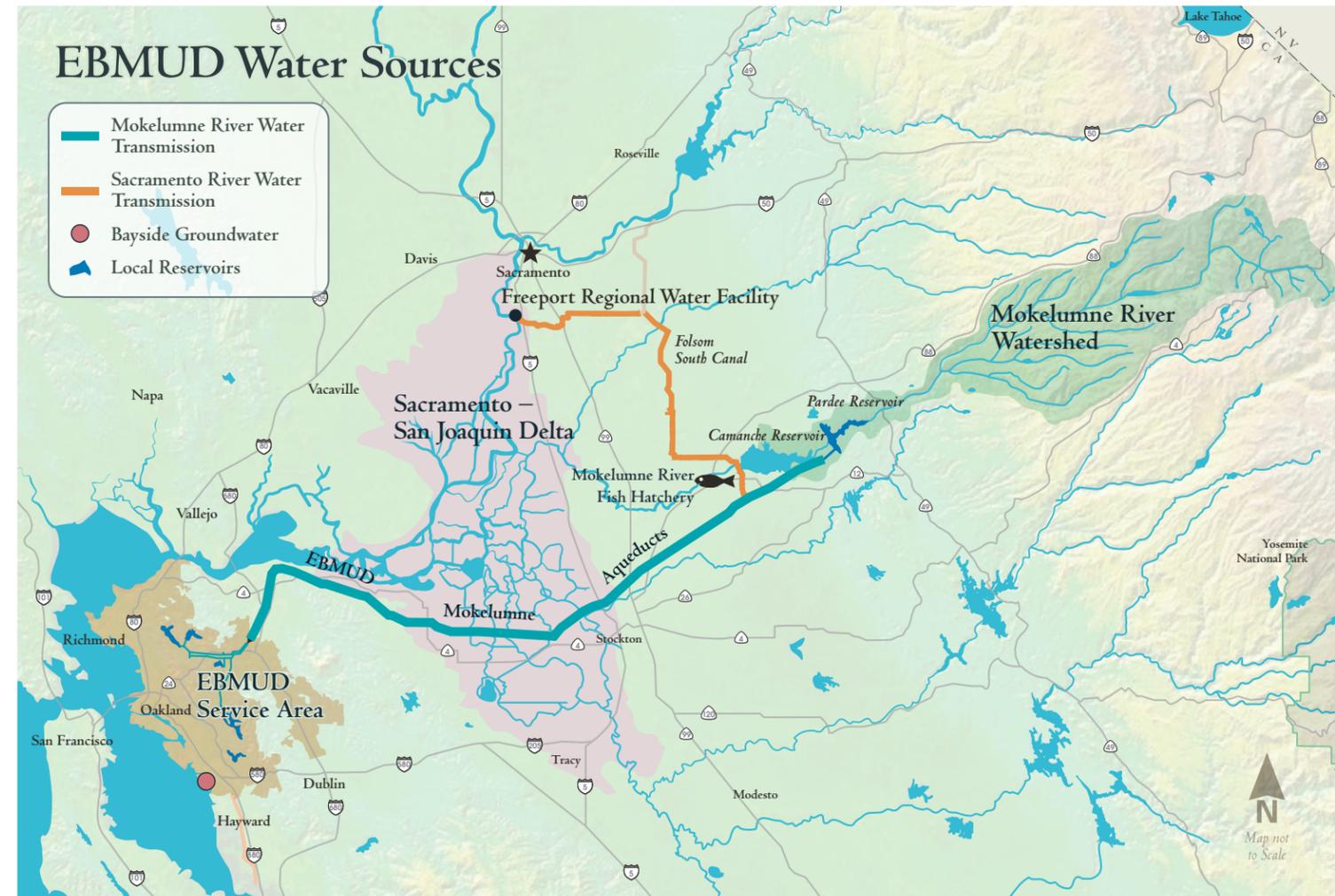
Local runoff is stored in several East Bay reservoirs for treatment and delivery to customers and to assure emergency supplies are available locally. In a year of normal precipitation, EBMUD uses an average of 21 million gallons per day (MGD) of water from local watershed runoff. In dry years, enough water can be lost through evaporation to completely offset any water gained from local runoff. EBMUD can store up to 151,670 acre-feet of water in the East Bay reservoirs. EBMUD typically maintains a six-month emergency supply in local reservoirs.

Also, a local groundwater injection well (Bayside) is being used to move some water into a deep underground aquifer for storage so it can be treated and used during droughts, adding another one million gallons per day of supplemental supply.

## Sacramento River Supply

EBMUD has a contract with the U.S. Bureau of Reclamation for a supplemental water supply because during times of drought or emergency, EBMUD's Mokelumne River supply can not meet customer needs. That supplemental supply comes from the Sacramento River.

EBMUD has rights to up to 100 MGD from the Sacramento River in dry years. When needed, the water will be conveyed through the Freeport Regional Water Facility (shown at right), jointly owned by EBMUD and Sacramento County. (Sacramento County can draw up to 85 MGD year round.) EBMUD will draw water from the Freeport facility through a pipeline east to the Folsom South Canal and then move the supplies south to the Mokelumne aqueducts into EBMUD's system.



## EBMUD and the Delta

The Sacramento-San Joaquin River Delta provides habitat for more than 55 fish species and 750 plant and wildlife species. It also provides water to roughly two-thirds of California's population, is a vital recreation resource and is critical to commercial fisheries, agriculture and an extensive network of infrastructure.

EBMUD's Mokelumne Aqueducts cross 15 miles of low-lying Delta islands. Between 1995 and 2012, EBMUD invested \$80 million in the Delta: \$39 million in aqueduct seismic improvements, \$20 million in corrosion protection for the aqueducts, \$20 million to support Delta reclamation districts' efforts to improve levees, and \$1 million for other Delta improvements. More will be invested in the coming years, including another \$7 million in aqueduct corrosion protection and additional funding support for levee improvements.

EBMUD's ability to sustain a healthy salmon run from the Mokelumne River also makes it a direct stakeholder in the Delta, as the fish pass through the Delta to reach the sea and, years later, return from the sea.



## Water Conservation

EBMUD's plan for assuring adequate future water supplies relies heavily on efficient water use by customers.

**Conservation Planning** EBMUD has sponsored conservation programs since the 1970s, and adopted its first water conservation master plan in 1994 to guide a comprehensive program for water education, conservation assistance and incentives. The plan was updated in 2011. EBMUD promotes cost-effective and sustained water savings by testing water conservation products and focusing on those that best help customers save water, energy and money.

**Conservation Savings** Since 1995, customers have been saving an estimated 28 MGD. Conservation programs ensure that EBMUD will meet requirements of the California Water Conservation Act of 2009, which mandates a 20 percent reduction in statewide urban water use by 2020. EBMUD's long-term water supply management program identifies a strategy for saving a total of 62 MGD of water through conservation initiatives by 2040.

**Leak Detection** EBMUD also has an aggressive leak detection program for its own water system that uses innovative technology to detect underground leaks. Finding leaks on EBMUD's system early not only saves valuable water but also reduces the cost of repairs and the amount of customer inconvenience resulting from breaks.



EBMUD works with business to encourage water use efficiency and awards certificates that can be publicly displayed for three years to those that implement water-efficient best practices. The 27 businesses recognized in 2011-12 for water efficiency improvements reduced their annual water demand by more than 18.6 million gallons—enough water to serve approximately 189 households for an entire year.

## Water Recycling

EBMUD has used recycled water for almost 40 years for industrial processes and irrigation at the wastewater treatment plant located at the foot of the Bay Bridge in west Oakland. Using recycled and non-potable water helps stretch drinking water supplies.

**Recycled Use** EBMUD currently has the capacity to produce an average of 9 MGD of recycled water. In 2012, EBMUD supplied an average of 5.4 MGD of recycled water to customers for irrigation (golf courses, parks and other landscaping) and industrial processes. This includes the Richmond Advanced Recycled Expansion facility, opened in 2010, which uses microfiltration and reverse osmosis to provide high-quality recycled water for an oil refinery.

**Recycled Water Partners** EBMUD partners with other public agencies to provide recycled water throughout its service area. Partners include the West County Wastewater District for Richmond projects, the City of San Leandro for service in Alameda and southern Oakland, and the Dublin San Ramon Services District in the San Ramon Valley. EBMUD also works closely with recycled water users to help them manage their recycled water systems efficiently and safely.

**Future Recycling Plans** By 2040, EBMUD plans to recycle an additional 11 MGD within the service area, which will reduce the overall need for drinking water in the year 2040 by six percent.

# Water Use and Distribution

Water use has been relatively constant over forty years despite a 29 percent increase in accounts.

## Water Use

The single-family residential customer category is the largest water user category, followed by multi-family residential, industrial and petroleum, commercial, irrigation, and institutional users. Historically, approximately 63 percent of EBMUD's water has been delivered to residential customers.

**Demand Over Time** Historical water production in the EBMUD service area is illustrated on page 4. Total demand has remained relatively constant despite the increase in the number of water service accounts.

Water use dipped significantly during water shortage emergencies (declared by the Board of Directors) in calendar years 1976-78, 1987-94 and 2007-2010. Water conservation and recycling, plus other factors described below, have offset growth in water demand.

**Climate's Impact** Among the many factors that influence how much water the EBMUD service area uses year to year, climate is especially significant. California has a summer-dry climate and periodic droughts. Water use increases when conditions are drier and warmer than normal. When dry periods are long and/or intense, EBMUD imposes water use restrictions.



Checking water quality at the Orinda Water Treatment Plant

**Other Factors** Changing land use patterns, changing technology for water-using equipment, and changing economics all can affect water use in the EBMUD service area. Over time there have been a variety of land use changes in the service area. Legislative changes that have reduced water use include plumbing and appliance efficiency standards, state-mandated landscape ordinances, and the Federal Energy Policy Act. The national economic downturn that began in 2007 also contributed to water use reductions in EBMUD's service area.

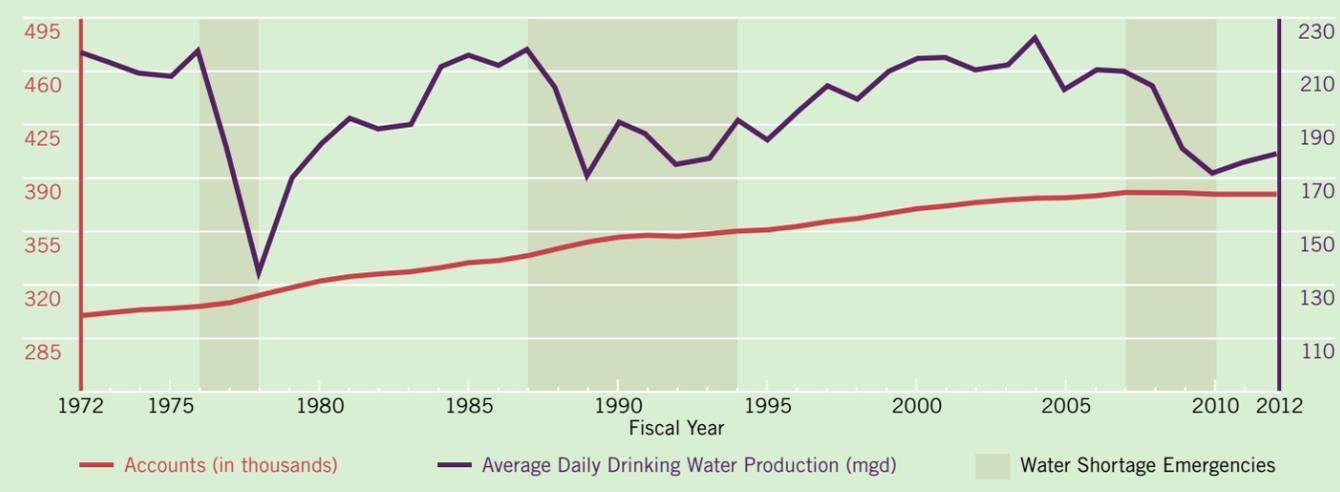
## Water Distribution

EBMUD uses gravity to bring water from the mountains to East Bay customers, saving energy and money.

**Aqueducts and Tunnels** The water collected from the Mokelumne watershed in Pardee Reservoir is transported 90 miles to East Bay water treatment plants and reservoirs. The journey begins near the town of Valley Springs in Calaveras County at the Pardee Tunnel and continues through three large pipes, the Mokelumne Aqueducts, which carry water 82 miles to the Lafayette Aqueducts.

The two Lafayette Aqueducts move the water to local water treatment plants

## Customer Water Accounts and Total Demand 1972–2012



## How much water will we need?

EBMUD plans for water needs for the long term. EBMUD's current long-term water supply plans were adopted in 2012 and extend to 2040.

The plans are based on studies that assessed EBMUD's ability to meet customer water needs based on available supplies, changing water demand locally and statewide and how climate change can affect local water supplies over the long term. Within EBMUD's established service boundaries, the studies project growth in demand at less than one percent per year, primarily in areas near the Bay. This future need for additional water can be met through water savings from aggressive conservation and water recycling in normal years. While conservation, recycling and system-wide rationing of up to 15 percent will provide, on average, three-quarters of the additional water needed in a multi-year drought by 2040, other demands on the Mokelumne River mean that EBMUD will need more supplies. EBMUD is partnering with other agencies and other water rights owners to investigate water transfers, regional water projects and other potential supply and storage alternatives.



and to terminal reservoirs. Lafayette Aqueduct No. 1 is a seven-mile-long pipe from Walnut Creek to the Orinda Water Treatment Plant. Lafayette Aqueduct No. 2 runs seven miles from Walnut Creek to the Briones Diversion Works near Orinda, where supplies are either pumped through the Briones Aqueduct into Briones Reservoir, moved into San Pablo Reservoir, or moved to the Orinda Water Treatment Plant.

San Pablo Tunnel carries water 2.6 miles from the San Pablo Reservoir to the San Pablo Water Treatment Plant, a standby plant. Upper San Leandro Tunnel carries water just over a mile from Upper San Leandro Reservoir to the Upper San Leandro Water Treatment Plant. Sobrante Pipeline carries water about two miles from San Pablo Reservoir to the El Sobrante Treatment Plant.

**East Bay Reservoirs** Water brought into EBMUD's service area is either stored in one of EBMUD's five East Bay reservoirs or immediately put through a water treatment plant and distributed within the water system. In total, EBMUD can store up to 151,670 acre-feet of untreated water in the East Bay reservoirs.

San Pablo Reservoir is the northernmost of the local reservoirs. East of San Pablo Reservoir is Briones, EBMUD's largest local reservoir. Lafayette Reservoir is located in the City of Lafayette, and to the south are Upper San Leandro Reservoir and Chabot Reservoir. (See map, page 1)

**Distribution Network** After water is treated at a water treatment plant it is distributed throughout EBMUD's service area.

When EBMUD first began serving Mokelumne water in 1929, it served 440,000 people in a 92.6-square-mile area with 40 MGD through 1,381 miles of pipe.

In 2012, the water distribution network included 4,200 miles of pipe, 140 pumping plants and 170 neighborhood reservoirs (tanks storing treated drinking water) having a total capacity of 830 million gallons. The 332-square-mile service area is divided into more than 120 water pressure zones. Pressure zones range in elevation from sea level to 1,450 feet. Approximately 50 percent of treated water is distributed to customers by gravity.

## Regional Connections for Emergencies

Interties link EBMUD's water system to those of other Bay Area water agencies. These connections will allow water agencies to move water from one system to another during emergencies and when completing planned work on critical facilities. The interties connect EBMUD's system to those of the San Francisco Public Utilities Commission and the city of Hayward to the west and south, to the Dublin San Ramon Services District to the east and south, and the Contra Costa Water District to the east and north. Interties make it easier for Bay Area agencies to respond to emergencies and keep water flowing.

## Maintaining Aging Infrastructure

EBMUD's oldest water system infrastructure dates to the 1870s. Much of the system we rely on today was built in the post-World War II era when the East Bay was growing rapidly. As infrastructure ages, it takes more work to make sure dependable water supplies arrive at customer taps round-the-clock, every day of the year.

EBMUD completes more than 23,000 preventative work orders and 56,000 corrective work orders annually. Priorities are set using a comprehensive asset management system to evaluate the reliability of existing facilities, the cost of rehabilitation versus replacement, the consequences of downtime or failure, and how specific facilities will be used in the future. Maintenance and replacement work planning focuses on ensuring public, worker and environmental safety and considers the financial burden to customers and the potential disruption to daily life that results when

crews must work in the streets and at facilities located near homes and businesses.

In 2012, more than three-quarters of every rate dollar EBMUD collected for water service went toward storage, treatment and delivery of water, day-to-day system maintenance, planning for future improvements, and repaying bonds that were sold to pay for long-term investments in pipes, reservoirs, dams and other infrastructure.

The unit costs for infrastructure work in urbanized service areas like the East Bay have outpaced general inflation because of a variety of factors, such as the cost of materials and supplies, the challenges of working in a congested underground environment that often requires hand-digging and other special construction provisions, and the limitations on work hours that are imposed by local jurisdictions on behalf of local residents and businesses.

EBMUD has a solid record of infrastructure maintenance investment and the system's performance meets recommended industry standards. To maintain high levels of system reliability and assure the overall least cost for customers, detailed infrastructure master plans have been developed that forecast when investments will be needed in key facilities such as treatment plants, pumps and dams.



EBMUD dispatchers and crews work each night to maintain service and promptly resolve problems.

# Renewable Energy

EBMUD generates renewable energy from solar and hydropower, and cogeneration at wastewater treatment facilities.

Across the world, energy is one of the biggest costs of delivering water to taps and treating wastewater. EBMUD's systems were built to rely as much as possible on gravity, and EBMUD's sustainability practices minimize energy use. In 2012 EBMUD generated approximately 164,000 MWh of renewable energy at its hydropower and cogeneration facilities. Total energy used in 2012 was 128,800 MWh, of which 92,500 MWh was purchased and 36,300 MWh was offset by EBMUD renewable supplies.

Because energy production and energy use periods cannot be perfectly synchronized, EBMUD both buys and sells power

**Power Use.** Annually, approximately 60 percent of the energy EBMUD uses is for pumping water to neighborhood reservoirs for delivery to customers, 10 percent is used in the water treatment process, and 15 percent is used to move water from reservoirs to treatment plants and at maintenance and administrative facilities. The wastewater treatment system uses 15 percent of the energy EBMUD purchases. The District routinely evaluates adding renewable energy capabilities to its facilities to meet the goals and objectives of its sustainability and renewable energy policies. In 2012, solar panels owned by EBMUD generated approximately 640 MWh of energy, and solar panels

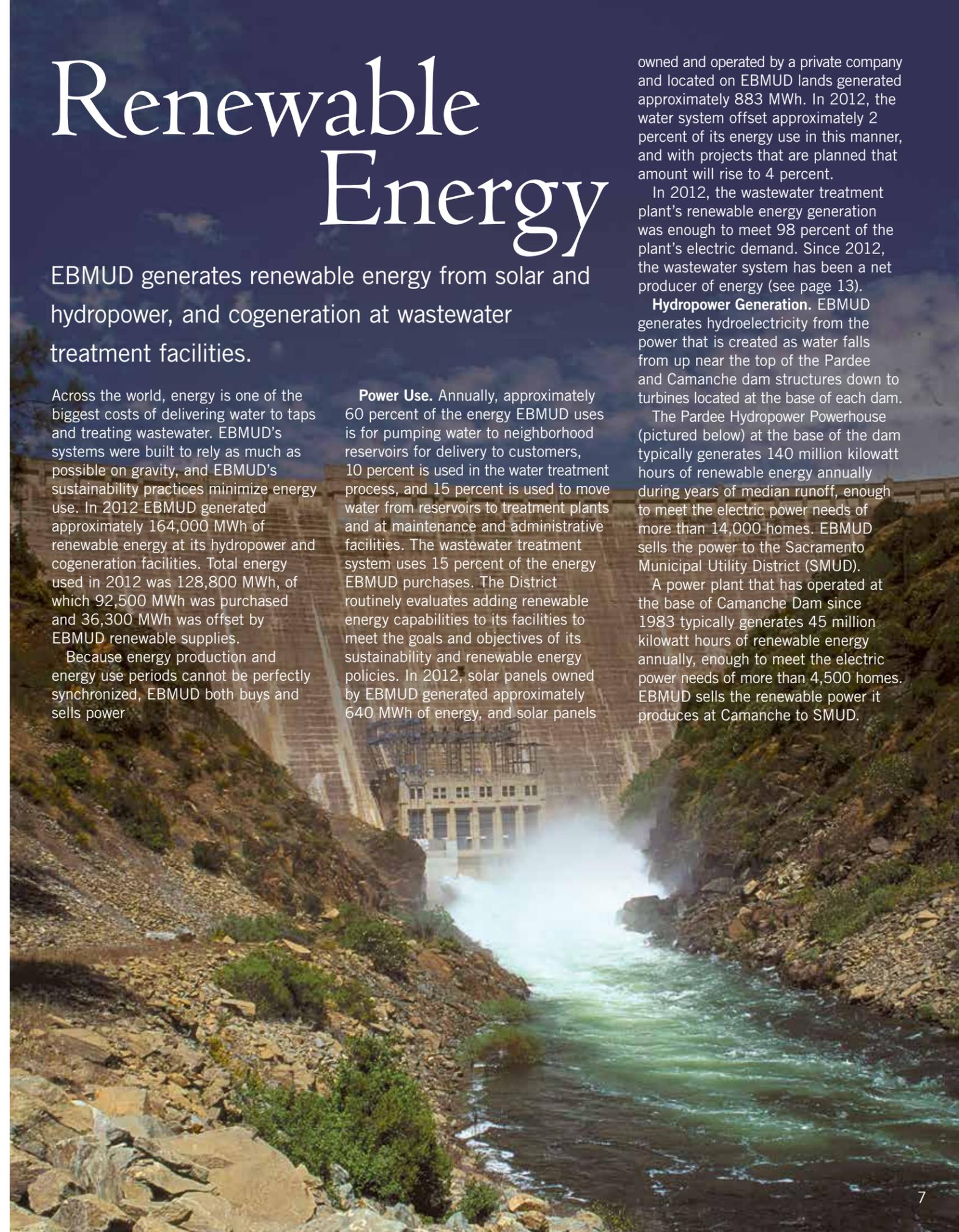
owned and operated by a private company and located on EBMUD lands generated approximately 883 MWh. In 2012, the water system offset approximately 2 percent of its energy use in this manner, and with projects that are planned that amount will rise to 4 percent.

In 2012, the wastewater treatment plant's renewable energy generation was enough to meet 98 percent of the plant's electric demand. Since 2012, the wastewater system has been a net producer of energy (see page 13).

**Hydropower Generation.** EBMUD generates hydroelectricity from the power that is created as water falls from up near the top of the Pardee and Camanche dam structures down to turbines located at the base of each dam.

The Pardee Hydropower Powerhouse (pictured below) at the base of the dam typically generates 140 million kilowatt hours of renewable energy annually during years of median runoff, enough to meet the electric power needs of more than 14,000 homes. EBMUD sells the power to the Sacramento Municipal Utility District (SMUD).

A power plant that has operated at the base of Camanche Dam since 1983 typically generates 45 million kilowatt hours of renewable energy annually, enough to meet the electric power needs of more than 4,500 homes. EBMUD sells the renewable power it produces at Camanche to SMUD.



# Water Quality

EBMUD water supplies meet or surpass all state and federal regulations.

## An Excellent Source

Because it comes from mostly undeveloped watershed lands, EBMUD's source water is not exposed to contaminants like pesticides, agricultural or urban runoff, municipal sewage

discharges or industrial toxics. Untreated water can be cloudy because of sediment and can contain bacteria, algae and other microorganisms—all of which are effectively removed by the treatment process. Mokelumne River supplies require only minimal treatment to meet or surpass regulatory standards.

## Treatment Plants

EBMUD treats all water it delivers to customers and adds fluoride to promote dental hygiene. EBMUD's water treatment plants are capable of filtering and processing a combined total of more than 425 million gallons of water daily. Orinda Water Treatment Plant is the largest, with a peak capacity of 200 million gallons per day. Other water treatment plants are Lafayette, Upper San Leandro, Sobrante and Walnut Creek. San Pablo is a sixth treatment plant which is currently a standby plant, not in use.

EBMUD publishes a detailed annual water quality report, which is available at [www.ebmud.com](http://www.ebmud.com).

## Laboratory Services

EBMUD's laboratory operates 365 days a year to support water and wastewater operations. Test results consistently show that regulated contaminants either are not detected at all or are generally present in amounts far below limits permitted by state and federal drinking-water standards.

EBMUD drinking water is sampled and tested frequently from all parts of the water system to ensure that it meets or surpasses all primary (health-related) and secondary (aesthetic) regulatory standards established by the U.S. Environmental Protection Agency and the California Department of Health Services. In 2012, EBMUD monitored for more than 100 regulated contaminants and conducted

more than 20,000 laboratory tests to ensure the safety of drinking water for customers.

EBMUD's laboratory is certified by the State of California to perform inorganic, organic and microbiological analyses related to drinking water, source water, wastewater, recycled water, receiving water, soil, biosolids, hazardous waste, and treatment chemicals. Quality assurance and quality control programs guide every aspect of the laboratory's daily operations.



## Water Treatment

Water treatment processes vary depending on the water supply. The process used at the Upper San Leandro and Sobrante water treatment plants has six steps. The Orinda, Lafayette and Walnut Creek water treatment plants use only three steps (coagulation, filtration, and disinfection) because the water they receive needs less treatment.

**Coagulation** Coagulants are added to the water in large basins. The coagulants help tiny particles of dirt and plant debris in the water to clump together by neutralizing the charge of the particles.

**Flocculation** The water is gently mixed, which causes sediment particles to combine. When the particles get large enough, they can settle to the bottom of the water.

**Sedimentation** The water is moved to another basin where it flows very slowly to allow the sediment particles to settle to the bottom. This step removes about 85 percent of the particles from the water. Water for the next step is collected from the top of the sedimentation basins.

**Ozonation** At Sobrante and Upper San Leandro water treatment plants, ozone is used to improve taste and reduce musty odors that occur occasionally due to algae blooms in the reservoirs that provide water to these plants. Ozone also helps disinfect water and control disinfection by-products that form when natural organics in water come into contact with chlorine, which is added in the final water treatment step.

**Filtration** The almost-clear water from the sedimentation basins flows into deep, concrete-walled boxes. At the bottom are filter beds made up of layers of sand and anthracite. Any remaining particles are trapped in the anthracite and sand as the now-clean water flows down and through the rest of the filter bed into a collecting system.

**Disinfection** The addition of chloramine, which combines low levels of dilute chlorine and ammonia, protects public health by killing any remaining microorganisms such as bacteria or viruses. As water leaves treatment plants it is chloraminated to ensure that the low level of disinfectant required by regulations remains in water as it is distributed to customers.



# Resource Management and Protection

Environmentally sound management protects water quality and natural resources while providing appropriate public access.

## Land Management

EBMUD owns 54,605 acres of protected watershed land in the East Bay and in the Mokelumne River Basin, including 12,765 surface acres of water in the reservoirs.

EBMUD lands are managed with the guidance of watershed master plans that enable EBMUD to offer recreation programs and offset the costs of land management through careful selection and management of compatible land uses. EBMUD has partnered with the U.S. Fish and Wildlife Service to create added protections for endangered species through a habitat conservation plan in the East Bay and a Safe Harbor Agreement in the Mokelumne watershed.

**Watershed Protection** Preventive management is a key element of EBMUD's environmentally sensitive watershed management programs. EBMUD minimizes the use of pesticides and chemicals on the watershed through integrated pest management

Watershed lands like Pinole Valley (pictured) provide critical links for the regional Coast-to-Crest and Bay trails. EBMUD manages 65 miles of trails for hiking and horseback riding through undeveloped East Bay watershed land and 31 miles of trails in the Mokelumne watershed. Backcountry trails in the East Bay and Mokelumne watersheds require a permit, which is available for a nominal fee.



acres of invasive non-native plant species in the East Bay. Several local schools have been involved in replanting programs that increase the number of native plants and trees such as valley oaks and California redwoods.

**Mitigation Bank** EBMUD-owned land in Pinole Valley is being evaluated as a site for a mitigation bank for endangered species. As an initial step, EBMUD plans to establish a 370-acre bank at Oursan Ridge that will provide credits for California red-legged frogs and Alameda whipsnakes. If developed, the Pinole Valley Mitigation Bank would preserve approximately 3,000 more acres as open space while generating revenue through sales of mitigation credits for Alameda whipsnake, California red-legged frog, wetlands, oak woodland, and steelhead. The mitigation credits would be used by EBMUD or sold to public agencies or private entities to mitigate for environmental impacts of their projects within the bank service area.

## Fishery Program

EBMUD protects and enhances the riparian environment along the Mokelumne and works with local landowners, state and federal agencies, and others to ensure a healthy fishery.

**Salmon Run** Conditions off the central California coast influence the survival of juvenile salmon that migrate from the Mokelumne River through the Golden Gate, rear in the ocean, and then return. Survival often declines in dry years with warmer ocean temperatures and increases in wet years with cool

## Recreation Services at EBMUD Reservoirs and on the Mokelumne River

Facility	Availability	Hiking	Boating	Fishing	Picnicking	Children's Play Area	Camping	Water Sports
Camanche	Year-round		•	•	•		•	•
Chabot	Year-round	•	•	•	•			
Lafayette	Year-round	•	•	•	•	•		
Mokelumne Day Use	Year-round	•	•	•	•			
Pardee	Feb-Oct		•	•	•	•	•	
San Pablo	Feb-Oct	•	•	•	•	•		

Details on the programs at these facilities are available at [www.ebmud.com](http://www.ebmud.com).

ocean temperatures. In 2009-10, ocean conditions were favorable for juvenile salmon. In part due to these conditions, a record number of salmon (over 18,500) returned to the Mokelumne in 2011. Over 12,000 returned in 2012.

**Protecting the Fishery** EBMUD and its partners (California Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service) use many strategies to protect the fishery, including minimizing non-native predators along the Mokelumne, improving riparian habitat, optimizing river operations for rearing, and operating the most modern salmon hatchery in the Central Valley.

The Delta is a complex system of waterways. It's easy for salmon to lose their way and end up in a different waterway than their natal stream. In recent years, EBMUD has generated pulse flows on the Mokelumne to mimic fall storm flows (and, when possible, state officials have closed the Delta cross channel during the peak up-migration period) to attract fish upstream past other tributaries and help more Mokelumne-origin salmon find their way back home.

EBMUD has created and improved salmonid spawning and rearing habitat along several miles of the river. Efforts also have included stabilizing stream banks, removing invasive plants, and planting native shrubs and trees.

EBMUD and its partner agencies believe that by improving habitat, modifying hatchery practices, better

coordinating Delta operations and continuing the robust scientific study program on the river, the Mokelumne salmon return will continue to increase and be a model for recovery on other Central Valley river systems.

## Recreation

EBMUD offers a wide range of recreation facilities. Reservoir uses are carefully controlled to protect water quality. All reservoirs except Camanche prohibit body contact recreation. In addition to the services on the chart above, EBMUD also manages the Camanche Hills Hunting Preserve, which offers hunting for upland game birds, a flighted mallard program and an extensive sporting clays course.

**Boating Restrictions** Boating is allowed on many reservoirs. Boat motor restrictions protect the water. EBMUD also inspects all boats for standing water that may contain quagga and zebra mussels and prohibits boats that have been in infected and potentially infected areas from launching at EBMUD reservoirs.

EBMUD developed a take-out facility that provides rafters and kayakers a place to exit the Mokelumne River at Middle Bar (above Pardee Reservoir).

After observing the spread of quagga and zebra mussels to reservoirs across the United States, EBMUD determined that the destructive and invasive species posed a threat to local reservoirs. The mussels have been shown to cause damage to water system facilities and to devour food and nutrients and starve native species.

An EBMUD-sponsored state law requires all California water storage reservoirs to implement programs like EBMUD's to prevent the introduction of these invasive species.



# The Wastewater System

More than 60 years of protecting San Francisco Bay.

Before EBMUD's wastewater treatment plant began operating untreated sewage flowed from city sewer systems into San Francisco Bay. In 1951, EBMUD's

wastewater treatment plant began cleaning the waste stream and improving the health of the Bay. Over the past 60 years, EBMUD's programs have

evolved and today the emphasis is on preventing pollution at the source and finding ways to generate energy and reuse elements from the waste stream.

EBMUD's wastewater programs use sound science to protect public health and the Bay. Proactive efforts help protect the Bay waters, minimize air emissions and keep waste discharges low. In collaboration with other agencies, EBMUD is developing watershed solutions to challenging San Francisco Bay water quality issues.

EBMUD's wastewater programs will continue to protect San Francisco Bay by seeking effective wastewater and wet weather flow management solutions that will meet increasingly complex and stringent regulatory requirements, while keeping rates affordable for customers.

## Treating Wastewater in the East Bay

In 1944, local residents voted to have EBMUD provide wastewater treatment services for a 70-square-mile area with a population of 593,000. When EBMUD's plant began operating on November 15, 1951, the wastewater flow was 55 MGD. Today, EBMUD treats domestic, commercial and industrial wastewater for 650,000 customers in an 88 square mile area in the East Bay. The average flow into the plant was 63 MGD in 2012.

The wastewater service area includes the cities of Alameda, Albany, Berkeley, Emeryville, Oakland and Piedmont, and the Stege Sanitary District, which includes El Cerrito, Kensington and part of Richmond. Each of these entities operates a sewer collection system that discharges into EBMUD's intercepting sewers.

EBMUD owns and operates a network of 15 wastewater pumping stations, 29 miles of concrete interceptor sewers, and 8 miles of force mains that convey wastewater to the wastewater treatment plant in west Oakland near the entrance to the San Francisco-Oakland Bay Bridge.

## Reusing the Waste Stream

EBMUD is an industry leader in finding ways to reuse the waste stream that protects the Bay and reduces customer costs.

### Generating Renewable Energy

EBMUD capture methane gas produced from the wastewater treatment process and turn it into power. In 1985, EBMUD installed a 6.3-megawatt power generation plant to recover energy from methane gas, meeting 50 percent of the electrical needs of the plant. In 2011, the addition of a 4.6-megawatt low-emissions turbine allows the wastewater treatment

plant to generate an abundance of power—and sell renewable energy generated from waste back to the grid.

In addition to treating waste received through the sewer collection system, EBMUD accepts high-organic waste streams delivered in trucks such as domestic waste from septic tanks, fats, oil and grease from restaurants and other food and drink wastes. These organic materials can also be processed to generate renewable energy.

**Generating Reusable Organic Material** Biosolids management helps local communities reduce the amount of materials going into landfills. Biosolids are the solid, stabilized organic material removed from wastewater. About 75,000 wet tons of biosolids are produced annually and beneficially used as a soil amendment in land applications or as alternative daily cover at nearby landfills.



A wastewater plant operator collects a sample of liquid oxygen. EBMUD's pure oxygen production facility is used in the secondary treatment phase of wastewater treatment.

## Preventing Pollution at the Source

EBMUD educates residents and businesses on steps they can take to help protect the Bay by choosing safer products and not dumping hazardous chemicals down the drains.

EBMUD's wastewater service area includes more than 20,000 commercial and industrial businesses. EBMUD helps these facilities monitor and pretreat their waste stream, so that materials discharged into sewers comply with local and state regulations.

**Removing Heavy Metals** Businesses are required to remove such toxics as heavy metals and organic pollutants by using best management practices, process controls and/or pretreatment. In 1972, EBMUD began working with and monitoring business practices to help control pollution at the source. By 1977, EBMUD was able to show a 98 percent reduction in the quantity of heavy metals discharged into the Bay.

**Removing Toxics** EBMUD partners with many groups to keep toxics out of the Bay. By collaborating with industry groups to develop and promote best management practices, EBMUD helps local businesses adopt effective business practices that protect the environment. Today, local dental offices release less mercury into the sewer system and more automotive repair facilities recycle and/or properly



dispose of radiator coolant and other solvents and lubricants.

**Educational Partnerships** EBMUD partnerships with public agencies and Bay protection groups have helped educate community members on what materials should not be put down the drain. Programs to collect unused pharmaceuticals and household fats, oils and grease, and to encourage wise choice of cleaning products all help protect San Francisco Bay.

In addition to sewage, the wastewater treatment plant accepts discarded materials like food grease and scraps that might otherwise go to landfill. It uses them, like a "green factory", to create renewable and beneficial products.

## Controlling Rainwater for a Cleaner Bay

In the 1980s, stormwater-related issues created a challenge for EBMUD and local cities whose sewer systems connect to EBMUD's wastewater treatment plant. Deteriorated community sanitary sewer pipes and improper storm drain connections were allowing rainwater into local communities' separate sanitary sewer systems during storms, causing overflows at more than 175 locations. EBMUD and the communities developed a regional solution and launched a program to collect and manage storm flows.

EBMUD spent \$325 million between 1988 and 1998 to build a wet weather collection and treatment system to keep raw sewage from entering the Bay when heavy rainfall overwhelmed the system. EBMUD can handle up to 415 MGD of short-term wet weather flows. The communities invested more than \$360 million in sanitary sewer system improvements. That program significantly increased protection of the Bay and was successful in meeting its objectives.

**A New Wet Weather Program** Despite the progress made, the system

today is still unable to handle the storm drainage from the communities, where sewer pipes leak heavily during rainstorms. In 2011, following a lengthy process of collaboration with regulators and others who work on the continued protection of San Francisco Bay, EBMUD and the communities launched a program to invest in further improving wet weather flow management.

EBMUD is investing in wastewater infrastructure. Communities are developing plans to assess and fix damaged sewer pipes and EBMUD is providing technical support to help the

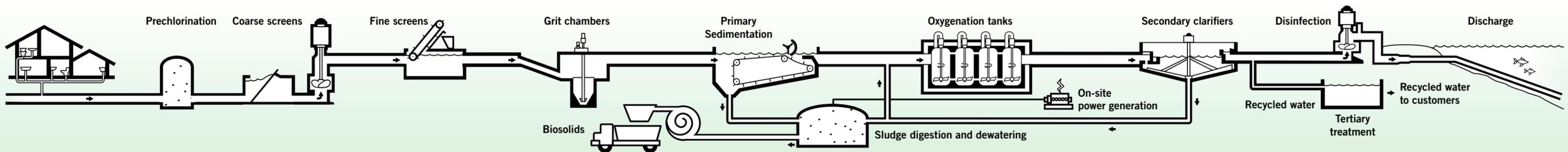
communities. City and EBMUD pipes will be inspected, cleaned and monitored.

In partnership with the EPA and the Regional Water Quality Control Board, a regional private sewer lateral program now requires owners selling a property to inspect and repair their sewer lateral if needed. It also mandates that anyone conducting a major remodel or changing the size of their water meter needs to go through the same process.

Fixing the source of inflow and infiltration into sewers during rainstorms is the best way to protect the Bay.



To protect San Francisco Bay, EBMUD's wastewater programs focus on preventing pollution at the source.



**The Process** Preliminary treatment screens untreated wastewater (influent) to remove rags, rocks, paper and debris, and then passes it through grit removal tanks that remove sand and silt. Concentrated household bleach (sodium hypochlorite) is added to help control odors.

**Primary treatment** occurs in large tanks, where floating material such as oils and grease are removed and organic solids that are heavy enough are allowed to settle. EBMUD can process up to 320 MGD through primary treatment.

**Secondary treatment** uses biological microorganisms (biomass) that break down and remove organics still present in the wastewater after primary treatment. Pure oxygen helps the biomass thrive and work efficiently. Large basins settle out the biomass sludge and separate it from the final treated wastewater effluent. EBMUD can process up to 168 MGD through secondary treatment.

**Disinfection** The treated wastewater is disinfected, dechlorinated and then discharged 1.2 miles off the East Bay shore through a deep water outfall into San Francisco Bay.

**Sludge digestion and dewatering** Large anaerobic digester tanks treat the settled solids from primary treatment and the biomass sludge separated during secondary treatment. These digesters use natural microbial activity to stabilize the biosolids, a process that takes 15 to 20 days. High-speed centrifuges remove excess water at the end of the process.

**Recycled water** Some of the water processed through secondary treatment is further treated and then recycled for irrigation, commercial and industrial purposes in Oakland and Emeryville. Future expansion will distribute recycled water into Alameda, Albany and Berkeley.

# Budget, Rates and Workforce

EBMUD is an enterprise special district, committed to providing essential public services.

## Budget

EBMUD's revenues come from a variety of sources, including sales of water and hydroelectric power, meter service charges, sewage treatment charges and a wet-weather facilities charge. The 2012 fiscal year budget was \$595.3 million for the water system and included \$222.9 million in capital improvement appropriations. The wastewater system budget of \$127.3 million included \$38.3 million in capital improvement appropriations.



## Rates and Charges

As an enterprise special district, EBMUD sets rates and charges to cover the costs of the services it provides. Most customers are billed every two months. Some large commercial and industrial accounts are billed monthly.

Water service charges have four elements:

- A service charge that covers the cost of the water meter, fire protection, customer billing and services. It is based on the meter size.
- A seismic surcharge that pays for system-wide seismic improvements.
- An elevation surcharge that covers the energy costs of pumping water to properties located at higher elevations.
- A charge for the amount of water used. To encourage wise water use, single family use charges increase across three tiers based on the volume of water used. The first tier is set at typical indoor water use levels.



In 2012, a typical residential water customer used 270 gallons of water a day and paid \$40.98 per month.

Wastewater treatment charges have three components.

- A charge based on wastewater strength and volume.
- A San Francisco Bay pollution prevention fee. This fee pays for services to reduce the discharge of pollutants from commercial customers and educate customers on actions at home that help keep the Bay clean.
- EBMUD provides billing services for five of the seven agencies that collect sewage and deliver it into EBMUD's wastewater treatment system. Those charges also appear on some customer bills.

In 2012, the average residential wastewater treatment customer paid \$16 per month.

## Equity in Contracting

In 1984, EBMUD adopted its first policy to ensure all businesses would get equitable opportunities to contract with EBMUD. Each year, EBMUD renews its policy that commits the organization to nondiscrimination, to promoting small business and local business participation in contracts, and to enabling all qualified contractors to compete for contract awards.

EBMUD contracting with historically underutilized businesses (ethnic minorities and white women) has grown from approximately 8 percent in 1984 to 21 percent in 2012.

## Workforce

EBMUD is a major Bay Area employer, with approximately 1,800 employees working in a broad range of trades, as well as technical, administrative and scientific fields.

Operating and maintaining the complex systems that deliver safe water supplies and treat waste streams requires working around-the-clock, 365 days a year. Plant operators, crews and dispatchers work each night to maintain service and promptly resolve problems.

EBMUD focuses on ensuring safe working environments and safe work practices for its crews and all employees. EBMUD devotes 11,500 hours to

workplace health and safety training annually, conducts approximately 120 jobsite inspections, and audits numerous facilities. Lost-time injuries per 100 employees were 2.7 in 2012.

EBMUD professional developmental academies help employees prepare for promotional opportunities. EBMUD works with local community colleges and non-profit organizations to support preparation by external candidates for EBMUD job opportunities. In 2011, EBMUD sponsored a Plumber Training Program with Laney College to prepare students for plumber job opportunities in the water industry. EBMUD seeks a workforce that is representative of California's diverse labor force.



# EBMUD Historical Highlights

- |      |   |      |  |      |   |
|------|---|------|--|------|---|
| 1923 | Election authorizes the formation of a regional utility district                              | 1978 | Full secondary wastewater treatment system begins operating to further protect the Bay     | 2010 | Dry-year supplies for the East Bay become available from the Sacramento River   |
| 1929 | First Mokelumne River water delivered to customers in the East Bay                            | 1983 | Renewable energy production begins at Sierra reservoirs (hydropower)                       | 2011 | National law adopted to get lead out of drinking-water plumbing based EBMUD-sponsored state law   |
| 1944 | Election authorizes EBMUD to provide regional wastewater treatment                            | 1984 | Recycled water sales begin   | 2012 | EBMUD becomes the first utility in the nation to generate net renewable energy by capturing methane gas from the wastewater treatment process |
| 1951 | Wastewater treatment system begins operating to protect San Francisco Bay                     | 1985 | Renewable energy production begins at wastewater treatment plant                           |      |   |
| 1970 | Watershed Land Use Master Plan adopted  | 1986 | Regional wet weather program established to minimize storm-induced sewer overflows         |      |   |
| 1977 | Driest year in EBMUD history; mandatory rationing required and conservation programs expanded | 1993 | Lower Mokelumne River Management Plan assures reliable water supplies and sustains fishery |      |   |

*For an expanded historical timeline, please visit the District history page at [www.ebmud.com](http://www.ebmud.com).*

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