

Drought to Deluge

2016–2017 Biennial Report



Pardee Dam



Between 2015 and 2017, water and wastewater agencies had to rapidly adjust from prolonged drought to managing one of the wettest rain years in Northern California's history. These events tested the East Bay Municipal Utility District (EBMUD) and showed that planning and forethought, investment, and decades of work paid off.



Throughout these two years, our flexibility prepared us to manage a sometimes unpredictable future. EBMUD's use of emergency water supplies combined with customer conservation got us through a challenging dry time. Then in the winter of

2016-2017, heavy precipitation reminded us of the importance of planning for all scenarios—something at which our staff excel.

Part of that planning is to forge stronger partnerships with Bay Area water agencies and upcountry partners so we can all benefit from shared improvements. We are looking at participating in the Los Vaqueros Reservoir Expansion with the Contra Costa Water District. We also are keeping a watchful eye on California WaterFix to protect our lifeline to the East Bay—the Mokelumne Aqueducts—as well as our fisheries' investments and customers' pocketbooks.

Going forward, our focus will be on infrastructure maintenance. The staff that came before us created a well-designed system. Now, it's our turn to maintain and upgrade this system. We will continue to prioritize pipeline repairs, identify and repair leaks and reduce water loss. As we ramp up pipeline replacements to 15 plus miles each year, you'll see District construction crews hard at work in the communities we serve.

We are undertaking comprehensive workflow and materials evaluations to cost effectively increase pipeline replacements to 20 miles a year in the near future.

Work is underway to renew ozone systems at two water treatment plants and advance new methods to tackle water quality challenges. We will continue our testing for lead in schools and at customer taps and advance our rehabilitation of oversized reservoirs to improve water quality.

Dam safety is also on the top of our minds. The Federal Energy Regulatory Commission and the State of California Division of Safety of Dams are requiring dam owners to study their spillways. Some studies of EBMUD dams are underway, with others scheduled next year.

Both the water and wastewater systems require monitoring to ensure we continue to meet stringent water quality and environmental regulations. Wastewater infrastructure projects underway include repairing interceptor pipes that collect sewage from cities along the East Bay shore, improving odor management at our treatment plant and implementing lessons learned from this past wet year to prepare for future wet weather events.

We will continue to develop services through our contact center, online, social media platforms and throughout the organization to engage with our customers.

Finally, I thank EBMUD staff for the work they've done and will do. Together, we keep the District financed, planned, managed, responsive and maintained. We are all a part of the District's future.

ALEXANDER R. COATE
General Manager



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Our Mission

Drought

From 2012 to 2015, California endured four years of historic drought, with low water storage levels not seen in decades. East Bay customers responded, using an average of 24 percent less from July 2015 to June 2016 (Fiscal Year 2016) when compared to Fiscal Year 2013. But looking at the bigger picture revealed an even more drastic drop—30 percent less water consumption than the average during 2005-2007. EBMUD hasn't seen customers need for water dip this low since 1978.

THE DROUGHT TEST

Years of creative drought planning proved invaluable as EBMUD added alternate water sources to its traditional Mokelumne River supply. This included water from the Sacramento River in 2014 and 2015 under our United States Bureau of Reclamation Central Valley Project contract, as well as water transfers from Placer County Water Agency, Reclamation District 1004 and Sycamore Mutual Water Company.

On May 10, 2016, with the rain year-to-date total at 48.89 inches (106 percent of average), EBMUD declared the water shortage emergency over and the excessive use penalty ended. On July 1, 2016, the 25 percent drought surcharge was discontinued, and EBMUD asked customers to continue using water wisely.

LESSONS LEARNED

The many decades of planning and preparing for the drought proved essential in the District's successful response. Although faced with significant challenges, EBMUD was able to meet or exceed the District's key goals and objectives while providing customers' with a reliable supply of water, complying with state mandates, protecting the environment, providing responsive service, and practicing fiscal stewardship. Droughts are dynamic and complex, as well as disruptive and costly for EBMUD, our customers, and the community. The District will continue to plan for and invest in long-term water supply and conservation to meet our current and future water needs.

Mokelumne Basin Precipitation

- Average precipitation is 48.28 inches
- 2016: 49.74 inches (103% of average)
- 2017: 82.10 inches (171% of average)

East Bay Precipitation

- Average precipitation is 26.76 inches
- 2016: 25.30 inches (95% of average)
- 2017: 41.11 inches (153% of average)

Runoff

- Runoff in water year 2016 was 705 thousand acre feet (TAF), which was 93% of average.
- Runoff in water year 2017 was 1,925 TAF, more than 250% of average and the most on record.



Deluge

In winter 2016-2017, water operators who had just stopped managing drought faced the daily challenge of managing excess rain and snowmelt impacts on reservoir storage. In October 2016, the Mokelumne watershed received 11.12 inches of precipitation, making it the wettest October on record (421 percent of average).

With massive precipitation and snowpack in 2017, Camanche Dam released water at the maximum channel capacity of 5,000 cubic feet per second for 82 days.

This is the greatest number of days of maximum release since construction of the dam in 1964. EBMUD dams controlled flows in the Lower Mokelumne River in ways that protected downstream residents—a good reminder that dams serve not only to store water but to provide flood protection.

Ultimately, the Mokelumne rain year total was 82.1 inches (171 percent of average) and the total runoff received from the Mokelumne River watershed was over 250 percent of average.



Pardee Dam spillway after heavy rains and runoff in spring 2017.

WET YEAR CHALLENGES

In early 2017, heavy rains meant saturated soils throughout the East Bay. In January, we declared a District emergency to repair a creek-side slide which placed the Briones Aqueduct—a critical water pipeline used to fill Briones Reservoir and deliver drinking water from the reservoir to area treatment plants—at risk. Contractors quickly installed riprap to secure the hillside and protect San Pablo Creek before further storms arrived.

We completed this work just as constant storms caused high levels of turbidity (cloudiness due to natural particles) to appear in Pardee Reservoir water. Our solution was to shut down all three Mokelumne Aqueducts that deliver water from Pardee Reservoir 90 miles to the East Bay and use less turbid water from local reservoirs to serve customers. EBMUD used the Briones Aqueduct until the Mokelumne Aqueducts returned to service in late March, when turbidity levels returned to normal.

In the East Bay, water releases from local reservoirs, including San Pablo, Upper San Leandro and Lafayette, were common in early 2017 as EBMUD

created space for continued rains. Our staff constantly balanced water supply, inflows, releases and spills during the wild swings in nature's rainfall patterns, and our dams protected downstream neighbors and stored spring snowmelt and rain.

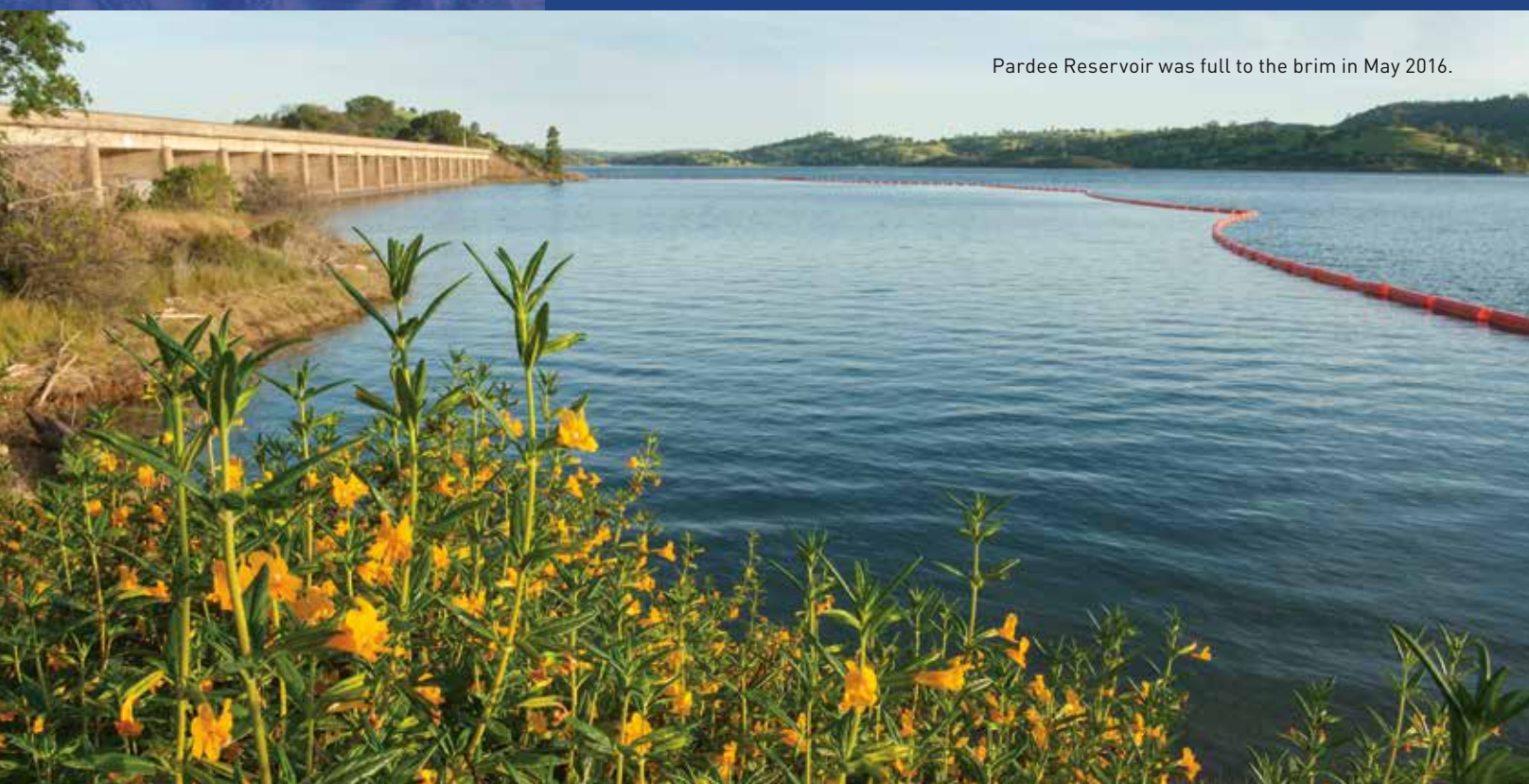
KEEPING DAMS, AND OUR WATER SUPPLY, SAFE

EBMUD dams and spillways performed well even in this record rainfall year. However, the 2017 Oroville Dam spillway incident highlighted the need for further inspections of California dams. As always, EBMUD is working closely with the State of California Division of Safety of Dams and the Federal Energy Regulatory Commission (which regulates dams that generate hydropower—our Pardee and Camanche Dams) to reconfirm all our dams are safe and operating well.

This safety is a reflection of our commitment to our infrastructure. In recent years, extensive upgrades occurred at Pardee, Upper San Leandro and San Pablo Dam spillways. EBMUD completed retrofits to strengthen the San Pablo Dam and Chabot Dam embankments. Upgrades to the tower at Upper San Leandro are underway, and

tower upgrades at Briones Reservoir are being designed. In September 2017, the Division of Safety of Dams rated 21 of EBMUD's 22 state-inspected dams at the highest safety rating—'Satisfactory.' The one remaining dam, Lafayette Reservoir Dam (built in 1927), was ranked second highest —'Fair' due to needed outlet tower seismic upgrades. EBMUD is working to design and complete this work within our approved Capital Improvement Program before 2022.

The Mokelumne Aqueducts are another critical piece of our water system infrastructure. These large pipes cross the fragile Sacramento-San Joaquin Delta levee system. EBMUD partnered with the Reclamation Districts, the Department of Water Resources and the Delta Stewardship Council to spend \$41.4 million to rehabilitate 40 miles of the 55 miles of levees that protect our aqueducts and to improve critical pipes in the Delta. In the coming years, we are strengthening another 9.2 miles of Delta levees whose failure could endanger the Mokelumne Aqueducts. Our 12th phase of a 13-phase, \$34 million program is also underway to recoat the aqueducts to prevent corrosion.



Pardee Reservoir was full to the brim in May 2016.



Planning for the East Bay's Future Water Supply

SECURING WATER SUPPLIES

After 16 years of work, EBMUD secured a time extension and Change Petition for the District's Camanche Water Right. This vital water right is essential for a dependable water supply, allowing EBMUD to store water in Camanche Reservoir and use the full capacity of EBMUD's aqueduct system.

EBMUD's Mokelumne River supplies are protected by two state water rights: a 1926 water right for Pardee Reservoir and the Camanche water right permit (granted in 1956), which allows the additional diversion of 125 million gallons per day of water from the Mokelumne River. The Camanche permit required that the need for the water be demonstrated by December 1, 2000. To maintain this permit, in

November 2000, EBMUD requested a 40-year time extension which the state approved on August 3, 2016.

THE PLAN AHEAD

EBMUD's system was created by visionary engineers and planners nearly 100 years ago. Planning water supplies for the next generation, and the next, requires an accurate water supply roadmap that considers known changes and anticipates variables. Our Urban Water Management Plan, which is updated every 5 years, entails review of EBMUD water supplies and customer use. We look 30 years into the future, taking into account development, population projections, climate change, precipitation in normal and drought years, recycled water and conservation and we incorporate plans from recent droughts.

WATER SYSTEMS WORK STRONGER, TOGETHER

California water systems evolved to meet the needs of local communities that invested in them. They were not originally designed to integrate as a whole.

Eight Bay Area water agencies serving a combined 6 million customers are changing that by exploring ways to pool infrastructure to improve water reliability in the region. The agencies (EBMUD, Contra Costa Water District, San Francisco Public Utilities Commission, Santa Clara Valley Water District, Alameda County Water District, Zone 7 Water Agency, the Bay Area Water Supply and Conservation Agency and Marin Municipal Water District) published a Drought Contingency Plan in summer 2017. This is the first effort to review Bay Area water systems comprehensively and coordinate drought planning efforts into a regional plan. The plan outlines 15 projects that work to solve future drought challenges through a regional effort. This collaboration has built opportunities for EBMUD to look outside of our system and our rate-funded finances to seek regional solutions that support the Bay Area's future needs.

Monitoring Delta Solutions

EBMUD is monitoring the California Department of Water Resources' California WaterFix and the State Water Resources Control Board's Bay-Delta Water Quality Control Plan efforts to resolve water supply, farming, fish, and salinity issues in the Sacramento-San Joaquin Bay Delta. We continue to support solutions for these Delta challenges, including providing feedback on the proposed new intakes for the State Water Project and Central Valley Project—WaterFix's Twin Tunnels—while protecting our customers' finances, our infrastructure and the environment.

Reimagine Your Landscape.

Save 30–60 gallons per 1000 sq. ft. each time you water!

Water Conservation. IT'S FOR LIFE.

ebmud.com

Swapping out a thirsty lawn for a drought-tolerant garden—and getting a rebate—remains a favorite way for customers to save water.

Relying on Sustainable Supplies

SAVING FOR TOMORROW

Conservation works. Though the drought cost \$75 million for emergency water purchases, depressed water sales, increased demand for conservation services and added operational costs, this is still far less expensive than the cost and environmental impact of developing new water supplies. Our customers' conservation played a key role in meeting water supply needs during the drought and is an integral part of our water supply planning.

PROGRAMS TO HELP

State regulations now require homeowners to install water-efficient fixtures. As a result, we wrapped up two of our largest rebate programs. EBMUD's high-efficiency toilet rebates and clothes washer rebates ended on Dec. 31, 2016. Over the past 23 years, we offered rebates on 206,000 water-efficient fixtures and issued \$16.7 million in incentives to make water-efficient products a household staple.

We continue to help homeowners with home water reports which provide comparative water use data, tailored tips and most recently, leak alerts, for more than 96,000 households. We review plans for all new water service applications to ensure installation of efficient plumbing fixtures and landscapes so new homes are built smart from the start.

We partner with the professional landscape community to champion best practices for water-efficient design, maintenance and irrigation. Our Landscape Advisory Committee unites the expertise of landscapers, architects, plant growers, nursery owners and maintenance workers.

EBMUD received a grant from the United States Bureau of Reclamation to install 3,000 automated meters for some of our largest customers to study water and energy savings. Additionally, under a California Public Utilities Commission project, EBMUD partnered with PG&E to study smart water meters on 10,000 randomly selected single-family residential accounts. UC Davis will support this study by analyzing the connection between energy and water

savings. EBMUD received \$1.25 million in grant funding for both projects. Meters will be installed beginning in 2018.

To help customers better manage their water use, EBMUD is pushing forward with technical tools and information including geographic information systems (GIS), accurate weather data for irrigation schedules and enhanced water management tools and information. We also are expanding leak detection and helping multi-family customers reach efficiency goals indoors and out.

REUSING A PRECIOUS SUPPLY

EBMUD continued to grow its recycled water infrastructure and sustainable water supply. We completed 3.5 miles of recycled water pipelines in Bishop Ranch in San Ramon in fall 2016, and

How EBMUD customers conserved during the drought

3 million
square feet
of lawn replaced

6,000
clothes washers
upgraded

4,400
toilets
replaced

Our data shows that customers maintain their new conservation habits even after droughts end. Changes put in place during drought such as lawn removal and fixture upgrades provide water savings for years to come. EBMUD remains committed to long-term conservation and we continue to help residents and businesses use water wisely.

connected new customers including San Ramon's Central Park and Iron Horse Middle School. When EBMUD's San Ramon Valley recycled water system is complete by 2040, it will bring 2.4 million gallons per day of recycled water to portions of Blackhawk, Danville and San Ramon.

For customers near the 680 corridor, EBMUD and Dublin-San Ramon Services District (DSRSD) continued our regional partnership by breaking ground on the DSRSD and EBMUD Recycled Water Authority (DERWA) recycled water expansion, projected to increase regional recycled water treatment capacity by 70 percent (from 9.7 to 16.2 million gallons a day).

Along the East Bay shore, EBMUD completed a one-mile recycled water pipeline extension in Emeryville at Shellmound Street. EBMUD also provided more than 2 million gallons of recycled water each year to commercial users at our wastewater treatment plant truck fill station. We also provided nearly 4 million gallons of recycled water for runway construction at Oakland Airport in 2015.

WATER UNDER OUR FEET

In many parts of California, people rely daily on underground aquifers. In EBMUD's service area, customers use water primarily from Pardee Reservoir in the Sierra foothills and local runoff into East Bay reservoirs. While we don't regularly use our groundwater resource, EBMUD is working to responsibly manage this supplemental supply and to preserve it for future generations.

In the East Bay, we are now the Groundwater Sustainability Agency for our portion of the East Bayside Plain Groundwater Basin and have tested injection at the Bayside Groundwater Project in San Leandro.

In the Sierra foothills, the San Joaquin County Board of Supervisors approved the Demonstration Recharge Extraction and Aquifer Management (DREAM) project. This multi-agency effort will establish the storing of wet year water supplies in the groundwater aquifers under San Joaquin County, and allow EBMUD, and others, to extract banked groundwater in dry years.

Our Take a Drink from the Sink campaign reminded customers that mountain snowmelt, treated and delivered right to the tap, is healthy, economical, and delicious.



Snowflake to the Bay

A great water source—Sierra snowmelt via the Mokelumne watershed—naturally leads to great water for customers. In addition to planning for long-term needs, the EBMUD team works day and night to deliver the best water quality, and we do. Our water met or surpassed all state and federal standards and we conducted thousands of tests to confirm its high quality and to guide water operations.

Exceptional events, however, in the past few years have challenged our water quality experts: increased concerns from the public about lead in water after the Flint crisis, historic drought with high temperatures and algae blooms and resulting higher levels of disinfection byproducts in drinking water.

To address these concerns, we have new programs and information for customers to further ensure our goals are met.

GETTING THE LEAD OUT

The most common source of lead exposure to people is lead paint. Rarely, lead in old pipes or fixtures can cause problems. To empower customers, EBMUD began a free lead testing program in spring 2017. With this new program, customers can have a certified lab test their home tap water for lead at no charge. And EBMUD is working with hundreds of schools throughout our service area to test for lead in water coming from campus plumbing.

MINIMIZING BY PRODUCTS

Though present in all chlorinated drinking water, disinfection byproducts were on the rise in the first half of 2017, reaching levels not seen since the mid-2000s. They form when chlorine, used to kill pathogens, interacts with organic material, which increased with heavy runoff after the drought ended. EBMUD immediately took short- and long-term actions to reduce the amount of disinfection byproducts, including trihalomethanes (THMs).

After detecting changes early, EBMUD increased sampling and flushing, adjusted water treatment and distribution system operations, increased production from treatment plants with lower THMs, and installed a pilot THM removal system. Long-term capital improvements will make water treatment plants more resilient to changes in source water quality. These projects will improve organic material removal, increase water quality in San Pablo Reservoir, and improve disinfection processes.

The East Bay's water continues to meet every federal and state standard, and our experts are carrying on this important work to limit THM formation.

An EBMUD crew prepares to tap into a purple pipe to provide recycled water to San Ramon's Central Park.





Keeping Our Watersheds Healthy

EBMUD's 57,000 acres of beautiful watershed lands in the East Bay and Sierra foothills protect water quality for our customers and local ecosystems.

These open space corridors provide protection and habitat for a variety of plant and animal species, provide a haven for the public to enjoy, and protect our water and waterways.

MANAGING FOR ECOSYSTEM HEALTH

In the East Bay, 29,000 acres of watershed lands surround five reservoirs: Briones, San Pablo, Upper San Leandro, Chabot and Lafayette, plus one basin without a reservoir: Pinole Valley. The East Bay Watershed Master Plan guides the management and protection of these lands. This plan—adopted in 1996—set the stage for our modern range management, fuel management, and recreation programs and created the framework for our threatened species recovery actions in the East Bay.

EBMUD is updating the plan to reflect new developments, potential climate change impacts and to confirm that the approaches initiated over 20 years ago are indeed protecting the watershed. The plan addresses issues such as invasive aquatic mussels and toxic algae, and incorporates habitat conservation, grazing and fire protection, and recreational changes such as limited access for cyclists, discussed at numerous public meetings. The final plan approval is slated for 2018.

PROTECTING DRINKING WATER AND HABITAT THROUGH INNOVATIVE FINANCING

For decades, the Carr Ranch property in Moraga was used for ranching. This undeveloped natural gem provides habitat for endangered species, and its creeks and streams drain into the Upper San Leandro Reservoir. Thanks to an innovative financing approach and a partnership with the John Muir Land Trust, our purchase of the ranch added

604 acres to watershed lands we own and manage. This was a rare opportunity to further protect drinking water here in the East Bay and save this vital property for future generations.

EBMUD crafted a creative plan to fund the \$4.5 million purchase of the property by designating Oursan Ridge, 430 acres of District-owned land near Pinole, as a conservation bank. By managing the conservation bank land to protect the California Red-Legged Frog and the Alameda Whipsnake, EBMUD can sell conservation credits to other utilities or public agencies that must offset the environmental impacts of their projects. The revenues from the conservation bank are expected to exceed \$9 million—double the purchase price of Carr Ranch. Together, the two properties preserve more than 1,000 acres of watershed land forever.

REDUCING THE RISK OF FIRE – NATURALLY

During the past two years, thousands of cattle grazed EBMUD's watershed lands, reducing fire risk and providing brush management. Cattle graze away from the water, and rotate through the grasslands to maintain range health and protect the soil, thereby preserving the watershed and water quality. EBMUD also maintains three horse pastures in the East Bay, whose grazing benefits the land as well as the horses, who can live outdoors as natural herd animals.

EMERGENCY RESTORATION COMPLETE

In early 2015, during a project to replace a 24-inch water pipeline, cellular concrete was inadvertently spilled into a half-mile stretch of Glen Echo Creek near Harbord Drive in Oakland. The material was to fill the abandoned pipe and prevent the

road from settling. As part of our commitment to the environment, EBMUD immediately focused on restoring the area. Biologists monitored the health of insects, plant life and the environment. Newly added river rock stabilized the creek and prevented erosion. Restoration efforts were completed in October 2016. As another part of our restoration work, EBMUD allocated funding to monitor polychlorinated biphenyls (PCB) sediment in the San Francisco Bay.

IT'S FISHY

Healthy river systems mean healthy water supplies. To support a healthy river, EBMUD aims to maximize the number of salmon surviving and returning to the Mokelumne River. In fall 2016, fisheries and river systems across California grappled with the lingering effects of four years of dry conditions. The 2016 fall-run Chinook salmon returns to the Mokelumne River

were an estimated 8,871 fish, including 1,984 fish that spawned in the river and 6,887 collected at the Mokelumne River Fish Hatchery for egg production. While lower than the annual returns of 12,000 each of the previous 5 years, the 2016 return remained 183 percent above the long-term annual average.

In the face of these challenges, EBMUD biologists focused on managing releases from Pardee and Camanche reservoirs to maximize the number of fish attracted to the Mokelumne River. Our biologists also harnessed the power of strong relationships with regional partners to coordinate pulse flows and implement innovative trap-and-haul programs to increase survival of naturally-produced juvenile fish with very promising results.

Current 2017 salmon returns exceeded 19,800 and broke the record for fish returns on the Mokelumne River.

This is your watershed too. EBMUD thanks the volunteers who protect watersheds in the East Bay and Sierra foothills. Here, volunteers from the East Bay chapter of the California Native Plant Society remove invasive plants along the Skyline Trail in the Berkeley Hills, an area with more than 228 native plant species.



In 2016-2017 nearly 4 million visitors enjoyed the raw beauty of EBMUD recreation areas in the East Bay and in the Mokelumne River region.



Renew and Rebuild

To deliver great water to 1.4 million customers in the East Bay, EBMUD relies on a complex water delivery system that includes raw water reservoirs, water treatment plants, and a distribution system with 4,200 miles of pipes, about 164 tanks and 135 pumping plants. EBMUD continuously works to improve our aging infrastructure, strengthen facilities for seismic readiness, and use new technology to maintain excellent service.

UPGRADING THE HEART OF OUR SYSTEM

The Orinda Water Treatment Plant is the largest of our six water treatment plants. In 2016, we shut down the plant and invested \$22 million to improve reliability and ease of maintenance. We eliminated single points of failure by adding backup systems including electrical and chemical system upgrades. Newly rehabilitated filters will use air and water to clean the filters reducing water use.

In advance of the Orinda shutdown, a multi-disciplinary team readied our other treatment plants and distribution facilities to ensure uninterrupted service during the plant outage. All the work was done to modern seismic standards.

BIG BENEFITS FROM DOWNSIZING

We've raised the roof on the new Summit Reservoir in Berkeley. This large open-cut drinking water reservoir, built 120 years ago, was originally 37 million

gallons, which is too large for current and future customer demands. We replaced the old facility with an updated and more seismically stable 3.5 million gallon tank. EBMUD is replacing oversized, open-cut reservoirs and large tanks with smaller facilities to improve water quality and operational flexibility while still ensuring adequate storage for emergencies.

MILES OF PIPES, MILES OF RENEWAL

To quicken the pace of pipe renewal from a historical average of 10 miles per year to 40 miles per year, EBMUD has added staff and is looking at speeding up all phases of pipe projects from planning, to design, to construction. We are investigating new technologies and methods to reduce costs and time, and to minimize the impacts of construction in neighborhoods. We collect data during construction to inform decision making and are also refining how pipes are evaluated for repair or replacement so we can focus on the most important pipes first.

EBMUD's ramped-up pipeline replacement rate increases reliability, reduces costly main breaks and limits disruption to communities. We are proud that we installed 16 miles of new pipe in fiscal year 2017. We project allocating \$40.1 million in Fiscal Year 2018 to replace pipes and another \$20.5 million for aqueducts maintenance and system improvements.



A new concrete roof at Summit Reservoir required 270 yards of concrete. It replaces a larger reservoir and makes it easier to preserve water quality.

HELIIPIPE

Narrow, hairpin turns were a challenge for trucks delivering new pipes to replace an old cast iron main in the Oakland/Berkeley Hills. A staff suggestion to take pipe delivery to the skies resulted in a new way to bring pipes to the construction site.

CAN YOU DIG IT?

EBMUD crews locate and mark underground water lines prior to digging projects. These service vehicles now remind customers: Call before you dig!



Instead of cutting pipes in half, hauling them by truck, and then welding them back together, EBMUD lifted 40-foot long sections of pipe by helicopter. This saved nearly \$500,000 by reducing truck trips and labor costs, and reduced construction time in the streets.

FINDING AND LISTENING FOR LEAKS

EBMUD has approximately 875 emergency main breaks a year. By identifying and fixing leaks before they become larger emergency breaks, we save money, time and spare our neighbors inconvenience. EBMUD's aggressive water loss prevention program includes acoustic devices to detect small leaks. We monitor pipe pressures, since higher pressures can contribute to breaks, and we are testing new satellite imagery technology to locate leaks.

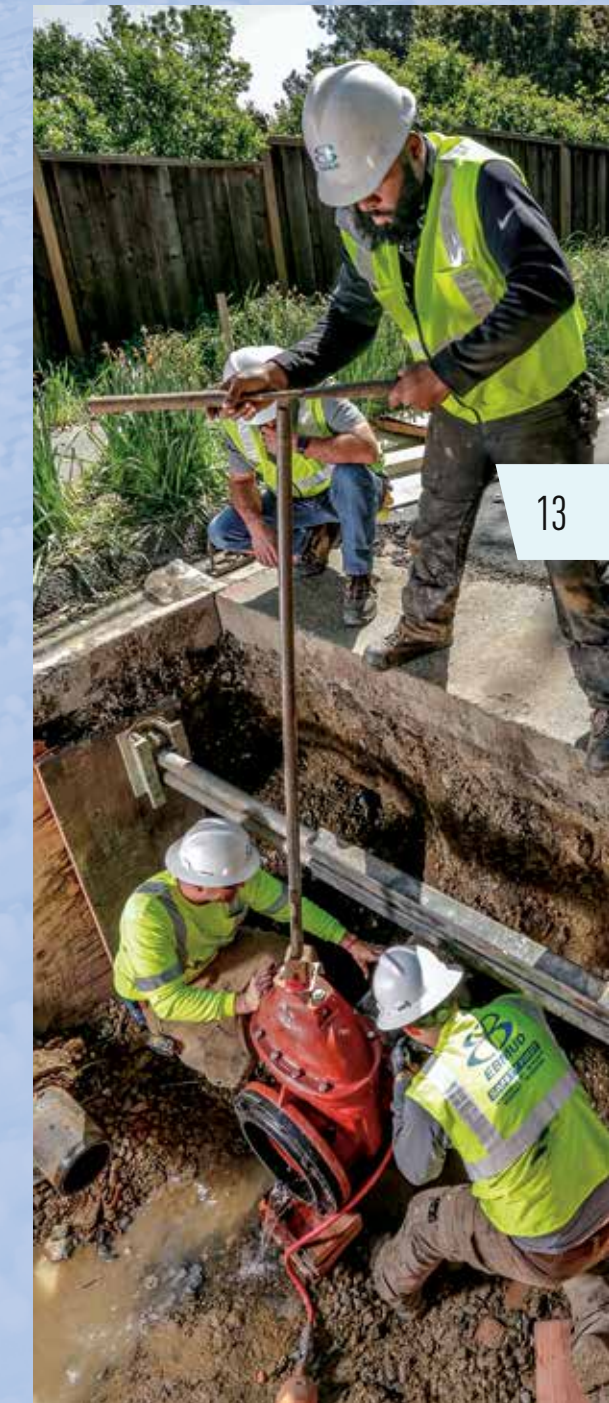
SMOOTH STREETS

When EBMUD repairs a break or installs a new pipe, we repave the portion of the street where we worked.

For years, we have partnered with cities to jointly complete paving, or coordinated schedules so a city can repave after a pipe replacement. In the last two years, EBMUD coordinated seven major projects with the cities of Oakland, Richmond and Orinda, generating nearly 650,000 square feet of newly paved roads, using new, efficient grind-and-overlay techniques that minimize neighborhood impacts.



Thanks to new, reliable materials and creative methods of working, EBMUD is accelerating its rate of pipeline replacement.



Treating Wastewater for a Cleaner Bay

EBMUD's wastewater treatment plant provides an invaluable public service for 685,000 people along the eastern shore of San Francisco Bay. Sewage flows through city pipes then empties into the EBMUD collection system which delivers it to the treatment plant at the base of the Bay Bridge. The plant treats sewage to meet stringent state and federal standards before recycling it or releasing it to the Bay. Before its existence, raw sewage was discharged directly into the Bay, posing serious water quality and health problems.

Between December 2016 and March 2017, our wastewater system operators managed a season of challenging storms and rain-swollen wastewater flows at our plants.

These events underscored the importance of the 2014 Consent Decree. This agreement between the US Environmental Protection Agency, EBMUD, and the cities of Alameda, Albany, Berkeley, Emeryville, Oakland, Piedmont and Stege Sanitary District aims to reduce the amount of rainwater that enters the sewer system during heavy storms. Added rain and overwhelming wastewater flows can result in discharges of partially treated sewage to San Francisco Bay.



This public service campaign reminded East Bay customers to only flush the 3 Ps—paper, pee and poop—and not “flushable” wipes, which wreak havoc on wastewater treatment equipment and make it difficult to keep the Bay clean.

Following our regional work, we are now seeing a reduction in wet weather inflow volumes since 2010. Efforts to locate sources of rainwater inflow and infiltration this past year in the regional wastewater collection system included flow monitoring, smoke testing and manhole inspections. Significant quantities—more than 1,000 meter months—of flow monitoring data was collected to assess how the collection system reacts during storm events. By flowing non-toxic smoke into 65 miles of sewer mains, EBMUD is able to follow the smoke to breaks and cracks

that let rain in. Exactly 864 manhole inspections were performed to gather condition assessment information and confirm drainage patterns in the regional collection system. Additionally, as of the end of Fiscal Year 2017, 25,526 private sewer lateral compliance certificates were issued, representing about 342 miles of private property sewer pipes that are now certified as leak-free.

OUR CONTINUING ACHIEVEMENT

EBMUD was awarded the National Association of Clean Water Agencies Platinum Peak Performance Award for 17 years of 100 percent compliance with our National Pollutant Discharge Elimination System Permit at the wastewater treatment plant. This permit program controls water pollution by regulating sources of waste including municipal sewage discharges. The California Environmental Laboratory Accreditation Program also confirmed the excellent work by the EBMUD laboratory in meeting all regulatory reporting requirements.



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What happens when you flush? EBMUD introduced a new tour program that ushered 679 people through our wastewater treatment plant to find out what happens after dirty water from your toilet, shower and laundry goes down the drain.

MAJOR WORK

Design and construction began on the 3rd Street Interceptor Rehabilitation Project in Oakland. This project will repair a section of 105-inch diameter sewer piping that was originally installed in the 1950s. Innovative construction and odor control approaches were incorporated in the design to reduce project costs and impacts to the adjacent community.

These efforts resulted in a 2017 Award of Excellence for Outstanding Capital Project from the California Association of Sanitation Agencies.

In the meantime, construction began on upgrades to the odor control facilities at EBMUD's wastewater treatment plant at the base of the Bay Bridge. These upgrades will play a significant role in minimizing odors for our neighbors. Ongoing construction projects include the rehabilitation of aging infrastructure and equipment to ensure reliable service for customers and continued protection of Bay Area waterways. In the coming years, we will complete necessary upgrades to our pump stations, sedimentation tanks, and digesters, as well as conduct a seismic evaluation of wastewater treatment plant infrastructure.



EBMUD's Laboratory operates 365 days a year to support water and wastewater operations.



Caring for Customers & Our Employees

Our customers are busy, and we want to make it easier for them to do business with us. We made improvements in service delivery and bill payment options, and provided more ways for customers to access information.

Many of our website visitors come to ebmud.com for one reason: to pay their bill. In summer 2017, EBMUD unveiled a new and improved paperless billing and payment system.



To help customers manage their EBMUD bills, we offer an integrated and secure payment process, options to schedule automatic payments and enhanced payment

services that include a new feature to pay by text. A newly designed portal clearly shows the account balance, and bill and payment history. Since launching, the enrollment rate in paperless bills has tripled—making it easier for more customers to manage their account.

EBMUD is part of the community it serves. As customer advocates, we work to assist all customers. We modified several procedures to ensure fairness; we increased customer assistance outreach and participation and established a Customer Assistance Policy to provide more help to those who may experience difficulty paying their bill.

In addition, interactive website maps now better answer popular customer questions: What is that EBMUD crew doing on my street? Which Board member represents me? Maps allow users to enter their address and find answers quickly. Online tools make it easier to purchase and renew trail permits to visit our watershed land and to sign up for education tours.

In addition to our website, ebmud.com, we also expanded communication avenues with our customers, and are now providing targeted information via Twitter, LinkedIn and Nextdoor. Come follow us!

BUILDING A CULTURE WE VALUE

To deliver great water and wastewater services, EBMUD relies on a great team. As a world-class utility, EBMUD is proud of the talented and diverse pool of nearly 2,000 employees who deliver water and wastewater services.

With a large number of employees eligible for retirement in the next 5 years, it's important that as an organization we champion values that our staff cares about. New efforts are afoot to support our strong culture of stewardship, integrity, respect and teamwork.

Employees are setting the tone, spearheading grassroots actions including finding new ways to recognize hard work and innovation, developing mentors and advocates and creating conversations to drive employee engagement.

KEEPING LEARNING FLOWING

Having an educated workforce is essential. In 2017, EBMUD kicked off a partnership to support employee development. This collaboration was spurred by employee input and provides ways to prepare staff for career opportunities and professional growth—all here at EBMUD through a partnership with Peralta Community College District and Laney College. College classes are paid for and offered at District facilities to make it easier for employees to attend after work hours.



Get to know us We want customers to get to know us, and to see what it takes to carry out our mission to deliver excellent water and wastewater services, protect the resources we are entrusted with, and to do so within a framework of fair rates, sustainability and great service.



Financial Stewardship

With nearly 100 years of service, EBMUD has weathered all kinds of circumstances. Managing well through years of drought and flood requires operational acumen and financial stewardship. EBMUD works to make sound, strategic decisions about how best to reinvest in the water and wastewater systems that serve the East Bay. Our goal is smart and sustainable investments for future generations. We look for ways to save energy and money, reduce greenhouse gasses and ensure our skilled workforce remains safe and on the job.

Smart money management is critical as the District undertakes new approaches to capital projects.

- In 2016 and 2017, EBMUD's innovative choice to deliver pipes by helicopter to the top of hard to serve areas of our distribution system resulted in completing the job in a tenth of the time it would have taken using traditional methods, saving money while reducing community impacts.
- Financial stewardship went hand in hand with sustainability, when we created a 430-acre conservation bank at Oursan Ridge which will generate up to \$9 million from sales of conservation credits. These credit sales will pay for the \$4.5 million purchase of the 604-acre Carr Ranch, preserving more than 1,000 acres of pristine watershed land forever.
- On the wastewater side of EBMUD operations, onsite power generation at EBMUD's wastewater treatment plant is sufficient to power the plant itself, and in fact provides over 130 percent of the plant's energy needs, allowing us to sell the surplus for approximately \$1 million each year.
- At Pardee and Camanche Reservoirs, EBMUD generated more than 337,000 megawatt hours of clean hydropower in fiscal years 2016 and 2017, which we sold for over \$12 million over two years. In addition, we generated and used more than 3,400 megawatt hours of photovoltaic power through cost saving partnerships with private companies and EBMUD-owned solar projects. EBMUD generates more power at Pardee and Camanche than we use District-wide in a year.

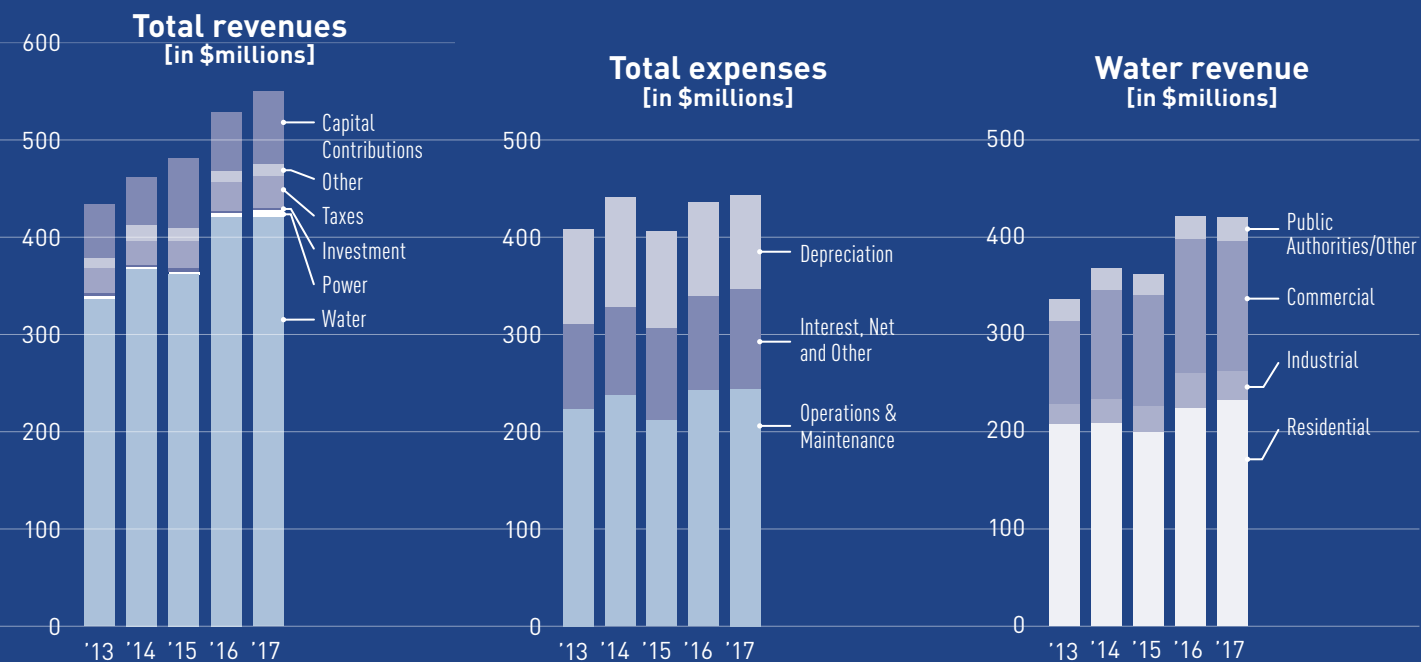
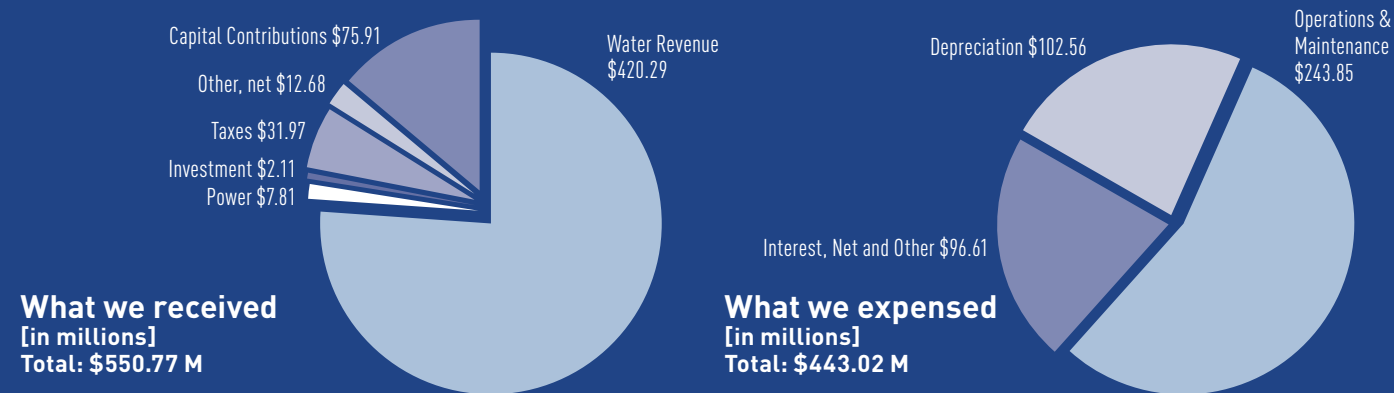
We are financially prepared for both drought and deluge. We stand ready with \$95 million in a rate stabilization fund to offset the cost of future drought and low water sales. Our drought rate structure, which rewards conservation, along with our rate stabilization fund will allow us to continue to meet our debt payments and keep bills affordable.

Looking ahead, EBMUD plans to continue to improve energy efficiency to lower costs in our water and wastewater operations. We will explore more ways to cost-effectively maximize preservation of our watershed lands and continue to be a state leader in improving healthy salmon populations, all while preserving our high quality water for drinking. Lastly, by recovering energy from wastewater, we will gain revenue and maximize the efficiency of our wastewater plant.

In the years to come, we are prepared to grow our investments in upgrades and continued maintenance of pipes, facilities, and treatment plants which prepare us for earthquakes and reduce expensive emergency repairs. We continue to evaluate new work methods and materials to reduce impacts to the environment and the communities we work in. Through all of this, EBMUD remains committed to transparency through our biennial budget and financial statements both of which have received more than 10 years of consecutive national awards.



Water System



Annual operating revenues continue to be greater than annual operating expenses. This allows the District to make progress on its goal to fund a large portion of the infrastructure projects needed to maintain the quality and reliability of the Districts' Water System without incurring additional debt.

Total revenues for the Water System increased by 4 percent from \$529 million in 2016 to \$551 million in 2017 primarily due to a \$15 million increase in capital contributions, a \$4 million increase in power revenue and a \$3 million increase in property tax revenue and other income. Even though we no longer collected the drought surcharge in 2017, water sales revenue remained stable as a result of a 3.6 percent increase in billed water consumption, and a 7 percent water rate increase.

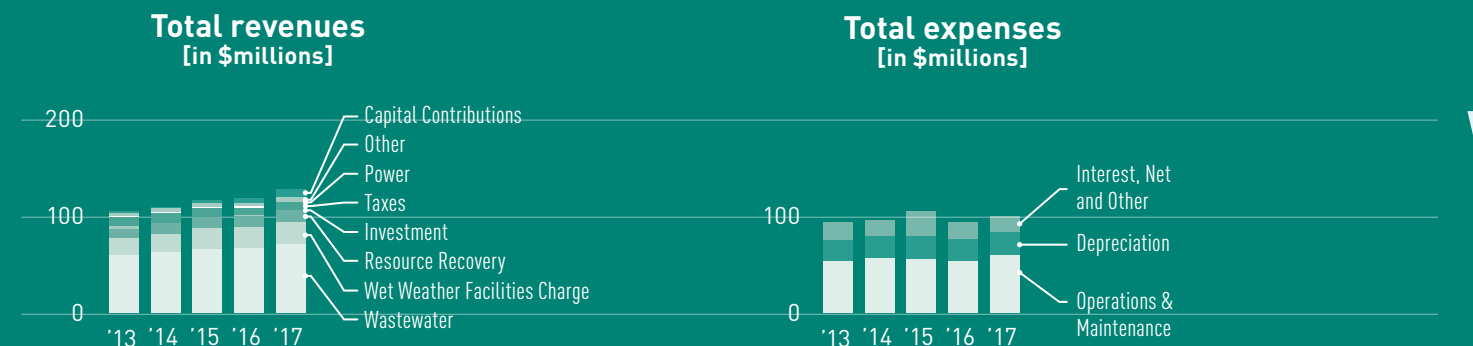
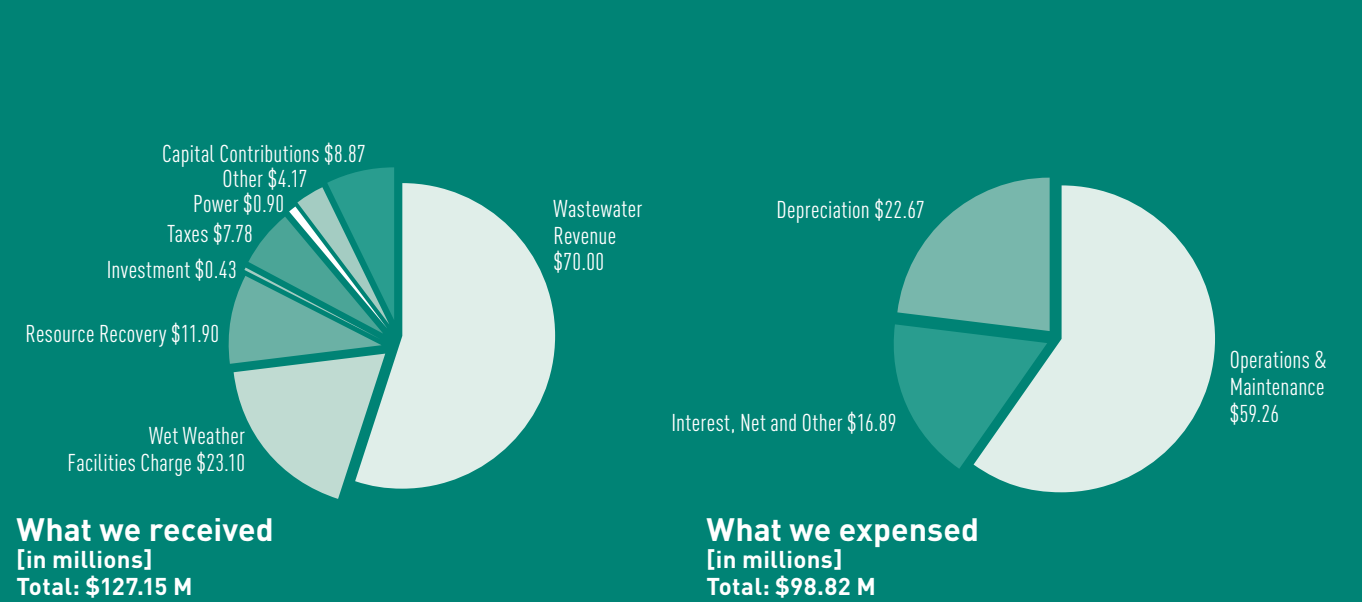
Total expenses increased by 1.8 percent from \$435 million in 2016 to \$443 million in 2017. Note that expenses shown do not include an increase in 2017 of \$144 million in capital assets net of depreciation.

Excluding capital contributions, net position increased in 2017 by \$108 million compared to last year's increase of \$94 million.

Unrestricted cash reserves are \$519.1 million or \$344.8 million above the operating reserves of \$174.3 million. These excess reserves will be used to fund future capital improvements.

Standard & Poor's continues to assign the highest possible rating of AAA to the Water Systems' Fixed Rate Revenue Bonds. The District's high bond rating allows us to borrow at very low interest rates, saving ratepayers money.

Wastewater System



Annual operating revenues continue to be greater than annual operating expenses. This allows the District to make progress on its goal to fund a large portion of the infrastructure projects needed to maintain the quality and reliability of the District's Wastewater system without incurring additional debt.

Total revenues for the Wastewater System increased 9 percent from \$117 million in 2016 to \$127 million in 2017, due to increases in wastewater rates, resource recovery and capital contributions.

Total expenses increased 7 percent from \$92 million in 2016 to \$99 million in 2017. Note that expenses shown do not include an increase in 2017 of \$17 million in capital assets net of depreciation.

Excluding capital contributions, net position increased in 2017 by \$28 million compared to last year's increase of \$25 million.

Unrestricted cash reserves are \$100.9 million or \$56.5 million above the operating reserves of \$44.4 million. These excess reserves will be used to fund future capital improvements.

Standard & Poor's continues to assign the highest possible rating of AAA to the Wastewater Systems' Fixed Rate Revenue Bonds and General Obligation Bonds. The District's high bond rating allows us to borrow at very low interest rates, saving ratepayers money.

Water System Statistics

During the Year:

	2017	2016
Total Water Production, millions of gallons (MGD)	57,311	53,390
Average Daily Water Production, MGD	157	146
Maximum Daily Water Production, MGD	222	186
Minimum Daily Water Production, MGD	112	118

At Year End:

Number of Accounts	383,284	382,114
Number of Active Employees	1,585	1,564
Miles of Water Distribution Pipe	4,131	4,130
Operating Distribution Storage Capacity, millions of gallons	607	652

Our Mission

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.



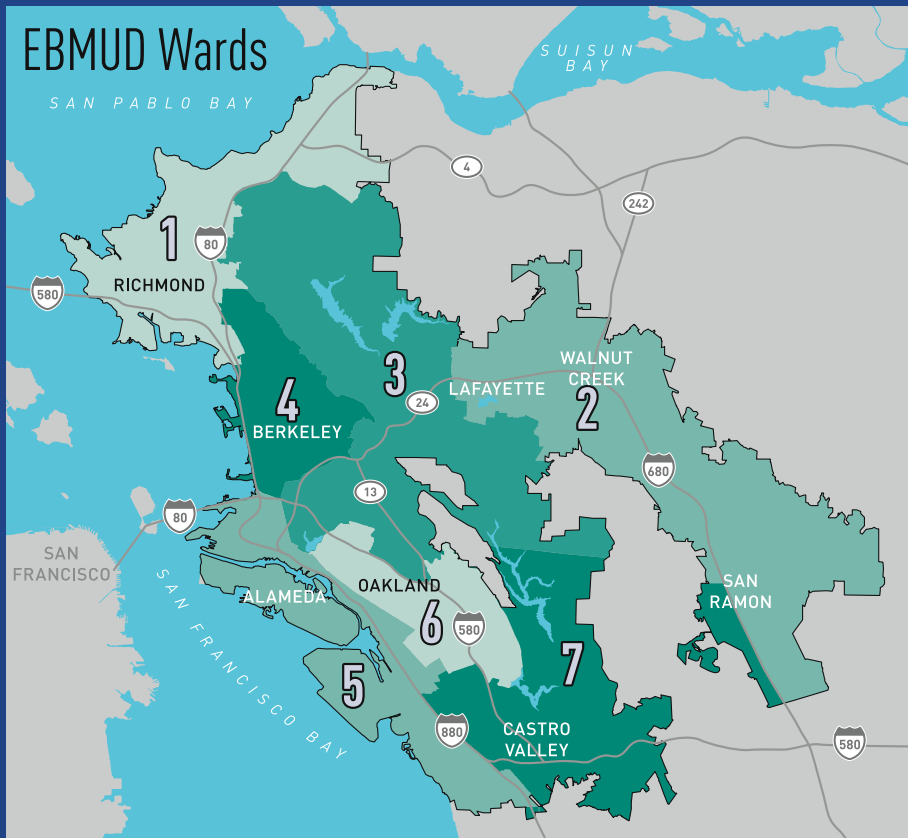
Wastewater System Statistics

During the Year:

	2017	2016
Average Daily Wastewater Flow, MGD	69	56

At Year End:

Number of Accounts	176,921	176,286
Number of Active Employees	247	252



BOARD OF DIRECTORS

Board member	Ward
Lesa R. McIntosh	1
John A. Coleman	2
Marguerite Young	3
Andy Katz	4
Doug Linney	5
William B. Patterson	6
Frank Mellon	7

Alexander R. Coate
General Manager

EBMUD provides high-quality drinking water for 1.4 million customers in Alameda and Contra Costa counties.

EBMUD's wastewater treatment plant generates renewable energy from waste and protects San Francisco Bay on behalf of its 685,000 customers.

EDITOR:

EBMUD Public Affairs

DESIGN:

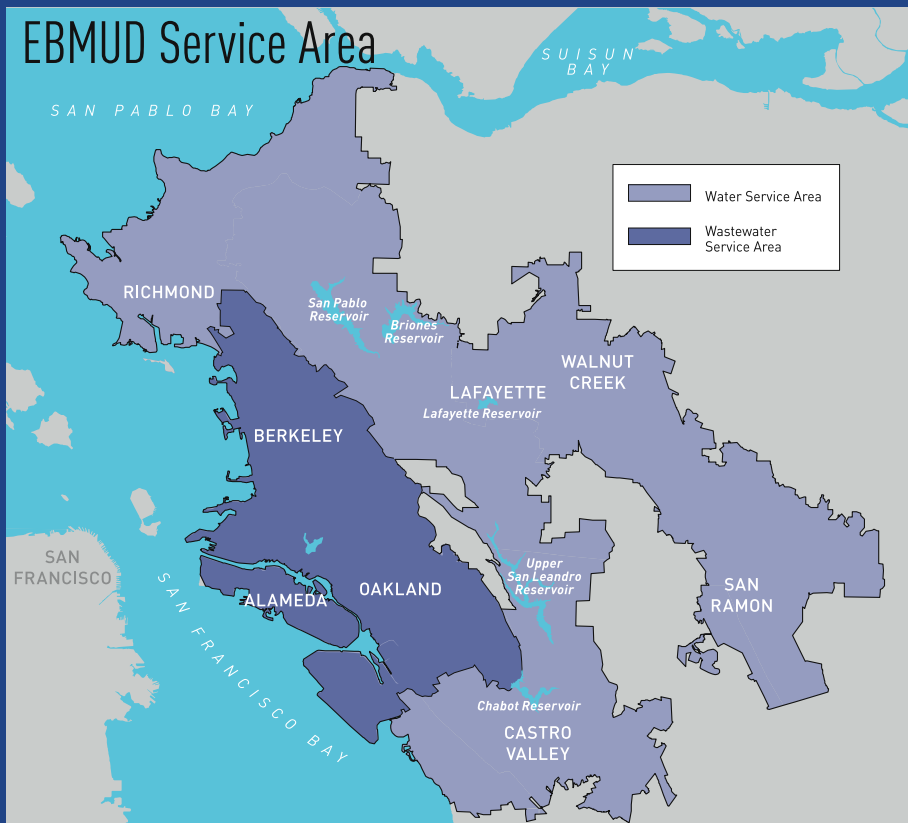
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