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2019 Sustainable LA Grand Challenge Environmental Report Card for Los Angeles County Water

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SUSTAINABLE LA GRAND CHALLENGE

ENVIRONMENTAL REPORT CARD FOR LOS ANGELES COUNTY

WATER | 2019

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UCLA Sustainable LA Grand Challenge

2019 SUSTAINABLE LA ENVIRONMENTAL REPORT CARD
FOR LOS ANGELES COUNTY

WATER

UCLA Sustainable LA Grand Challenge

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EXECUTIVE SUMMARY

The Sustainable LA Grand Challenge (SLA GC) Environmental Report Card (ERC) for Los Angeles County (L.A. County) is the only comprehensive environmental report card for a megacity in the world. This 2019 ERC on Water provides an in-depth look at the region's efforts in moving toward a more resilient local water supply, which requires maximizing high-quality local water supplies, improving water conveyance and treatment infrastructure, reducing water consumption, and implementing innovative technology and policy solutions. Twenty indicators were assessed across eight categories. Many of these indicators are new areas of assessment for the ERC and will provide a more comprehensive picture of current conditions compared to the 2015 ERC that last assessed L.A. County's water. Grades were assigned in each category based on compliance with environmental laws or numeric standards where applicable, on our best professional judgment, and on historical improvements and context. This year's grades range from D/ Incomplete to B+, and although there has been great progress in some areas, others still require significant improvement to raise the county's C+ average.

WATER SUPPLY & CONSUMPTION:

C +

- In 2017, 59% of the Metropolitan Water District (MWD)-supplied water used in L.A. County was sourced from outside the region. Local recycled water made up only 9% of the county's 2017 water supply, while groundwater resources provided 32%.
- In 2018, the City of L.A. imported an estimated 307,949 acre-feet of water (above average) despite the fact that the Eastern Sierras had an average year of snowpack. Overall, the city imported well over 90% of its water from distant sources.
- The volume of reused water in the county increased by approximately 31% from 2006 to 2016 (ca. 55.8 to 73 billion gallons).
- The largest increase in reused water in L.A. County occurred between 2006 and 2007, with more modest year-to-year increases (and occasional decreases) since then.
- The percent of total wastewater treatment effluent reused in the county increased from 16.6% in 2006 to 28.5% in 2016, the highest value over the 11-year period.
- Between 2000 and 2017, countywide per capita water demand dropped by more than 27%. In 2017, total annual water consumption was 418 billion gallons, compared to 483 billion gallons in 2013 – a drop of 13.5%.
- Total annual water consumption in L.A. County decreased from 2013 to 2016, but then rose in 2017 drawing closer to the 2013 benchmark consumption level.
- All but two reporting water suppliers in L.A. County reduced water use in July 2017 compared to July 2013; however, many suppliers saw increased water use between 2016 and 2017.
- Water pricing varies widely across the nearly 300 public water systems, and drought charges brought cost above the affordability threshold for low-income households.

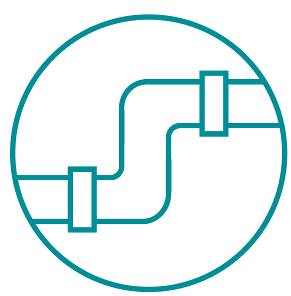
Approximately 60% of water used in L.A. County is imported from outside the region, and that number rises to 90% for the City of L.A. Although the volume of reused water has been increasing, the county has a long way to go to meet its water needs with local water resources. The region significantly reduced its water consumption from its 2013 baseline in response to Governor Brown's mandatory conservation measures implemented in 2015 due to the major drought. However, water consumption crept up after the drought was declared "over" in 2017, demonstrating that progress was lost due to inattention and decreased public focus. Recently, precipitation patterns have been highly variable – oscillating between drought and extreme precipitation – demonstrating the vulnerability of the state's water infrastructure and the need to maximize local, sustainable, and resilient water supplies.

DRINKING WATER QUALITY:

B+/ Incomplete

- Overall, nearly everyone in L.A. County has been provided with clean water at the point of delivery (but, see notes below about available data and monitoring points).
- Primary Maximum Contaminant Level (MCL) violations in L.A. County were less than 2.5% of the total for all California public water systems each year from 2012-2017.
- Most L.A. County MCL violations were for elevated levels of arsenic or coliform bacteria.
- In 2017, seven public water systems in L.A. County serving a total of over 60,000 residents had a combined total of 10 primary MCL violations.
- MCL violations affected 74,931 people in 2012 and 61,641 people in 2017, while only between 3,850 and 2,909 people in the intervening years. This variation in the number of people affected depended on which water systems had violations.
- Four public water systems failed to report an MCL violation to constituents on their annual Consumer Confidence Report between 2012 and 2016. No water system failed to report more than once over the five-year period.
- There are multiple, well documented accounts of discolored, foul-smelling and poor-tasting water coming out of taps in largely disadvantaged communities served by publicly-regulated drinking water systems across L.A. County.

Available monitoring data shows that L.A. County's drinking water is meeting most health-based standards and communicating most instances of standards-based contamination to consumers. Primary MCL violations are infrequent and impact a small percentage of residents. However, many people are still receiving smelly, discolored tap water. Without publicly-available data on exceedances of secondary MCLs, it is difficult to evaluate the scope of this problem. In addition, drinking water quality monitoring typically occurs just after the water is treated rather than after it is delivered to the consumer at the tap, which means that even effectively-treated water is vulnerable to contamination such as lead that may enter the water supply from old pipes on private property. Fortunately, new monitoring requirements are at least testing school tap water for lead. However, there are more areas of responsibility to examine in order to ensure that L.A. is living up to California's new Human Right to Water bill, promising every individual the right to safe, clean, and affordable drinking water.



LOCAL WATER INFRASTRUCTURE:

C+

- With one exception, urban water retailers serving more than 100,000 people had fewer than 50 gallons per connections per day real water losses in 2016, the first year of reporting.
- In 2016, all but two retailers serving more than 100,000 people achieved an Infrastructure Leakage Index score within a good range (< 3.0).
- As of 2017, there were 35 spreading ground facilities in L.A. County with a combined total of 21,259 acre-feet in surface storage capacity.
- The average annual volume of conserved stormwater from 2004-2017 was 190,227 acre-feet; the highest recorded amount was 662,862 acre-feet in 2004-2005, and the lowest amount was 37,542 acre-feet in 2013-2014. Variation in annual volumes of water conserved correlated strongly with annual rainfall.
- A total of $129 million of state funds were provided to L.A. County for 71 Integrated Regional Water Management projects through California bond measures Proposition 50 (2002) and Proposition 84 (2006).
- Grant funds were invested in projects that improved water supply and groundwater (76% of projects), water quality (19%), habitat, open space, and recreation projects (3%), and flood projects (2%).
- In 2017 there were 302 reported sewage spills, of which 92 reached waterbodies. These spills represented nearly 600,000 gallons of sewage in total, with approximately 380,000 gallons of that volume reaching waterbodies. Over half of the 2017 spills reaching waterbodies were considered small.

The County's water infrastructure is aging, but investments have been made by the state and local jurisdictions to reduce water loss, decrease sewage spills, and improve water capture and infiltration. Nearly half of the county water projects funded through Propositions 50 and 84 have been completed. However, there is room for significant infrastructure improvements through new projects focused on an integrated regional water recycling system and stormwater infiltration, treatment, and capture infrastructure with funds anticipated through Measure W in 2020.

GROUNDWATER:

C-

- Spring and fall groundwater elevations in wells across L.A. County generally rose in 2016-17: 34% of wells increased by more than 2.5 feet in spring, and 40% increased by the same margin in fall.
- Due to historic drought, both spring and fall groundwater levels were also considerably lower in 2017 than they were in 2012: in spring, almost 47% of wells were more than 10 feet lower compared to 2012, and fall elevations in 2017 decreased by more than 2.5 feet in 63% of wells.
- Compared to statewide trends, fewer L.A. County wells showed increases in groundwater levels in both the spring and fall seasons between 2012 and 2017.
- In 2018-19, 23 of the 39 pollutants examined exceeded their MCLs or comparison concentrations in one or more groundwater wells. Note, well contaminant levels do not equate to drinking water quality.
- 1,4-Dioxane had the largest percentage of wells in exceedance for all three periods of analysis between 2014 and 2019. Exceedances decreased from 46% to 35.6% between 2017 and 2018-19.
- Nitrate as N was detected in more than 80% of wells in 2017, but has the lowest maximum relative concentration amongst the top ten pollutants exceeding their MCL or comparison concentration in 2017. Cr6 was detected in almost 60% of wells and had one of the highest maximum relative concentrations.
- In 2017, 83 sites threatened groundwater in L.A. County; 54% of these sites were Leaking Underground Storage Tank (LUST) Cleanup Sites, and 45% were Cleanup Program Sites.
- The number of groundwater threats increased annually from 2013 to a high of 428 in 2015, and then decreased in 2016 and 2017. It is not clear whether this represents an actual surge of new releases in the earlier years with cleanup in subsequent years, or whether this pattern is a result of changes in enforcement, tracking, or reporting.

While L.A. County is fortunate to have significant groundwater resources, these resources are under threat from pollution, and for coastal aquifers, seawater intrusion. Cleaning up and protecting groundwater resources is critical to moving the region toward local water reliance. Although groundwater basins are largely managed well through adjudications, more comprehensive data on absolute amounts of groundwater and groundwater storage volume in the county are necessary to accurately quantify groundwater and more sustainably manage the basins. Regular assessment of groundwater quality is also important given the prevalence of contamination and the number of contamination sites that threaten county aquifers. When groundwater aquifers are used for drinking water, contamination means that additional energy and resources must be expended to utilize this local water resource.

SURFACE WATER QUALITY:

D / Incomplete

- No new water body assessment data has been processed by the State or Regional Boards since 2010.
- 99% of assessed bays, harbors, estuaries, lakes, reservoirs, and wetlands were impaired in 2010, compared to 100% impairment in 2007. However, 2010 impairments included an additional 512 acres compared to 2007.
- 59% of assessed shorelines, rivers, and streams were impaired in 2010, down from just under 85% in 2007. Note, however, that the total assessed miles greatly increased from 600 in 2007 to 992 in 2010; and, the absolute length of impairments increased from 509 to 582 miles.
- The fecal indicator bacteria, metals/metalloids, and pH + miscellaneous pollutant categories each impair over 20% of the assessed water body lengths, while toxicity, nutrients, salinity and trash impair over 10% of assessed water body lengths.
- Results for 2016-17 year of stormwater quality monitoring data at the mass emissions stations showed Water Quality Objective (WQO) exceedances for several parameters in Ballona Creek, Malibu Creek, Dominguez Channel, and the Santa Clara River. Results also show one WQO exceedance for the L.A. River and none in Coyote Creek or the San Gabriel River. This is surprising given historic trends and concurrent data from other monitoring programs.
- The most common parameters exceeding WQOs at mass emission stations in 2016-17 were E. coli, dissolved oxygen, dissolved copper, and dissolved zinc.
- The number of total exceedances during wet weather monitoring greatly exceeded those during dry weather across all years (2009-17), because stormwater discharges scour pollutants off impermeable surfaces, thereby increasing pollutant loads entering water bodies.

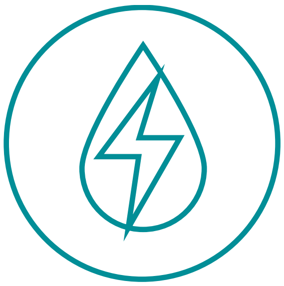
L.A. County's surface waters regularly exceed water quality standards. The majority of local water bodies are polluted to the point of being unsafe for primary uses such as recreation, drinking water supply, or as aquatic life habitat. Without regular assessments by the state, it is unclear whether water quality is improving or worsening, and there has been no new assessment data released since 2010. Stormwater quality monitoring data shows multiple rivers and creeks frequently exceed water quality standards for toxic heavy metals and fecal indicator bacteria. L.A. County's Measure W (2018) has the potential to enable improvement projects, but will require strategic implementation to help water bodies meet relevant water quality standards.

INDUSTRIAL AND SEWAGE TREATMENT PLANT DISCHARGES:

B-

- There is no clear trend in violations of National Pollutant Discharge Elimination System (NPDES) permits for 2009-2016. Since 2009, the annual number of Class 2 violations ranged from a low of 35 to a high of 110. There were no Class 1 violations.
- There were 70 Class 2 violations (posing a moderate, indirect, or cumulative threat to water quality) of NPDES permits in 2016 across 6 facilities.
- Overall discharge volumes from all 13 Publicly Owned Treatment Works (POTWs) facilities analyzed were just over 216 billion gallons in 2016, compared to just under 244 billion gallons in 2013, an 11% decrease.
- From 2013 to 2016, total lead mass discharges decreased by approximately 16%; arsenic decreased by 2.6%; and nitrate + nitrite decreased by over 23%. Copper mass discharges increased by approximately 47% and ammonia remained relatively constant despite the decrease in sewage volumes, indicating a general increase in concentrations.
- The total number of non-sewage hazardous materials spills to water each year between 2012 – 2016 varied from a low of 350 (in 2014) to a high of 457 (in 2013). The number of spills in 2016 (286) was nearly equal to the average value from 2012-2016. There was no clear trend in number of spills over time.
- Between 2012-2016, the total volume of spills was lowest in 2012 (~226,000 gallons). The volume spilled in 2016 (315,620 gallons) was greater than the volume spilled over the previous three years combined. Note that this excludes two single incidents of extremely large spills of relatively clean substances (20 million gallons of drinking water and 10-100 million gallons of secondary treated wastewater in 2014 and 2015, respectively).

Data on discharges of pollutants to receiving waters supplement surface water quality information for a more complete picture of the state of the region's receiving waters. Although conditions have vastly improved over the last several decades, there is still room for improvement. Pollutant loads from sewage treatment plants have decreased or remained constant and the number of sewage spills has remained relatively constant over the last few years. And although there were no Class 1 violations by large industrial dischargers from 2009-2016, there was no decrease in the overall number of Class 2 violations. Unfortunately, there are still hundreds of petroleum spills annually; and chemical spills, although less frequent, are still a major concern. Furthermore, the database of hazardous materials spills is insufficient to support accountability and trend assessment.



WATER-ENERGY NEXUS:

C+

- The energy intensity (kilowatt hours per acre-foot [kWh/AF]) for each water source is constant from year-to-year. However, greenhouse gas emissions vary annually based on changes in the power portfolio and water supply volumes.
- The State Water Project (SWP) is the county's most energy-intensive source, consuming over 2,500 kWh/AF, even when accounting for hydroelectricity generated by the SWP. The Colorado River Aqueduct (CRA) has the second-highest energy requirement. The Los Angeles Aqueduct (LAA) does not require any energy for pumping or conveyance since it is entirely gravity-powered. Recycled water represents almost a halving of energy intensity compared to the CRA, and less than one-third of the SWP, while stormwater has an intensity of about 15% of recycled water.
- Overall, L.A. County has decreased its water supply-related GHG emissions by 33% between 2010-2016, due primarily to a shift away from the use of coal for energy generation.

Due to the climate crisis, there is increasing focus to reduce greenhouse gas (GHG) emissions and energy use in all sectors, including water supply. Pumping water from distant sources is energy-intensive, and shifting from fossil fuel energy generation to GHG emission-free renewables and increasing reliance on local water supplies are both key strategies to reducing the impact of L.A. County's water supply on the climate. However, one must also consider the energy intensity of local water/ wastewater treatment, which varies widely depending on the quality of the source water, the intended end-use, and the specific treatment technologies employed. There is a need for more explicit, integrated consideration of energy demand in water supply planning.

BEACH WATER QUALITY:

B+

- According to Heal the Bay's annual Beach Report Card, summer 2017 dry weather beach water quality in L.A. County was excellent with 97% A or B grades and zero F grades, better than the average over the last 5 years. The 2018 summer grades were slightly worse with 91% A's and B's and 1% F grades.
- Winter dry weather grades for 2017-18 were slightly better than the average over the previous five years, with 91% A or B grades and 4% F grades. However, the 2018-19 winter grades were much worse with 70% A's and B's and 6% Fs.
- Wet weather water quality continues to be an area of concern, with only 60% of beaches receiving A or B grades, and 26% receiving F grades in 2017-18. This is an improvement over 2016-17, and better than the average over the previous 5 years. The 2018-19 report card demonstrated that L.A. County beaches had the poorest wet weather water quality in years with only 30% A and B beaches and 56% of beaches receiving F grades. In particular, the Malibu beaches downstream of the Woolsey Fire had extremely poor grades after the fire.
- There were three beach closures due to sewage spills or other contamination events (such as oil or fuel spills) in 2017, all occurring within the Long Beach Department of Health's jurisdiction.
- There were fewer than five beach closures annually between 2012-2017.
- The number of beach closures are an order of magnitude less than the number of sewage spills that reached water bodies for each year.
- There is no centralized data source for specifically identifying beach closures in the state.

L.A. County's beaches fuel the region's robust coastal economy and provide more than 50 million residents and visitors with swimming and surfing enjoyment annually. Maintaining high levels of water quality is vital for public safety and enjoyment. Beach water quality tends to be excellent during dry summer weather and poorer during wet weather, when precipitation sends contaminants coastward. Although the number of closure days remains low, with fewer than five closure days each year from 2012 to 2017, this information lacks a centralized data source for aggregation and examination.

CONCLUSIONS

L.A. County's average grade on water is a C+, but there is reason to believe that this grade will improve with recent local water target setting by the City and County in their sustainability plans, and with new projects funded through Measure W starting in 2020. This funding has great potential to clean up surface water and localize the water supply.

The County demonstrated that it can reduce its water demand when faced with a major drought, but once Governor Brown declared the drought over, consumption increased. More needs to be done to make water conservation a way of life in the region. Furthermore, L.A. County still imports around 60% of its water supply, and the City over 90% the last two years. In order to meet the City, County, and UCLA's Sustainable LA Grand Challenge local water goals in the coming decades, the region must develop an integrated regional water recycling system and accelerate the execution of stormwater projects.

Investments in regional water runoff diversions, runoff capture and storage projects, and runoff treatment plants have dramatically improved beach water quality over the past decades, but we still see some poor beach water quality when we have wet weather. Drinking water quality is also quite good throughout the County, but far too many people still receive discolored, smelly water from the tap. The lack of publicly available data on exceedances of secondary MCLs makes it very difficult to adequately assess the county's drinking water quality.

Surface water quality in the County needs significant improvement, with a large majority of local waterbodies listed as impaired for a variety of pollutants. The state has not been adequately assessing the status of these impaired waters, so the public does not have clear picture of whether surface waters are improving or worsening over the past decade.

Another area in need of major improvement is the County's groundwater basins. Although these groundwater basins are managed well through adjudications, poor groundwater quality continues to be prevalent in local aquifers. Strong, health-based standards are necessary to ensure pollutant concentrations are reduced to safe levels. L.A. County requires commitment to reducing groundwater threats and remediating contaminated aquifers to fully capitalize upon the local supply of groundwater resources.

This 2019 Sustainable LA Grand Challenge Environmental Report Card on L.A. County Water demonstrates that despite the promise of goals and plans for sourcing water locally, recycling wastewater, and constructing stormwater capture and cleaning projects, L.A. County has a long way to go to implement these plans before becoming an A student.

Introduction

Los Angeles (L.A.) County is the most populous county in the nation with 10.1 million people, and home to the City of Los Angeles, 87 other cities, and over 120 unincorporated areas.[1] The county spans over 4,000 square miles that are as diverse topographically —from beaches to desert and mountains— as they are culturally.

By 2050, L.A. County will be more crowded, with an estimated population of 11.3 million residents.[2] And, according to University of California, Los Angeles (UCLA) research, it will also be hotter, with more frequent and dangerous heat waves, increased wildfire risk, and less snowpack to feed imported water supplies, a majority of which come from over 200 miles away.[3,4] A hotter and more populous region means increased pressure on energy, transportation, and water infrastructure, exacerbated public health problems, and stressed ecosystems and habitats.

Addressing the effects of climate change and moving the region to sustainability is no small task. Fortunately, local, regional, and state officials have demonstrated a commitment to leading in this area, and in 2013, UCLA formally committed to contributing research and expertise to reaching ambitious sustainability goals in the county with the announcement of the Sustainable LA Grand Challenge (SLA GC).[5] The SLA GC aims to transition L.A. County to 100% renewable energy, 100% locally-sourced water, and enhanced ecosystem health by 2050 through innovations in science, technology, policy, and implementation strategies.

To measure progress toward sustainability, and to create a thought-provoking tool to catalyze discussions and policy changes that contribute to a healthier environment for L.A. County residents moving forward, UCLA released the nation's first environmental report card for a major metropolitan area in 2015.[6] The 2015 environmental report card (2015 ERC) evaluated 22 total indicators within L.A. County across the categories of Water (grade = C), Air (grade = C+), Ecosystem Health (grade = C-/ Incomplete), Waste (grade = B/ Incomplete), Energy and Greenhouse Gases (grade = B-), and Environmental Quality of Life (grade = C+). The 2015 ERC established a baseline from which to measure the County's progress toward sustainability and informed research priorities for the SLA GC.

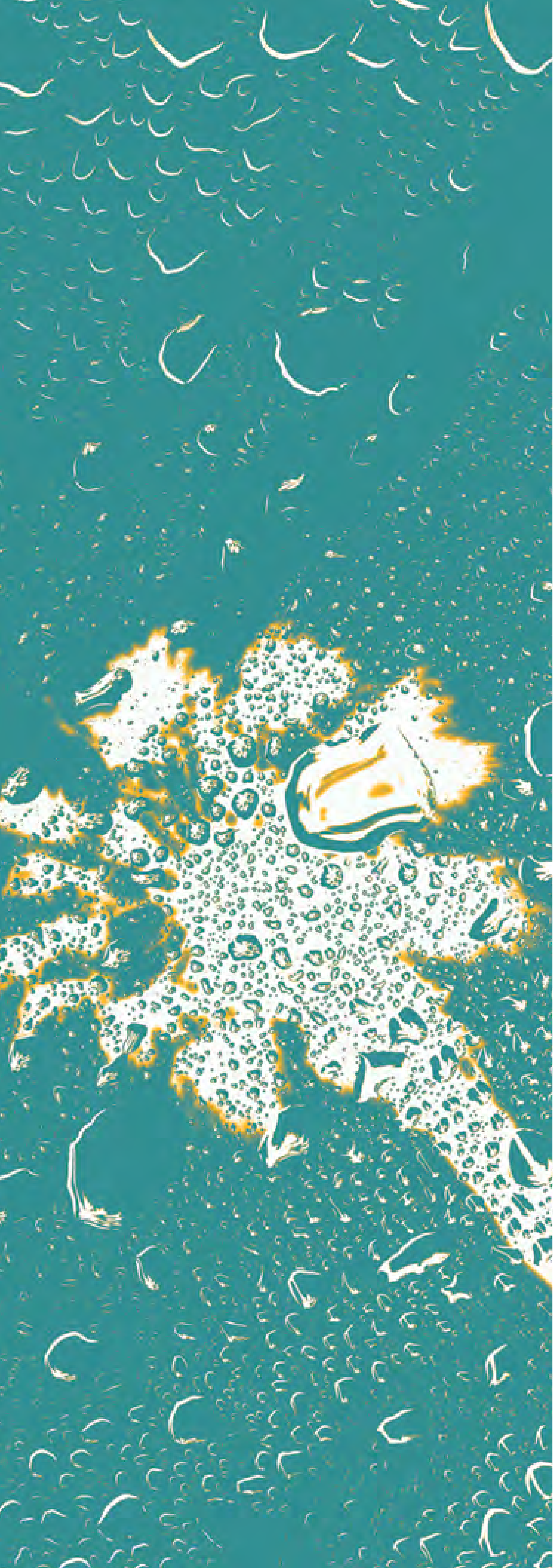
For subsequent report cards, the SLA GC aimed to increase the depth of evaluation in topic-specific report cards for categories most closely aligned with SLA GC goals. In 2017, the first of these topic-specific ERCs was released with a focus on Energy & Air Quality.[7] The SLA GC ERCs will continue to evaluate environmental progress in L.A. County with report cards covering the topics of Energy & Air Quality, Water, and Ecosystem Health.[8]

This Water ERC builds upon the water indicators from the 2015 ERC, and as with the 2017 Energy & Air Quality ERC, a number of new indicators were developed for water to provide a more comprehensive assessment of regional water resources, quality, and infrastructure as the County transitions to more resilient local water sources. This ERC reflects overall performance in these areas, and is not limited to the four years since water was evaluated in the 2015 ERC. It is important to note that due to extenuating circumstances, the release of this Water ERC was delayed, and as such, some of the most recent data is not presented. However, we are confident that the historic trends and comparisons with the 2015 ERC data provide a strong and compelling basis for evaluating the state of water in L.A. County today.

The SLA GC ERCs provide tremendous opportunity to continue our partnership with the city and county of L.A. and their respective sustainability plan implementation and assessment efforts. Around the same time as the 2015 ERC was released, the city of Los Angeles released their first-ever Sustainable City pLAn, developed under the leadership of Mayor Eric Garcetti,[9] and updated in April 2019 in LA's Green New Deal.[10]

L.A. County's first Chief Sustainability Office developed their first sustainable county plan in partnership with the Sustainable LA Grand Challenge, the California Center for Sustainable Communities in the UCLA Institute of the Environment and Sustainability, and the Emmett Institute for Climate Change and the Environment at the UCLA Law School, as well as other consultants.[11] OurCounty[12] was unanimously approved on August 6, 2019 by the L.A. County board of supervisors, and is heralded as the most ambitious sustainability plan of any major metropolitan region in the nation.[13]

We look forward to continued collaboration with county stakeholders to advance sustainability in the region for a healthier, more prosperous, and more equitable Los Angeles.



Methodology

Indicators and Data Selection

The ERCs assess environmental conditions across L.A. County using a comprehensive approach based on quantitative indicators. In the 2015 ERC, 10 of the 22 indicators assessed were focused on water. This ERC builds upon those indicators and assesses 20 total water indicators across eight categories to grade the status and trends associated with moving L.A. County to local water.

Indicators are linked to compliance with federal and state regulations where applicable and selected specifically for their relevance to L.A. County. The ideal criteria for an indicator to be useful in the report card are that data for that indicator are collected countywide, easily obtainable, and quantifiable; published by agencies, universities, or non-profit organizations; and updated on at least an annual basis. However, as with the 2015 and 2017 ERCs, we found that such data is often difficult to come by and many of the factors critical to assessing environmental conditions are not regularly measured and/or the data is not accessible.

Some data that did not meet our indicator criteria, but that we deemed important, are presented as "highlights" throughout the report under the most relevant category. Conversely, we acknowledge that some indicators, although accessible and regularly updated, do not represent the most important measures of progress in their respective areas, but are included due to the lack of data availability on more critical metrics. We have addressed this issue through recommendations for improved monitoring and/or by using an "incomplete" designation as part of our grading.

Grading

We faced challenges to developing an objective grading system for the 2015 and 2017 report cards. Our ideal approach is to base grades on compliance with environmental laws or progress toward accepted policy targets. This may be feasible for some indicators, but many are not tied to any environmental standard or legal requirement. There are also some indicators that pose an assessment challenge. For example, we have presented new data on water system leaks, but do not have any trend data to evaluate yet.

Grades could also be based on the achievement of regional environmental numeric goals, or targets, but in many cases those goals have not been established for L.A. County. It is important to note, however, that the first-ever sustainability plan for L.A. County was developed at the same time as this ERC.[14] This plan will have clear targets related to water sustainability, and will make grading easier for some categories moving forward. However, even where associated targets are identified, a grading rubric must still be developed to characterize conditions when targets are not being met (i.e., if zero exceedances is an "A," what exceedance levels are associated with grades B through F?).

Furthermore, as we assembled indicators across a wide range of environmental dimensions, we recognized there are combinations of "cause" and "effect" indicators that have varied environmental implications. As such, the weighting of different indicators in determining the final category grades were not always equal. For example, for the category of Water Supply and Consumption, the lack of progress on shifting to local water supplies was a stronger consideration than progress on conservation. Furthermore, a lack of critical data were severe enough in some cases to warrant an "incomplete" notation, even associated with an otherwise good grade, such as for Drinking Water Quality.

Consequently, as with previous ERCs, this Water ERC used a less complex and more subjective grading approach. As before, we grade at the "category" level and have therefore issued eight grades based on the best professional judgment of the authors, taking the historical context into account. We will continue to improve our choice of indicators and grading system based on feedback from government agencies, NGOs, academics, business leaders, and the community. We will also work to establish more objective numeric targets, and goals and metrics necessary to develop a more consistent and explicit grading rubric.

1

WATER SUPPLY & CONSUMPTION

Overview

L.A. County imports a majority of its water from sources hundreds of miles away. Delivery of this water strains water supplies in other regions and requires a lot of energy. L.A. has not historically maximized its available local water resources, but a number of recent policy shifts are moving the region in this direction. Transitioning L.A. County to more local water sources must include commitments to maximizing the use of the water that falls in the region combined with water conservation efforts.

Precipitation levels since 2016 demonstrate the extreme variability in California's water supply. After California's record drought, the winter of 2016-17 was one of the wettest on record with annual precipitation close to 30% above normal (19 inches in downtown L.A.). Then from July 2017 to June 2018, downtown L.A. received less than 4.8 inches of rain, but was back to nearly 19 inches from July 2018 to June 2019.[15] Similar patterns were observed throughout the state. This extreme precipitation variability is likely a window into California's climate future: years of extreme drought, followed by extreme precipitation, and then extreme drought – or, "climate whiplash."[16] These years of extremes exposed the vulnerability of the state's current water infrastructure to extreme precipitation events with flooding in the San Jose area and major damage to the Oroville Dam spillway in early 2017. In response to these precipitation extremes, the state and region have made a number of policy proposals and changes to ensure water sustainability.

One proposed project to ensure water sustainability in the state is the controversial twin tunnel WaterFix project in the Bay-Delta. In 2018, the Metropolitan Water District (MWD) approved an increase in funding of up to $11 billion for this $17 billion (most recent estimate is as high as $20 billion) project. The increase in potential MWD funding from $5.2 billion to nearly $11 billion was controversial with the L.A. and San Diego board delegations opposing the motion. The major selling point for this project was increased reliability of delta water supplies, as concerns about climate change-caused sea level rise increases in water supply salinity continue to grow. The scope of this project shifted as the newly elected governor, Gavin Newsom, endorsed a one-tunnel verses two-tunnel approach. The specifications of this project, including cost and environmental impacts, will be determined in the near future. Adding complexity was the State Water Resources Control Board (SWRCB) Bay-Delta Water Quality Control Plan decision that requires a minimum of 40% unimpaired flows in the San Joaquin River from February through June to protect aquatic life. Many entities that rely on the San Joaquin River for water supply have submitted a voluntary agreement proposal (an alternative approach to the Water Quality Control Plan) that the SWRCB will decide on by the end of the year.

At the state level, Proposition 68 was approved ($4 billion for California parks and water) in June 2018 and will provide critical funding needed to reduce the region's reliance on local water supplies. With regard to conservation, AB 1668 (Friedman) and SB 606 (Hertzberg) focused on establishing water efficiency standards with both indoor and outdoor targets and local water budgets. These bills, known together as "Making Water Conservation a California Way of Life," were written to ensure that urban Californians permanently live within their water means —not only in times of drought— and were signed into law by Governor Brown in May 2018. Unfortunately, the 2018 November ballot measure Proposition 3 —an $8.87 billion California Water Bond with extensive funding for recycled water and stormwater capture— barely failed with 49.35% of the vote.

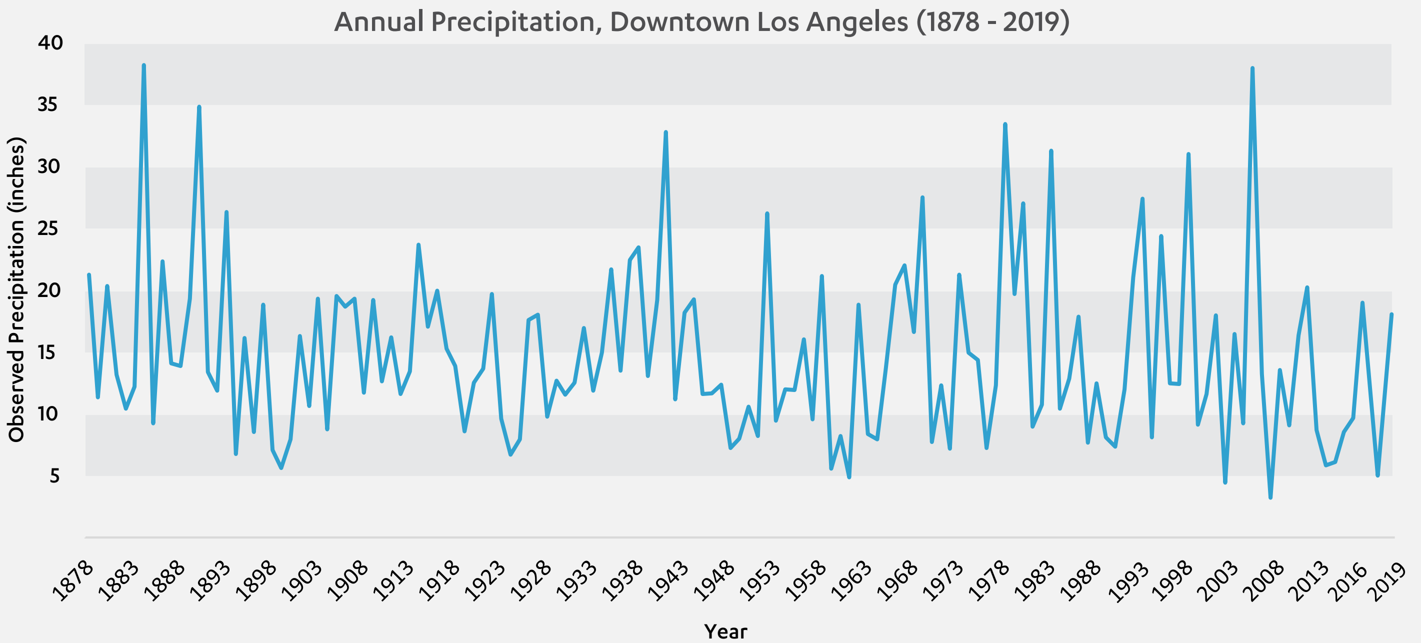
Locally, the L.A. County Safe, Clean Water Measure (Measure W) passed in November 2018 with 69.5% of the vote. This measure provides approximately $300 million annually in perpetuity for stormwater capture and pollution abatement projects in the region. Forty percent of the funds will be spent at the municipal level, while 50% will be spent on regional projects at the subwatershed level across the county's nine delineated subwatersheds. The remaining 10% of the funds will be used for program administration, monitoring, education and research. Additionally, the city of L.A. committed to 100% water recycling for all four of its wastewater treatment plants and 70% local water by 2035. These may have been the most transformational commitments from Mayor Garcetti's Green New Deal that was released on April 29, 2019.[17] These city targets were informed and supported by UCLA research on the LA Sustainable Water project for the City of Los Angeles.[18]

Other recent commitments to maximizing local water supplies include funding for remediation of the San Fernando Valley aquifer in L.A., and the construction of a pilot water recycling facility [funded by the L.A. County Sanitation Districts (LACSD) and MWD] that could lead to the transformation of the LACSD's sewage treatment plant in Carson to a regional reclamation facility. In addition, the city of Santa Monica recently approved a plan that includes over $120 million in water recycling, groundwater remediation, stormwater capture, and drinking water treatment plant upgrade projects to make the city water self-sufficient by 2023.

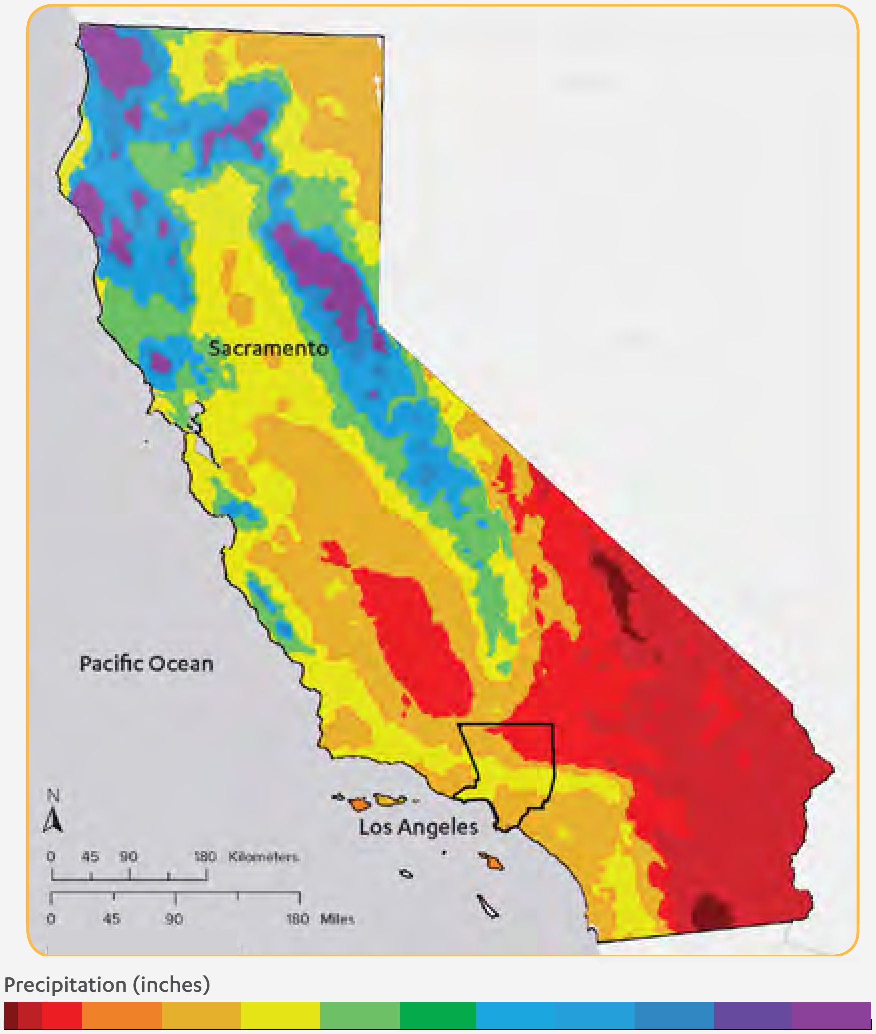
The indicators used in this category to evaluate the status of L.A. County water supply and consumption include: water sources, water reuse, and water consumption. We also present highlights on the drought index, water conservation technologies, water pricing, water use for seawater barriers, and turf-replacement programs.

Los Angeles County Imported Water Sources (2017)

Sources: Metropolitan Water District of Southern California, 2006; ESRI



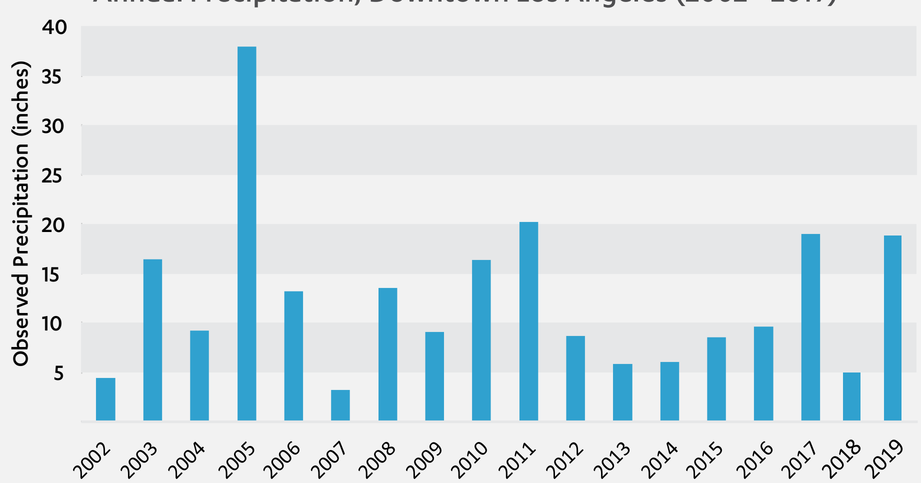
Observed Precipitation in California for Water Year* 2017



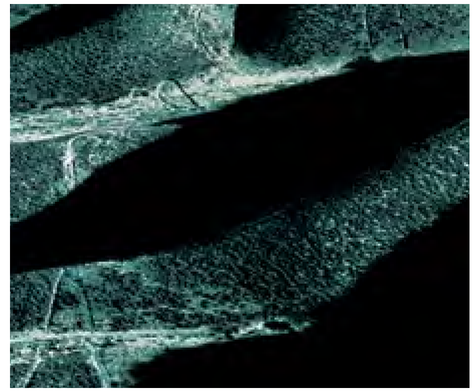
*The water year starts on October 1, 2016 and ends on September 30, 2017.
Precipitation values for the Channel Islands are best estimates due to limitations in precipitation records. White areas indicate that there was no data available.

Sources: California Nevada River Forecast Center; National Oceanic and Atmospheric Administration; ESRI

Annual Precipitation, Downtown Los Angeles (2002 - 2019)



INDICATOR • WATER SOURCES



Introduction

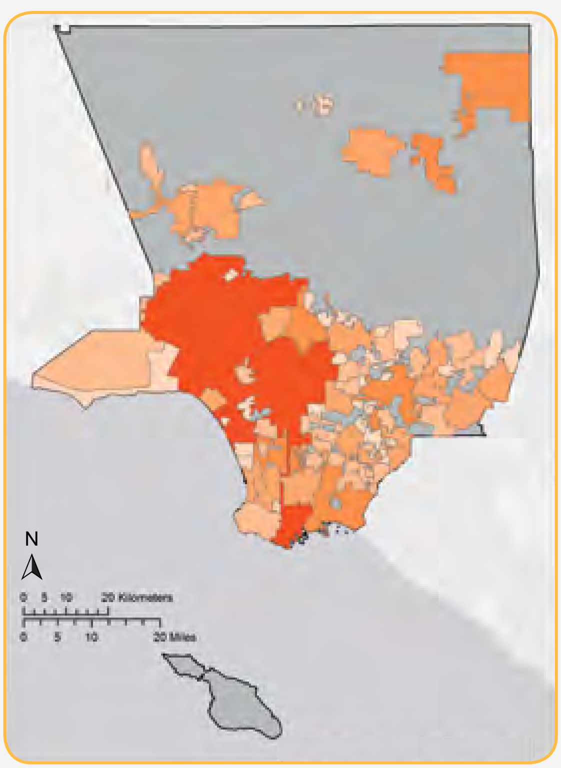
The percentage of water sourced from local supplies (groundwater, recycled water, and local surface water) is a fundamental measure of progress toward water self-sufficiency in L.A. County. Historically, the region has relied heavily on water from Northern California and the Colorado River. This distant water supply is vulnerable to fluctuating annual precipitation, extreme precipitation events, and other natural disasters.

Data

L.A. County sources its water from approximately 100 different suppliers, many of which get their water through the Metropolitan Water District (MWD), which is the regional wholesale water agency. MWD imports water from the Bay-Delta via the State Water Project (SWP) and from the Colorado River via the Colorado River Aqueduct (CRA).

Since it was not feasible to compile data from all suppliers, we used MWD data for L.A. County (provided through a data request) to understand water sources for the entire county. MWD identifies four main sources for L.A. County's water: imported water, local groundwater and surface water, the Los Angeles Aqueduct (LAA, which supplies the City of Los Angeles only), and local recycled water. For evaluation purposes, we consider LAA supplies to be imported water. We examined how much water came from each source and compared the most recent (2017) values to historical data (2000-2017).

Los Angeles County Large Urban Water Suppliers* and Population Served (2017)



Population

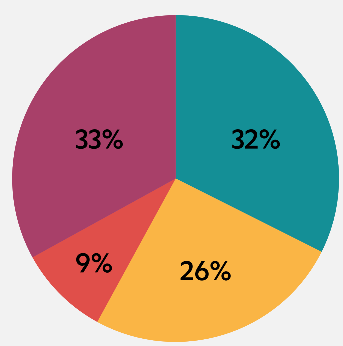
- 100 - 40,000
- 40,000 - 90,000
- 90,000- 180,000
- 180,000 - 500,000
- 4,078,609
- No data available

* 'Large urban water suppliers' are defined as those suppliers that serve more than 3,000 service connections or deliver more than 3,000 acre-feet of water in a year. Map shows 78 out of a total of 80 suppliers

Sources:

UCLA Luskin Center for Innovation; California State Water Resources Control Board; ESRI

Los Angeles County Sources of Water (2017)

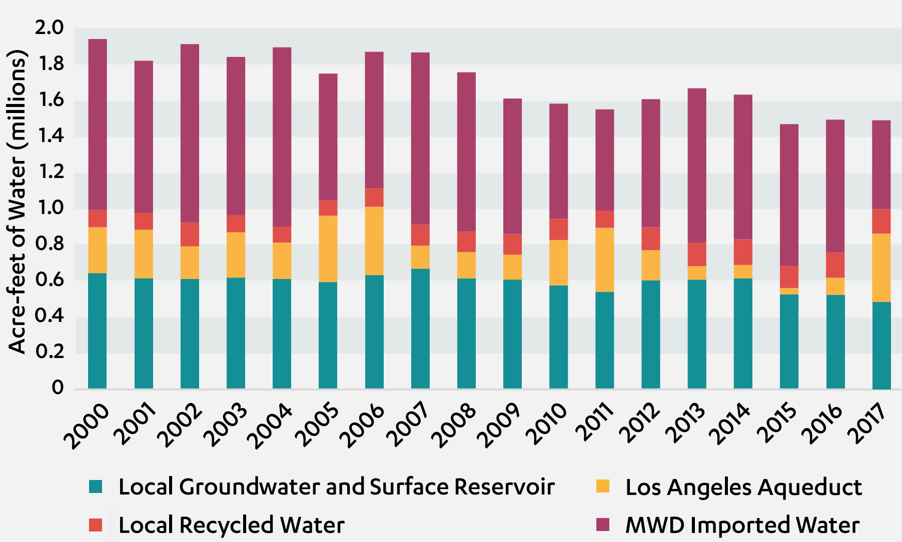


- Local Groundwater and Surface Reservoir
- Los Angeles Aqueduct
- Local Recycled Water
- MWD Imported Water

WATER SOURCES

Los Angeles County Water Sources (2000 - 2017)					
Year	Local Groundwater and Surface Reservoir	Los Angeles Aqueduct	Local Recycled Water	MWD Imported Water	Total Water Use (acre-feet)
2000	643,843	255,182	94,137	947,078	1,940,240
2001	616,474	266,923	94,243	841,954	1,819,594
2002	613,366	179,338	132,124	990,229	1,915,057
2003	620,111	251,942	95,700	873,461	1,841,214
2004	610,182	202,547	90,972	990,286	1,893,987
2005	594,349	368,839	84,145	703,064	1,750,397
2006	632,423	378,922	105,793	752,105	1,869,243
2007	668,040	129,400	116,076	954,506	1,868,022
2008	614,999	147,365	110,482	883,693	1,756,539
2009	607,889	137,084	116,571	750,643	1,612,187
2010	577,538	251,090	117,395	637,754	1,583,777
2011	540,002	355,127	94,573	560,326	1,550,028
2012	605,320	166,858	128,391	708,627	1,609,196
2013	609,559	72,173	133,512	853,172	1,668,416
2014	616,487	74,493	141,131	802,740	1,634,851
2015	526,868	34,683	119,649	790,181	1,471,381
2016	522,655	95,477	141,262	734,689	1,494,083
2017	482,688	380,711	134,451	491,714	1,489,564

Los Angeles County
Water Sources, Absolute Value (2000 - 2017)



Findings

- Just under 1.5 million acre-feet of water was supplied to L.A. County in 2017. This is close to half a million acre-feet less than in the year 2000.
- MWD has been the primary source of water supply for the county. In 2017 imports from MWD were the lowest of any year since 2000.
- In 2017, approximately 59% of water used in L.A. County was sourced from outside the region, with 33% from MWD service water and 26% from the LAA. While the percentage of water sourced from outside the region was similar in 2016 and 2017 (55% and 59%, respectively), the percentage of water provided through the LAA increased from 6% in 2016 to 26% in 2017, while the percentage from MWD imports decreased from 49% in 2016 to 33% in 2017.
- Groundwater provided 32% of total Countywide demand, and local recycled water contributed 9%. Together, these sources provided 41% of the total supply. However, because the MWD "groundwater" category includes both runoff from local watersheds and an unspecified amount of imported water used for groundwater replenishment, it is not possible to accurately evaluate how much of L.A. County's water supply is truly local.
- In 2017, LAA imports, which supply only the City of L.A., were 380,711 acre-feet, the highest since the year 2011 (when 355,127 acre-feet were imported, representing ~23% of total water sources for the region).
- In 2018 (not shown in the table), the City of Los Angeles imported an above average estimated 307,949 acre-feet of water despite the fact that the Eastern Sierras had an average year of snowpack. This means that the city of L.A. received 55-60% of its water supplies from the LAA over the last two years, and imported well over 90% of its water from distant sources. Also, in 2018, LADWP purchased 35% of its water from MWD (182,706 acre-feet), pumped 4% of its water from underlying groundwater aquifers (21,760 acre-feet), while recycled water provided the additional 2% (9,778 acre-feet) of supply used in the city.

HIGHLIGHTS

Drought Index

U.S. Drought Monitor maps offer a broad view of the state of drought that contextualizes policy decisions and local events, and have been produced on a weekly basis since 1999.[19] The classification levels of drought severity reported in the map are determined based on five quantitative indicators of drought, described below, as well as on the effects of the drought and qualitative reports from experts in the geographical areas described.[20]

1. Palmer Drought Severity Index (PDSI) – approximates relative dryness of an area using temperature and precipitation data.[21]

2. Climate Prediction Center (CPC) Soil Moisture Model (percentiles) – generated by NOAA's National Weather Service using a model for estimating soil moisture, evaporation, and runoff based on observed precipitation and temperature data.[22]

3. U.S. Geological Survey's Weekly Streamflow – a 7-day compilation of streamflow levels across the U.S.[23] presented as a percentile compared to historical standards.[24]

4. Standardized Precipitation Index (SPI) – developed by McKee, et al. (1993)[25] and is based solely on precipitation and is expressed in terms of standard deviations from the average value.[26]

5. Objective Drought Indicator Blends – prepared by the Climate Prediction Center (CPC) of the National Weather Service. It includes both long-term and short-term categories that combine weighted factors such as recorded precipitation levels into a simplified percentile that is compared to historical data.[27]

The California Drought Intensity maps depict the cyclical long-term fluctuation in California's level of drought intensity. For the sake of consistency, we chose to look at the last week of September each year, when the state is typically dry. During every year of the past decade, some portion of California has been at least abnormally dry during the sampled week. More than half of the state was in exceptional drought in 2014; nearly half remained so in 2015, and exceptional drought persisted into 2016. There was only one year, 2011, in which no area of the state was classified as being in drought. Although conditions in 2017 with greatly improved compared to the previous three years, drought conditions worsened in 2018. Of course, this past water year has been another wet year, like 2017, with only small areas of the state experiencing dry or moderate drought conditions. California's drought cycles are a major impetus for the transition to greater reliance on local water resources in L.A. County.

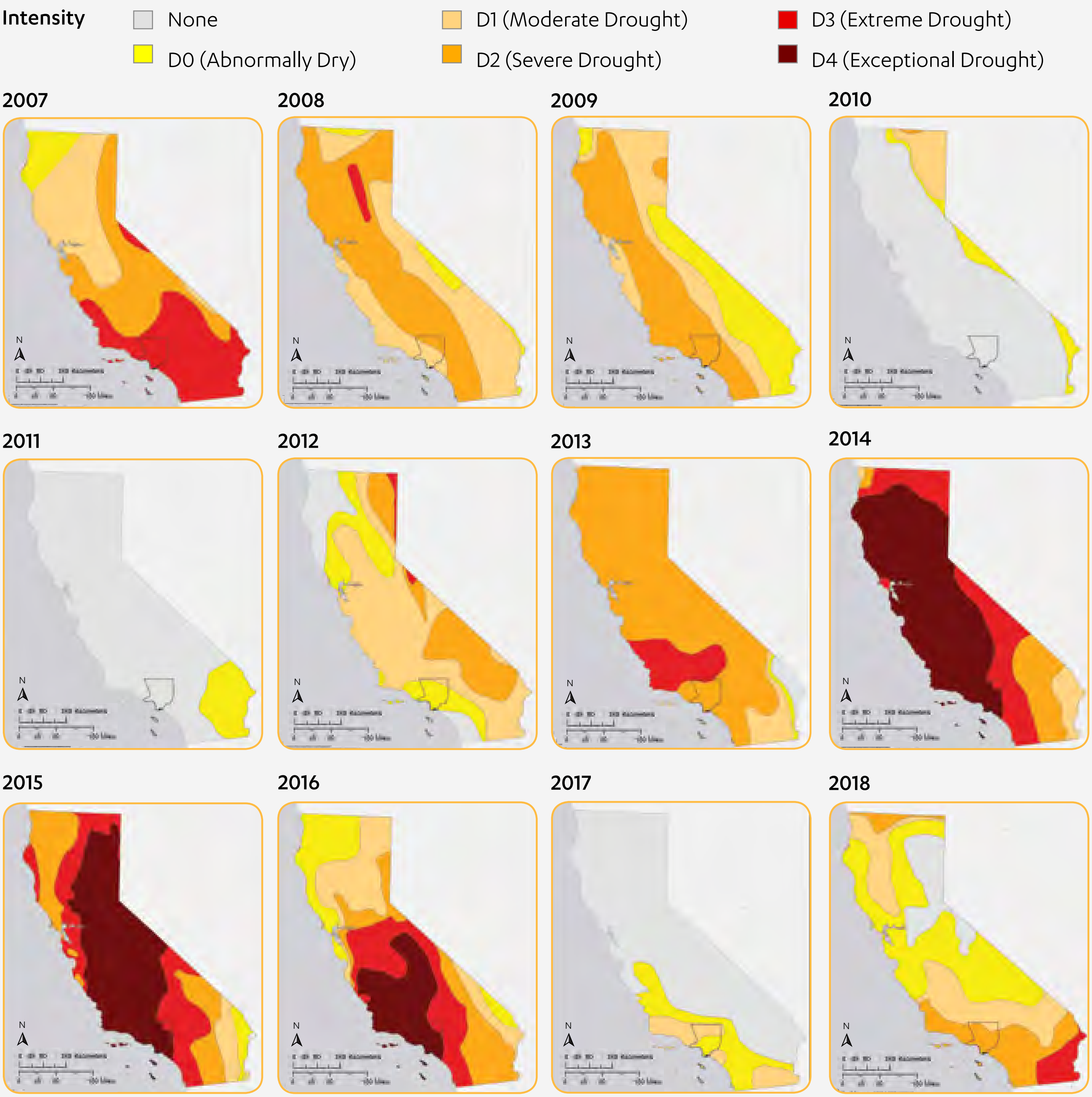
Water Conservation Technologies

Water conservation is fundamental to decreasing dependency on imported water and increasing resiliency during droughts. A wide range of technologies are available to facilitate conservation in both residential and non-residential buildings, including graywater reuse; drip irrigation and weather-based irrigation controls; rainwater harvesting; increased recycling of water in and reuse of condensate from industrial cooling towers; and a myriad of plumbing fixture retrofits for increased efficiency. An additional category of conservation technologies enables tracking and recording of water use at high frequency, in real time, and at a finer scale, to greatly improve understanding of water use patterns and to support behavioral change. Currently, most customers only get consumption feedback on their monthly or bimonthly water bills.

- **Smart meters** are part of an **advanced metering infrastructure (AMI)** that collects real-time water consumption data and transmits it wirelessly to a central location for analysis and instantaneous leak detection; data may also be made accessible to consumers via website.[28] Because the upfront costs are high, AMI has not yet been widely adopted, but is a potential area for future growth.[29] LADWP is engaged in three pilot projects to test the feasibility and reliability of AMI in the City of Los Angeles.[30] The Long Beach Water Department (LBWD) offers a smart water meter installation program and has already conducted two pilot programs. Santa Monica has initiated a pilot program as well. Other cities that have deployed AMI include Glendale, Burbank, and Beverly Hills.

- A study conducted in the City of Los Angeles determined that over 50% of single-family water use comes from landscaping irrigation.[31] Installation of **dual-metering systems** that differentiate between indoor and outdoor water use would allow water pricing systems that incentivize reductions in landscape irrigation while maintaining affordability for indoor water needs.[32] Multi-family residents are frequently metered collectively, resulting in a lack of direct use/cost correlation for renters.[33] **Sub-meters** installed to track water use by individual household would provide important information to residents, supporting behavioral changes and the ability to respond to tiered pricing structures. However, the challenges of retrofitting multi-family and commercial buildings make quantification of consumption in individual dwelling units or offices very difficult.

California Drought Intensity (2007 - 2018)



Note: Maps represent the last week of September for each year.

Sources: US Drought Monitor: National Drought Mitigation Center at the University of Nebraska-Lincoln (NDMC-UNL); the United States Department of Agriculture (USDA); the National Oceanic and Atmospheric Administration (NOAA); ESRI

INDICATOR • WASTEWATER REUSE



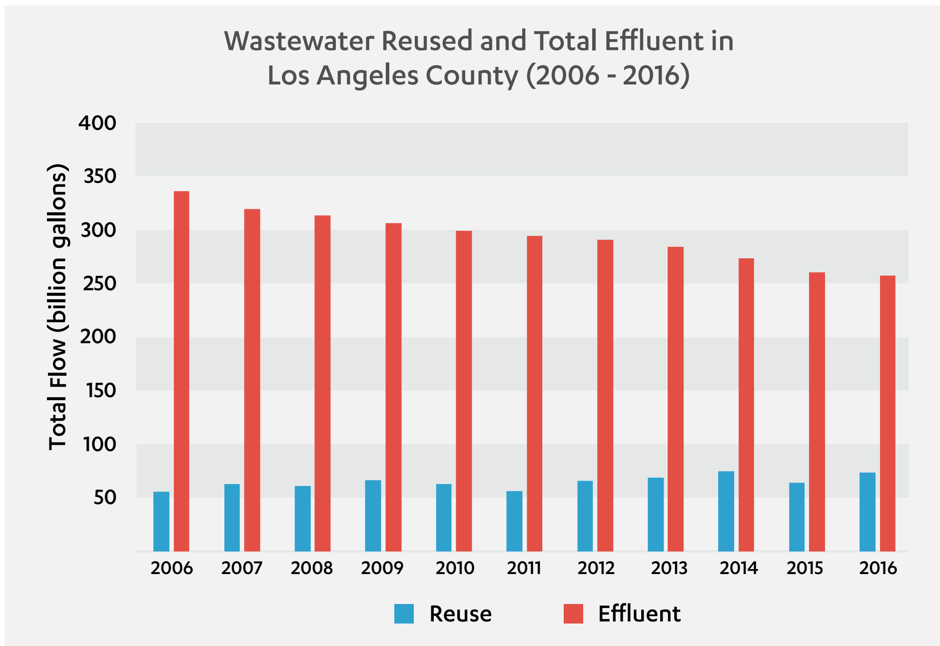
Introduction

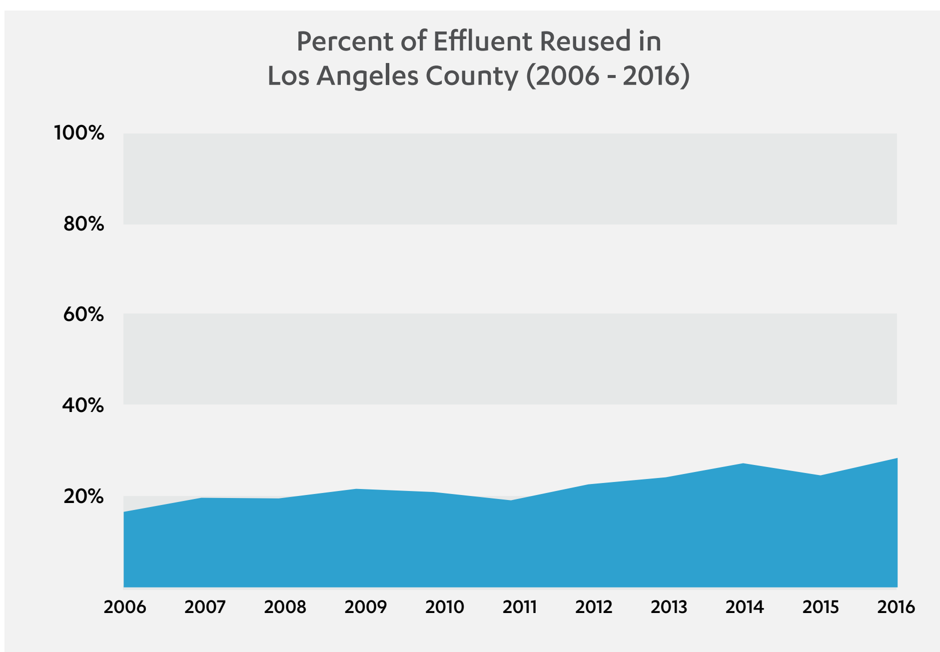
Treatment and reuse of wastewater is critical to support a reduction in the County's reliance on imported water. The region has the major potential to increase water reuse by upgrading the County's two large coastal wastewater treatment plants (Hyperion Treatment Plant and the Joint Water Pollution Control Plant in Carson) to advanced treatment, as well as increasing flows to and reuse of flows from the Tillman Water Recycling Facility. Treated wastewater may be used for outdoor irrigation, groundwater recharge, and industrial processes, among other end uses. This indicator assesses the status of wastewater reuse in the county, and how it has changed over the last 11 years.

Data

The data for this indicator were obtained from individual treatment plants, the City of Los Angeles Sanitation, and the Sanitation Districts of L.A. County, as well as through the State Water Resources Control Board's California Integrated Water Quality System Project (CIWQS) website.[34] We requested data directly from the following treatment plants: Avalon, Burbank, Edward C. Little, and Tapia. We obtained information from 2006 to 2016 for the 18 major, geographically representative treatment plants in the county. The data were provided in a variety of formats, which we analyzed to obtain total effluent and reuse values. In this analysis, "effluent" refers to all flows out of a treatment plant, including flows that will be ultimately discharged or reused. "Reuse" refers only to those flows leaving the treatment plants that were categorized as such in the raw data.

We considered Hyperion Water Reclamation Facility (Hyperion) and Edward C. Little Water Recycling Facility (ECLWRF) as one plant in our analysis because Hyperion predominantly recycles its secondary effluent through ECLWRF. For the Avalon plant, we were only able to acquire flow data for the period 2014-2016.

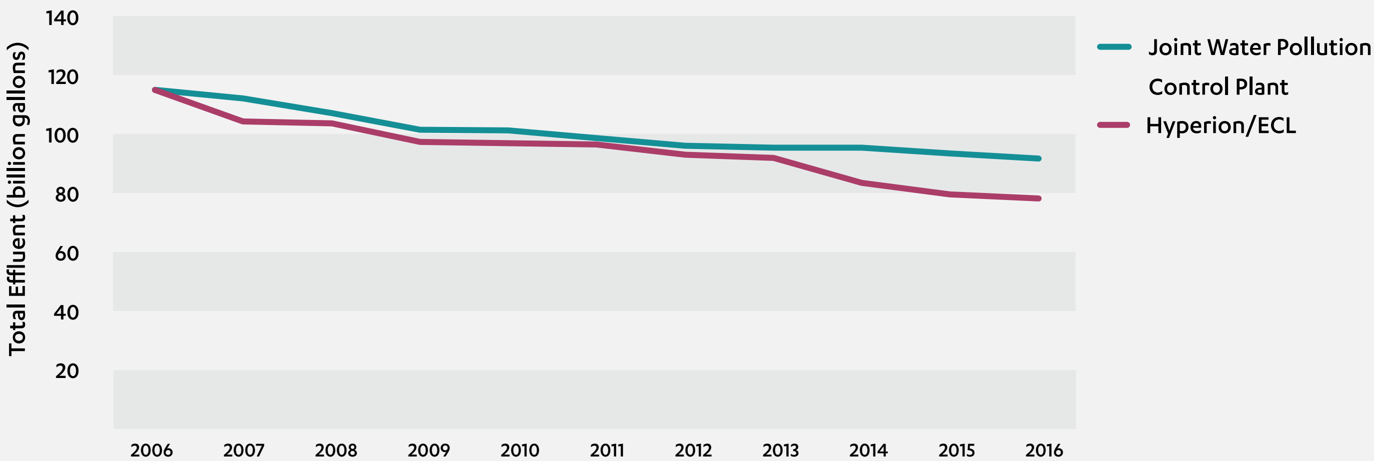




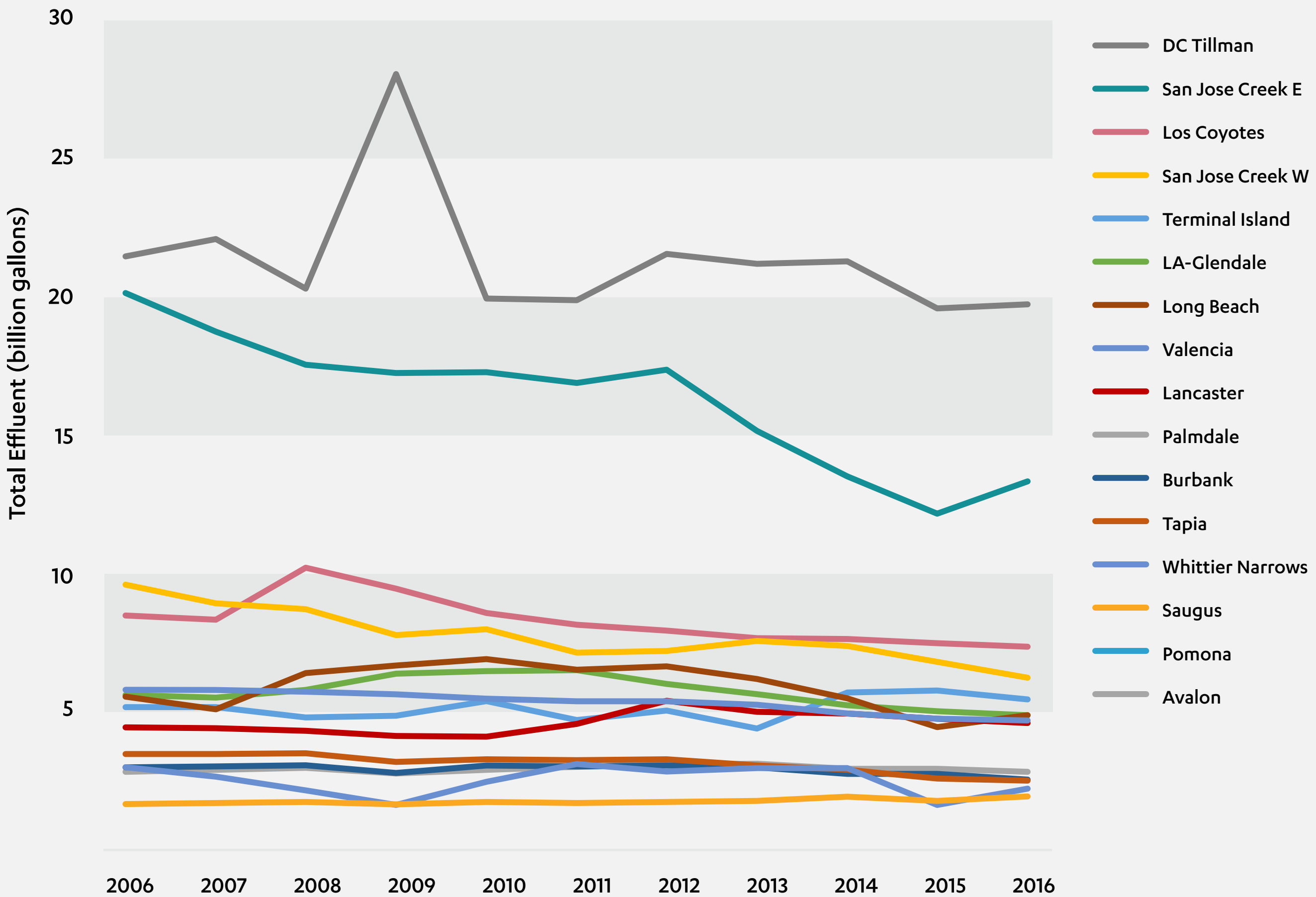
WASTEWATER REUSE

Wastewater Reused Annually in Los Angeles County from 2006 to 2016 (billion gallons)											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Reuse	55.8	63.3	61.4	66.7	63.0	56.4	66.1	69.2	74.7	64.5	73.5
Effluent	336.4	319.8	313.8	306.7	299.5	294.7	291.2	284.8	273.7	260.9	257.8
% Reused	16.6%	19.8%	19.6%	21.7%	21.0%	19.1%	22.7%	24.3%	27.3%	24.7%	28.5%

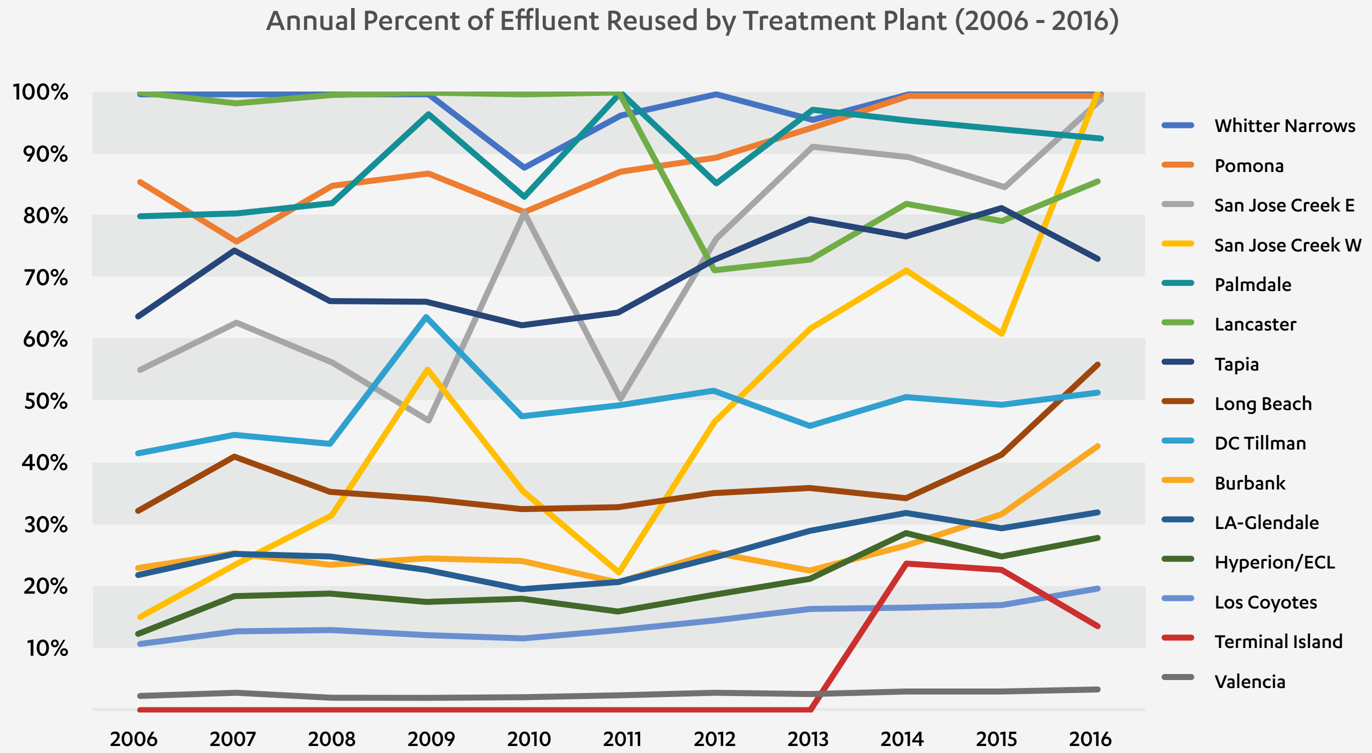
Total Effluent Flows, Los Angeles County Large Treatment Plants (2006 - 2016)



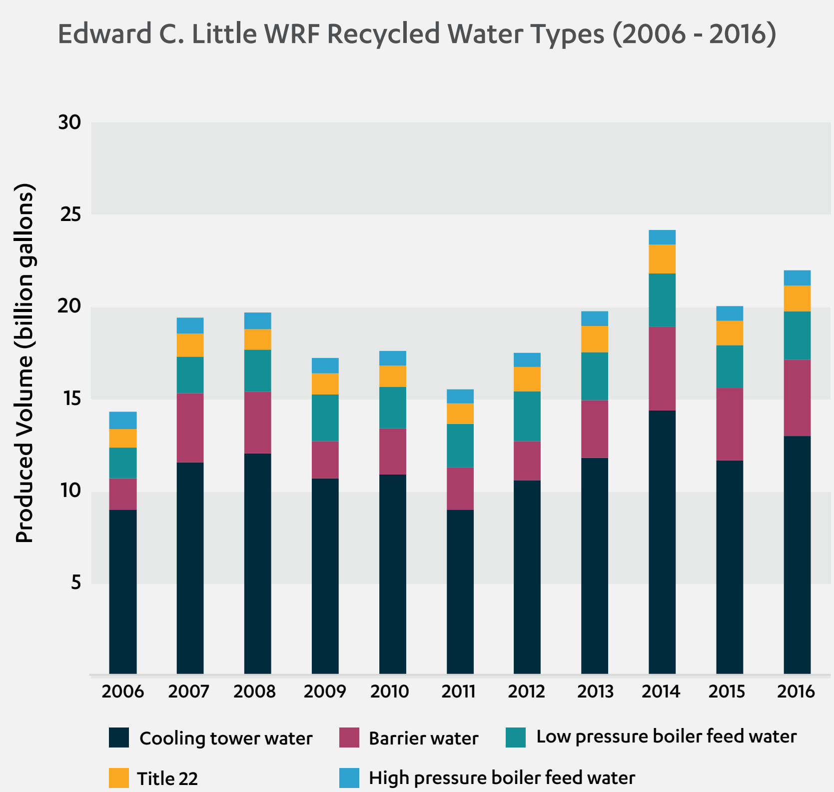
Total Effluent Flows, Los Angeles County Small and Medium Treatment Plants (2006 - 2016)



WASTEWATER REUSE



[1]This chart only includes the 15 treatment plants that produce water for reuse.
[2]Lancaster WRP and Palmdale WRP deliver all plant effluent to reservoirs for later use. The differences in the total amounts of plant effluent and the total amounts reused annually are caused by losses to evaporation or flow metering error.

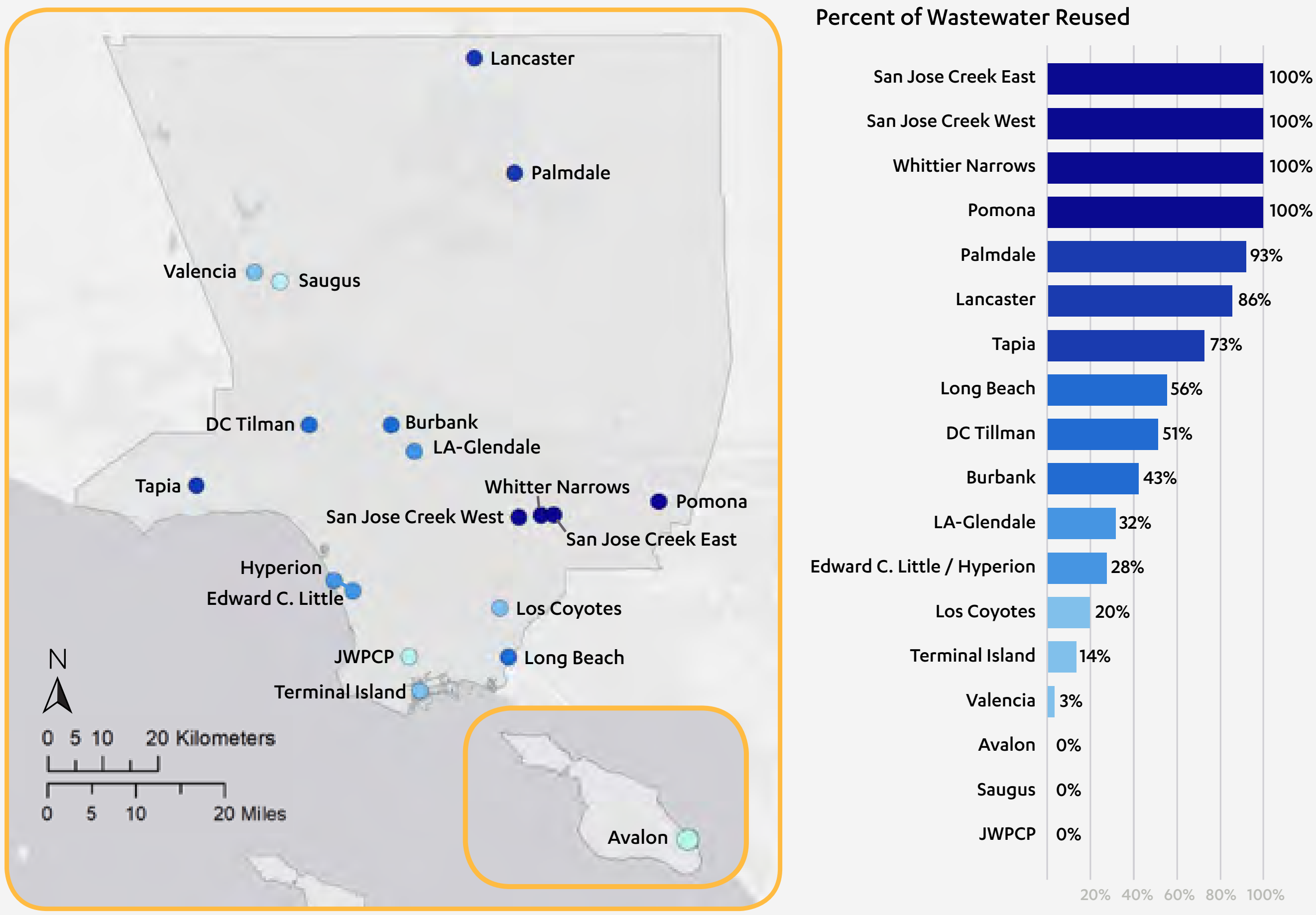


Findings

- The volume of reused water in the county has increased over the 11-year period assessed: from just over 55.8 billion gallons in 2006 to over 73 billion gallons in 2016 - approximately a 31% increase. The largest increase occurred between 2006 and 2007, with more modest year-to-year increases (and occasional decreases) since then.
- The percent of total effluent reused in the county increased from 16.6% in 2006 to 28.5% in 2016, the highest value over the 11-year period.
- In general, most of the small to medium sized treatment plants displayed a stable or slightly decreasing trend in annual total effluent, while the large coastal plants, Hyperion and the JWPCP, have substantially reduced effluent volumes over the last decade. This is likely the result of ongoing indoor conservation efforts.
- The percent of effluent that is treated for reuse is stable or modestly increasing in most plants over the period of review. Several plants achieved nearly 100% reuse in 2016, including: Whittier Narrows,

WASTEWATER REUSE

Wastewater Reuse in Los Angeles County (2016)



Source: ESRI

Pomona, San Jose Creek East, San Jose Creek West, Palmdale, and Lancaster. These plants are all part of the L.A. County Sanitation Districts' system and deliver treated effluent for reuse purposes such as groundwater recharge at Montebello Forebay for use by cities and agricultural irrigation.

- In 2016, the Terminal Island Advanced Water Purification Facilities underwent an expansion that increased its production capacity to 12 million gallons per day. This is not reflected in our analysis since 2017 flow data for the Terminal Island plant were not available at the time of our analysis. The expansion allows for approximately 100% of the Terminal Island effluent flows to receive advanced treatment. This increase in highly treated effluent is anticipated to increase flows for recharging the Dominguez Gap Barrier, supplying Machado Lake, and providing industrial users with recycled water.[35]

- Only three of the 18 treatment plants assessed did not produce water for reuse from 2006-2016: the Joint Water Pollution Control Plant (JWPCP), Saugus Water Reclamation Plant, and Avalon Wastewater Treatment Facility. However, the L.A. County Sanitation Districts and MWD are partnering on a water reuse pilot project at the JWPCP (0.5 MGD) that was operable in March 2019 and could lead to a Regional Reclamation Project that transforms the entire facility to advanced treatment.

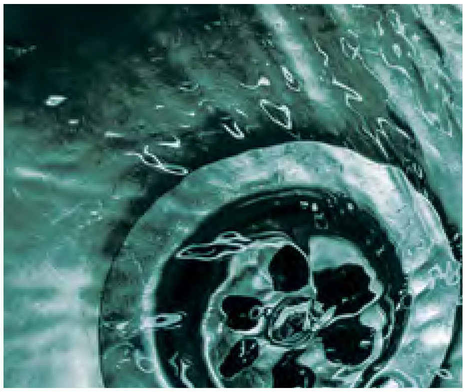
- We examined data from the Edward C. Little facility to understand various end uses for recycled water. Treatment requirements differ depending on end use. Title 22 water serves various industrial and irrigation uses. Reverse Osmosis/Advanced Oxidation treated barrier water goes toward the West Basin Seawater Barrier Project that helps alleviate seawater intrusion and replenish the West Coast basin. The other types of produced feedwater supply water for various operational uses.

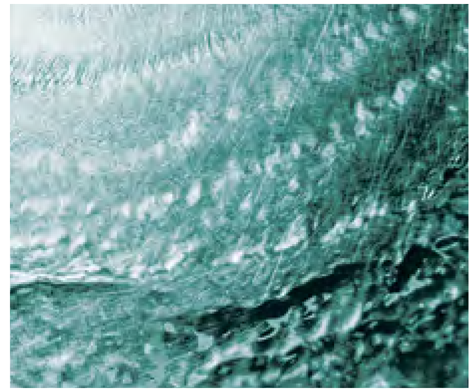
Data Limitations

- The data reported as "reuse" for each treatment plant depended on which effluent flows an individual treatment plant attributed to reuse, and may not be consistent across all plants in the county. Furthermore, some reports noted various measurement issues such as flow meter malfunctions or inconsistent flow measurements and classifications between years. Therefore, assumptions were made based on information from data providers to produce total effluent and reuse values for use in this indicator.

- Due to the time required to obtain, categorize, and process data provided in various formats, this assessment only used data for the major treatment plants in the county. Data were only available at this time for all plants through 2016, so 2017 flows were not used in evaluating this indicator.

INDICATOR • WATER CONSUMPTION



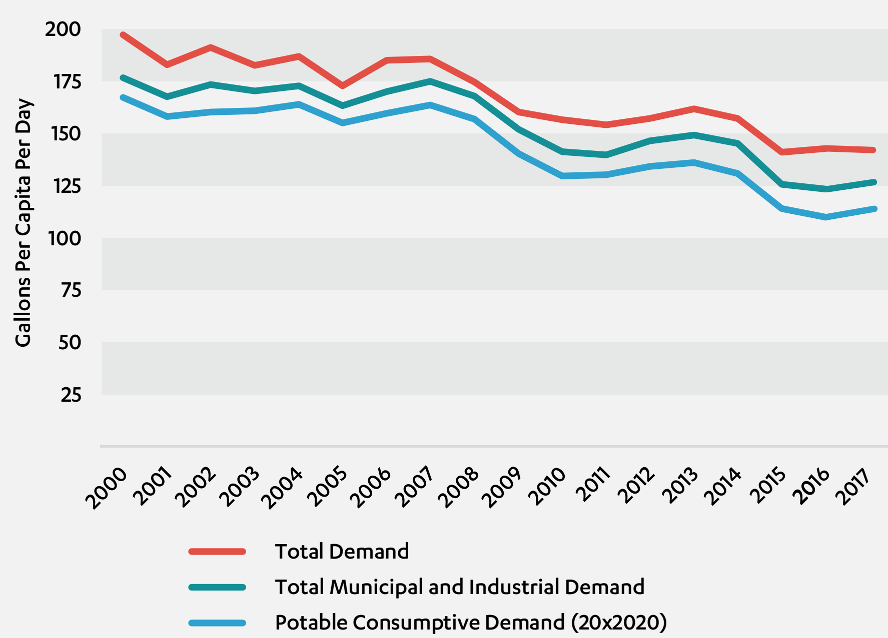


Water Demand in Los Angeles County Sourced by Metropolitan Water District (2000-2017)			
GPCD	Total MI Demand	Potable Consumptive Demand (20X2020)	Total Demand
2000	177	167	197
2001	168	158	183
2002	173	160	191
2003	170	161	183
2004	173	164	187
2005	163	155	173
2006	170	160	185
2007	175	164	186
2008	168	157	175
2009	152	141	160
2010	142	131	157
2011	139	130	153
2012	148	135	158
2013	150	137	163
2014	148	134	159
2015	127	116	142
2016	124	111	144
2017	128	116	143

Introduction

While reducing water consumption has been a goal in the region for some time, the most recent extraordinary drought conditions were accompanied by a series of state policy measures. In April 2015, then California Governor Brown imposed mandatory water restrictions,[36] calling for a statewide reduction in water use of 25% through February 2016 compared to 2013. To implement this statewide reduction, the State Water Resources Control Board (SWRCB) imposed percent reduction standards on each water supplier. Suppliers were assigned to one of 8 tiers of reduction targets,[37] based on water use in summer 2014. In April 2017,[38] after the drought was declared over, Governor Brown lifted the mandatory requirements for urban water suppliers, which are defined as suppliers that serve more than 3,000 service connections or produce more than 3,000 acre-feet of water in a year. As part of conservation regulations, water use reporting was required starting June 2014 and monthly water use reports are submitted by each urban water supplier to the State Water Resources Control Board. This indicator looks at both overall trends in county consumption as well as individual water supplier's behavior in response to these policy measures.

Water Demand in Los Angeles County Sourced by Metropolitan Water District (2000-2017)



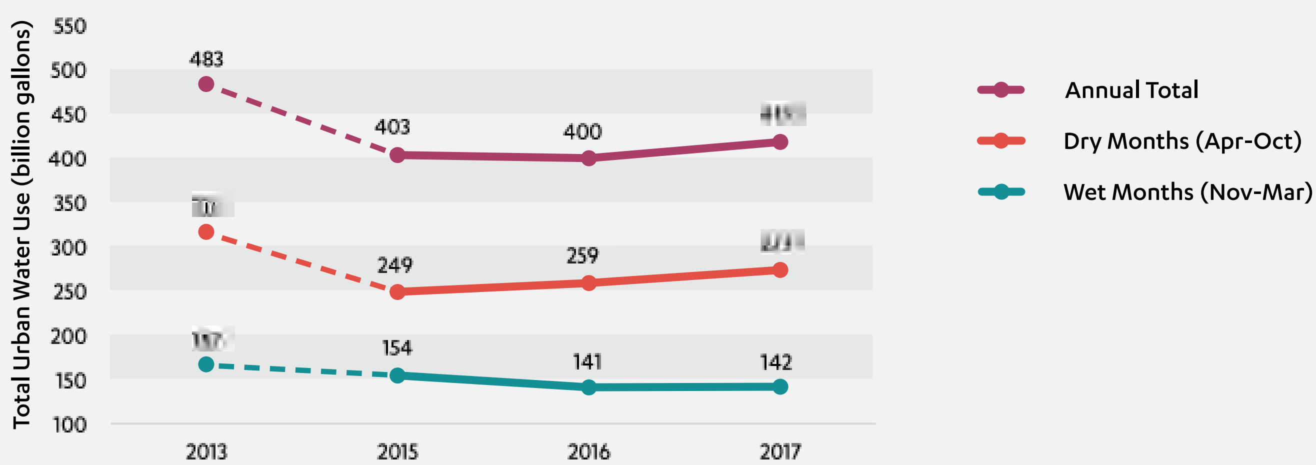
WATER CONSUMPTION

Data

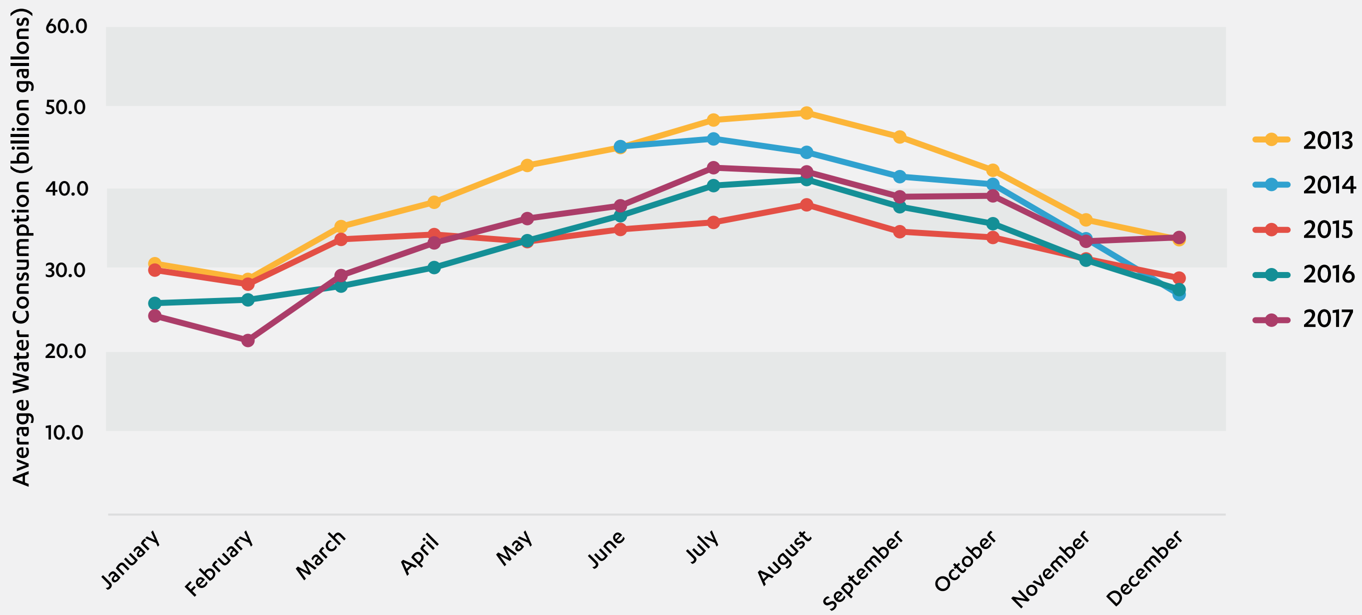
We looked at water consumption at two scales. First, we looked at county-wide water consumption using data from the Metropolitan Water District (MWD) for L.A. County, provided through a data request. The three categories of water use are: "Total Municipal and Industrial (MI) Demand"; "Potable Consumptive Demand," which is MI Demand minus recycled water – this is the value used to calculate gallons per capita per day (GPCD) water use for compliance with SBX7-7; and "Total Demand," which includes MI, agricultural, seawater barrier and groundwater replenishment. We looked at data from 2000-2017, with particular interest in changes since 2013 in response to the governor's January 2014 drought declaration.

Second, we looked at monthly urban water use data by supplier, which we totaled to get county-scale information. This water use includes residential, commercial, and industrial. The data were obtained from the State Water Resources Control Board's Water Conservation Portal under "Water Conservation & Production Reports."[39] The Portal contains data for every month starting June 2014 (when reporting became mandatory), as well as the 2013 baseline monthly water production value for all suppliers subject to the reporting requirement. We looked at data through December 2017. Statewide information on the SWRCB website was narrowed down to only include L.A. County suppliers, using supplier information previously compiled at UCLA.[40,41] We also looked at total urban water use each year compared to 2013 to evaluate the effectiveness of the governor's Executive Order[42] relating to mandatory water use reduction.

Urban Water Use Trends, Los Angeles County (2015 - 2017, Compared to 2013)

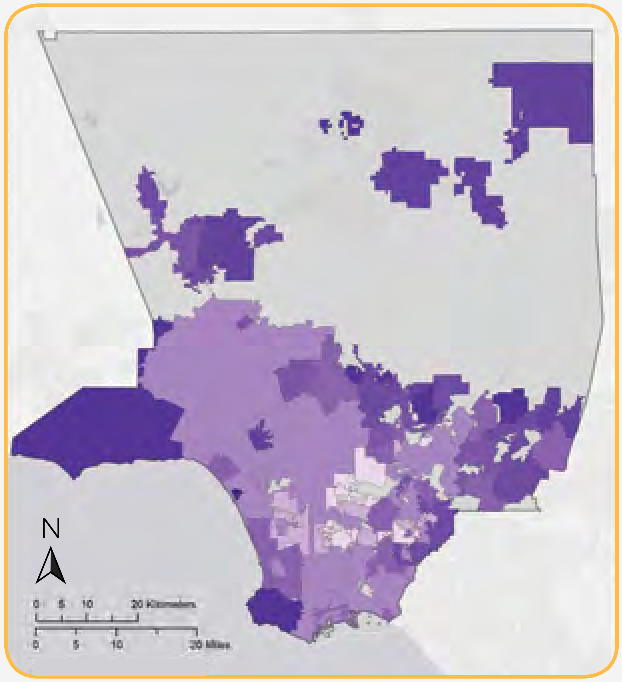


Monthly Total Urban Water Use, Los Angeles County (2013 - 2017)



WATER CONSUMPTION

State-mandated Water Reduction Targets, Los Angeles County
(established in 2014, referenced to 2013 baseline)



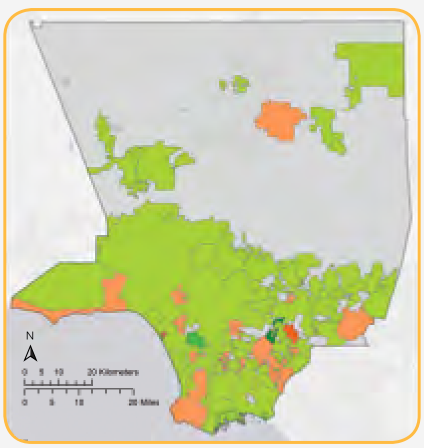
Mandatory Standards Set (%)

- 8
- 12
- 16
- 20
- 24
- 28
- 32
- 36

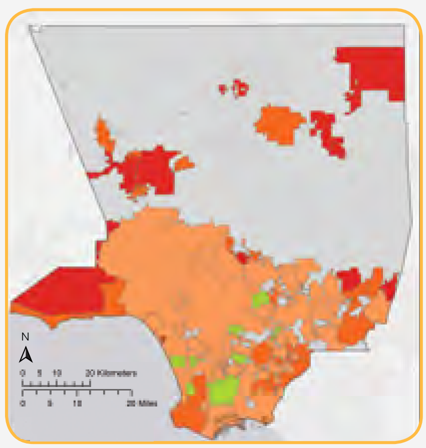
Sources: California State Water Resources Control Board; UCLA Luskin Center for Innovation; ESRI

Percent Change in Urban Water Use in Los Angeles County (2013-2017) Year-by-Year comparisons

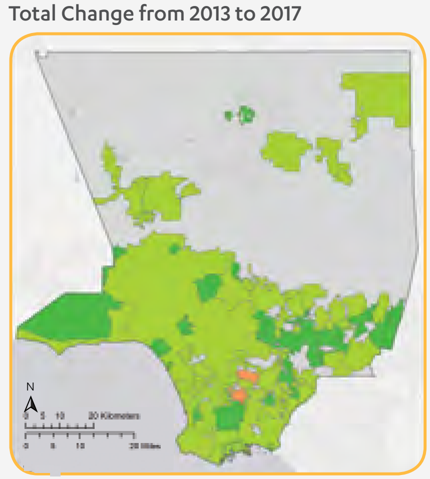
July 2017 compared to July 2016



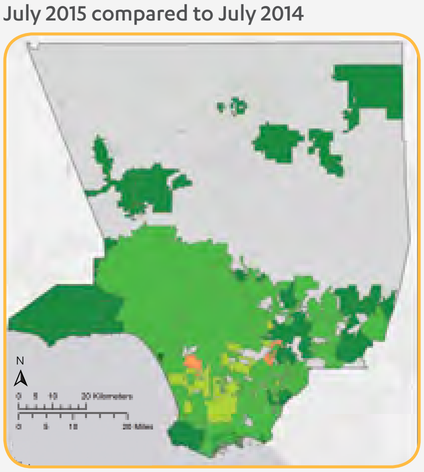
July 2016 compared to July 2015



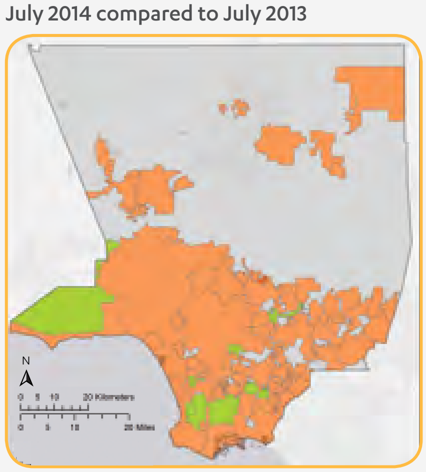
Total Change from 2013 to 2017



July 2015 compared to July 2014



July 2014 compared to July 2013

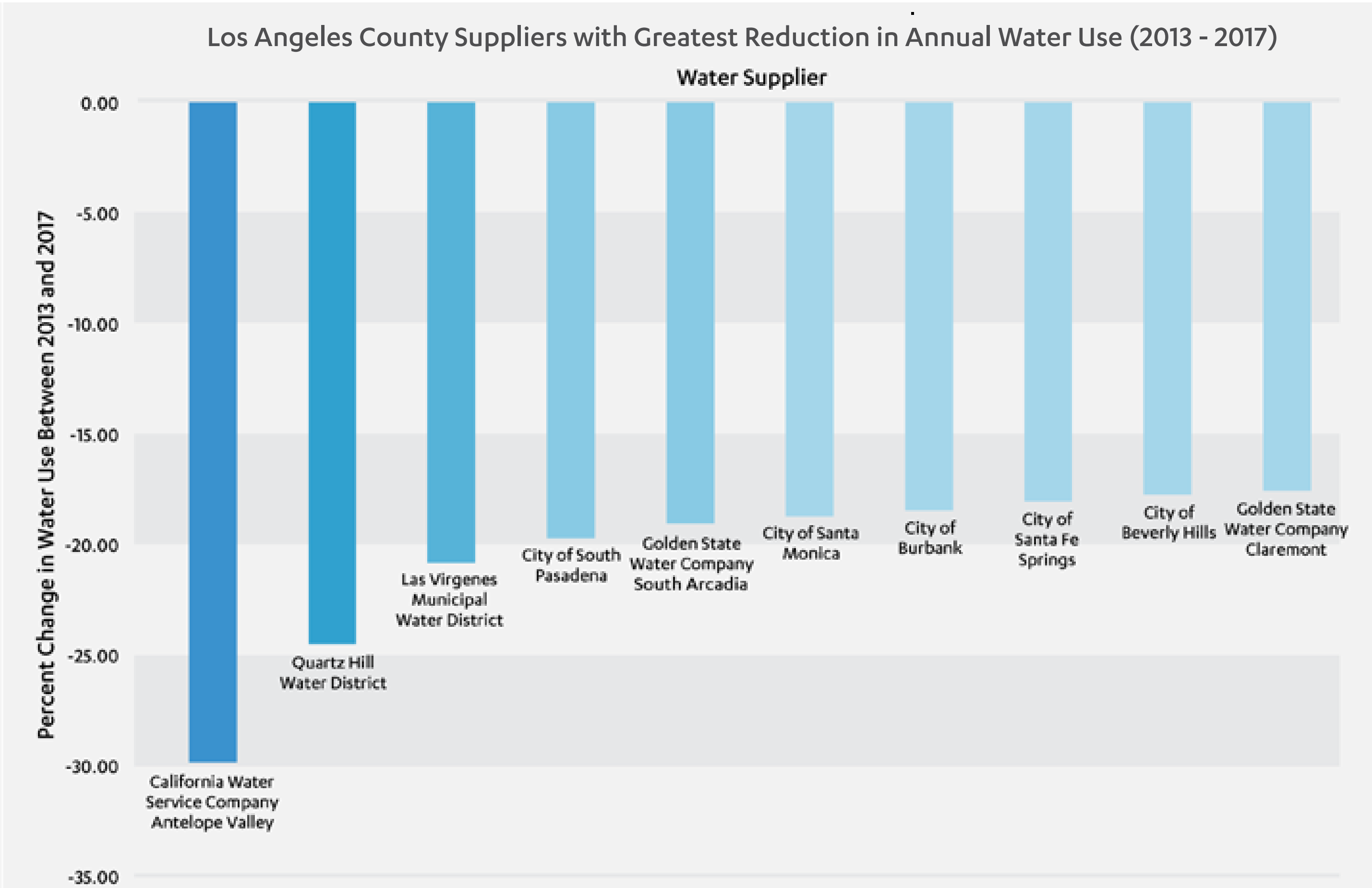


% change in water use

- -45 – -30
- -30 – -15
- -15 – 0
- 0 – 15
- 15 – 30
- >30

Sources: State Water Resources Control Board; Luskin Center for Innovation; ESRI

WATER CONSUMPTION



Los Angeles County Suppliers by Residential Per Capita Water Use (2017)

		Los Angeles County Water Supplier Name	Residential - Gallons Per Capita Per Day
Highest Water Users	1	Valley Water Company	262
	2	Los Angeles County Public Works Waterworks District 29	236
	3	Quartz Hill Water District	189
	4	California Water Service Company Palos Verdes	182
	5	Las Virgenes Municipal Water District	168
	6	Rubio Canyon Land and Water District	161
	7	City of Arcadia	161
	8	California Water Service Company Antelope Valley	150
	9	Golden State Water Company Claremont	148
	10	Los Angeles County Public Works Waterworks District 40	147
Lowest Water Users	1	City of Lynwood	34
	2	City of Huntington Park	41
	3	California Water Service Company East Los Angeles	44
	4	Park Water Company	47
	5	Golden State Water Company Florence Graham	52
	6	City of Paramount	53
	7	City of El Monte	54
	8	Golden State Water Company Bell-Bell Gardens	54
	9	Golden State Water Company Southwest	60
	10	Golden State Water Company Norwalk	62

WATER CONSUMPTION

Los Angeles County Suppliers by Population and Water Use Change (2013 - 2017 and 2016 - 2017)					
		LA County Water Supplier Name	Population Served	Percent Change in Water Use Between Years	
				2013-2017	2016-2017
Largest Suppliers	1	Los Angeles Department of Water and Power	4,077,709	-11.73	4.23
	2	City of Long Beach	489,719	-13.67	0.43
	3	Golden State Water Company Southwest	271,677	-10.31	1.49
	4	San Gabriel Valley Water Company	257,000	-17.34	6.60
	5	Los Angeles County Public Works Waterworks District 40	208,478	-14.56	5.57
	6	City of Glendale	199,248	-15.35	5.06
	7	Suburban Water Systems San Jose Hills	178,500	-17.56	5.80
	8	City of Pasadena	167,388	-12.89	7.59
	9	City of Pomona	155,604	-16.47	4.94
	10	California Water Service Company East Los Angeles	151,041	-13.08	2.13
Smallest Suppliers	1	California Water Service Company Antelope Valley	3,418	-29.86	25.68
	2	Rubio Canyon Land and Water Association	9,600	-13.86	10.49
	3	Valley Water Company	10,070	-9.68	8.20
	4	Lincoln Avenue Water Company	16,126	-14.94	13.43
	5	City of Santa Fe Springs	18,199	-18.05	1.28
	6	City of Norwalk	18,361	-6.59	3.39
	7	City of Lomita	20,463	-16.30	-0.02
	8	Los Angeles County Public Works Waterworks District 29	22,249	-13.04	-0.37
	9	City of San Fernando	24,560	-16.59	2.96
	10	Orchard Dale Water District	25,000	-9.84	-0.34

Findings
Countywide

a) Per capita water use
- In response to the Governor's drought declaration and State Water Board and local government conservation actions, there was an overall decrease in countywide consumption.
- Between 2000 and 2017, there was a drop of over 27% in total countywide water demand.
- There was a 12% drop in total countywide demand between 2013 and 2017, from 163 to 143 gallons per capita per day (GPCD).
- Both potable consumptive demand and total MI demand increased between 2016 and 2017, by 3-4%; however, total demand remained below the 2016 level.

b) Total consumption
- In 2017, total annual water consumption was 418 billion gallons, compared to 483 billion gallons in 2013, a drop of 13.5%.
- Total annual water consumption in L.A. County decreased by 16% in 2015 compared to 2013 and decreased by another 1% in 2016, but then rose in 2017. While the 2017 total is still 13% lower than the 2013 baseline, it is 4% higher than 2015 usage and 5% higher than 2016 usage. This demand increase trend continued into 2018, as municipal water demand from January to August in the South Coast area (L.A., Orange, and San Diego counties) has been only 10.1% below 2013 consumption levels (analysis not included here). However, 2019's above average rainfall statewide, longer rainy season, and low average temperatures, and reduced demand for outdoor landscape irrigation has led to another significant reduction in water consumption (For January through May 2019, analysis not included here).
- L.A. County's monthly total water use remained lower than 2013 values from 2014-2017; however, the margin of difference decreased over time, and in December 2017, the county's water use was higher than the same month in 2013.
- Although reductions achieved in wet months (Nov-Mar) were not as great as in dry months (Apr-Oct), the wet month reductions are more persistent while the dry month reductions bounced back with time.
- After a noteworthy reduction of water use by 21% in 2015, dry month usage increased by 4% in 2016 and by a further 6% in 2017, although it remains lower than the 2013 target.

Supplier-specific progress and trends
- All except 2 water suppliers (City of Compton and South Gate) in L.A. County reduced water use in July 2017 compared to July 2013, with a maximum reduction of 29% achieved by Golden State Water Company South Arcadia.
- Overall, for the month of July, L.A. County suppliers reduced water use in 2014 and 2015 compared to the previous year. However, in July 2016, only 9% of suppliers in L.A. County reduced water use compared to the previous year. In July 2017, a similar pattern followed with only 11% of suppliers reducing water use compared to the previous year.

WATER CONSUMPTION

- California Water Service Company Antelope Valley (a small supplier) achieved a 30% reduction in water use between 2013 and 2017, the largest in L.A. County during that time period.
- There were substantial reductions in water use among small and large suppliers. Among the ten largest and ten smallest suppliers in the county, all managed to achieve a reduction in water use between 2013 and 2017. The highest reduction was 17% for the large water suppliers, and 30% for the small suppliers. However, in the most recent analyzed year (between 2016 and 2017) water use increased among all large water suppliers, from between 0.5 to 7.5%, and seven out of ten small suppliers increased their water use, from between 1% to 25%.
- In 2017, water used by the highest residential user (Valley Water Company) was over seven times greater than the lowest user (City of Lynwood). Within the top 10 residential users in 2017, the values ranged between 147 and 262 R-GPCD, while within the lowest 10 residential users, values ranged between 34 and 62 R-GPCD.

Data Limitations

- The byzantine nature of the water supply system currently prevents a comprehensive analysis of total water consumption and per capita water usage in the county. There is no single agency to access data for all of L.A. County, and MWD does not have a specific 20x2020 target for L.A. County.
- We would have liked to analyze water use based on per capita values, but the data provided at the SWRCB's portal do not include 2013 population served, or percent residential use, therefore per capita water use for 2013 cannot be derived from the 'total' 2013 use.
- Data from the State Board is available with a 2-month lag period. Each monthly dataset update may include revisions to previous months' data as well. For data through August 2017, we used values provided as of August 2017. For data after August 2017, we used values provided as of December 2017.
- Reporting began in April 2014. Therefore, we did not include 2014 data in our analysis of total annual usage.
- Total data does not reflect the sum of all suppliers in L.A. County, since some suppliers did not report consistently for every month of every year, and therefore had to be excluded from the totals to maintain consistency. The following suppliers were excluded: City of Alhambra, City of Compton, City of Covina, City of Lynwood, City of Sierra Madre, City of South Gate, City of South Pasadena, City of Vernon, Walnut Valley Water District, City of Whittier. Additionally, since reporting is only required for large urban water suppliers, this data does not include small suppliers.

HIGHLIGHTS

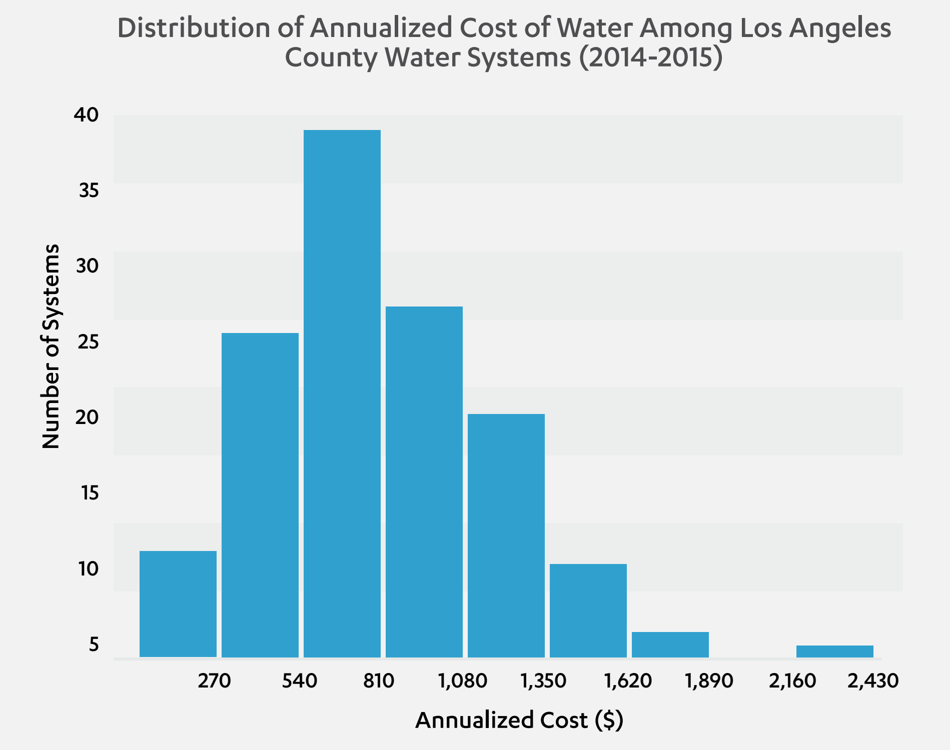
Water Pricing

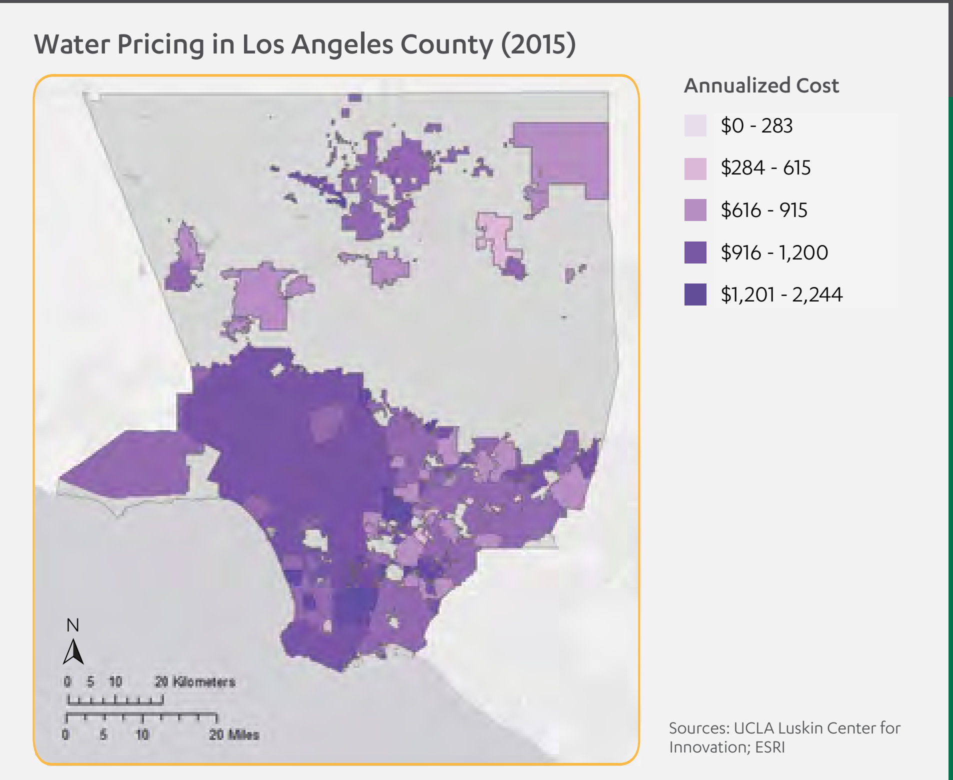
There are nearly 300 active public water systems in L.A. County, ranging from small systems serving 25 consumers,[43] to the Los Angeles Department of Water and Power, which serves more than four million people.[44] Water pricing varies widely among these systems. Each system sets its own water rates based on the cost of importing or otherwise obtaining water, operating costs, costs of water-related infrastructure projects and maintenance, and other considerations. Each system has one of eight different governance structures, which fall under five separate state-level entities.[45] The wide variety of authority structures contributes to the pricing variation. Results from a 2015 study[46] are mapped and graphed (at right), showing the typical annualized cost of water for a single-family residential household in approximately 120 L.A. County water systems; costs vary by an order of magnitude among systems. In over 30 water systems, serving nearly 5 million people, households pay more than $1,000 in an average year.

A pricing structure commonly used to achieve water conservation is tiered pricing, and specifically, increasing block pricing, in which a water provider charges higher marginal prices for greater amounts of water consumed. Tiered pricing structures can be legally used if rates are demonstrably linked to the cost of providing the water.[47]

As with energy services, the basic financial model of water utilities is usually at odds with encouraging conservation, making it challenging to achieve deep reductions in water use. Some researchers have proposed that restructuring pricing in order to loosen the direct coupling between consumption and revenue could help water providers maintain fiscal viability even as water sales decrease.[48]

The application of drought surcharges to compensate for lost revenue can disproportionately impact lower-income consumers.[49] In a 2017 study of California water systems, the average percentage of household income spent on basic water service before drought charges was 1.8 percent for a single-family household earning less than $25,000; drought-related charges brought the rate up to 2.1 percent of income, more than the California State Water Resources Control Board's affordability threshold of 1.5 percent.[50]





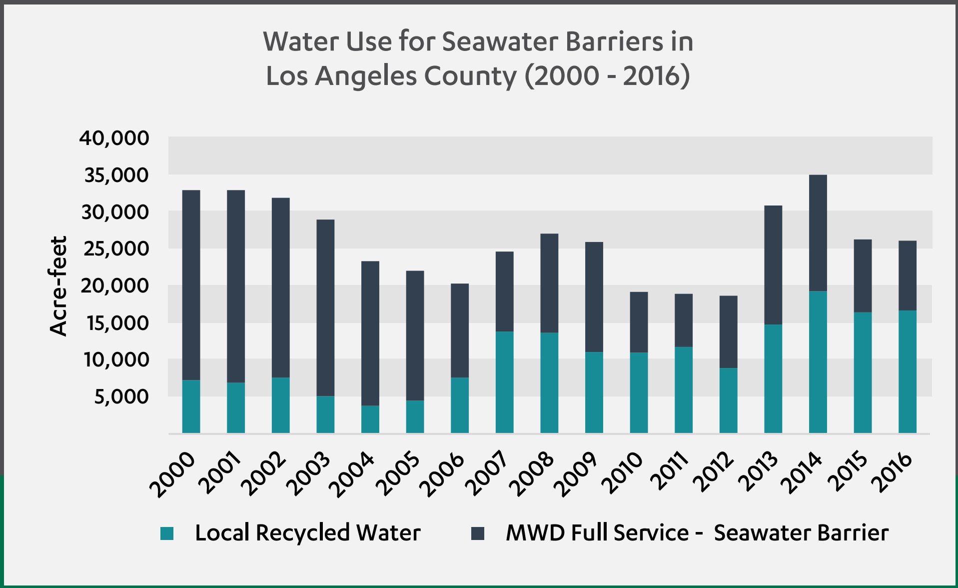
Sources: UCLA Luskin Center for Innovation; ESRI

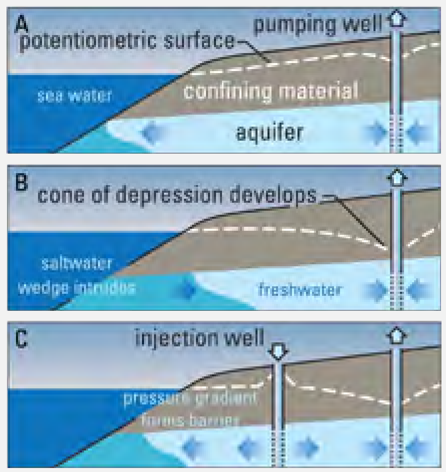
Water Use for Seawater Barriers

Saltwater intrusion barriers are a series of wells designed to prevent saltwater from entering groundwater aquifers. Normally, the pressure from fresh groundwater moving coastward creates a barrier that prevents saltwater intrusion.[51] However, when fresh groundwater from coastal aquifers is overdrawn, the barrier breaks down, allowing saltwater to seep closer to freshwater pumping wells.[52] To counteract this effect, freshwater is added to coastal aquifers via injection wells, reestablishing the pressure barrier and maintaining the aquifer's freshwater storage space.[53]

There are currently three saltwater barriers in L.A. County, all within the coastal plain region:[54] the West Coast Basin Barrier Project, initiated in 1953; the Dominguez Gap Barrier Project, started in 1971; and the Alamitos Barrier Project, started in 1966 as a partnership with the Orange County Water District.[55]

Over the last 10 years, there was a fairly steady increase in the percentage of recycled water, compared to MWD potable water, used to maintain the seawater intrusion barrier systems. Overall water use for seawater barriers can be reduced through improved groundwater management practices, and by reducing freshwater demand through conservation measures.





Data source: USGS California Water Science Center

Turf-Replacement Programs

In many urban areas of California, over 50% of residential water use is for outdoor landscaping. Transitioning away from lawns toward native plants with lower water needs is a key water conservation measure. In 2014, the Metropolitan Water District of Southern California (MWD) offered a $340 million turf replacement ($2 per square foot of turf replaced) rebate incentive program. A 2019 study[56] by UCLA and the University of Utah examined the spatial and socioeconomic distribution of program participants, and assessed the landscape changes resulting from this program. Key findings included:

- Out of the 25,000 MWD rebates made to customers in L.A. County, over 80% were also taking advantage of additional rebates offered by the City of L.A.
- Highest participation rates were in the San Fernando Valley.
- Middle- and higher-income homeowners participated at higher rates, particularly where both MWD and City of L.A. rebates were available.
- Rebate recipients took advantage of a variety of land cover alternatives to turf, resulting in a diversity of plant functional types following replacement.
- There was evidence of "neighborhood adoption" effect; about one-third of participants were neighbors with another participating building clustering of participating properties, where multiple neighbors replaced turf.

One of the limitations of the MWD turf replacement rebate program was its brief tenure. Other entities offer ongoing rebate support for turf replacement, including the City of Long Beach. Furthermore, new plants require time to establish root systems that allow for drought tolerance, and require frequent irrigation during the first several growing seasons. Therefore, more consistent funding of turf replacement, including prior to drought conditions, would improve the likelihood that replacement landscapes survive. The MWD has recently restarted the turf replacement program with a $2 per square foot rebate at a more modest level (no more than $50M annually).[57]

grade C+

for water supply & consumption

The grade for L.A. County water supply and consumption is only a C+ despite the fact that the region had tremendous water conservation success during the peak of the drought under then Governor Brown's water conservation mandate. The grade reflects the fact that water consumption has increased since the Governor declared the drought over in April 2017. After the wet winter of 2017, local media no longer covered water issues on a daily basis, and some cities rolled back their conservation mandates (Los Angeles, Santa Monica, and numerous other cities are exceptions) and toned down their conservation messaging. As a result, consumption behavior, particularly at the residential level, increased significantly. This grade is also due to the many water pricing inequities that disproportionately impact large populations within L.A. County. It is our opinion that unless a household routinely uses large volumes of water because of enormous lawns, non-native landscapes, or onsite water intensive agriculture, no household should be paying over $1,000 annually for water. On the water supply side, there has been little change in the region's reliance on imported water over the last few years. L.A. County still imports approximately 60% of its water supply and the city of L.A. has imported over 90% of its supply in the last two years. Although there are numerous promising opportunities to increase local resources (e.g., stormwater capture, particularly in the L.A. River watershed; groundwater pump and treat in the San Fernando Valley; water recycling through the City's Hyperion and Tillman projects; and the LACSD-MWD Regional Reclaim project in Carson), the ambitious stormwater capture and water recycling efforts are currently in the planning stage. The passage of Measure W will accelerate construction of stormwater projects with funds expected to be allocated as early as January 2020. Despite comprehensive integrated water management planning efforts and the passage of Measure W, L.A. County and the City have a long way to go before the region's water supply becomes sustainable and more climate and seismically resilient.

2

DRINKING WATER QUALITY

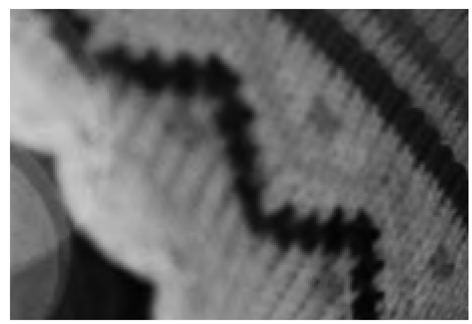
Overview

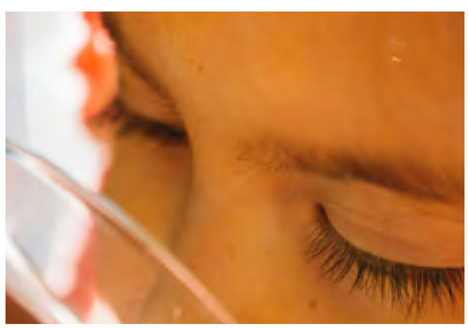
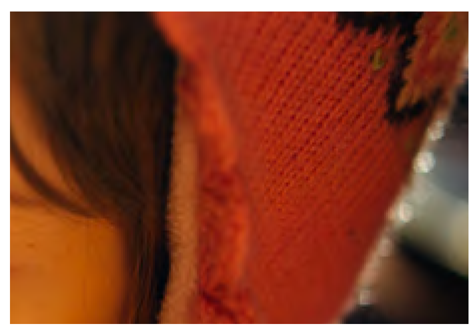
Drinking water quality is a fundamental indicator related to human health. A number of national and local drinking water stories have led to a general mistrust in tap water quality in the L.A. region - from water supply crises affecting disadvantaged communities in Detroit, Washington D.C., Corpus Christi and the South San Joaquin Valley, to brown and often smelly water from the tap in and near Compton. These water problems in Compton led to the state's dissolution of the local Sativa Water District in 2018 and put the district under the management of the L.A. County Department of Public Works.[58,59] In previous years, the city of Maywood also has had numerous customers with discolored water coming from the tap. Other mistrust of drinking water quality in L.A. County stems from the perceptions of drinking water quality by many immigrant residents that came from countries with historically poor water quality, and the fact that much of the L.A. region's groundwater is severely polluted by solvents and other organic chemical pollutants.

In 2012, California became the first state in the nation to pass a law (AB 685; Eng) that declared that "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes." Over the last two years, the state legislature deliberated on multiple bills (SB 623, 844 and 845; Monning) crafted to ensure that all Californians have a human right to water. Despite the fact that over 300,000 Californians do not have access to clean, reliable and affordable water supplies, these bills failed because of the lack of consensus on a mechanism to fund the measure. The 2019-20 legislative session has led to an initial ten-year solution to California's safe drinking water crisis - predominantly in the Central and Salinas Valleys. Governor Newsom negotiated with the state legislature to utilize $130 million of cap and trade dollars from the Greenhouse Gas Reduction Fund to provide clean water to disadvantaged communities with contaminated drinking water.

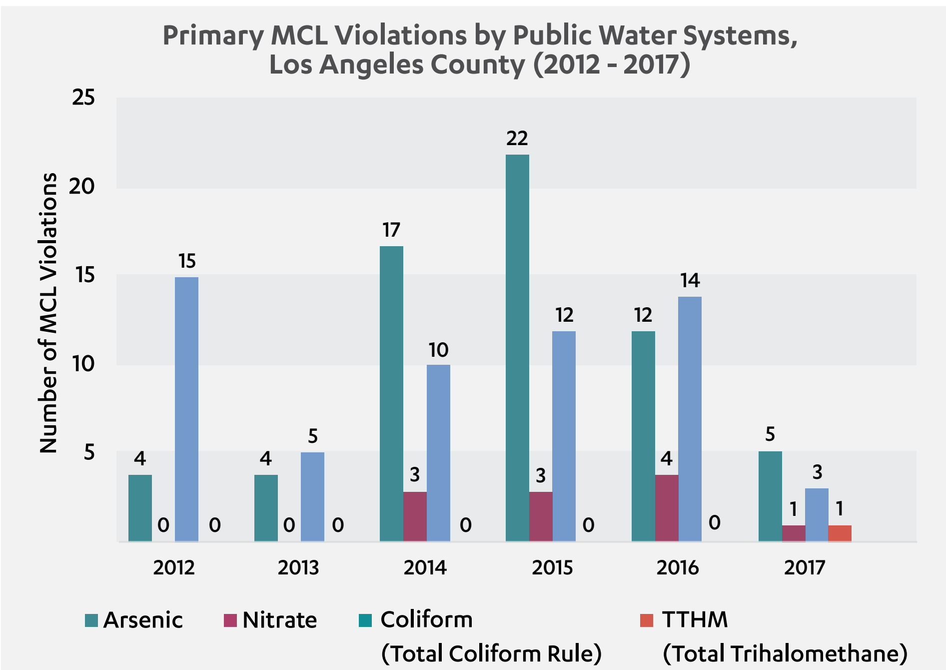
With so many local, state, and national polluted drinking water headlines, one would expect that drinking water quality would be a major problem that impacts hundreds of thousands of L.A. County residents. However, as you will see from the data presented, an overwhelming majority of local residents are provided clean water from the tap. Largely, this is because local contaminated groundwater is effectively treated by mid to large water quality utilities and imported water supplies from MWD and LADWP are of very high quality after treatment. The ongoing drinking water quality uncertainty falls into two main categories: smaller water systems with insufficient oversight; and water quality problems at the tap in older buildings with on-site distribution systems that are not managed by water districts. However, the lack of adequate and/or transparent water quality data for secondary drinking water standards (taste, odor, smell, color, etc.), further exacerbates these uncertainties.

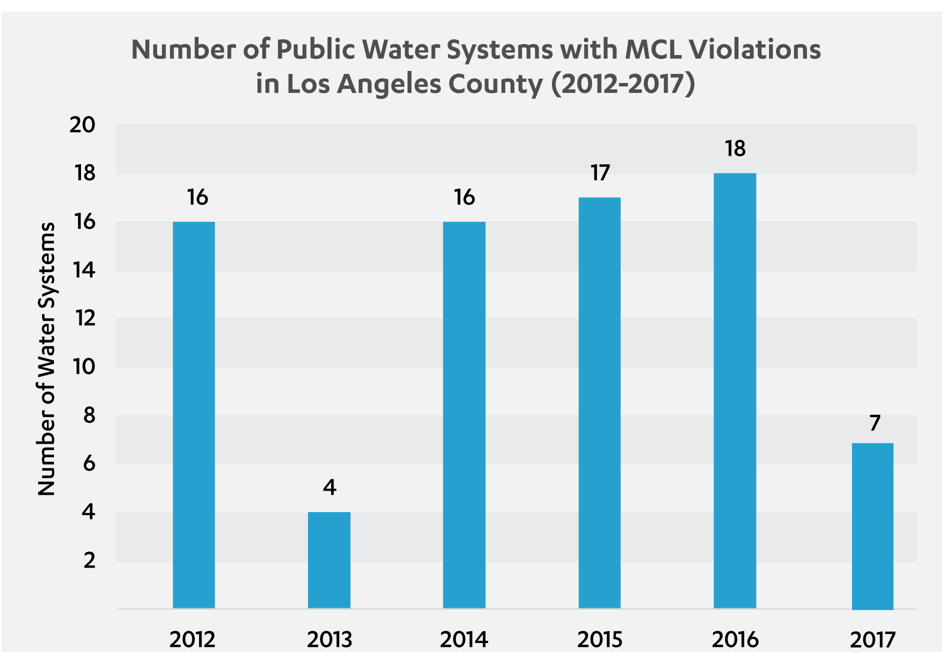





INDICATOR • EXCEEDANCES OF PRIMARY MAXIMUM CONTAMINANT LEVELS (MCLs)





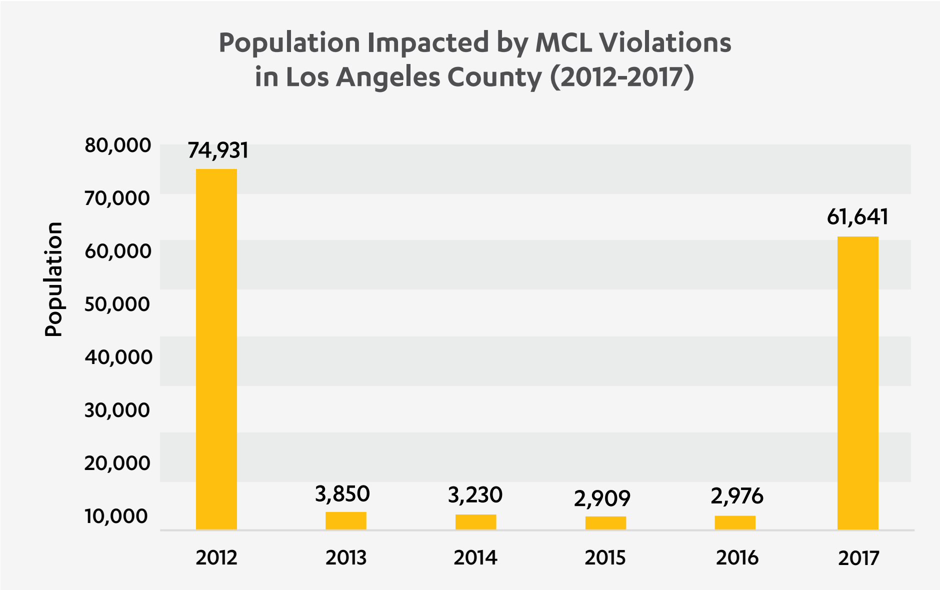
Introduction

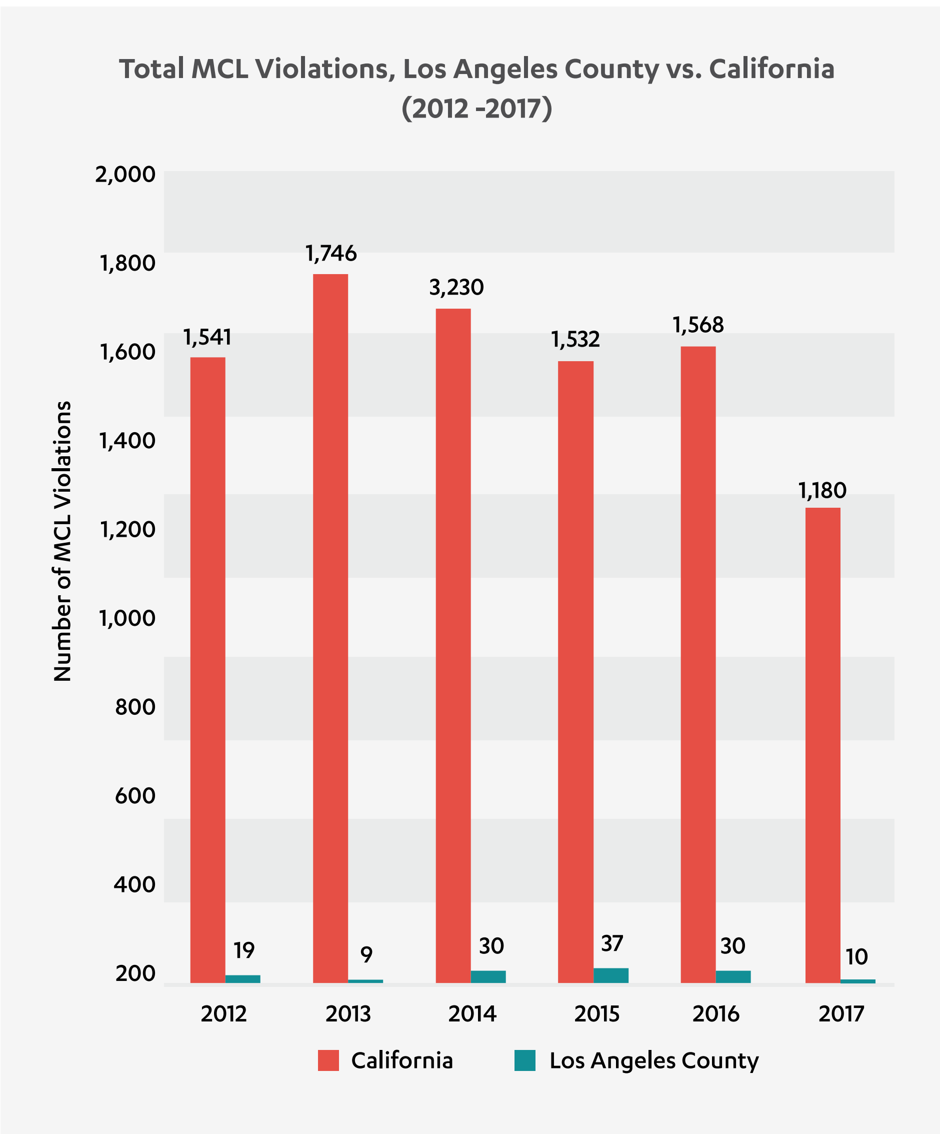
As of spring 2018, there were 346 active water systems (both public and private) serving L.A. County, according to the State Water Resources Control Board (SWRCB) Drinking Water Division website. Of these, 299 are public and 47 are non-public; only public water systems are regulated by the SWRCB and required to conduct monitoring and report results. Public water systems are classified into three types based on rules developed by the U.S. EPA and the state of California. The following is the breakdown of how many public water systems fall into each of these three classifications in L.A. County:

1. Community Water Systems (CWS)[60] - 205
2. Non-Transient Non-Community Water Systems (NTNCWS)[61] - 26
3. Transient Non-Community Water Systems (TNCWS)[62] - 68.

All public water systems are required to monitor water quality for compliance with maximum contaminant levels (MCLs) and report results to the SWRCB, which publishes annual information on MCL exceedances.

EXCEEDANCES OF PRIMARY MAXIMUM CONTAMINANT LEVELS (MCLs)





Data

We looked at violations of MCLs for primary drinking water contaminants in public water systems in L.A. County listed in the Annual Compliance Reports (ACR)[63] published by the SWRCB, or, for 2012 and 2013, published by the Department of Public Health (DPH). Primary MCLs are based on human health risks posed by exposure to toxic elements, organics, pathogen indicators, or other chemicals, while secondary MCLs are based on aesthetics like taste, color and odor. We were unable to access standardized, consistent data for exceedances of secondary MCLs, so we focused exclusively on primary MCLs. We used reports from 2012-2017. In some cases, the same violation is listed multiple times on the ACR due to responsive actions being reported via separate listings; we therefore identified the number of violations using the unique violation identification number to avoid duplicative counting.

Note: As of July 1, 2014, authority over state Drinking Water Programs was transferred from the California Department of Public Health (DPH) to the Division of Drinking Water under the SWRCB.[64]

EXCEEDANCES OF PRIMARY MAXIMUM CONTAMINANT LEVELS (MCLs)

Los Angeles County Public Water System MCL Violations by Year and Type							
System Name	System Population	Contaminant by Year (Number of Violations)					
		2012	2013	2014	2015	2016	2017
City of Beverly Hills	44,290	Coliform (1)					
La Verne, City WD	33,200						Nitrate (1)
Calif State Polytechnical Univ - Pomona	26,757						TTHM** (1)
El Monte-City, Water Dept.	22,968	Coliform (1)					
Wm. S. Hart High / Placerita Jr High Sch	4,000	Coliform (1)					
Lynwood Park Mutual Water Co.	2,300		Coliform (1)				
Land Project Mutual Water Co.	1,500	Arsenic (4)	Arsenic (4); Coliform (1)	Arsenic (4)	Arsenic (4); Coliform (1)	Arsenic (4)	Arsenic (4)
Hemlock Mutual Water Co.	985	Coliform (1)					
Mira Loma High Desert Hospital	500			Coliform (1)			
Golden Sands Mobile Home Park	450	Coliform (1)					
Hughes-Elizabeth Lake Unified School Dis	300					Coliform (3)	
Sherwood Mobile Home Park	250	Coliform (1)					
USFS-Skyline Park / Mount Wilson A-4*	200	Coliform (1)			Coliform (1)		
Alpine Springs Mobile Home Park*	175			Coliform (3)		Coliform (1)	
Canyon Creek Sports Complex	170			Coliform (1)			
Camp Verdugo Oaks Boyscouts	159				Coliform (2)		
LARC Ranch / Los Angeles Comm	154			Coliform (1)			
Acton Four Square Church*	150			Nitrate (1)	Coliform (1); Nitrate (1)	Nitrate (1)	
Agua Dulce Winery*	147			Coliform (1)	Coliform (1)		
Mettler Valley Mutual*	135	Coliform (1)		Arsenic (3)	Arsenic (4)	Arsenic (2)	
New Apostolic Church*	135				Nitrate (2)	Nitrate (3)	
Sleepy Valley Water Company	130					Coliform (1)	
Gorman Elementary School	122			Coliform (1)			
USFS-Monte Cristo Camp T-4*	116	Coliform (1)		Coliform (1)		Coliform (1)	
21st Century Holiness Tabernacle Church*	110		Coliform (1)				Coliform (1)
Saint Andrews Abbey*	105				Coliform (1)	Coliform (1)	
Evergreen Mutual Water Company	99				Coliform (1)		
Property Owners Water System	96			Nitrate (2)			
Bleich Flats Mutual	93	Coliform (1)					
Lancaster Water Company*	80			Coliform (1)	Coliform (1)	Coliform (1)	
Wilsona Gardens Mutual	75	Coliform (1)					
The Village Mobile Home Park*	70			Arsenic (1)	Arsenic (4)	Arsenic (2); Coliform (1)	
The Oaks	67				Coliform (1)		
Lancaster Park Mobile Home Park*	61			Arsenic (3)	Arsenic (4)	Arsenic (2)	
Oak Grove Trailer Park	60	Coliform (1)					
Winterhaven Mobile Estates*	56			Arsenic (3)	Arsenic (2)	Arsenic (2)	
Living Springs Church	50					Coliform (1)	
Coldbrook Campground	38					Coliform (1)	
White Rock Lake RV Park	30					Coliform (1)	
Casa Dulce Estates	28					Coliform (1)	
Mitchell'S Avenue E Mobile Home Park*	28			Arsenic (3)	Arsenic (4)		Arsenic (1)
Camp Cisquito / Live Again Recovery Home	27					Coliform (1)	
Del Sur Gardens Trailer Park	25				Coliform (1)		
Rancho Sierra Acres	25	Coliform (1)					
Usfs-Buckhorn Camp A-12	25		Coliform (2)				
Usfs-Chilao Main A-9	25						Coliform (1)
Usfs-Jackson Lake V-4	25	Coliform (1)					
Usfs-Little Jimmy A-13	25	Coliform (1)					
Usfs-Mill Creek Summit T-5	25						Coliform (1)
Valhalla Water Association	25				Coliform (1)		

"*Water system reported different populations during different years. The value shown is the largest population value reported from 2012-2017.
**TTHM = Total Trihalomethane"

EXCEEDANCES OF PRIMARY MAXIMUM CONTAMINANT LEVELS (MCLs)

Findings

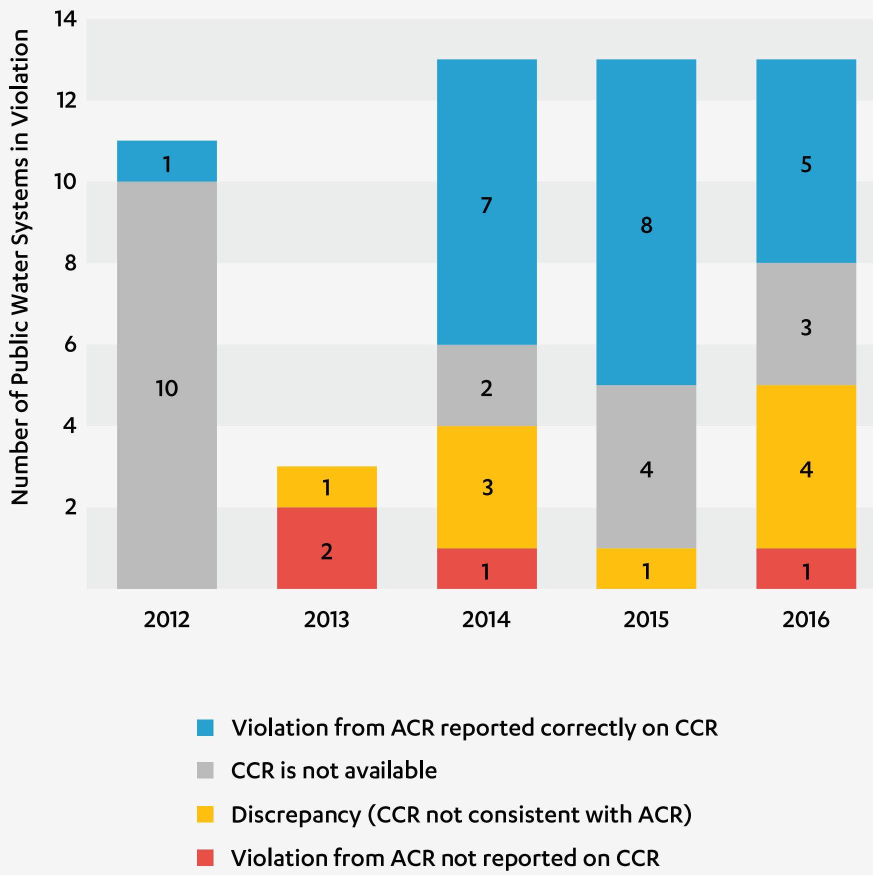
- In 2017, seven public water systems in L.A. County, serving over 60,000 residents, had a combined total of 10 primary MCL violations.
- Overall, 50 water systems had violations of at least one MCL from 2012-2017.
- There is no clear trend in the number of violations and in the number of systems in violation over the six-year review period.
- All violations for the last 6 years were for arsenic, nitrate, or total coliform bacteria, with the exception of one TTHM (Total Trihalomethane) violation in 2017. Of these violations, nitrate violations occurred with the lowest frequency, reported by only three water systems over the period of review. There were no nitrate violations reported in 2012 or 2013.
- Six water systems reported arsenic violations over the period of review, and each had violations over multiple years.
- Coliform bacteria violations occurred throughout the most water systems (43) between 2012 and 2017, but for most of these systems, it was a one-time, rather than ongoing, problem. Only eight systems were in violation for more than one year.
- TTHMs are a byproduct of drinking water disinfection.[65] According to their own reporting, the California State Polytechnic University-Pomona violation in 2017 was due to an increase in water from the State Water Project (SWP); actions have since been taken to remedy this, and TTHMs have not been shown to have immediate health impacts.[66]
- The population served by systems with MCL violations was significantly higher in 2012 (74,931 people) and 2017 (61,641 people) than for the intervening years (when it ranged between 3,850 and 2,909 people) due to larger water systems having violations in those years only. In 2012, the City of Beverly Hills and the El Monte City Water Department had violations; in 2017, the City of La Verne Water Division and California State Polytechnic University – Pomona had violations.
- MCL violations in L.A. County were less than 2.5% of the total in all California public water systems each year from 2012-2017.
- Land Project Mutual Water Company, serving a population of 1,500, was a consistent violator, exceeding the arsenic MCL in every quarterly monitoring from 2012-2017.

Data Limitations

- For some water systems, the reported population served differed from one year to the next. For the purposes of this analysis, we used the largest population value reported during the period of review.
- Three water systems with reported violations had different classifications under federal regulations versus state regulations. For purposes of this analysis, we used the state classification.
- Annual Compliance Reports from the SWRCB do not contain information on secondary MCL violations – this is a significant data gap that needs to be filled. No one should have to drink brown, smelly water, yet without mandatory monitoring and reporting of drinking water violations for secondary MCLs, these problems continue to affect thousands in the L.A. region.

INDICATOR • COMMUNICATION OF WATER QUALITY THROUGH CONSUMER CONFIDENCE REPORTS (CCRs)

Reporting of Primary MCL Violations on Consumer Confidence Reports, Los Angeles County (2012 - 2016)



A discrepancy in reporting includes an exceedance listed on a CCR but not specifically denoted as a violation, not listed in the report's summary of all violations, denied elsewhere in the report narrative, or listing fewer dates in violation than the ACR.

Introduction

Communicating drinking water quality information to consumers is essential for empowering individuals to make informed health-related choices about their drinking water use. Consumer confidence reports (CCRs) are designed to provide consumers with information on drinking water quality specific to each public water system.

Two types of public water systems, Community Water Systems (CWS) and Non-Transient Non-Community Water Systems (NTNCWS) are required to prepare CCRs annually for their customers[67] that must include information about violations of Maximum Contaminant Levels (MCLs). Reports are created by each water purveyor; certain information is required by law to be included, but reports vary by system in both format and content. We chose to examine the extent to which MCL exceedances identified in the State's Annual Compliance Report (see previous indicator) are correctly communicated on the CCRs.

Data

For water systems that had MCL violations reported on the state's Annual Compliance Reports (ACRs—see previous indicator), we assessed whether these violations were reported on their CCRs. Most CCRs were available on California's search portal of the Safe Drinking Water Information System.68 Some CCRs were available on individual water system websites. We looked at reports from 2012-2016.

COMMUNICATION OF WATER QUALITY THROUGH CONSUMER CONFIDENCE REPORTS (CCRs)

Findings

- There were four occurrences of a public water system failing to report an MCL violation on their CCR between 2012 and 2016. No water system failed to report more than once over the five-year period.
- There were nine instances of inconsistent reporting of MCL violations between ACRs and CCRs between 2012 and 2016. A discrepancy in reporting includes an exceedance listed on a CCR but not specifically classified as a violation, not listed in the report's summary of all violations, denied elsewhere in the report narrative, or listing fewer dates in violation than the ACR.
- In the most recent year of data (2016) five out of ten water systems with violations reported on the ACR for which a CCR was both required and available correctly reported violations from the ACR on their CCR. Four had some discrepancy in reporting, and one failed to report the violation listed.
- While our goal was to ensure that any violation listed on the ACR was being communicated to residents via the CCR, we noted that there were some cases in which the CCR reported more frequent violations of the same contaminant than were shown on the ACR. We considered those cases to be sufficiently reported to the consumer.

Data Limitations

- Water systems serving fewer than 100,000 people are encouraged but not required to post their CCRs on a website accessible to the public. All public water systems are required to either mail or deliver a copy of their CCR to customers, and must demonstrate a "good faith effort" to deliver a CCR to non-bill-paying consumers via the means most practical for the individual water district.[69] Because some water systems in L.A. County serve as few as 25 constituents, some CCRs are not online and were therefore not available for review.
- In some years, water systems classified as transient non-community issued CCRs, although they are not required to do so.
- In addition to what is shown on the graph, in several years, systems reported violations on their CCRs that were not reported on the ACR; this happened most frequently (seven times) in 2013, and is potentially related to the transition between agencies during the generation of the 2013 report. Overall, this occurred 11 times between 2012 and 2016. However, these instances are only representative of the 46 water systems that had any MCL violation during the review period; we do not have a sense of the full scope of this type of inconsistency as we did not examine the CCRs for all 231 public community and non-transient non-community water systems in California.

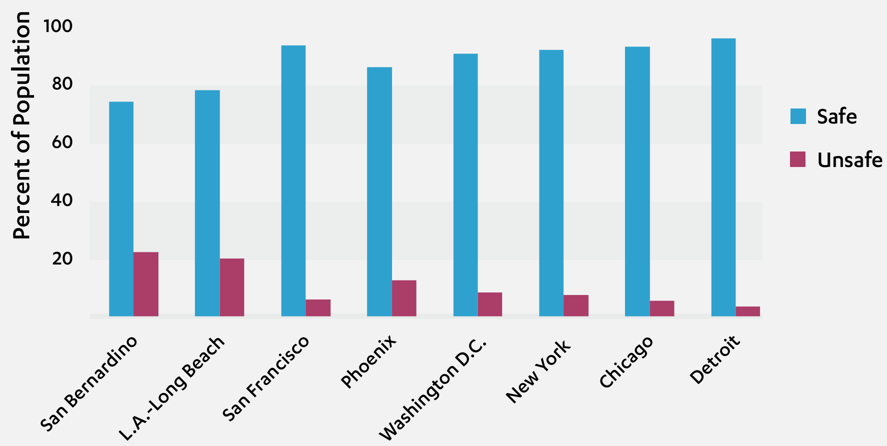
HIGHLIGHTS

Tap Water Quality Perception

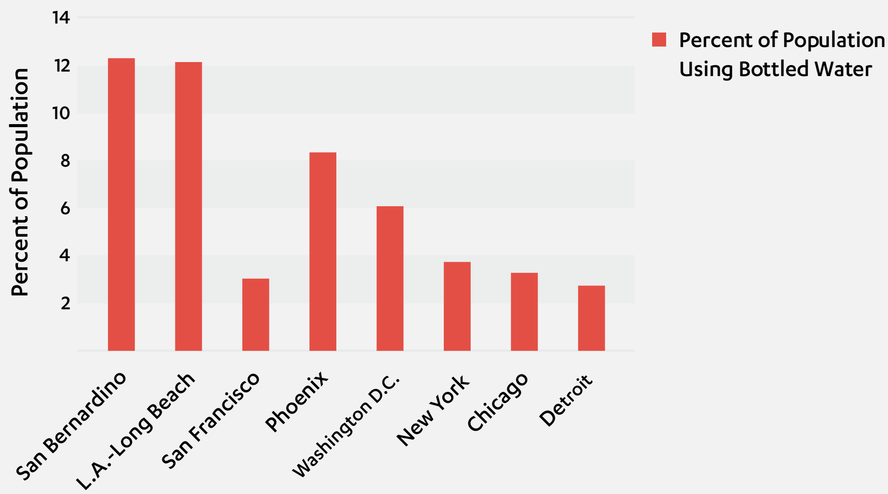
There are multiple, well documented accounts of continuously discolored, foul-smelling, and poor-tasting water coming out of taps in largely disadvantaged communities served by publicly-regulated drinking water systems across L.A. County. Communities recently affected include, but are likely not limited to Maywood, Gardena, Jordan Downs/Watts, Compton, Sierra Madre, El Monte, Lomita, and Inglewood. Most notably, a recent survey in Jordan Downs/Watts shows that over 95% of the residents in this disadvantaged community mistrust their tap water.[70] Across the county, more than 20% of the population reports mistrusting their tap water, higher than all other major metro areas in the country except San Bernardino. Consequently, many households report bearing a substantial out-of-pocket expenditure burden to purchase much more expensive non-tap potable water from bottles, filling stations, or water stores. Among the Los Angeles-Long Beach population who perceived their tap water as unsafe, about 60% subsequently rely on bottled water for drinking and cooking purposes.[71]

In addition to the constraint this places on household budgets, mistrust of tap water can also have direct and indirect adverse health consequences via lower levels of water and higher levels of sugary beverages consumed. Addressing these problems not only will reduce monetary and health costs in the affected communities, but also will improve community-government relations and will potentially enhance the revenue base of drinking water systems. Currently, for most, if not all of these communities, no primary health (maximum contaminant level-MCL) exceedance has been observed in the drinking water system, and thus there is no regulatory trigger to force systems or the state to act.

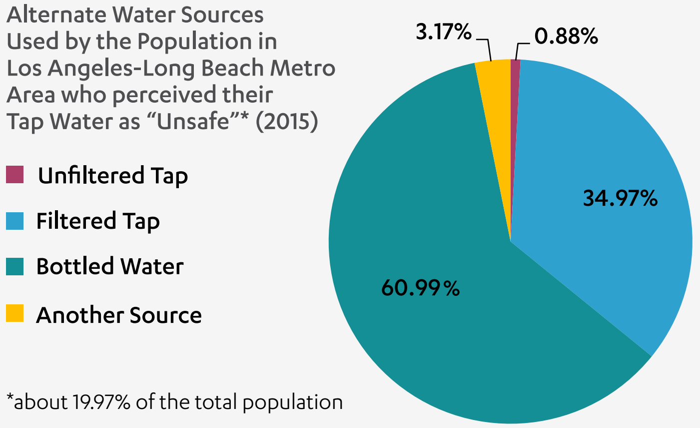
Percentage of Total Population Perceiving Drinking Water as "Safe" or "Unsafe" in Major U.S. Cities (2015)



Percentage of the Total Population Using Bottled Water for Drinking Water After Perceiving Tap Water as "Unsafe" in Major U.S. Cities (2015)



Alternate Water Sources Used by the Population in Los Angeles-Long Beach Metro Area who perceived their Tap Water as "Unsafe"* (2015)



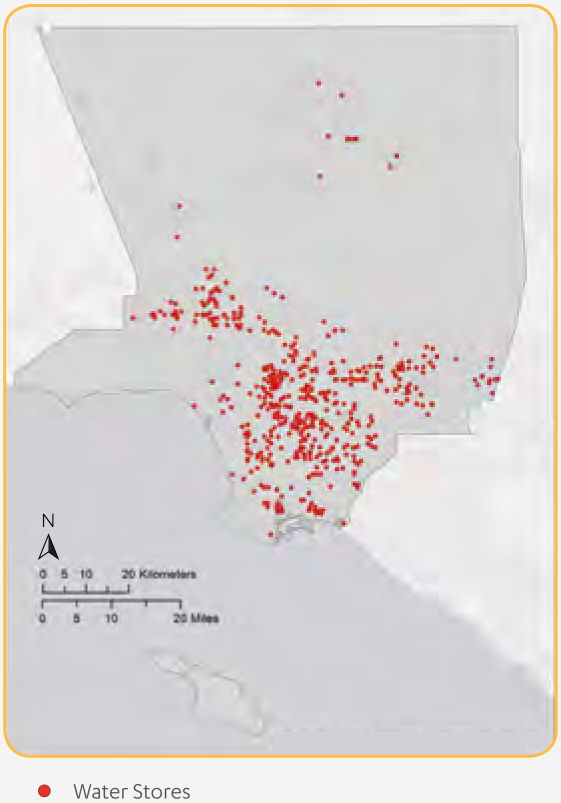
*about 19.97% of the total population

Water Stores

Several recent studies have looked at the issue of water stores.[72,73] According to data obtained from the California Department of Public Health, there are over 500 standalone water stores (retail water facilities) doing business in L.A. County, representing nearly 50% of the state total. Water stores exclusively sell drinking water to individual customers who visit their retail locations and claim that this water is superior to tap water in terms of taste and health. Customers pay a much higher price for this water (up to 25 times as much, or more), although it has never been scientifically shown to be of superior quality to tap water. The ubiquity of these stores is also unique to California—there are smaller numbers of these stores in Texas and Arizona—in the context of the U.S.

Within L.A. County (and across the state more broadly), water stores are clustered in neighborhoods with disadvantaged socioeconomic status, particularly with higher proportions of racial or ethnic minorities, households with foreign-born nativity, and lower household income. By contrast, there appears to be little to no correlation between primary and secondary health contamination in the drinking water systems serving these neighborhoods and the presence of water stores in those areas. In other words, the presence of these stores appears to be capitalizing on misperception and misinformation in certain neighborhoods regarding tap drinking water quality, and perpetuating an outsized cost and health burden on disadvantaged households who feel they need to purchase water from these stores. Potential solutions to this problem include educating households and directly combating false claims made by water stores about comparative quality.

Water Stores in Los Angeles County (2015)



Sources:
California Department of Public Health; ESRI

Monitoring Lead in School Tap Water

Drinking water quality is a concern in schools with aging infrastructure. In January 2017, the California State Water Resources Control Board (SWRCB)'s Division of Drinking Water issued an amendment to the community public water system permits. Under this amendment, any public or private K-12 school served by such a system could request a lead test,[74] which the system would be required to perform for free within 90 days.[75] This option was available to schools until November 1, 2018.[76]

Furthermore, Assembly Bill 746, effective January 1, 2018, updated Health Code Section 116277 to require community water systems to conduct lead testing at public K-12 schools by July 1, 2019.[77,78] Under this law, the water systems (as opposed to school districts) are responsible for initiating the testing.[79]

Results of the sampling (as of May 2019) are as follows: approximately 30,300 samples were taken at about 5,200 public schools statewide;[80] this represents 52% of the approximately 10,000 public schools served by a community public water system.[81] Over 300 taps had lead levels requiring action, and action has been taken to address approximately 80% of violating taps.[82] In addition, over 300 out of approximately 3,500 private schools in California (8.5%) have been sampled. Preliminary sampling results are available from the Division of Drinking Water and readable via story map.[83]

The permit amendment and AB 746 (Gonzalez Fletcher) demonstrate California's attempt to address potential contaminants originating in building plumbing systems, prioritizing school sites where children are present. To be effective, there must also be follow-up repairs or removals and replacements of impacted fixtures to ensure the delivery of sufficiently clean drinking water.

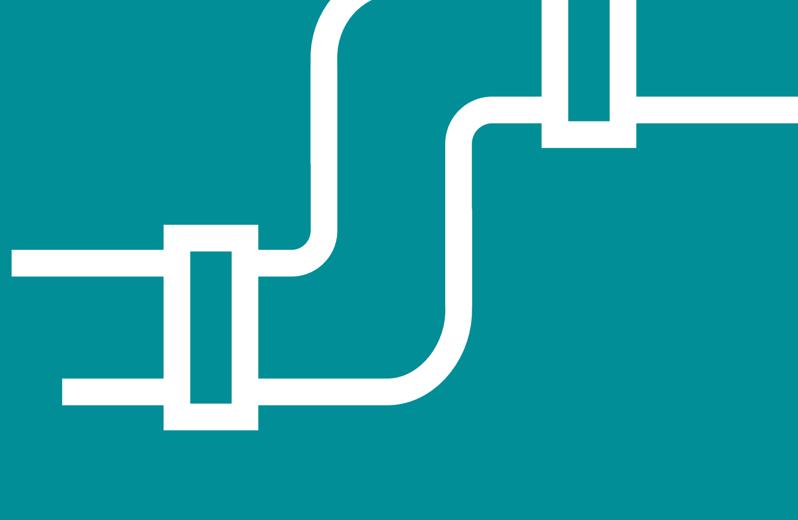
grade B+ / incomplete

for drinking water quality

Based on available drinking water quality data, L.A. County provides excellent drinking water quality to its 10 million residents. The frequency of primary MCL exceedances is extremely low and impacts a tiny fraction of the people that live here. However, there are far too many people in L.A. County that receive discolored, smelly water from the tap. Unfortunately, the lack of data publicly available on exceedance of these secondary MCLs makes it very difficult to assess how well the County is doing in this area. One other area of concern that is not adequately monitored is lead in our drinking water at the tap and in public drinking fountains. The lead monitoring programs in water systems are just after the point of treatment, not at the tap. Lead from old pipes on private property can leach into drinking water and pose a health risk to consumers. However, water system managers generally do not monitor water from the tap and they definitely do not currently have the responsibility to eliminate lead contamination health risks posed by private plumbing systems. One positive development is that lead in school tap water is being addressed through mandatory monitoring requirements, and we await the final data from this program in 2019.

3

LOCAL WATER INFRASTRUCTURE



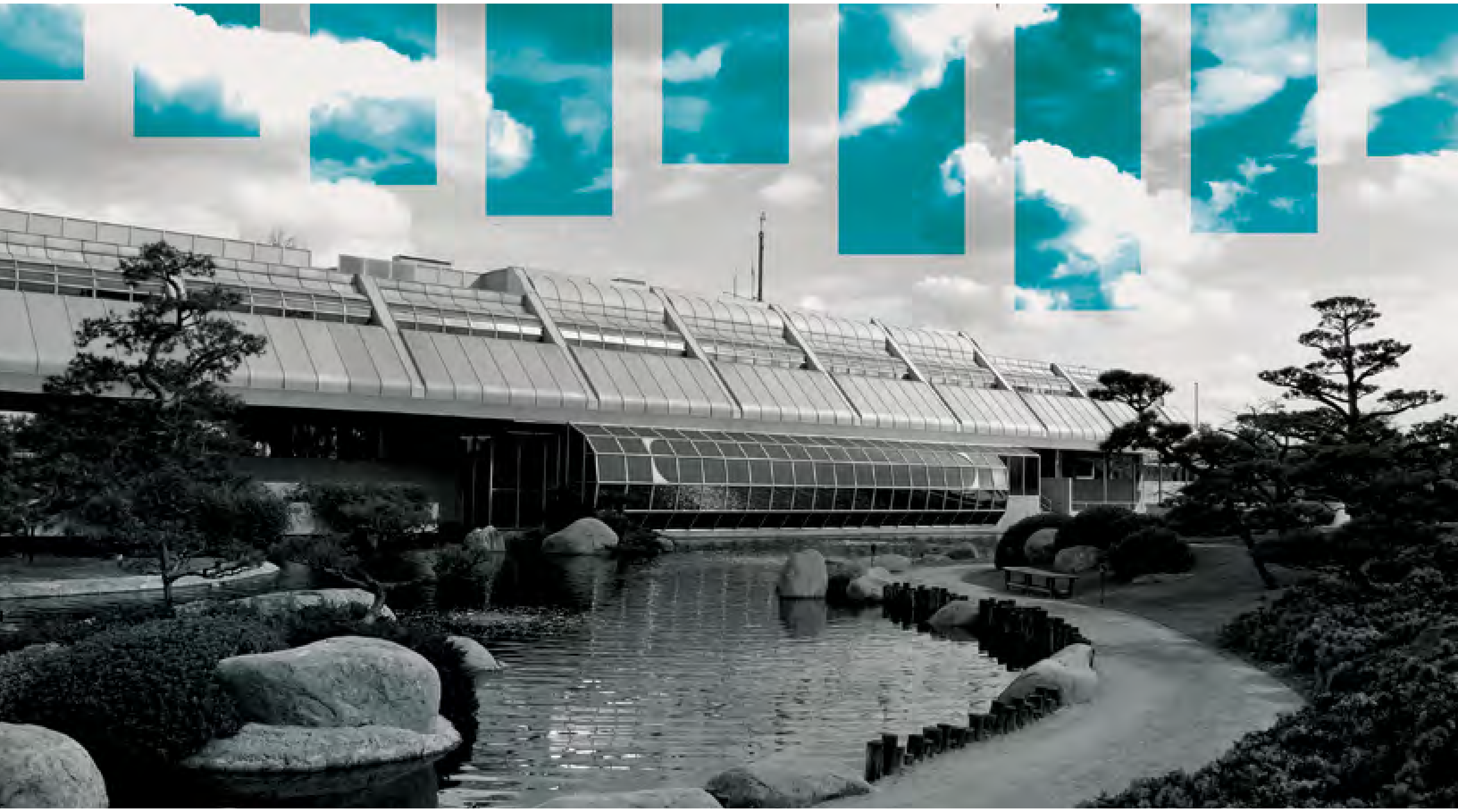
Overview

L.A. County's local water infrastructure has been the subject of great concern over the last few years. Spectacular images of the ruptured water line on Sunset Boulevard flooding the newly upgraded UCLA Pauley Pavilion in 2014 brought the issue of our hidden water infrastructure into the public eye. Many pipes in the county's water distribution system are over a century old, and finding funding for replacing and upgrading these pipes has been a major challenge.

On the stormwater side, L.A. County and its 88 cities have concluded that the lack of flexibility in the region's stormwater infrastructure is posing a tremendous problem. Single purpose flood control infrastructure does not make much sense in the 21st century where Clean Water Act stormwater permit requirements and increasing stress on imported water supplies have made stormwater capture an imperative for the region. To that end, 69.5% of county voters approved Measure W in 2018 to invest approximately $300 million/ year in green infrastructure to reduce runoff pollution, augment local water supplies through stormwater capture, and provide additional benefits such as flood control, habitat and recreational open space.

Associated with the effort to infiltrate more runoff into the region's underlying aquifers, especially in the L.A. River watershed, is an increased focus on pumping groundwater from contaminated aquifers, treating it to drinking water standards, and then serving it to customers. With the cost of imported water increasing substantially over the years, groundwater remediation has become cost competitive with imported water. As a result, the city of Los Angeles and the state have invested in projects to clean up the contaminated aquifer in the eastern San Fernando Valley in the North Hollywood area. Also, the EPA, local water agencies, and polluters have increased their remediation efforts for the contaminated San Gabriel Valley aquifer. Pump, treat and deliver infrastructure is becoming more critical in the region. The City of Santa Monica exemplifies this approach, having gone from zero percent local water in the 1990s to over 80% local water today, largely through getting polluters to pay for groundwater cleanup.

The sewer system, including wastewater treatment plants, is another critical part of local water infrastructure. The region is on the precipice of making decisions to transform the wastewater system into a countywide water recycling system. The city of Los Angeles committed to 100% recycled water use by 2035 in 2019. They are currently upgrading the Tillman Water Reclamation Plant to advanced treatment to increase water recycling in the San Fernando Valley, and they have initiated planning to add advanced treatment and nitrogen removal to the Hyperion Water Reclamation Plant. Also, the MWD and LACSD have partnered on a recently completed, small advanced wastewater treatment pilot project at the Joint Water Pollution Control Plant (JWPCP) in Carson. In addition, the LACSD has been seriously considering transforming their JWPCP coastal treatment plants to advanced water recycling plants in the next 10 years. Together, the Hyperion and JWPCP recycled water projects could potentially provide enough recycled water for over 3 million people's annual consumption needs.



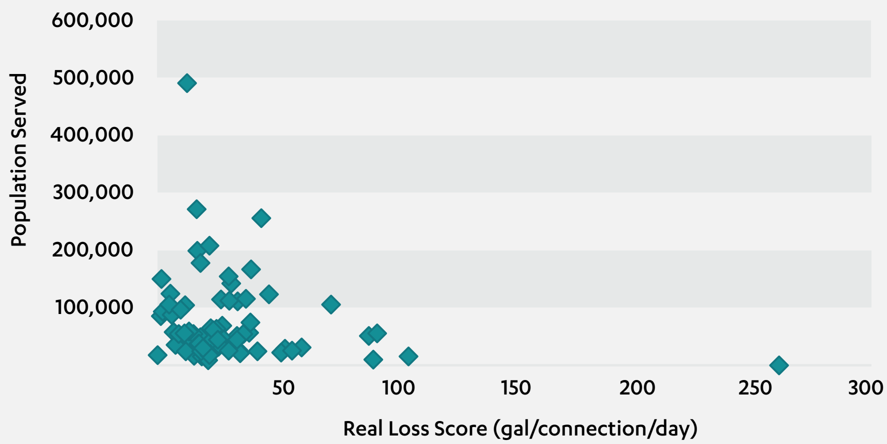
INDICATOR • DISTRIBUTION SYSTEM WATER LOSS AUDITS



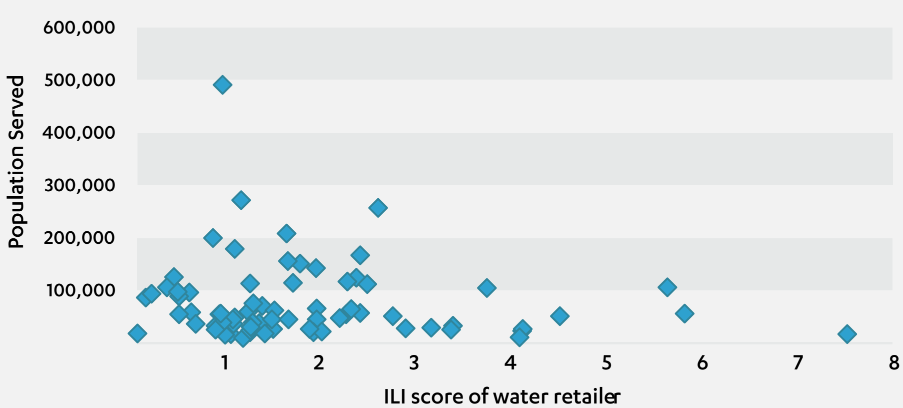
Number of Water Retailers and Population Served

Category	Population Served	No. of Retailers
Smaller Retailers	0 - 100,000	58
Larger Retailers	100,000 - 500,000	19

Los Angeles County Water Retailers:
Real Loss Score vs. Population Served (2016)



Los Angeles County Water Retailers:
Infrastructure Leakage Score* vs. Population Served (2016)



* A lower score means less leakage

Introduction

The challenge of meeting water demand for a growing population in L.A. County's arid climate is made harder by the aging pipe infrastructure. In their 2017 Infrastructure Report Card, the American Society of Civil Engineers reported that California will need to invest $44.5 billion to maintain and expand its drinking water infrastructure over the next 20 years.[84] To help California achieve its urban water use reduction goals, the state passed SB 555 (Wolk) in October 2015, requiring all urban retail water suppliers to submit a validated water loss audit annually. These water audits mainly serve to reflect the data the agencies have on their system, and to improve these systems on the fiscal and water conservation front. The bill also requires the Department of Water Resources (DWR) to publish these reports for public viewing, as well as to provide technical assistance.

Data

The first water loss audits required under SB 555 were due October 1, 2017 to the DWR and included an American Water Works Association (AWWA) water loss audit, a validation review of the audit, and a submitted audit and summary report. We reviewed this data for 83 urban retail water suppliers in L.A. County and assessed results using two size categories of retailer.[85] We left LADWP in a separate category because the population it serves is an order of magnitude greater than the next largest retailer.

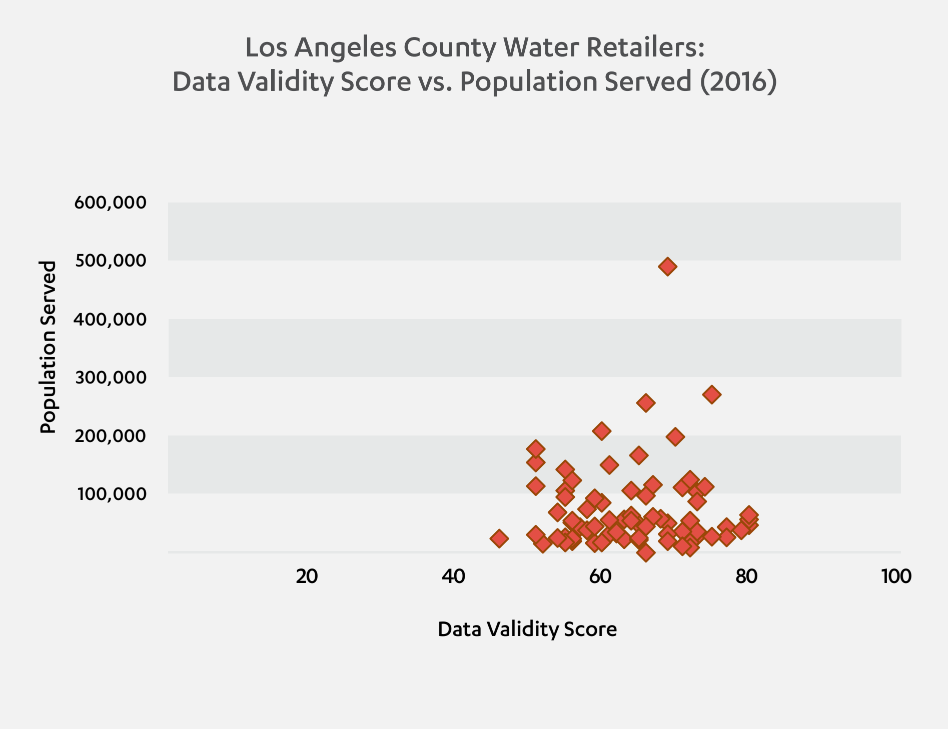
We assessed three of the metrics provided in the water audit data: the real loss per service connection per day, the infrastructure leakage index (ILI), and the water audit data validity score. Real loss per connection per day is a normalized indicator of real loss volume that can be used for comparison between retailers. ILI is a ratio that compares the system's actual leakage to its unavoidable annual real loss (UARL), which is a theoretical minimum based on the system's model.

DISTRIBUTION SYSTEM WATER LOSS AUDITS

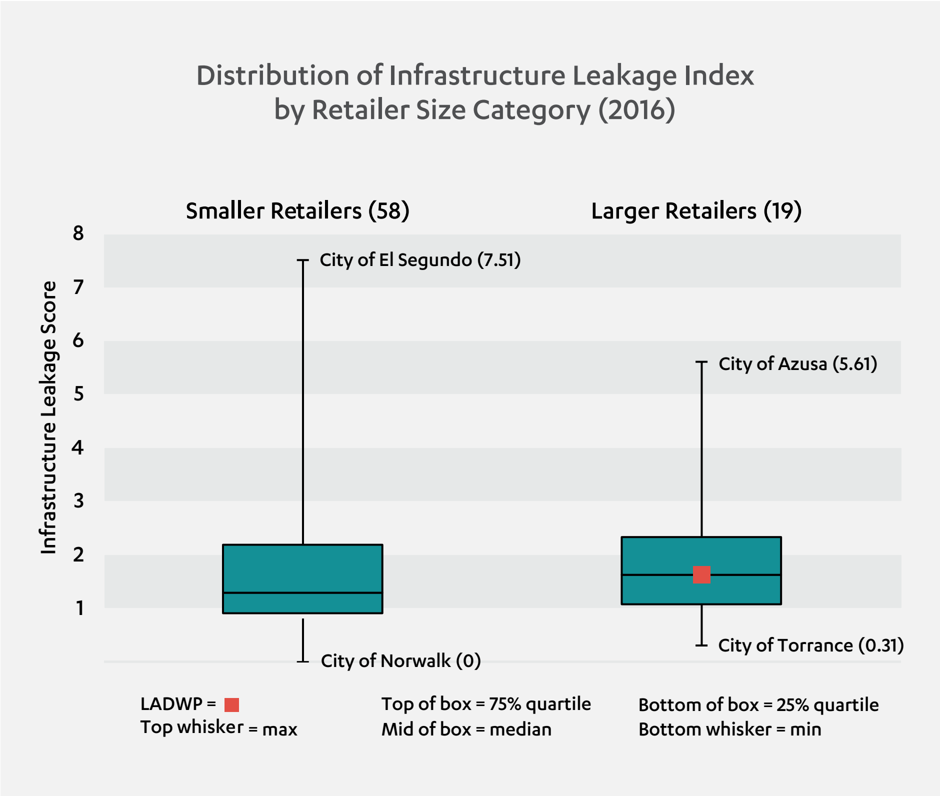
A higher ILI means more leakage, while an ILI of 0 means minimum leakage; an ILI of 1.0-3.0 is considered a good range. The data validity score, which is assigned by a technical expert and ranges from 0 to 100, takes into account the retailer's thoroughness in data collection, active management planning, and reliability of their benchmarking. Note that the AWWA also conducted an assessment of this data.[86]

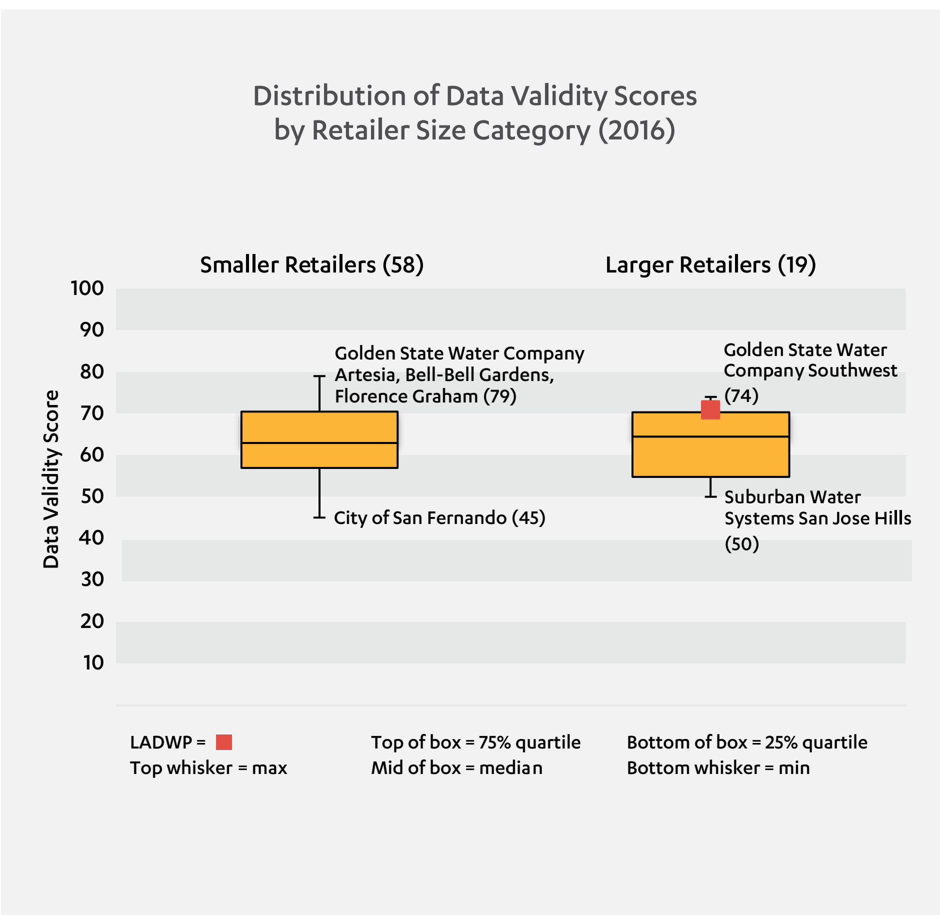
Findings

- Out of the 83 retailers evaluated, 77 submitted reports at the time of our evaluation. The five retailers that did not submit reports include the cities of Alhambra, Compton, Lynwood, Whittier, and the Valley Water Company.[87] Populations served range from 112 people (City of Vernon) to 4,081,310 (LADWP).
- LADWP had a real loss of 37 gallons per connection per day, an ILI of 1.61, and a data validity score of 71. The second largest water retailer, City of Long Beach, had a real loss of 12 gallons per connection per day and an ILI of 0.9, and a data validity score of 68.
- The City of Norwalk scored best among all retailers for both real losses and ILI.
- Among small retailers, the City of Vernon scored worst for real losses, and the City of El Segundo scored worst for ILI.
- With one exception, retailers serving more than 100,000 people had fewer than 50 gal/conn/day real water losses. Furthermore, losses of more than 75 gal/conn/day were all associated with retailers serving less than 100,000 people. Overall, the median real loss score was slightly lower for smaller retailers than for larger retailers.
- All but two retailers serving more than 100,000 people achieved an ILI score within a good range (lower than 3.0). Scores above 3.0 were primarily received by retailers serving less than 100,000 people. Overall, the median ILI score was lower for retailers serving populations less than 100,000, than for retailers serving more than 100,000.
- Twenty retailers achieved an ILI score of 1.0 or less.
- Data validity scores ranged from 45 to 79. The median data validity score was slightly lower for smaller retailers than for larger retailers, but the distribution was similar between the two categories.



DISTRIBUTION SYSTEM WATER LOSS AUDITS

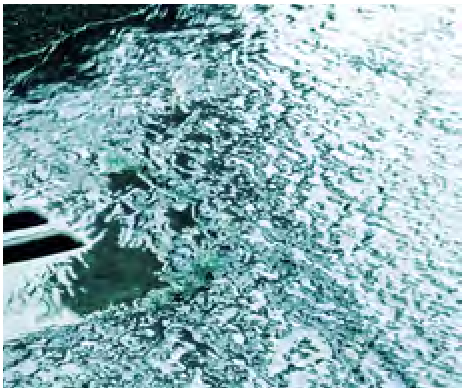




Data Limitations

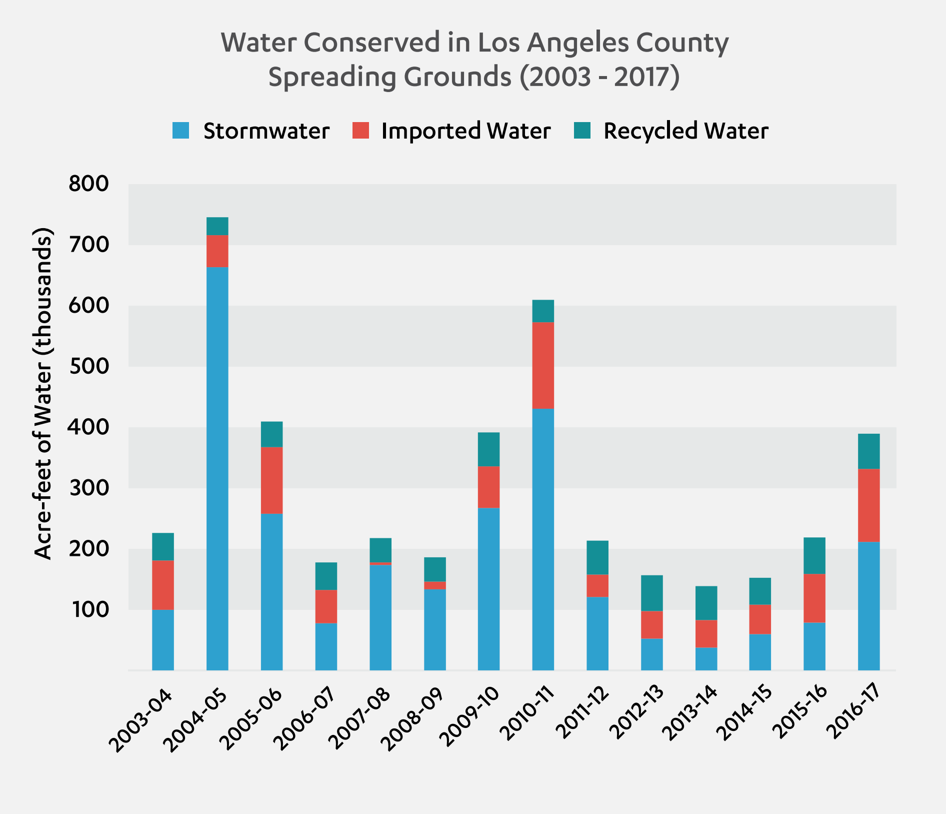
- Some retailers may not have implemented pressure management measures, which may result in a low (good) ILI score despite high real losses.
- The term "real loss per service connection per day" is a statistical term and does not signify the actual loss of gallons at each service connection. There currently is not enough data or consensus on an acceptable range for this number.
- The DWR database showed negative values for real loss and ILI score for Bellflower-Somerset Mutual Water Company, so we did not include them in our rankings.

INDICATOR • LARGE-SCALE STORMWATER CAPTURE



Introduction

The large-scale capture and infiltration of stormwater is a major component of the region's strategy to increase groundwater reserves and decrease dependence on imported water. The L.A. County Flood Control District (LACFCD), operated by the Department of Public Works (Public Works), manages water conservation facilities such as spreading grounds and soft-bottom channels that capture stormwater, imported water, and recycled water to recharge groundwater basins for later pumping. The annual volume of water that can be recharged by these spreading grounds depends on runoff quantity and quality, spreading ground capacity, and groundwater conditions.[88]



Data

The Public Works website publishes data on its spreading grounds and water conservation volumes, with digital records going back to water year 2003-2004.[89,90] Spreading grounds are categorized within three geographical areas: San Fernando Valley facilities, San Gabriel Valley facilities, and Coastal Plain facilities. Public Works monitors and quantifies flows into the spreading grounds via intake structures and reports infiltration volumes monthly, and an accumulated total is determined at the end of the water year (September 30). There are also records of the historic average and historic high for each spreading facility. We examined the total water conserved (i.e. infiltrated) for all facilities from 2003-2017, focusing on stormwater in our analyses, and also compared the 2016-2017 conserved water amounts per area to their historic averages. Note that information provided on storage capacity represents a surface capture volume, not a subsurface capacity.

LARGE-SCALE STORMWATER CAPTURE

Water Conserved in Los Angeles County Spreading Grounds by Facility in 2016-2017 Compared to Five-Year Historic Average and Storage Capacity

Area	Spreading Facility	Accumulated Total AF (2016-2017)	5-Year Average Acre-feet (AF)	Storage Capacity (AF)
San Fernando Valley Facilities	**Branford**	470	518	137
	Hansen	12,824	3,662	1,409
	Lopez	4,178	1,076	24
	Pacoima	16,341	6,708	440
	Tujunga†	0	383	Data not available
	Tujunga Wash *	7,741	2,045	Data not available
San Gabriel Valley Facilities	**Ben Lomond**	746	803	168
	Big Dalton	637	140	12
	Buena Vista	0	34	177
	Citrus	1,468	1,173	80
	Eaton Basin	984	735	284
	Eaton Grounds	694	162	525
	Forbes	250	95	87
	Irwindale	2,354	1,705	1,134
	Little Dalton	2,224	791	5
	Live Oak	169	192	12
	Peck Road	7,942	3,182	3,347
	San Dimas Canyon	1,102	298	22
	San Gabriel Canyon	16,477	18,876	8,170
	Santa Anita	0	28	25
	Santa Fe SG	38,401	13,283	540
	Sawpit	363	384	13
	Walnut	23	195	170
	Sierra Madre†	1,233	466	Data not available
	Fish Canyon†	2,806	1,885	Data not available
	Between San Dimas Dam & S.G	736	436	Data not available
	Between Big Dalton Dam & S.G	251	225	Data not available
	Morris Dam to Sta. F190	48,277	26,162	Data not available
	Sta. F190 to Santa Fe Dam O/F	14,535	4,325	Data not available
	Santa Fe Dam O/F to Sta. E322	33,222	16,812	Data not available
	E322 to F263	11,867	11,630	Data not available
Coastal Plain Facilities	**Rio Hondo Coastal**	53,688	21,278	3,694
	Whittier Narrows Reservoir	41,438	21,411	Data not available
	San Gabriel Coastal	65,660	47,959	550
	Dominguez Gap	348	263	234
Area Subtotals	San Fernando Valley Facilities (6)	41,554	14,391	2,010
	San Gabriel Valley Facilities (25)	186,761	104,018	14,771
	Coastal Plain Facilities (4)	161,134	90,911	4,478
Totals		389,449	209,320	21,259

Bolded= owned and operated by LACFCD
†= owned by other entities(but operated by LACFCD)
* = reach from below Big Tujunga to Hansen Dam

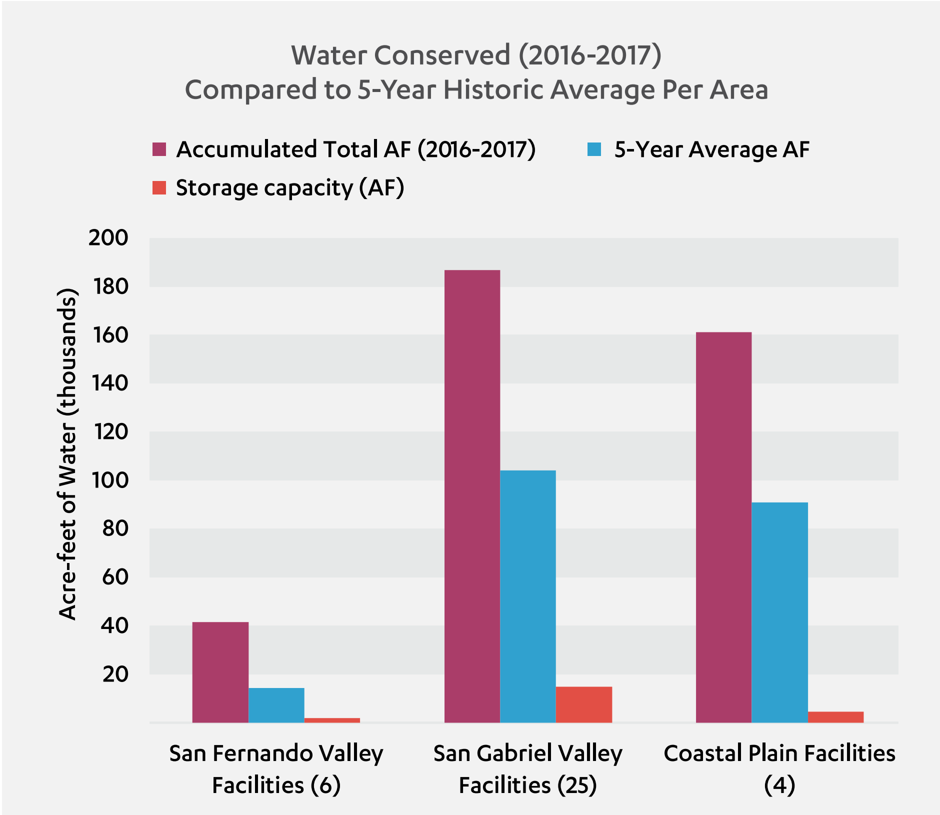
LARGE-SCALE STORMWATER CAPTURE

Findings

- The majority of spreading ground facilities are in the San Gabriel Valley (25 out of 35). San Fernando Valley has six facilities and the Coastal Plain has four. These 35 facilities total 21,259 acre-feet in surface storage capacity.
- In the 2016-2017 water year, spreading grounds across L.A. County conserved a total of 211,730 acre-feet of stormwater. This is the largest amount of water captured since 2010-2011, and marks a notable increase from the past few drought years.
- The average annual volume of conserved stormwater from Water Year 2004-2017 is 190,227 acre-feet; the highest recorded amount was 662,862 acre-feet in 2004-2005, and the lowest amount was 37,542 in 2013-2014.
- While all three areas conserved above-average amounts in 2016-2017, the San Fernando facilities conserved close to twice as much as their 5-year average.
- In 2015-2016, the San Gabriel Valley facilities took in about 50% stormwater and 50% imported water. Meanwhile, all the recycled water went to the Coastal Plain facilities. The San Fernando facilities mainly took in stormwater.
- Variation in annual volumes of conserved water correlate strongly with annual rainfall.

Data Limitations

- Of the 35 spreading grounds in our data, 27 are owned or operated by the LACFCD. The other eight are soft-bottom channels where recharge occurs naturally, supporting the overall stormwater capture and reuse system. We only have storage capacity estimates for the 27 LACFCD spreading grounds.
- Information by facilities includes all types of conserved water (stormwater, imported water, and recycled water). The breakdown of conserved water into these three types is only specified by regional level (San Gabriel Valley, San Fernando Valley, and Coastal Plain), and at the time of data analysis was only available for 2015-2016.
- The 2015-2016 numbers in the 2003-2017 graph do not match the data in the 2015-2016 graph; they are larger by 10,430 AF due to differences in when the data were captured.



Water Conserved by Type within each Area (2015-2016)

Areas	Stormwater (AF)	Imported Water (AF)	Recycled Water (AF)	Total (AF)
San Fernando Valley Facilities (6)	3,722	302	0	4,024
San Gabriel Valley Facilities (25)	56,189	55,351	0	111,540
Coastal Plain Facilities (4)	11,233	23.961	57,859	93,053

INDICATOR • IRWMP INVESTMENTS IN LOCAL WATER INFRASTRUCTURE

Introduction

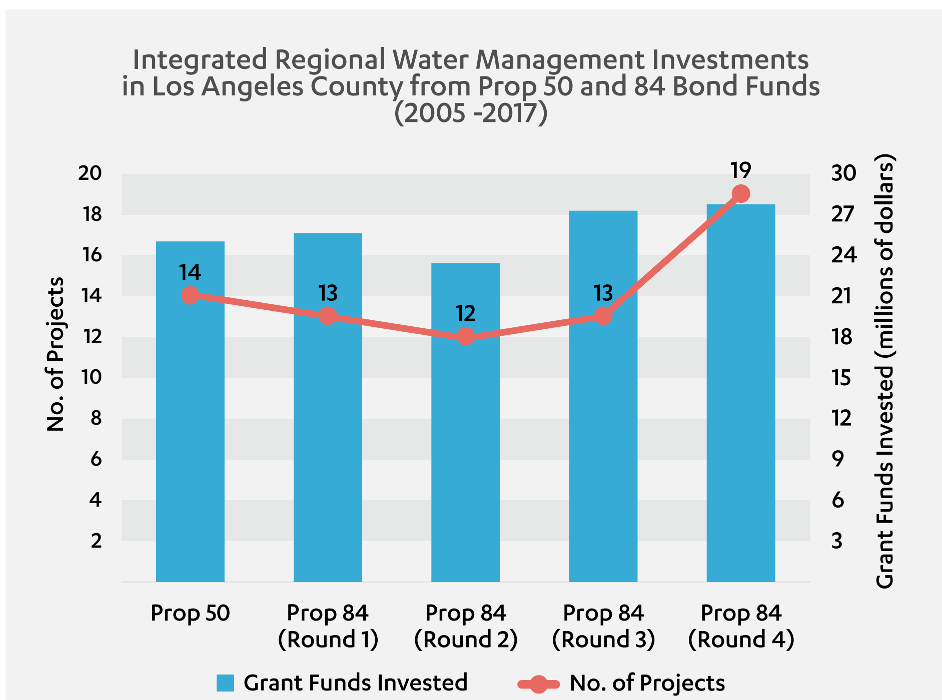
State-issued water bonds help fund "green" water infrastructure projects throughout California. Two such bonds are Proposition 50 (Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002) and Proposition 84 (Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006). Prop 50 authorized $3.44 billion in general obligation bonds to fund a variety of water projects in the state,[91] while Prop 84 provides $5.388 billion.[92]

Data

As part of L.A. County's Integrated Regional Water Management (IRWM) process, the L.A. County Flood Control District receives grants from the Department of Water Resources, and distributes these to project sponsors. Through a data request to the L.A. County Department of Public Works,[93] we received a list of IRWM projects funded under Prop 50 (2005) and Prop 84 Rounds 1-4 (2011, 2014, 2015). We analyzed the number of projects funded under each bond, the amount of money invested in each project, and the number of projects in each of the four primary benefit categories (as defined in the grant application forms): water supply/ groundwater, water quality, flood control, and habitat/open space/recreation. This is not a comprehensive overview of water infrastructure projects funded by state bond measures. In addition, Propositions 13, 40 and 1 have funded substantial projects in the region, but those data were not readily available for the region. Other sources of funding for local water infrastructure include Santa Monica's Measure V from 2006 and Los Angeles' $500 million Measure O from 2004.

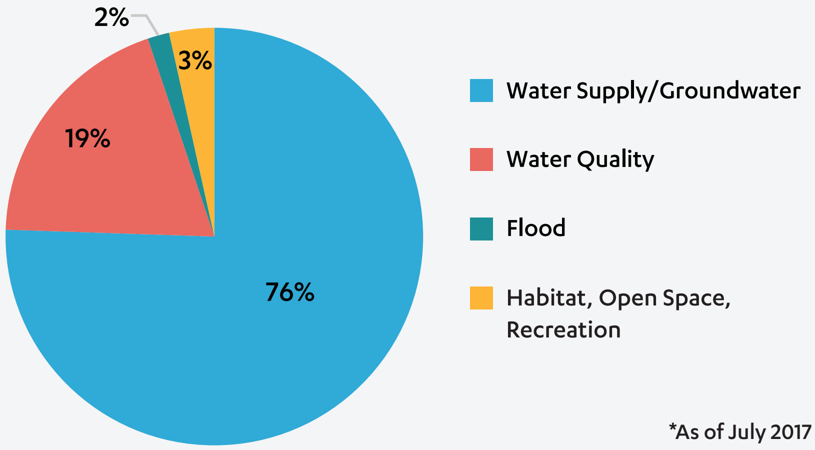
Los Angeles County Integrated Regional Water Management Grant Funding Breakdown (Props 50 and 84)

Prop	No. of projects	Grant funding	Projects in progress	Completed projects
Prop 50	14	$ 25,000,000	0	14
Prop 84 (Round 1)	13	$ 25,600,000	8	5
Prop 84 (Round 2)	12	$ 23,433,962	10	2
Prop 84 (Round 3)	13	$ 27,261,414	13	0
Prop 84 (Round 4)	19	$ 27,742,975	19	0
Total	71	$ 129,038,351	50	21



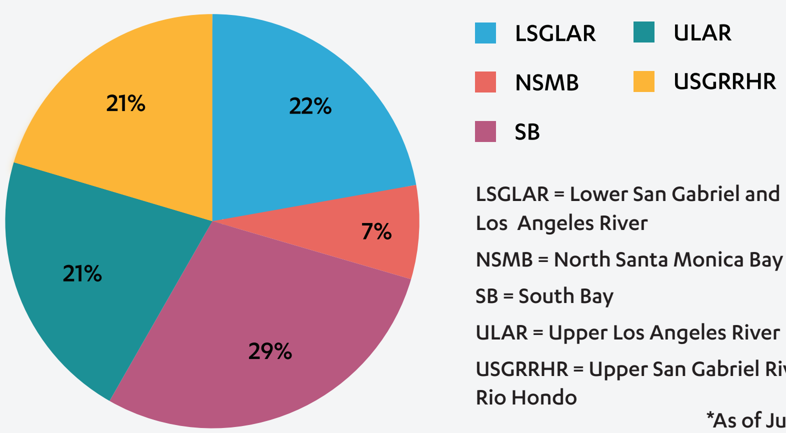
IRWMP INVESTMENTS IN LOCAL WATER INFRASTRUCTURE

Los Angeles County Integrated Regional Water Management Grant Funding Breakdown by Primary Benefit Category (Props 50 and 84)*



*As of July 2017

Los Angeles County Integrated Regional Water Management Grant Funding Breakdown by Sub-Region (Props 50 and 84)*



LSGLAR = Lower San Gabriel and Lower Los Angeles River

NSMB = North Santa Monica Bay

SB = South Bay

ULAR = Upper Los Angeles River

USGRRHR = Upper San Gabriel River and Rio Hondo

*As of July 2017

Findings

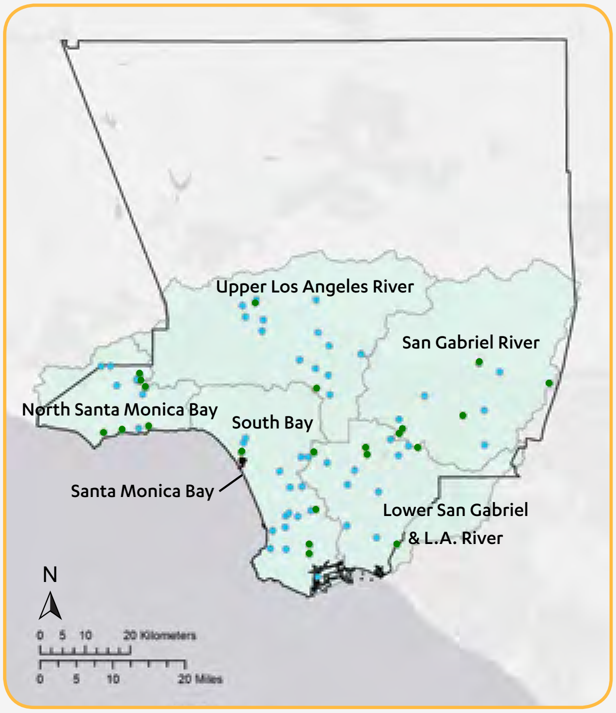
- A total of $129 million of state funds went to L.A. County for 71 IRWM projects through these two bond measures from 2005-2017.
- Prop 50 provided $25 million to 14 projects.
- Prop 84 provided $104 million to 57 projects.
- As of July 2017, nearly $72 million of grant funds have been billed, with a balance of about $57 million. All the IRWM projects in L.A. County under Prop 50 have been completed, while 50 out of 57 Prop 84 projects are still in progress.
- A total of $153.8 million in match funding was provided by sponsoring agencies for the 71 projects.
- The vast majority of grant funds were invested in projects that improved water supply and groundwater (76%), with water quality projects making up the second largest benefit category (19%).
- Projects were allocated geographically according to the sub-regions defined in the Greater L.A. County IRWM Plan.[94]

Data Limitations

- This data includes only the IRWM projects funded under Props 50 and 84. We were unable to obtain data for these other California state water bonds: Prop 13 (2000 Water Bond), which authorized $763.9 million,[95] Prop 40 (California Clean Water, Clean Air, Safe Neighborhood Parks and Coastal Protection Act of 2002), which authorized $2.6 billion,[96] and Prop 1 (Water Quality, Supply, and Infrastructure Improvement Act of 2014), which authorized $7.545 billion.[97]

IRWMP INVESTMENTS IN LOCAL WATER INFRASTRUCTURE

Integrated Regional Water Management Plan Investments in Local Water Infrastructure (Status as of July 2017)



Integrated Regional Water Management (IRWM) Planning Regions

Status of Investments

- In Progress
- Completed

Catalina Island not included in IRWM Planning Regions

Sources:

Los Angeles County Department of Public Works; ESRI

HIGHLIGHT

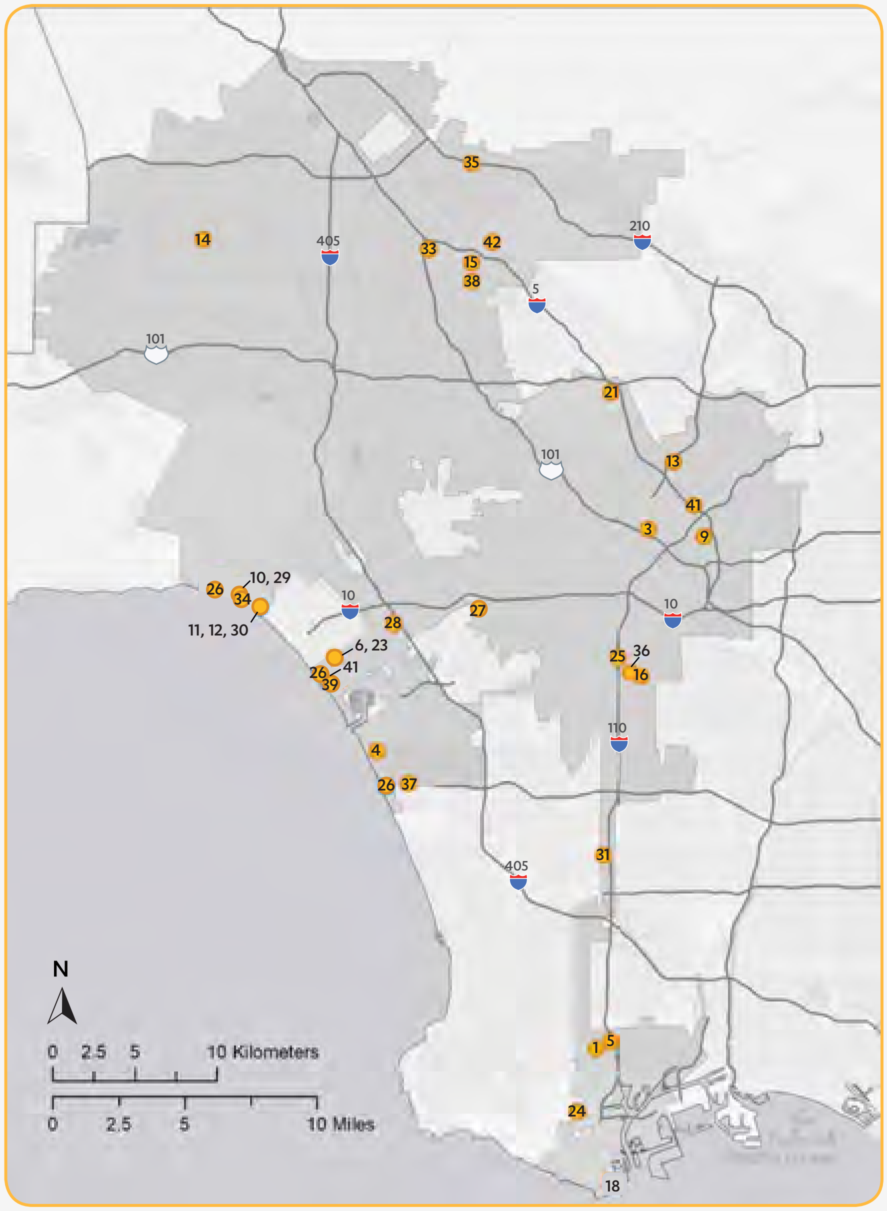
City of Los Angeles Proposition O Projects

Residents in the City of L.A. passed the Proposition O Clean Water Bond in November of 2004, which authorized $500 million of general obligation bonds for projects that improve water quality, water conservation, and open space. The four funding categories are:

1. Rivers, Lakes, Beaches, Bays, and Ocean Water Quality Protection;
2. Water Conservation, Drinking Water and Source Protection;
3. Flood Water Reduction, River and Neighborhood Parks that Prevent Polluted Runoff and Improve Water Quality; and
4. Stormwater Capture, Cleanup and Reuse.

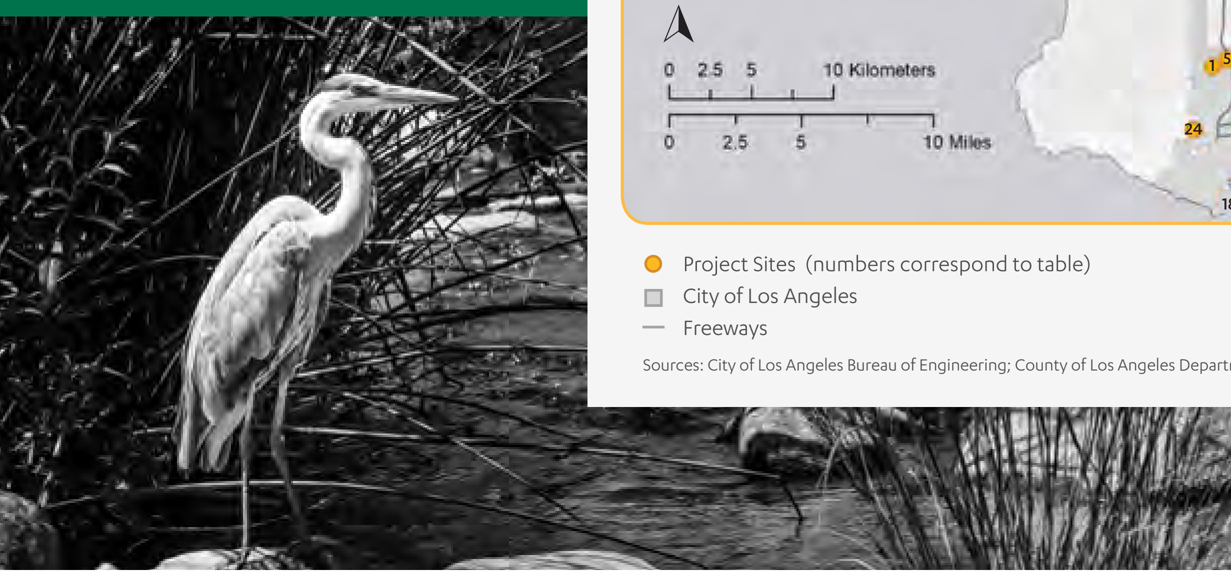
As of March 2019, $506,306,570[98] was budgeted, not including administrative costs, for 45 projects, with $400,029,594 spent.[99] The majority of the 45 projects (76%) are completed. Projects can fit into one of four funding categories, and the funding category that most frequently appears is Category 1: Rivers, Lakes, Beaches, Bays and Ocean Water Quality Protection. The projects included dry weather runoff diversion projects to keep polluted runoff off of beaches, catch basin screens to keep trash out of the storm drains, treatment wetland with other features at Echo Park Lake, Machado Lake and South L.A. Wetlands Park, and runoff capture and infiltration projects along the Santa Monica Bay coast, L.A. River, and in the eastern San Fernando Valley.

City of Los Angeles Proposition O Projects (as of May 31, 2017)



Project Sites (numbers correspond to table)
City of Los Angeles
Freeways

Sources: City of Los Angeles Bureau of Engineering; County of Los Angeles Department of Regional Planning; ESRI



City of Los Angeles Proposition O Projects

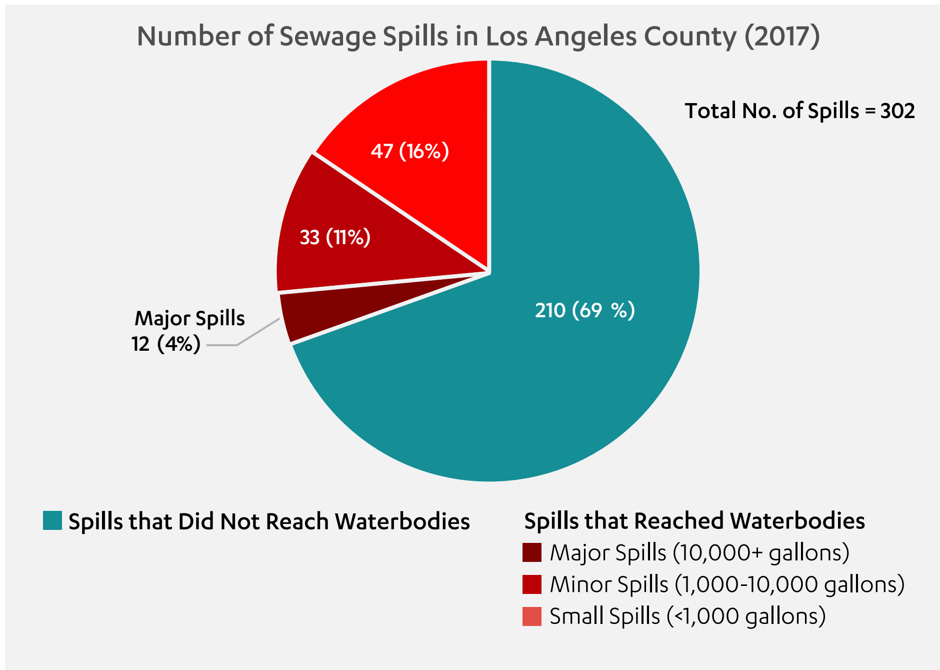
	Project	Current Prop O Budget (dollars)	Prop O Expenditures as of February 28, 2019 (dollars)	Phase	FC1	FC2	FC3	FC4
1	Machado Lake Ecosystem Rehabilitation	99,457,563	90,576,601	Post-construction	X		X	
2	Catch Basin Opening Screen Covers Ph III	44,500,000	43,477,927	Completed	X			X
3	Echo Park Lake Rehabilitation	36,626,015	36,626,015	Completed	X	X	X	X
4	Argo Drain Sub-basin Facility	38,087,269	2,807,343	Construction	X	X		X
5	Machado Lake - Phase I (Wilmington Drain)	25,093,711	24,422,083	Completed	X		X	
6	Penmar Water Quality Improvement Phase I	17,754,800	17,403,397	Completed		X		X
7	Albion Riverside Park Improvements	18,355,000	16,829,350	Construction		X		
8	Catch Basin Inserts and Coverings Ph I	14,702,886	14,702,886	Completed	X			
9	Albion Dairy Park Land Acquisition	14,560,000	14,534,940	Completed		X		
10	Temescal Canyon Park Stormwater BMP Phase I	14,247,435	14,155,906	Completed			X	X
11	Santa Monica Bay Low Flow Diversion Upgrades P 3 Phase 2	14,194,469	13,399,734	Completed	X			
12	Santa Monica Bay Low Flow Diversion Upgrades P 3	14,079,108	12,604,684	Completed	X			X
13	Taylor Yard River Park - Parcel G2 Land Acquisition	12,400,000	0	Completed			X	
14	Aliso Creek-Limekiln Creek Restoration	10,940,089	1,067,365	Design		X		
15	Strathern Pit Multiuse -Land Acquisition	10,000,000	2,729	Completed		X		
16	South Los Angeles Wetlands Park (includes Site Readiness)	9,829,374	9,829,374	Completed			X	
17	Catch Basin Opening Screen Covers Ph II	9,630,787	9,630,787	Completed	X			
18	Inner Cabrillo Beach Bacterial Water Quality Improvement	8,000,000	6,921,005	Completed	X			
19	Rory M. Shaw Wetlands Park	7,800,000	9,064	Design		X		
20	Albion Dairy Park Demolition & Remediation	6,956,400	6,351,904	Completed			X	
21	LA Zoo Parking Lot	6,240,455	6,240,455	Completed	X		X	
22	Catch Basin Opening Screen Covers Ph IV	6,160,000	4,268,150	Construction	X			X
23	Penmar Water Quality Improvement Phase II	5,830,200	4,679,336	Post-construction				X
24	Peck Park Canyon Enhancement	5,557,090	5,557,090	Completed			X	
25	Broadway Neighborhood Stormwater Greenway	4,626,502	4,525,819	Completed		X		X
26	Santa Monica Bay Low Flow Diversion Upgrades P 1	4,613,088	4,553,112	Completed	X			
27	Westside Park Rainwater Irrigation	4,556,504	4,555,953	Completed	X			
28	Mar Vista Recreation Center Stormwater BMP (Phases I & II)	4,556,186	4,350,389	Completed	X			
29	Temescal Canyon Park Stormwater BMP Phase II	5,056,565	4,024,057	Post-construction			X	X
30	Santa Monica Bay Low Flow Diversion Upgrades P 4	3,891,062	3,848,345	Completed	X			
31	Rosecrans Recreation Center Stormwater Enhancements	2,978,235	2,978,235	Completed			X	X
32	Westchester Stormwater BMP (Renamed Argo)	2,574,787	2,657,762	Completed	X	X		X
33	Cesar Chavez Ground Water Improvement	2,527,873	2,527,873	Completed		X		
34	Santa Monica Bay Low Flow Diversion Upgrades P 2	2,032,342	2,026,413	Completed	X			
35	Hansen Dam Wetland Restoration	2,220,702	1,812,791	Completed			X	
36	Avalon Green Alley South	1,602,642	1,469,585	Completed		X		X
37	Imperial Hwy Sunken Median Stormwater BMP	1,301,724	1,301,724	Completed	X			
38	Elmer Avenue Phase II: Elmer Paseo	829,000	752,741	Completed			X	
39	Westminster Dog Park Stormwater BMP	687,888	687,888	Completed				X
40	La Cienega/Fairfax Stormwater BMP	668,159	0	Canceled	X			
41	Grand Blvd. Tree Wells	713,039	713,039	Completed	X			
42	Glenoak/Sunland Stormwater Capture	508,696	376,505	Completed			X	
43	Oros Green Street	198,925	198,925	Completed				X
44	Vermont Ave. Stormwater Capture & Green St.	3,700,000	347,954	Construction			X	X
45	Westwood Neighborhood Greenway	5,460,000	222,358	Bid & Award	X			

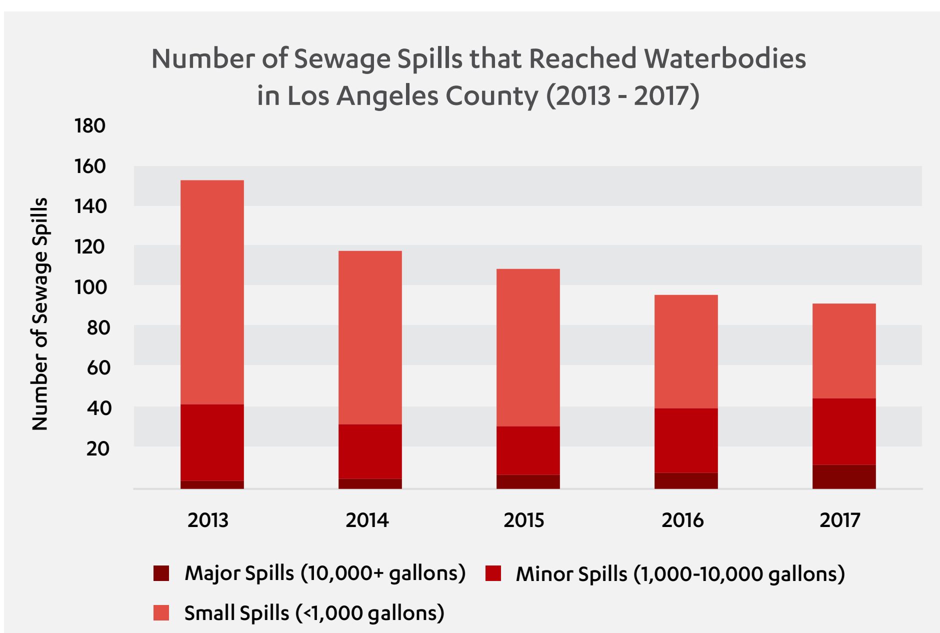
"FC" stands for "Funding Category" and includes the following: 1) Rivers, Lakes, Beaches, Bays and Ocean Water Quality Protection; 2) Water Conservation, Drinking Water and Source Protection; 3) Flood Water Reduction, River and Neighborhood Parks That Prevent Polluted Runoff and Improve Water Quality; and 4) Stormwater Capture, Cleanup and Reuse.

INDICATOR • SEWAGE SPILLS

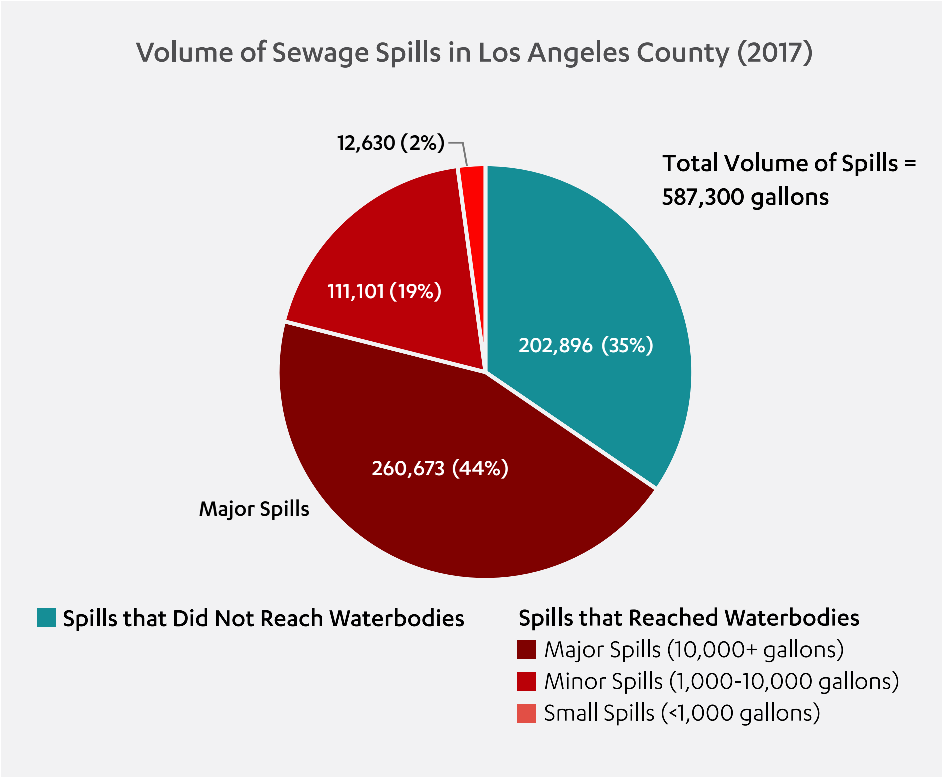
Introduction

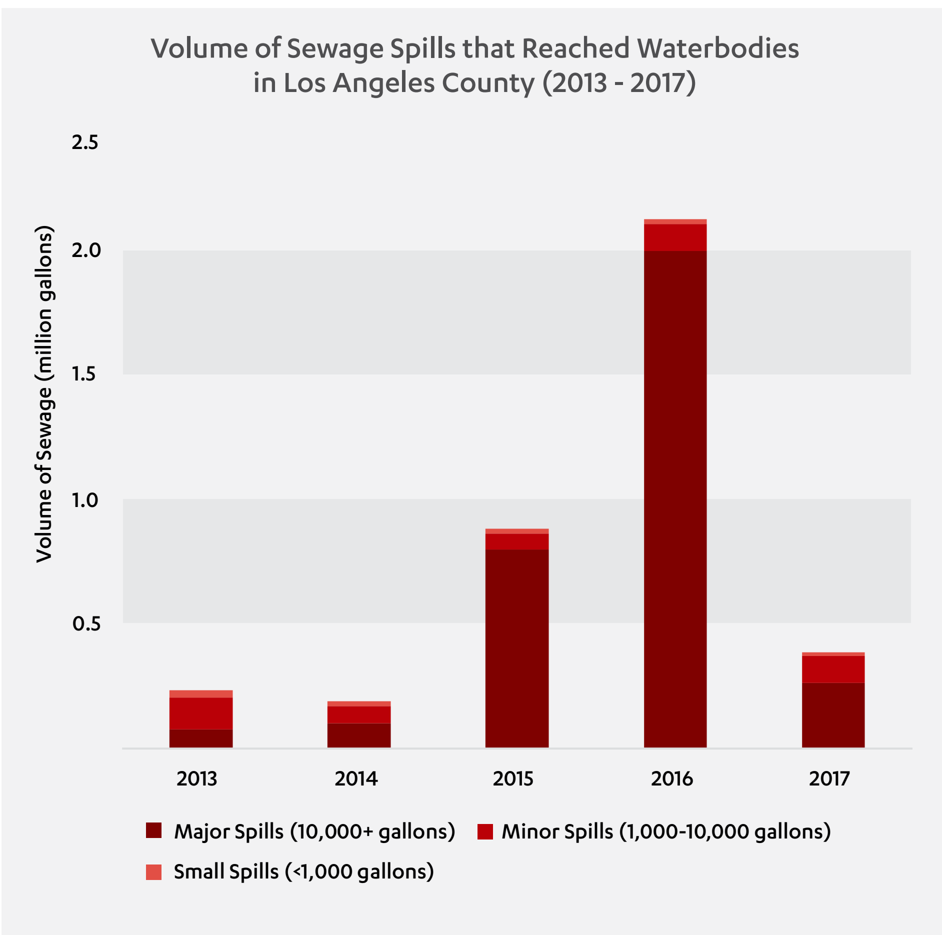
A sewage spill or sanitary sewer overflow (SSO) takes place when a sewer system releases wastewater that has not been treated. SSOs typically contain toxic pollutants, suspended solids, pathogens and even oils.[100] These flows can damage property and infrastructure, contaminate surface and ground water, and pose risks to public health. Resources must be expended to cleanup waterbodies impacted by SSOs, during which time people are unable to use these areas for recreation. Potential causes include materials such as grease, fats or tree roots blocking pipes, faulty sewer system maintenance, structural failures, and stormwater infiltration.[101] As part of the Statewide General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems, the State Water Resources Control Board requires public agencies or operators of sanitary sewers to report data on SSOs to their specific regional water board through the California Integrated Water Quality System (CIWQS) database.[102]





SEWAGE SPILLS





Data

To obtain data on sewage spills in L.A. County, we generated reports from the CIWQS SSO database using the Interactive SSO Reports tool.[103] We used data on Category 1, 2 and 3 SSOs in L.A. County for years 2013-2017. Spills are categorized in the database in one of three categories: Category 1 spills are discharges of any volume that reach surface water; Category 2 spills are discharges of 1,000 gallons or more that do not reach surface water; and Category 3 spills are discharges that are less than 1,000 gallons and do not reach surface water.[104]

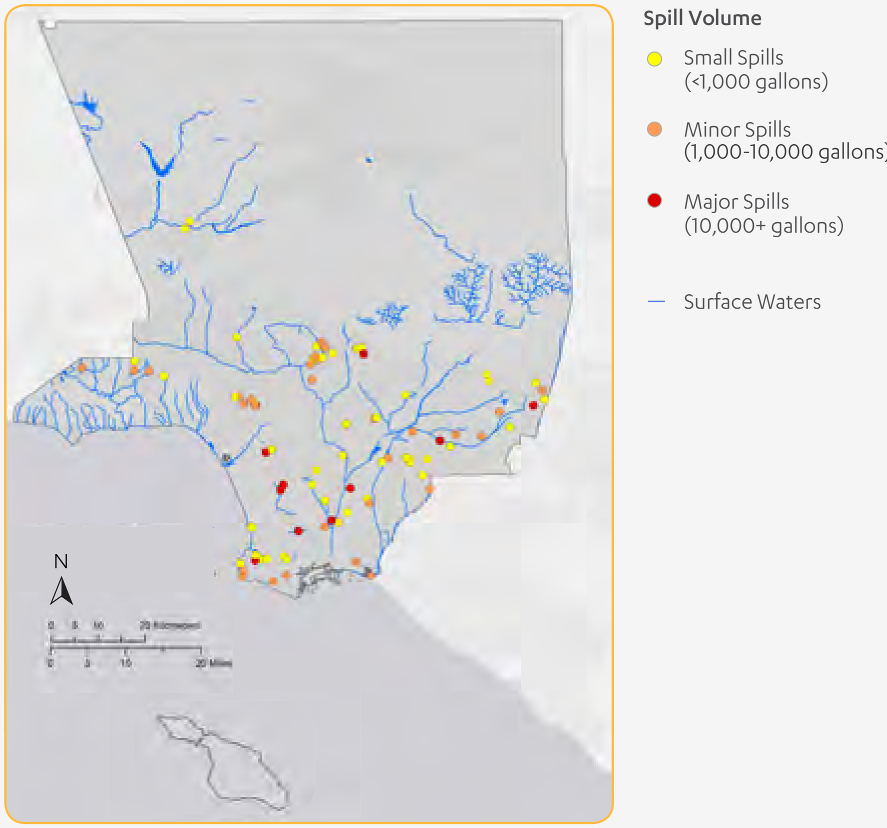
For purposes of our analyses, we combined Categories 2 and 3 (did not reach water), and broke down Category 1 spills into three size groupings: Small (<1,000 gallons), Minor (between 1,000 and 10,000 gallons), or Major (10,000+ gallons). For some spills, only a portion of the spill volume may have reached a waterbody.

SEWAGE SPILLS

Findings

- In 2017 there were 302 reported sewage spills, of which 92 (31%) reached waterbodies. These spills represented nearly 600,000 gallons of sewage, with approximately 380,000 gallons (65%) reaching waterbodies.
- Over half of the spills that reached waterbodies in 2017 were small (<1,000 gallons), while around 36% were minor (1,000-10,000 gallons). Major spills (10,000+ gallons) accounted for 13% of spills that reached waterbodies by number.
- Within the years evaluated, 2013 had the highest total number of spills that reached a waterbody; however, the number of major spills increased from 4 in 2013 to 12 in 2017.
- The volume of sewage reaching waterbodies in 2017 was less than in 2015 or 2016, but higher than in 2013 and 2014.
- The volume of sewage spills reaching water peaked in 2016 and was primarily due to one very large spill of 2.6 million gallons, of which 1.7 million gallons entered storm drains leading to the L.A. River.

Sewage Spills that Reached Water Bodies, Los Angeles County (2017)



Sources:
California Integrated Water Quality System; California State Water Resources Control Board; ESRI

grade C+
for local water infrastructure

The success story on the reduction of sewage spills to local waters is a dramatic one. Billions of dollars in sewer infrastructure investments have greatly reduced the number of sewage spills in the region. As a result, over the last few years, beach closures due to sewage spills have been greatly reduced compared to the 1990s and 2000s. In addition, despite the age of the drinking water distribution system infrastructure, the water leak metrics for the region are generally pretty positive. In future years, adding a metric on the frequency of drinking water pipe ruptures and the age of infrastructure could provide essential additional information for the local water infrastructure category. The reason that the County does not receive a higher grade on local water infrastructure is the fact that much needed improvement projects that will stem from Measure W funding have not yet been initiated – although funding should become available in 2020. As such, progress in the county has been limited to the successful Proposition O funding in the City of L.A., Measure V funding in Santa Monica, and state water bond funding, including Propositions 50, 84 and 1. With Measure W funding, the potential for building new, green stormwater infiltration, treatment and capture infrastructure is unprecedented. As for recycled water, the potential is equally high for the creation of an integrated regional water recycling system in the county, but grades are issued based on results, not potential.

4

GROUNDWATER

Overview

The L.A. region, unlike San Diego, has tremendous groundwater resources and storage potential. Different from areas such as the San Joaquin Valley, the major basins in the L.A. region have been adjudicated so catastrophic overdraft situations with significant loss of storage capacity and major subsidence impacts have not been prevalent. As such, we have the potential to greatly increase aquifer volumes and our local water supplies in L.A. County through stormwater recharge, brackish groundwater desalination projects, and recycled water recharge and injection efforts.

However, L.A. has been an industrialized area for over a century and one of the cornerstones of the nation's aerospace industry. Also, the region's car culture led to the ubiquitous presence of gas stations, auto repair shops, and chrome platers. As a result, numerous L.A. County groundwater basins and aquifers are highly contaminated with organic solvents, chromium, gasoline and its additives, and other contaminants. Another threat to our coastal groundwater basins is sea water intrusion, which could be exacerbated by sea level rise caused by climate change. Already, the County and local water agencies spend millions of dollars annually to treat wastewater to high standards in order to inject it into coastal aquifers, thereby creating sea water intrusion barriers.

As the L.A. region moves to a more local water approach reliant on stormwater recharge and recycled water recharge and injection, the need has never been greater for clean groundwater basins that can provide water agencies with the maximum sustainable yield of water supply. The County's two major groundwater Superfund sites are finally making remediation progress after over four decades of litigation and federal and state enforcement efforts. Because of the increasing cost of imported water, local water agencies are investing millions of dollars in groundwater pump and treat systems that remediate contaminated groundwater basins while providing customers with clean, affordable, local water supplies.

Spreading Grounds in Los Angeles County (2017)

Spreading Grounds (not labeled on map)

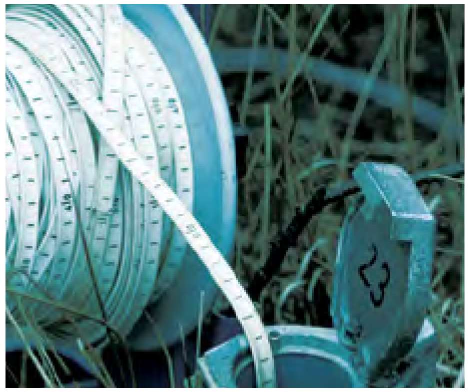
Adjudicated Groundwater Basins (labeled on map)

Non-Adjudicated Groundwater Basins (labeled on map)

Seawater Barriers

Sources: Los Angeles County Department of Public Works; California Department of Water Resources; USGS EarthExplorer; ESRI

INDICATOR • GROUNDWATER SUPPLY

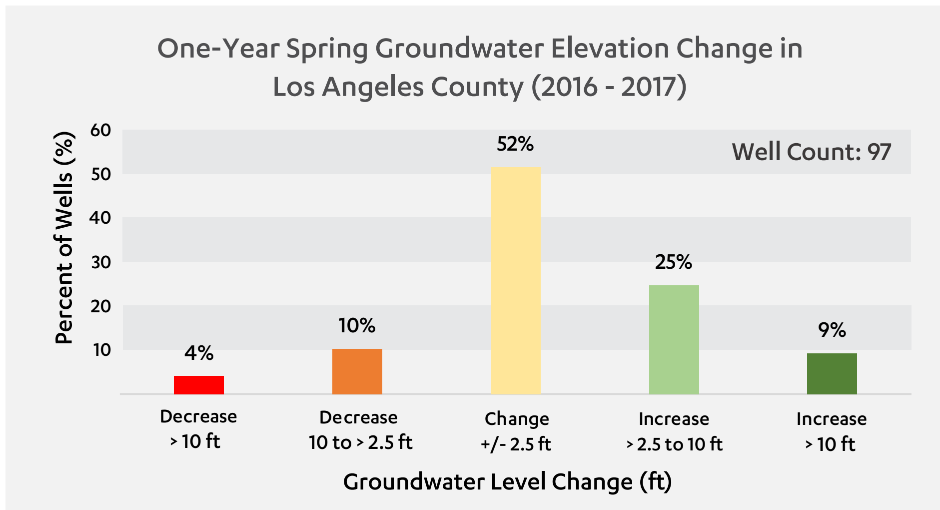


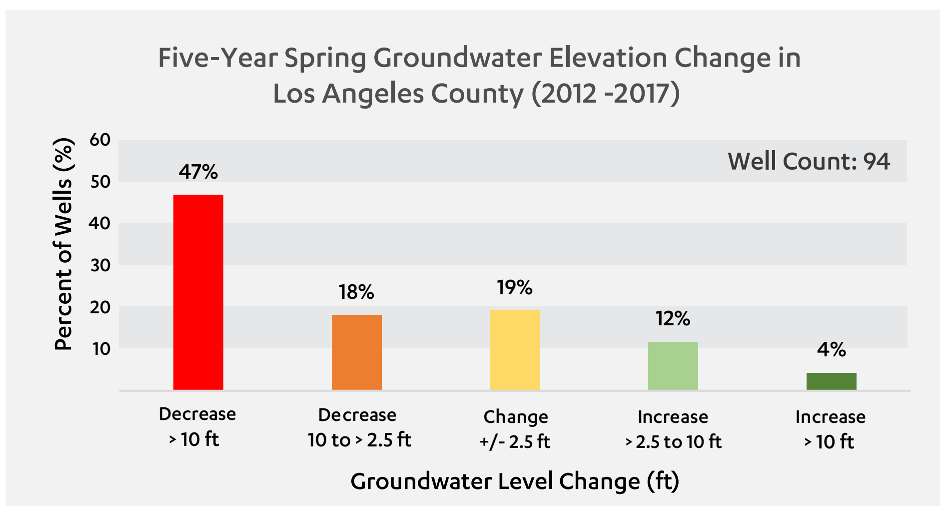
Introduction

Local groundwater is a critical component of L.A. County's water supply. As the population continues to grow and rely on finite groundwater supplies, it will become increasingly important to find ways to sustainably manage and conserve this resource. Monitoring groundwater levels allows us to understand basin conditions, protect our supplies and improve upon groundwater management practices, such as adjusting withdrawals in response to declining recharge.[105]

Data

We used DWR's Groundwater Information Center (GIC) Interactive Map application to obtain data on groundwater elevation change in L.A. County.[106] GIC's Map application calculates groundwater elevation change information from data contained in the California Statewide Groundwater Elevation Monitoring (CASGEM) database.[107] CASGEM collects groundwater elevation measurements in the spring and fall. Spring elevation changes are driven primarily by aquifer recharge, whereas fall elevation changes are driven primarily by groundwater pumping. Using the DWR's Statewide Groundwater Level Change "Dotmaps" analysis as a model to present our information, we looked at changes in groundwater elevation for all of the wells in L.A. County in 2016-2017 and 2012-2017 for data collected in both Spring and Fall.[108]





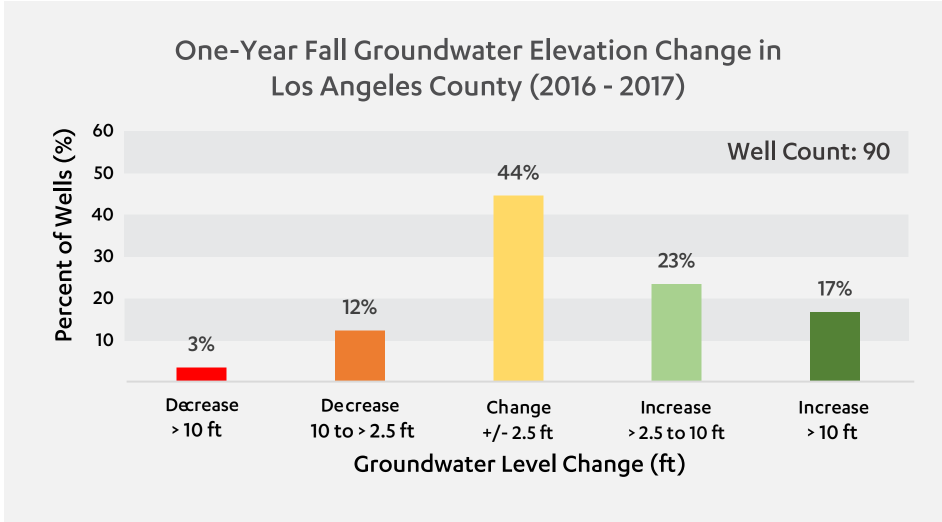
Comparison of Groundwater Level Change in Los Angeles County and the state of California

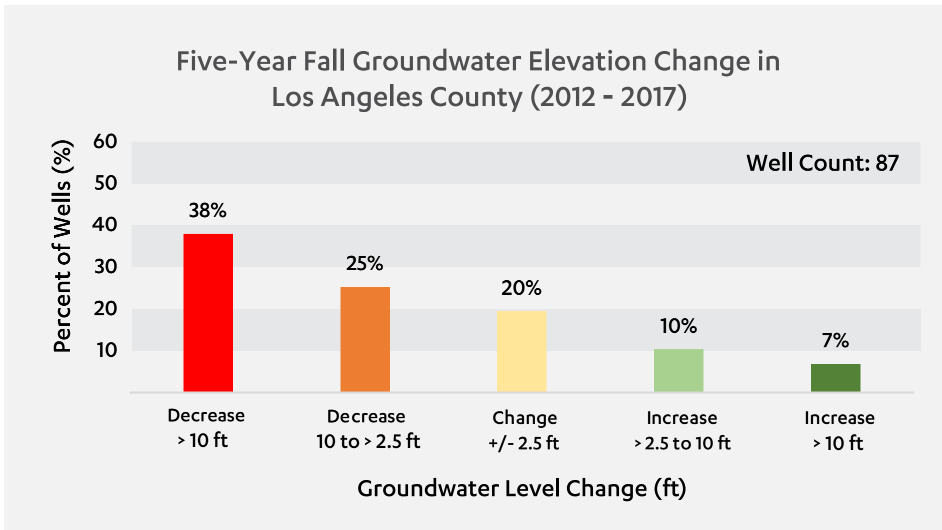
Groundwater Level Change (ft)	One-Year Spring Change (2016 - 2017)		Five-Year Spring Change (2012 - 2017)		One-Year Fall Change (2016 - 2017)		Five-Year Fall Change (2012 - 2017)	
	L.A. County	California	L.A. County	California	L.A. County	California	L.A. County	California
Decrease > 2.5 ft	14%	12%	65%	47%	15%	10%	63%	44%
Increase > 2.5 ft	34%	52%	16%	27%	40%	48%	17%	23%

GROUNDWATER SUPPLY

Findings

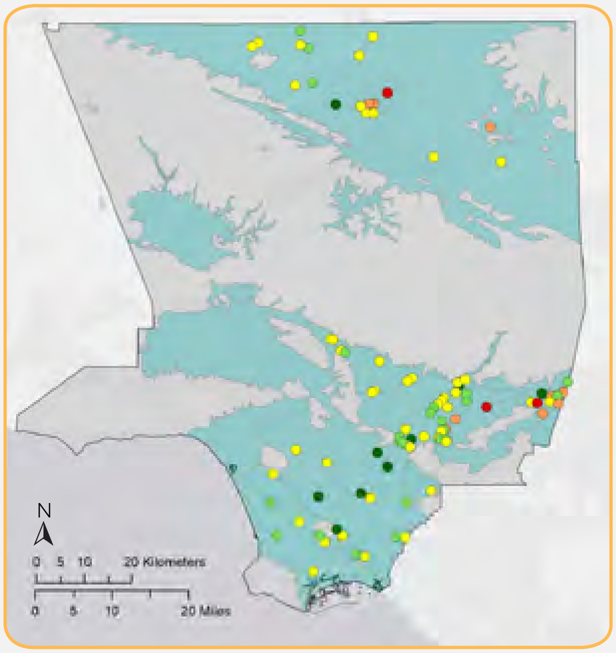
- Between 2016 and 2017, spring groundwater elevations in 34% of wells increased by more than 2.5 feet, whereas elevations in only 14% of wells decreased by more than 2.5 feet.
- As a result of historic drought, 2016-2017 spring groundwater elevations are still considerably lower than five years ago, with 65% of wells more than 2.5 feet lower, and almost 47% of wells more than 10 feet lower compared to 2012.
- Fall groundwater elevations generally rose between 2016-2017; 40% of wells increased by more than 2.5 feet, while only 15% of wells dropped by more than 2.5 feet.
- Compared to 2012 levels, fall groundwater elevations in 2017 decreased by more than 2.5 feet in 63% of wells.
- Spring groundwater elevation changes between 2016-2017 showed more declines in the eastern and northern areas of the county. There were no noticeable patterns in fall changes in that same time period.
- Compared to statewide trends, fewer L.A. County wells showed increases in groundwater levels in both the spring and fall seasons. The most notable difference between the two is the one-year spring groundwater levels, where over half the statewide wells, but only 34% of L.A. County wells increased by more than 2.5 feet. The five-year change in fall indicates a larger decrease in L.A. County groundwater levels compared to the overall statewide average.





GROUNDWATER SUPPLY

One-Year Spring Groundwater Elevation Change in Los Angeles County (2016 - 2017)



Elevation Change

- Increase > 10 ft
- Increase > 2.5 ft to 10 ft
- Change +/- 2.5 ft
- Decrease 10 ft to > 2.5 ft
- Decrease > 10 ft

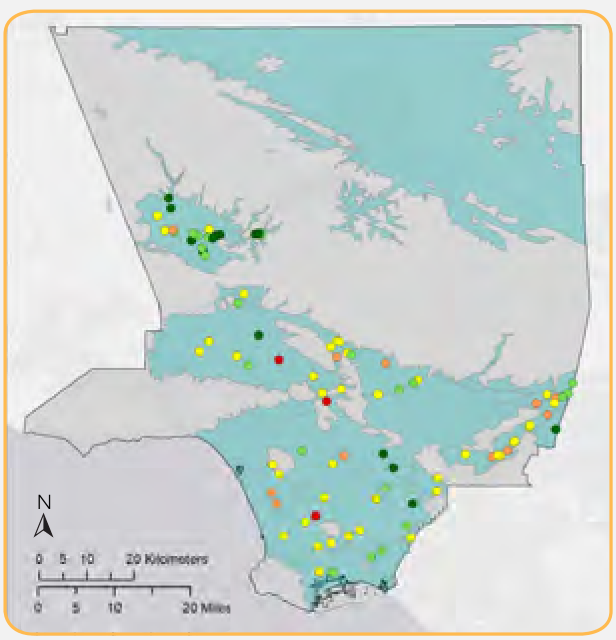
Groundwater Basins

No data available for Catalina Island

Sources:

California Department of Water Resources; Los Angeles County Department of Public Works; ESRI

One-Year Fall Groundwater Elevation Change in Los Angeles County (2016 - 2017)



Elevation Change

- Increase > 10 ft
- Increase > 2.5 ft to 10 ft
- Change +/- 2.5 ft
- Decrease 10 ft to > 2.5 ft
- Decrease > 10 ft

Groundwater Basins

No data available for Catalina Island

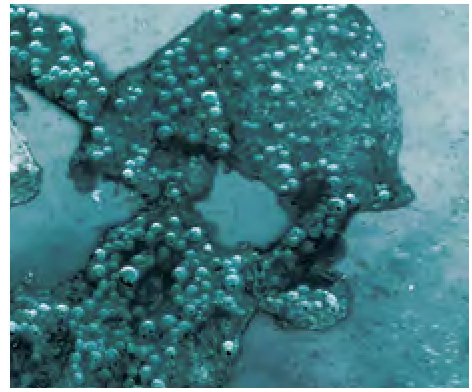
Sources:

California Department of Water Resources; Los Angeles County Department of Public Works; ESRI

Data Limitations

- Although estimates of groundwater basin storage capacity exist,[109] there is no comprehensive data source that tracks groundwater storage volume changes for L.A. County. We therefore had to use groundwater levels to quantify changes in groundwater supply in the county. While changes in groundwater levels helped to quantify groundwater sustainability, there needs to be more comprehensive data on absolute amounts of groundwater in the county, especially in producing basins and aquifers.
- Not all of the wells in the CASGEM program are regularly monitored or even reported on the database.
- Smaller non-public water systems and individual private wells are not under state regulation, so have not been monitored.
- Comparisons to the state as a whole do not differentiate between urban and agricultural regions, whose pumping behavior may be dramatically different. A more nuanced analysis was beyond the scope of this project.

INDICATOR • GROUNDWATER QUALITY



Introduction

The region's groundwater has a history of contamination that can be traced back to the 1940s. In recent decades, remedial measures have reduced contaminant levels significantly, but there remains a huge need to improve groundwater quality across the County. Although there is no indication that drinking water customers are being served unsafe contaminated groundwater, the groundwater treatment plants and operating costs necessary to provide clean water cost the region billions of dollars.

In 2012, a comprehensive U.S. Geological Survey (USGS) report was issued on groundwater quality in L.A. County using data from 2006.[110] The study assessed the Coastal L.A. Basin (CLAB) study unit, which encompasses part of L.A. and Orange Counties. The evaluation was based on a statistically representative grid of wells with data obtained through USGS-GAMA (Groundwater Ambient Monitoring & Assessment) as well as the California Department of Public Health database (now called Division of Drinking Water). While we were unable to replicate this type of rigorous assessment, we chose to look at the same list of pollutants and to include similar graphics as were included in the USGS report.

Data

Groundwater contamination was evaluated using reports generated by the GeoTracker GAMA database.[111] GeoTracker GAMA compiles statewide groundwater sampling data and water level information from multiple programs and agencies into a publicly-accessible internet database. We selected one of the nine major datasets to assess the groundwater quality in L.A. County: Public Water System Wells (State Water Board – Division of Drinking Water). We looked at concentrations of the 37 pollutants included in the 2012 USGS report, as well as two other contaminants: chromium, hexavalent, which was included in the 2015 Environmental Report Card (ERC),[112] but not in the USGS Report; and 1,2,3-Trichloropopane. All of these pollutants have historically been prevalent in groundwater and are known to pose serious human health problems or aesthetic issues.

State-established Maximum Contaminant Levels (MCLs) or comparison concentrations (health-based target values from other sources were used where no Federal or State MCLs have been promulgated) were the basis for evaluating reported concentrations of pollutants.[113] We looked at the percent of wells with concentrations above the MCL or comparison concentration for all 39 pollutants in the most recent year of data, 2018-2019, and for 38 pollutants in 2017 and 2013-2014, as we do not have historical data for 1,2,3-Trichloropropane. For some pollutants that were assessed in the 2015 ERC, the comparison concentration was updated from the previous assessment. Therefore, we recalculated the percentage of wells with a concentration above the comparison levels in 2013-2014 using the 2017 MCLs. This means that Sept 2013 to July 2014 values may not be the same as what was shown in the 2015 ERC. The 2017 MCLs were used to evaluate the 2017 data as well. The 2019 MCLs were used to evaluate the 2018-2019 data. Due to the nature of the request function of the GAMA database tool, 2013-2014 data covers September 2013 – July 2014; 2017 data covers January 2017 – November 2017; and 2018-2019 data covers approximately April 2018 – March 2019.

We also looked at detection frequencies and maximum relative concentrations for the top ten pollutants that exceeded their MCL or comparison concentration in 2017, using the 2012 USGS report as a model to present our information. The maximum relative concentration is defined as the value of the highest observed concentration relative to the MCL or comparison concentration. For example, a maximum relative concentration of 10 means that the highest observed concentration for the pollutant was 10 times that of the MCL or comparison concentration.

GROUNDWATER QUALITY

Groundwater Quality for Selected Pollutants in Public Water System Wells in Los Angeles County (2013-2019)

Stayed the same as previous year's data	Change in MCL/Comparison Concentration level or type
Increased since previous year's data	Decreased since previous year's data
% Change is not comparable due to a new MCL/Comparison Concentration	

No.	Pollutant	Comparison Concentration Type**		MCL or Comparison Concentration			Total no. of Public Water System Wells			% of Public Water System Wells with Concetration > MCL or Comparison Concentration		
		2017	2019	2013/14	2017	2018/19	2013/14	2017	2018/19	2013/14 ††	2017	2018/19
1	1,4-Dioxane	NL	NL	1 ug/L	1 ug/L	1 ug/L	213	213	208	25.5%	46.0%	35.6%
2	Manganese	HAL-US	SMCL		300 ug/L	50 ug/L	468	394	336	0.6%	1.8%	19.9%
3	Trichloroethene (TCE)	MCL-US	MCL-US	5 ug/L	5 ug/L	5 ug/L	806	712	676	12.7%	12.1%	13.8%
4	Perchloroethene/ Tetrachloroethylene or PCE	MCL-US	MCL-US	5 ug/L	5 ug/L	5 ug/L	823	715	687	9.0%	10.5%	11.5%
5	Arsenic	MCL-US	MCL-US		10 ug/L	10 ug/L	422	360	301	9.2%	7.8%	10.6%
6	Perchlorate	MCL-CA	MCL-CA	6 ug/L	6 ug/L	6 ug/L	637	615	542	9.1%	8.5%	9.8%
7	N-Nitrosodimethylamine (NDMA)	CA-CPF	NL		0.0022 ug/L	0.01 ug/L	106	123	109	22.6%	13.0%	9.2%
8	Iron	SMCL	SMCL		300 ug/L	300 ug/L	447	377	321	9.6%	10.6%	8.7%
9	Nitrate as N	MCL-US	MCL-US	45 mg/L (applied to results reported as NO3)	10 mg/L	10 ug/L	871	815	773	8.8%	7.1%	8.4%
10	Boron	NL	NL		1 mg/L	1 mg/L	193	156	133	0.5%	0.6%	8.3%
11	Carbon Tetrachloride	MCL-CA	MCL-CA		0.5 ug/L	0.5 ug/L	771	682	669	6.1%	6.0%	5.7%
12	1,2,3-Trichloropropane (1,2,3-TCP)		MCL-CA			0.005 ug/L	NA	NA	888	NA	NA	5.0%
13	Total Dissolved Solids	SMCL	SMCL		1000 mg/L	1000 mg/L	411	415	392	3.4%	2.9%	4.6%
14	Chromium, hexavalent (Cr6)	NL	HBSL	10 ug/L	See note below***	20 ug/L	223	332	234	12.8%	10.8%***	3.0%
15	Fluoride	MCL-CA	MCL-CA		2 mg/L	2 mg/L	456	409	332	2.2%	2.9%	2.7%
16	Uranium	MCL-CA	MCL-CA		20 pCi/L	20 pCi/L	199	146	194	0.5%	1.4%	2.6%
17	Gross Alpha	MCL-US	MCL-US		15 pCi/L	15 pCi/L	221	105	169	3.2%	4.8%	2.4%
18	1,1-Dichloroethene	MCL-CA	MCL-CA		6 ug/L	6 ug/L	772	680	667	2.6%	2.2%	2.3%
19	Aluminum	MCL-CA	MCL-CA		1000 ug/L	1000 ug/L	362	303	260	0.3%	0.3%	1.5%
20	Chloride	SMCL	SMCL		500 mg/L	500 mg/L	409	344	299	0.7%	0.6%	1.3%
21	Sulfate	MCL	SMCL		500 mg/L	500 mg/L	420	355	314	1.2%	1.7%	1.3%
22	Cis-1,2-Dichloroethene	MCL-CA	MCL-CA		6 ug/L	6 ug/L	766	673	661	0.7%	0.9%	0.5%
23	Benzene	MCL-CA	MCL-CA	1 ug/L	1 ug/L	1 ug/L	759	671	659	0.0%	0.1%	0.2%
24	Nickel	MCL-CA	MCL-CA		100 ug/L	100 ug/L	355	291	256	0.0%	0.3%	0.0%
25	1,1-Dichloroethane	MCL-CA	MCL-CA		5 ug/L	5 ug/L	761	672	659	0.0%	0.0%	0.0%
26	Antimony	MCL-US	MCL-US		6 ug/L	6 ug/L	354	292	256	0.0%	0.0%	0.0%
27	Cadmium	MCL-US	MCL-US		5 ug/L	5 ug/L	355	292	256	0.0%	0.0%	0.0%
28	Chloroform	MCL	MCL		80 ug/L	80 ug/L	696	564	582	0.0%	0.0%	
29	Copper	AL	AL		1.3 mg/L	1.3 mg/L	378	323	258	0.3%	0.0%	0.0%
30	Dichloromethane (Methylene Chloride)	MCL-US	MCL US	5 ug/L	5 ug/L	5 ug/L	759	671	659	0.0%	0.0%	0.0%
31	Lead	AL	AL		15 ug/L	15 ug/L	516	219	215	0.0%	0.0%	0.0%
32	Mercury	MCL-US	MCL-US		2 ug/L	2 ug/L	350	286	259	0.0%	0.0%	0.0%
33	MTBE	MCL-CA	MCL-CA	5 ug/L (SMCL)	13 ug/L	13 ug/L	775	707	670	0.0%	0.0%	0.0%
34	Radium-228	MCL-US	MCL-US		5 pCi/L	5 pCi/L	169	85	161	0.0%	0.0%	0.0%
35	Thallium	MCL-US	MCL-US		2 ug/L	2 ug/L	354	291	256	0.0%	0.0%	0.0%
36	Trichlorofluoromethane	MCL-CA	MCL-CA		150 ug/L	150 ug/L	760	672	659	0.0%	0.0%	0.0%
37	Vanadium	RfD	NL		63 ug/L	50 ug/L	140	88	73	0.0%	0.0%	0.0%
38	Vinyl Chloride	MCL-CA	MCL-CA	0.5 ug/L	0.5 ug/L	0.5 ug/L	761	706	660	0.0%	0.0%	0.0%
39	Zinc	MCL	SMCL		5 mg/L	5 mg/L	376	321	248	0.0%	0.0%	0.0%

GROUNDWATER QUALITY

*Pollutants presented in order of the highest % of wells with concentrations above the MCL or comparison concentration in 2019.

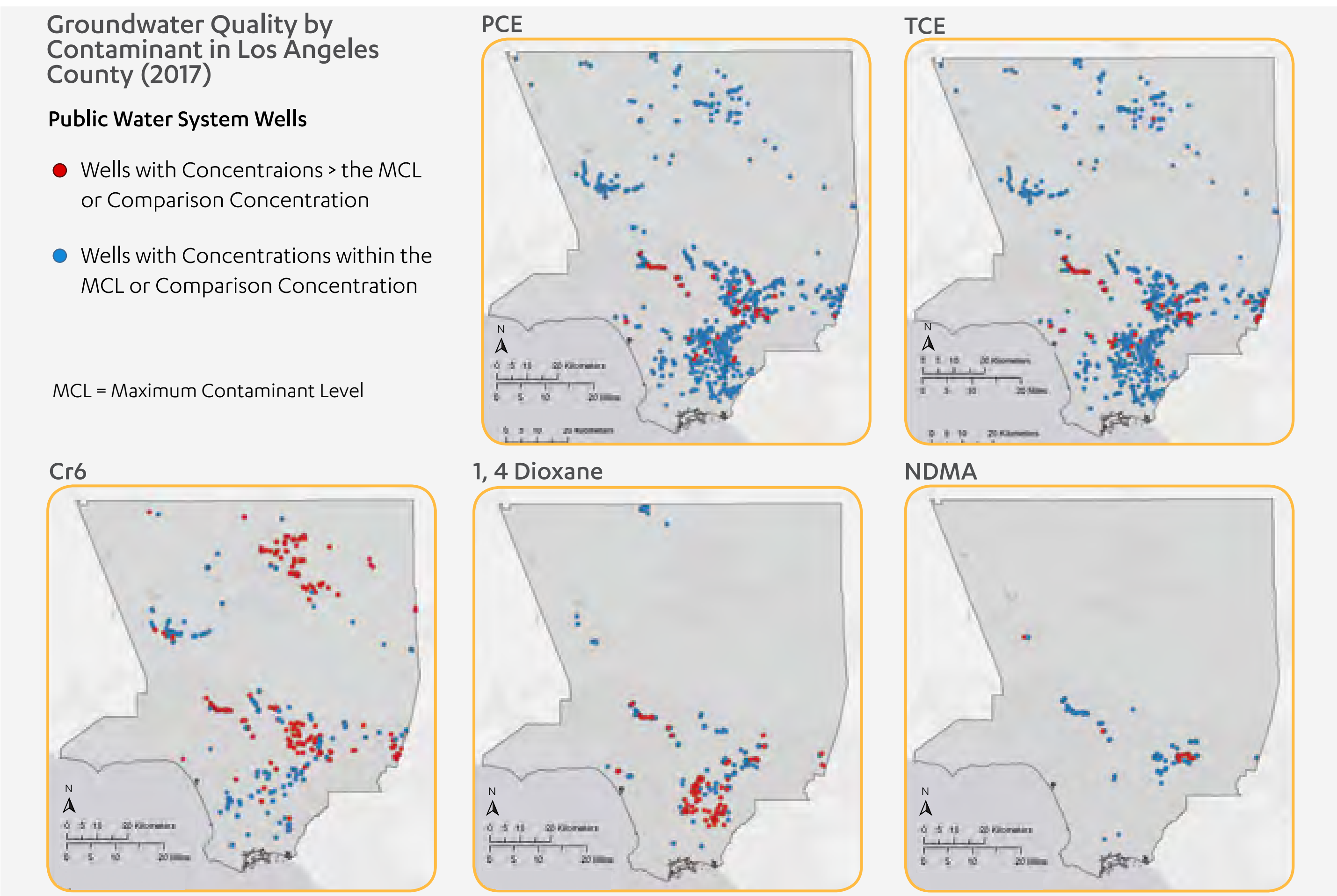
***Hexavalent Chromium (Cr6)- for the period of 2017, we continued to use the 10ug/L MCL as a comparison concentration, although it was invalidated for administrative reasons in May 2017. For further information, see https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Chromium6.html

†2018/19 reflects values for the period of April 2018 to March 2019; 2017 reflects values for the period of January 2017 through November 2017. 2013/14 reflects values for the period of September 2013 through July 2014.

††The percent of public water system wells with concentrations greater than the MCL or comparison concentration is based on 2017 MCL/Comparison Concentration values for 2013-2014 and 2017, and on the 2019 MCL/Comparison Concentration for 2019.

**Definitions
MCL-CA: California drinking water maximum concentration
MCL-US: Federal drinking water maximum concentration
AL-US: Federal Action Level
HBSL: Cancer or non-cancer Health Based Screening Level
HAL-US: Federal Health Advisory Level
RfD: Reference Dose as a drinking water level
CA-CPF: California Cancer Potency Factor
SMCL: Secondary MCL
NL: Notification Level

Note: Comparison concentration type is identified in GAMA Geotracker.
Designation of US or CA MCL was determined using the following references:
https://www.waterboards.ca.gov/rwqcb3/water_issues/programs/gap/docs/salinas_pajaro_valley_proj_2012-2013/gap_dw-stds_fact_sheet_121713.pdf
https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations

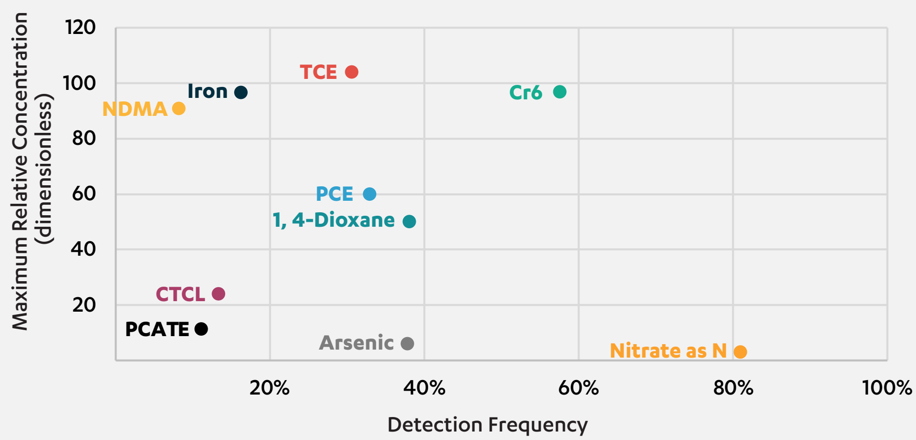


Sources: GeoTracker GAMA (State Water Resources Control Board); ESRI

GROUNDWATER QUALITY

Findings

Detection Frequency and Maximum Relative Concentration for Selected Groundwater Pollutants in Los Angeles County (2017)



Exceedances of MCLs/ Comparison Concentrations

- In 2018-2019, 23 of 39 pollutants exceeded their MCLs or comparison concentrations in one or more wells.
- The pollutants that exceeded the most frequently in 2018-2019 were 1,4-dioxane in 36% of monitored wells, and manganese in 20% of monitored wells. Exceedances occurred in less than 13% of monitored wells for all other pollutants. There were no exceedances for 16 pollutants.
- Although there were 13 pollutants that had increases in percentage of wells above the threshold from the previous period, the changes were minor. Fifteen pollutants showed no change between the years, all with 0% of wells in exceedance.
- For three pollutants (Manganese, N-Nitrosodimethylamine (NDMA), and Chromium, hexavalent (Cr6)) changes from the previous period could not be assessed due to recent changes in the MCL or comparison concentration.
- Exceedances of 1,4-Dioxane decreased significantly between 2017 (46%) and 2018-2019 (35.6%). It has had the largest percent of wells in exceedance for all three periods of analysis, and the comparison concentration has not changed.
- In 2017, 1,4-Dioxane's comparison concentration decreased from 1 ug/L to 0.4 ug/L on GeoTracker GAMA. This is inconsistent with the DDW, which uses a notification level of 1 ug/L. However, there are a number of reported results for this pollutant shown as "<1 ug/L", which appears to indicate that 1 ug/L is the detection limit for laboratory analysis. This means that monitoring agencies are unable to identify if a sample has concentrations greater than 0.4 ug/L, but less that 1 ug/L.
- Changes in comparison concentrations from year to year make it difficult to track trends in groundwater quality. For example, Cr6 had the fourth-highest percent of wells in exceedance in 2017 (10.8%), based on a comparison concentration of 10 ug/L, but in 2018-2019 only 3% of wells exceeded the new comparison concentration of 20 ug/L. The 10 ug/L MCL was invalidated for administrative reasons in May 2017,[114] although the California Public Health Goal set in 2011 for Cr6 is 0.02 ug/L.
- Although not included in previous years' analyses, 5% of tested wells exceeded the MCL of 0.005 ug/L for 1,2,3-TCP for the 2018-2019 review period. This MCL was promulgated by the California Department of Drinking Water, effective 2017.

Overall Detection Frequencies and Maximum Relative Concentration

- Nitrate as N was detected in more than 80% of wells in 2017, but has the lowest maximum relative concentration amongst the pollutants shown on the graph. Cr6 was detected in almost 60% of wells and had one of the highest maximum relative concentrations. The other eight pollutants were detected in less than 40% of wells, but several had maximum relative concentrations of over 80.
- The detection frequencies for 1,4-Dioxane, PCE, TCE and Carbon Tetrachloride have all increased since 2006. Perchlorate and NDMA were the only two pollutants with lower detection frequencies in 2017. We were unable to make comparisons for Arsenic, Nitrate and Iron, as the detection frequencies are not included in the USGS report.

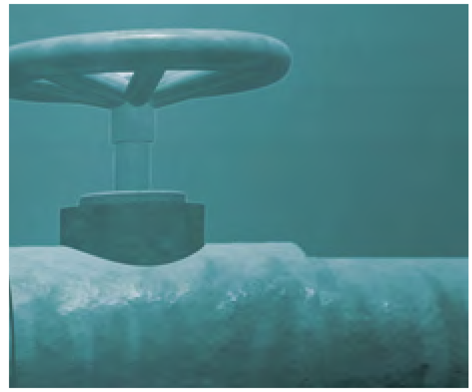
Note that contaminant levels in water system groundwater wells do not equate to drinking water quality – where groundwater is used for drinking water, additional monitoring is required and the water is usually treated. However, contamination of drinking water aquifers means that significant additional energy and resources must be expended to use this local resource in place of imported water.

Data Limitations

- The database lacks uniform monitoring frequency by well and by pollutant across the County. In many cases, the number of wells monitored each year are significantly different for each pollutant in that year, and also differ between years for a given pollutant. This limits the conclusions that can be drawn from the data.
- At the time of the 2017 data download, the following pollutants had data available only through October 2017: Aluminum, Antimony, Cadmium, Mercury, Nickel, Radium-228, Thallium and Vanadium. All of them exceeded their MCLs or comparison concentrations in less than 1% of monitored wells.
- We were able to add 1,2,3-TCP to our analysis for 2018-2019, but due to the nature of the request function of the GAMA database tool, we were unable to obtain equivalent data for previous years.

INDICATOR • GROUNDWATER THREATS





Introduction

It is important to quantify and manage groundwater threats to protect this vital resource. Few groundwater threats come from nature; the bulk of these threats are associated with human activities such as the storage or disposal of hazardous substances underground. Harmful materials such as gasoline, nutrients, pesticides and heavy metals have the potential to contaminate and pollute soil and groundwater if containment is breached, rendering groundwater unsafe and unusable for human consumption and requiring time and resources for cleanup. There may also be air exposure pathways by which these hazardous material releases can create adverse health impacts on surrounding communities.[116] Understanding and mitigating these potential threats is necessary to keep our groundwater and residents safe.

Data

Data on groundwater threats were obtained through the State Water Resources Control Board's (SWRCB) GeoTracker database.[117] We downloaded data on GeoTracker cleanup sites in California and narrowed it to L.A. County.[118] GeoTracker is a publicly accessible statewide database containing information on sites that need cleanup and have the potential to contaminate groundwater. One of the main purposes of GeoTracker is to check the progress of cases in order to ensure that cleanup is underway.[119]

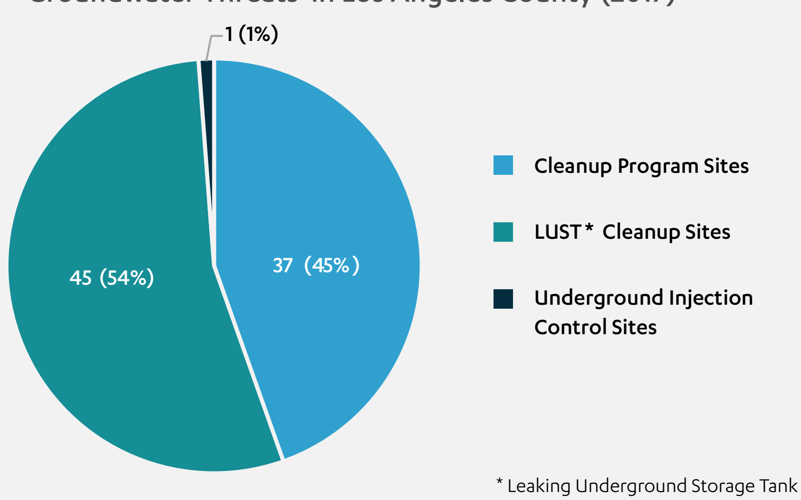
We used the CalEnviroScreen 3.0 Groundwater Threats indicator to determine which site types and statuses to display based on groundwater impact.[120] Seven types of sites that threaten groundwater were analyzed: Cleanup Program Sites, Military Cleanup Sites, Military Privatized Sites, Land Disposal Sites, Produced Water Ponds, Leaking Underground Storage Tank (LUST) Cleanup Sites and Military Underground Storage Tank (UST) Sites.

The following definitions apply (but note that CalEnviroScreen used only selected statuses within each threat type):[121]

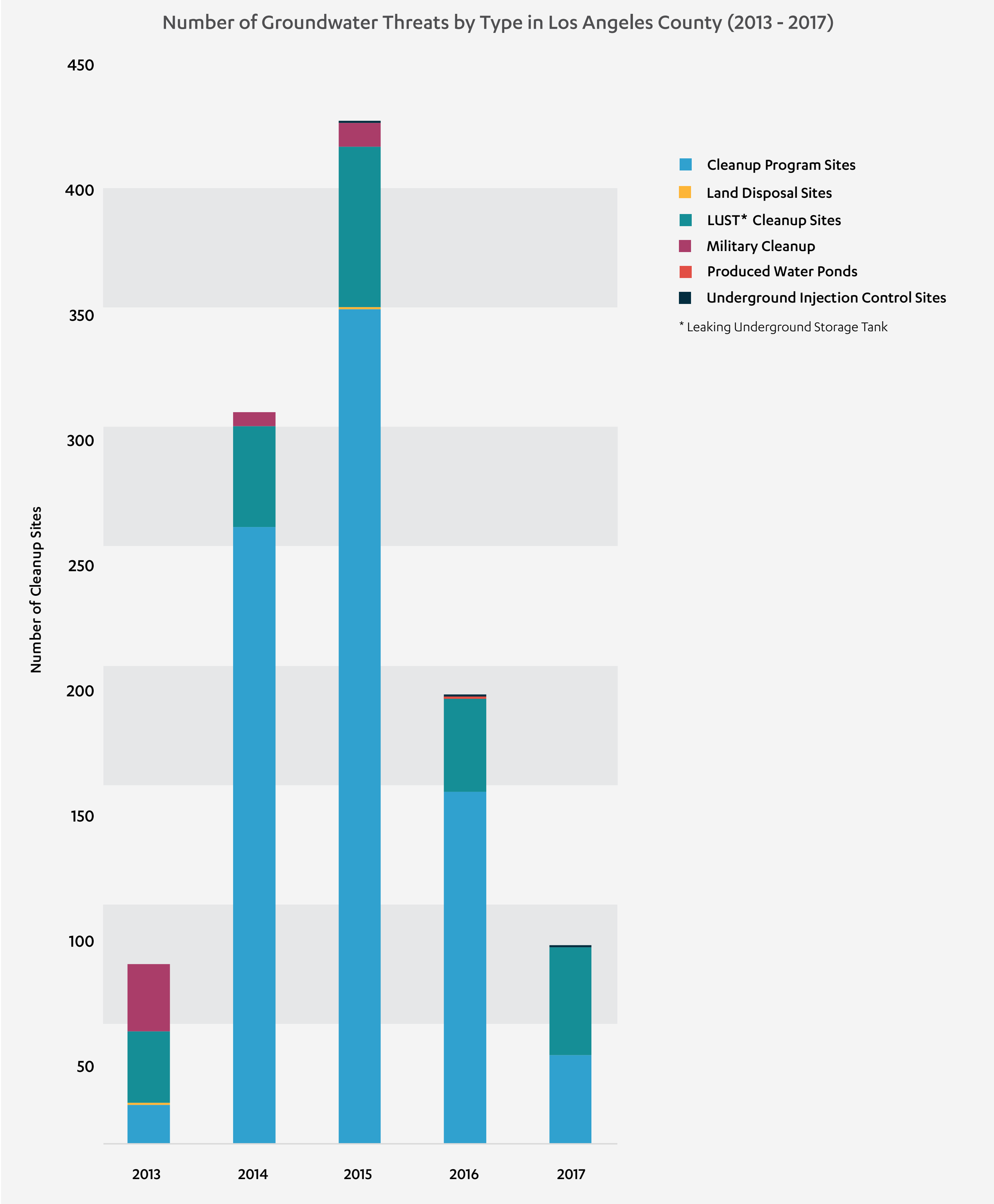
- **Cleanup Program Sites** are varied and include, but are not limited to, unauthorized releases at pesticide and fertilizer facilities, rail yards, ports, equipment supply facilities, metals facilities, industrial manufacturing and maintenance sites, dry cleaners, bulk transfer facilities, refineries, and mine sites. Unauthorized releases detected at Cleanup Program Sites are highly variable and include but are not limited to hydrocarbon solvents, pesticides, perchlorate, nitrate, heavy metals, and petroleum constituents.
- **Military Cleanup Sites** include all cleanup sites that are located on existing military bases.
- **Land Disposal Sites** includes sites where solid and/or liquid wastes have been discharged to land such as landfills, mines, surface impoundments, waste piles, and land treatment facilities.
- **Produced Water Ponds** include surface impoundments used to store and/or dispose of water produced during oil production.
- **Leaking Underground Storage Tank (LUST) Cleanup Sites** include all Underground Storage Tank (UST) sites that have had an unauthorized release (i.e. leak or spill) of a hazardous substance, usually fuel hydrocarbons, and are being cleaned up or are eligible for closure.
- **Military Underground Storage Tank (UST) Sites** include all petroleum-related Leaking Underground Storage Tank (LUST) cleanup sites located on existing military bases.
- **Underground Injection Control Sites** include wells used for disposing of oilfield fluids by subsurface injection, or injection used to enhance oilfield production.

Following the CalEnviroScreen methodology, we looked at sites with the status of "Open" with a few exceptions.[122] Note that as part of the CalEnviroScreen scoring process, different weights are applied to each of these categories of threats, but for purposes of this indicator, we just looked at absolute numbers.

Groundwater Threats in Los Angeles County (2017)



GROUNDWATER THREATS



GROUNDWATER THREATS

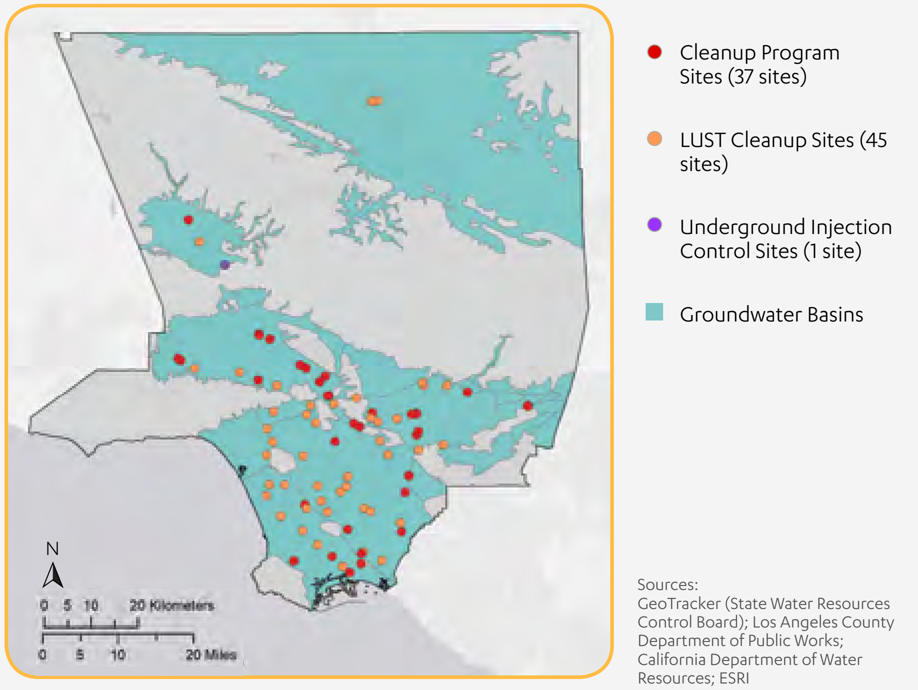
Findings

- In 2017, there were 83 groundwater threats in L.A. County, the vast majority of which were LUST Cleanup Sites (54%) and Cleanup Program Sites (45%). Only one site was a designated Underground Injection Control Site. There were no Military Sites, Land Disposal Sites, or Produced Water Ponds.
- The number of groundwater threats increased annually from 2013 to a high of 428 in 2015, and then decreased in 2016 and 2017.
- Between 2013 and 2014, there was a significant increase in the number of reported Cleanup Program Sites that posed a threat to groundwater (from 16 to 258 sites). In 2015, there was an additional increase to 349 sites. The number of sites decreased significantly in 2016 and 2017. It is not clear whether this represents an actual surge of new releases in the earlier years with cleanup in subsequent years, or whether this pattern is a result of changes in enforcement, tracking, or reporting.

Data Limitations

- Despite consultation with SWRCB staff, we were not able to determine the reason for the rapid increase and decrease in the number of Cleanup Program Sites in 2014 and 2015. We suspect that the data may not actually be representative of the actual timeframes for the emergence and resolution of these problem sites.

Groundwater Threats in Los Angeles County (2017)



Sources: GeoTracker (State Water Resources Control Board); Los Angeles County Department of Public Works; California Department of Water Resources; ESRI

HIGHLIGHT

Sustainable Groundwater Management Act

Historically, groundwater basins in California have been largely unregulated in terms of both management and monitoring of withdrawal volumes, leading to harmful effects such as land subsidence, saltwater intrusion, lowering of the water table, and reduced water quality.[123] Because groundwater basin boundaries do not align with political (city/county) or utility service area boundaries, additional governance mechanisms are needed to organize and assign both responsibility and authority with respect to withdrawing groundwater more sustainably.

California's Sustainable Groundwater Management Act (SGMA), signed into law in 2014 in response to California's recent drought, became the state's first framework for regulating groundwater management. Under SGMA, local stakeholder agencies in high- and medium- priority unadjudicated groundwater basins are required to form groundwater sustainability agencies (GSAs). These agencies are then required to create and implement groundwater sustainability plans (GSPs) that describe how the groundwater basin will be managed to keep withdrawals within the basin's sustainable yield and prevent other consequences of unsustainable management.[124] If no GSA is formed by other agencies, the county in which the basin is located will serve as the GSA for that basin.[125] GSA formation completion was required by July 1, 2017.[126] SGMA also established reporting requirements for adjudicated basins (those for which water withdrawal rights have been established by court order).[127]

According to the 2018 draft basin prioritization, the unadjudicated high- and medium-priority basins in L.A. County are the Santa Clara River Valley East Subbasin of the Santa Clara River Valley (high priority), and the Santa Monica Subbasin of the Coastal Plain of Los Angeles Basin (medium priority).[128] Both formed GSAs in June 2017, namely The Santa Monica Basin Groundwater Sustainability Agency[129] and the Santa Clarita Valley Groundwater Sustainability Agency.[130]

grade C-
for groundwater

Although groundwater basins are largely managed well through adjudications throughout much of the County, poor groundwater quality continues to be prevalent in numerous local aquifers. Groundwater remediation efforts at San Fernando Valley and San Gabriel Valley Superfund sites are finally underway and starting to make a difference. Despite numerous local, state and federal programs to reduce threats to groundwater and to remediate contaminated aquifers, the L.A. County region still has a long way to go before achieving clean groundwater countywide. We recommend that assessments such as the USGS study of the Coastal L.A. Basin are conducted more frequently, and made more accessible to the public. Furthermore, aquifers that do have high quality groundwater must be protected from degradation through regulatory policies and the salt and nutrient management plan efforts currently underway. We anticipated that this grade will rise over the next decade because of groundwater remediation efforts, increased stormwater infiltration efforts, and a stronger focus on sustainable groundwater management. L.A. County is fortunate to have such extensive groundwater resources with a great deal of underutilized storage capacity, so the region has a large incentive to remediate and sustainably manage local groundwater basins.

5

SURFACE WATER QUALITY

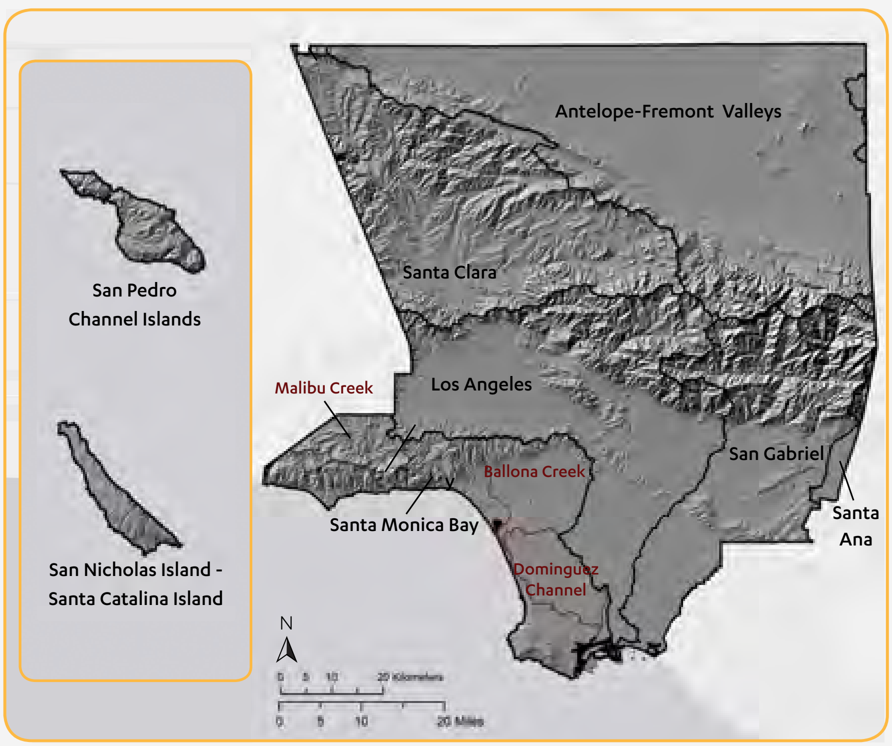
Overview

In the L.A. region, coastal waters are greatly impacted by wastewater and storm sewer system discharges, increasing urban development, habitat degradation, oil spills, and numerous other activities. Similarly, regional surface waters are polluted through increasing development, point and non-point discharge sources, habitat loss due to sedimentation, erosion and development, bioaccumulation of legacy toxins, and more. As a result, the majority of L.A. County's receiving waters are so polluted that designated uses such as contact recreation, municipal water supply, and aquatic life are impaired. Although the state and regional water board and the U.S. Environmental Protection Agency (EPA) have approved dozens of Total Maximum Daily Loads (TMDLs – water body specific water quality standards, usually with compliance deadlines) in L.A. County, and the Regional Water Board has issued four stormwater permits and hundreds of permits for point source dischargers (sewage treatment plants, industries, etc.), local rivers, lakes, beaches and bays often contain pollutant concentrations that exceed water quality standards.

Clean water regulations have resulted in the installation of tens of thousands of catch basin screens and inserts to keep trash out of local waterways and off local beaches. In addition, regulations and funding measures have led to the construction of dozens of stormdrain dry weather flow diversions that pump polluted runoff into the sewer system instead of discharging it to local rivers and popular beaches. Also, water bond measures such as Measure O, Proposition 50, 84, and others have resulted in the construction of structural best management practices (BMPs) at locations like Machado Lake, Echo Park Lake, Sun Valley Park, Legacy Park, and more. The recent passage of L.A. County's Measure W will provide approximately $300 million annually for the construction and installation of hundreds of distributed and regional projects with BMPs in nine subwatersheds across L.A. County, so there is hope for improving water quality in the near future.

Due to catastrophic wildfires in the region, especially in the Malibu Creek watershed, water quality along Malibu's coast, in Malibu Lagoon, and in Malibu Creek and its tributaries was likely very poor in winter 2018-19 and in the months and potentially years to come. Furthermore, the most recent Heal the Bay Beach Report Card highlighted that numerous beaches in Malibu had very high fecal indicator bacteria densities during and after the rains that followed the Woolsey Fire. Data on other contaminants has not become publicly available yet. Based on previous studies completed by Terri Hogue of Colorado School of Mines, Eric Stein from the Southern California Coastal Waters Research Project and others, it is clear that local wildfires result in dramatic increases in contaminants including metals, sediments, nutrients, and polycyclic aromatic hydrocarbons. An assessment of the severity of the burn-zone's polluted runoff impacts on the Malibu Creek watershed, Malibu's other watersheds, and their coastal waters including beaches, tidepools, kelp beds and Marine Protected Areas is critical.

Los Angeles County Watersheds (2017)*



Watershed Boundaries (HUC = Hydrologic Unit Code)

— HUC 8

— HUC 10

*HUC 8 watershed boundaries with selected HUC 10 watersheds identified
Sources: Los Angeles County GIS Data Portal; ESRI

INDICATOR • EXTENT OF IMPAIRED WATER BODIES

Introduction

Section 303(d) of the Clean Water Act requires the state to identify waters not meeting water quality standards. These waters are listed as "impaired" and prioritized for total maximum daily load (TMDL) development or other programs to reduce receiving water pollutant concentrations. Impairments of assessed waters are summarized in the 303(d) List of the California Integrated Report that is intended to be released every two years; however, this schedule has not been met in recent years.

Data

The 2014/2016 California Integrated Report is the most recent report issued on L.A. region surface water impairments. It combines all information for both the 2014 and 2016 listing cycles, because a report was not released in 2014. The U.S. EPA approved the California 2014-2016 Clean Water Act Section 303(d) List of Impaired Waters on April 6, 2018.[131] The data from this listing is from 2010. As a result, a current status and trends assessment on the impairment of L.A. region waterbodies is not possible, but we have provided summary data from this listing, and conducted some comparisons with the prior listing.

303(d) updates for L.A. County were obtained from the 2014/2016 California Integrated Report on the State Water Resources Control Board website.[132] This report assessed information and data received in the 2010 data solicitation period (January – August 2010). Measurements for streams, rivers, and shorelines are expressed in miles, while bays, harbors, lakes, and estuaries are expressed in acres. We looked at the status of impairments from the report, and also compared it to the previous 2010 Integrated Report. The 2010 Integrated Report assessed information and data received in the data solicitation period from December 2006 to February 2007.[133]

For purposes of the findings discussion below, we refer to the most recent results as representing conditions in 2010, and the previous assessment as representing conditions in 2007. Each assessed water segment was assigned one of five categories based on the segment's overall beneficial use support.[134] The following category definitions were used in the 2014/2016 Integrated Report.

- Category 1: at least one core beneficial use is supported and none are known to be impaired.
- Category 2: insufficient information to determine beneficial use support.
- Category 3: insufficient data and/or information to make a beneficial use support determination but information and/or dates indicate beneficial uses may be potentially threatened.
- Category 4: at least one beneficial use is not supported, but a TMDL is not needed. Sub-categories are as follows:
  - Category 4a: all 303(d) listings are being addressed and at least one of those listings is being addressed by a U.S. EPA-approved TMDL.
  - Category 4b: all 303(d) listings are being addressed by actions other than TMDLs.

Impaired vs. Assessed Shorelines, Rivers, and Streams (2010)

Water Body Type	Impaired Length (miles)	Assessed Length (miles)	Percent Impaired (%)
Coastal & Bay Shoreline	53	60	90
River & Stream	529	932	57
Total	582	992	59

Impaired vs. Assessed Bays, Harbors, Estuaries, Lakes, Reservoirs, and Wetlands (2010)

Water Body Type	Impaired Area (acres)	Assessed Area (acres)	Percent Impaired (%)
Bay & Harbor	162,953	162,953	100
Estuary	362	416	87
Lake & Reservoir	4,990	6,010	83
Tidal Wetland	333	333	100
Total	168,638	169,712	99

EXTENT OF IMPAIRED WATER BODIES

  - Category 4c: waterbodies impacted by non-water pollutant related causes.
- Category 5: at least one beneficial use is not supported and a TMDL is needed.

California considers Categories 4a, 4b, and 5 to be impaired waters, while the U.S. EPA only considers Category 5 water segments impaired. Note that these definitions are different from the category definitions in the 2010 Integrated Report.

We also looked at waterbodies listed as impaired in the 2010 Integrated Report that achieved Category 1 status in the 2014/2016 Report, as one measure of progress toward achieving water quality standards.

Waterbodies Listed as Impaired in 2007 that Achieved Category 1 Status in 2010

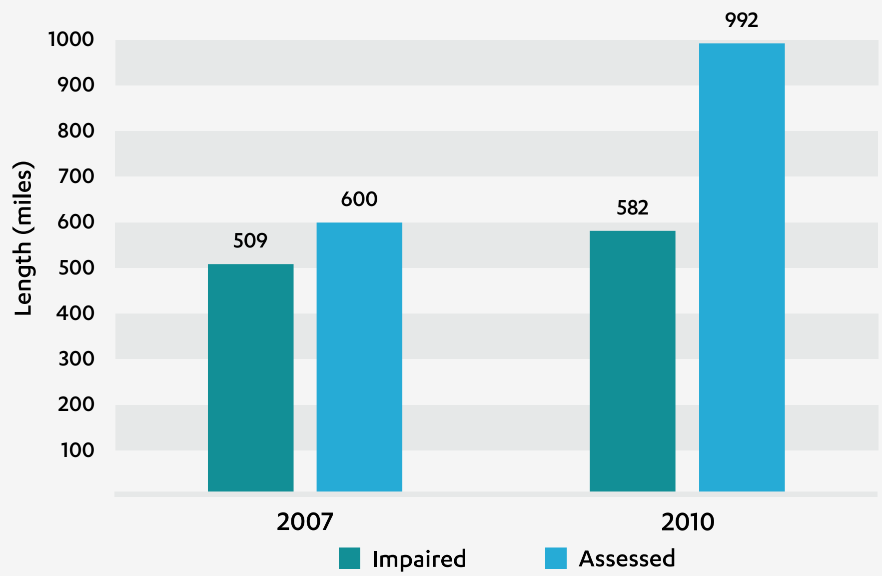
Segment (Pollutant)	Length (miles)	Previous Category
Hermosa Beach (indicator bacteria)	2.0	4a
Leo Carrillo Beach (coliform bacteria)	1.2	4a
Manhattan Beach (indicator bacteria)	2.0	4a
Total	5.2	

Rivers, Streams and Shoreline Impairments by Pollutant Category (2010)

Pollutant Category	Impaired Length (miles)	Percent of Assessed Length (%)
Fecal Indicator Bacteria	382	39
Metals/Metalloids	232	23
pH + Miscellaneous*	224	23
Toxicity	181	18
Nutrients	160	16
Trash	157	16
Salinity	108	11
Cyanide + Sulfates	51	5.1
Nuisance	51	5.1
Pesticides	50	5.0
Other Organics†	39	4.0
Sediment	36	3.7
Hydromodification	11	1.1

* The 'Miscellaneous' pollutant category includes the following pollutants: benthic community effects, habitat alterations, invasive species, and water temperature.
† For these water body types, the 'Other Organics' pollutant category includes bis(2ethylhexyl)phthalate (DEHP), dioxin, and polychlorinated biphenyls (PCBs).

Impaired and Assessed Shorelines, Rivers, Streams (2007- 2010)

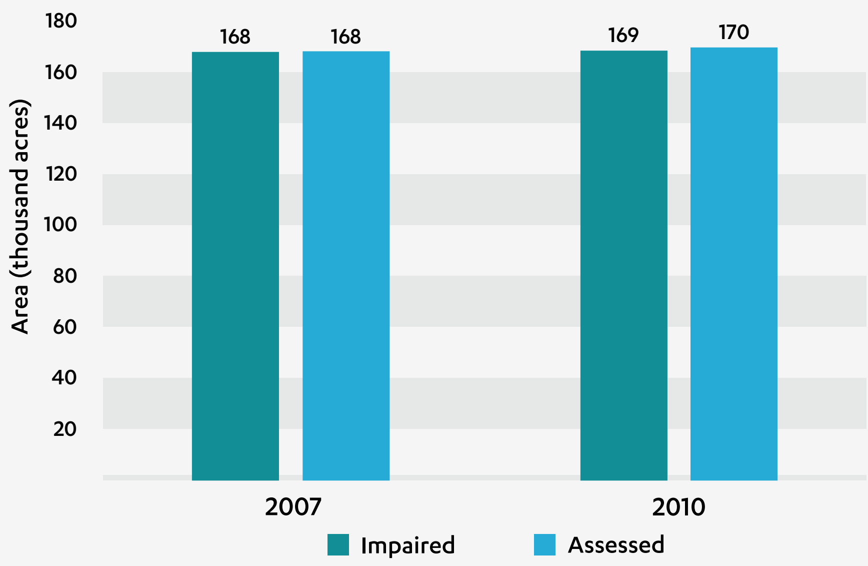


EXTENT OF IMPAIRED WATER BODIES

Bays, Harbors, Estuaries, Lakes, Resevoirs, and Wetlands Impairments (2010)		
Pollutant Category	Impaired Area (acres)	Percent of Assessed Area (%)
Other Organics*	167,228	99
Pesticides	164,882	97
Metals/Metalloids	154,740	91
Trash	147,527	87
Toxicity	16,123	9.5
pH + Miscellaneous	3,743	2.2
Nutrients	1,834	1.1
Fecal Indicator Bacteria	999	0.6
Hydromodification	289	0.2
Nuisance	244	0.1
Salinity	15	0.01

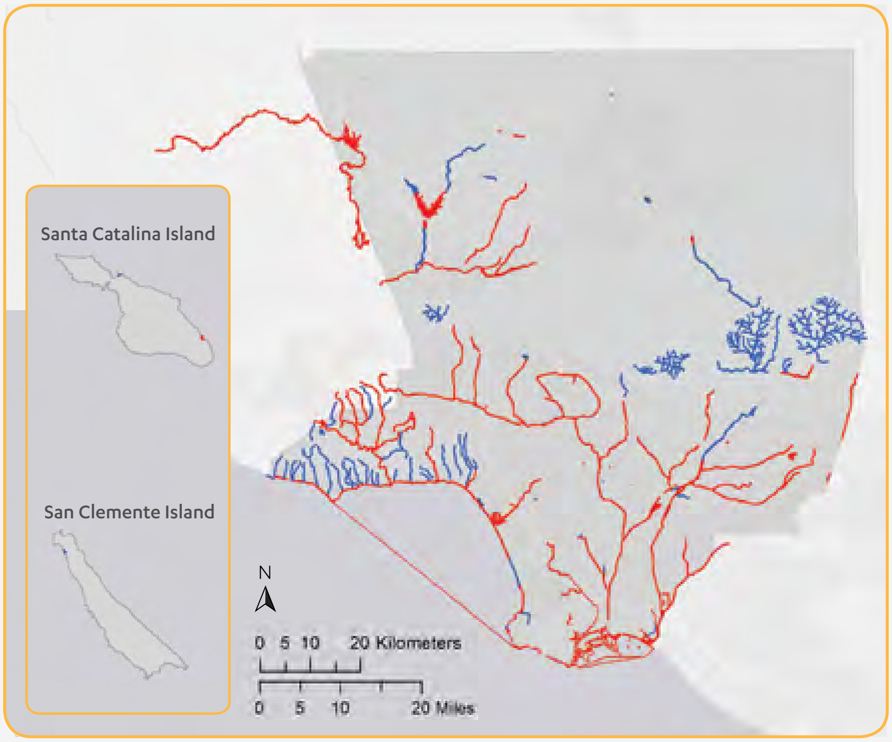
*For these water body types, the 'Other Organics' pollutant category includes, polychlorinated biphenyls (PCBs), pyrene, and the plasticizer bis(2ethylhexyl)phthalate (DEHP).

Impaired and Assessed Bays, Harbors, Estuaries, Lakes, Resevoirs, and Wetlands (2007 - 2010)



EXTENT OF IMPAIRED WATER BODIES

Extent of Impaired Water Bodies in Los Angeles County (2010)



Sources: California State Water Resources Control Board, 2014/16 Integrated Report; ESRI

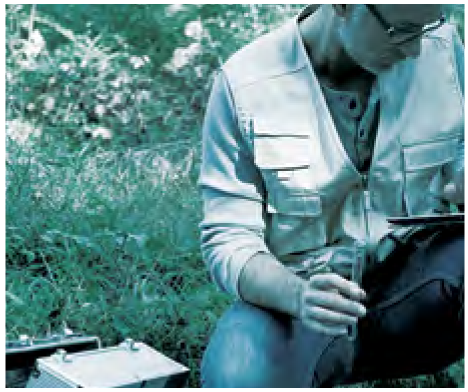
Findings

- The extent of impaired bays, harbors, estuaries, lakes, reservoirs, and wetlands is exceptionally high throughout L.A. County. Ninety-nine percent of assessed water bodies of this type were impaired in 2010, compared to the 100% impairment level in 2007. In absolute numbers, conditions have gotten worse: an additional 512 acres were found to be impaired in 2010 compared to 2007. There has been no new water body assessment data processed in nine years.
- The percentage of impaired shorelines, rivers, and streams decreased from just under 85% in 2007, to 59% in 2010. The total assessed miles greatly increased from 600 to 992; and, the absolute length of impairments increased from 509 to 582 miles.
- Between 2007 and 2010, 3 segments (5.2 miles) were reclassified from Category 4a (on the 303(d) list) to Category 1 (restored for beneficial uses). A number of other waterbodies / segments were delisted for certain pollutants, but remain impaired for others.
- Organics, pesticides, metals/metalloids, and trash encompass the vast majority of the impairments in bays, harbors, estuaries, lakes, reservoirs, and wetlands, ranging from 86.9% to 98.5%.
- The fecal indicator bacteria, metals/metalloids, and pH + miscellaneous pollutant categories each impair over 20% of the assessed water body lengths, while toxicity, nutrients, salinity, and trash impair over 10% of assessed water body lengths.

Data Limitations

- Data used for this analysis was from monitoring conducted up to 2010 only. According to the 2016 Integrated Report Draft Staff Report: "Due to the volume of data received during the 2010 data solicitation period, the State Water Board determined that no additional data would be solicited or analyzed until all the 2010 data are assessed. Each of the 2012, 2014 and 2016 303(d) lists have assessed only data from the 2010 data solicitation."[135]

INDICATOR • EXCEEDANCES OF WATER QUALITY OBJECTIVES IN RECEIVING WATER



Introduction

L.A. County and its constituent cities are required to conduct stormwater quality monitoring, both within receiving waters and at stormwater outfalls under Municipal Separate Storm Sewer System (MS4) permits issued by the L.A. Regional Water Quality Control Board. The structure of this monitoring is complex. Starting in 2015, under the terms of the 2012 L.A. County Municipal Stormwater Permit, many permittees began conducting monitoring in groups called Coordinated Integrated Monitoring Programs (CIMPs) or Integrated Monitoring Programs (IMPs), which apply to various sub-watersheds throughout the County. A comprehensive assessment of all stormwater monitoring results across these various plans was beyond the scope of this report card because of the lack of a single source of information on number and location of exceedances. Instead, we looked at L.A. County Department of Public Works (DPW) monitoring at mass emissions stations within receiving waters, as done in the 2015 Environmental Report Card. Monitoring results are compared to water quality objectives (WQOs), which are standards designed for each waterbody that will protect its designated beneficial uses. The WQOs that apply to L.A. County waterbodies are contained in the Water Quality Control Plan[136] for the Los Angeles Region and the California Toxics Rule,[137] 40 Code of Federal Regulations (CFR) Part 131. We did not conduct our own evaluation of reported monitoring results compared to WQOs, as this would have been infeasible, especially in the case of some metals, where the WQO is a function of the concurrently measured pH value. Instead, we used information provided in the DPW annual reports that identified results that exceeded the applicable WQO.

Exceedances of Water Quality Objectives During Coordinated Integrated Monitoring Programs at Mass Emission Stations (2016 - 2017)

Mass Emission Station	Wet Weather			Dry Weather		
	Monitoring Events	Parameter	% Exceedances	Monitoring Events	Parameter	% Exceedances
Ballona Creek (S01)	3	Copper (Dissolved)	33%	9	4,4'-DDT	11%
		Zinc (Dissolved)	33%		E. coli	11%
Malibu Creek (S02)	4	Selenium	50%	2	Sulfate	50%
		Sulfate	50%			
Los Angeles River (S10)	3	None		2	E. coli	50%
Coyote Creek (S13)	3	None		2	None	
San Gabriel River (S14)	4	None		2	None	
Dominguez Channel (S28)	3	Copper (Dissolved)	100%	2	Copper (Dissolved)	50%
		Total PCBs	33%			
		Zinc (Dissolved)	67%			
Santa Clara River (S29)	3	Cyanide	33%	2	None	
		E. coli	100%			

EXCEEDANCES OF WATER QUALITY OBJECTIVES IN RECEIVING WATER

Summary of Total Exceedances at Mass Emission Stations* (2013 - 2017)		
Mass Emission Station	Wet Weather	Dry Weather
Ballona Creek (S01)	46	2
Malibu Creek (S02)	12	5
Los Angeles River (S10)	25	8
Coyote Creek (S13)	24	6
San Gabriel River (S14)	9	4
Dominguez Channel (S28)	37	5
Santa Clara River (S29)	18	2
*See data limitations		

Summary of Total Exceedances at Tributary Stations (2012-2015)*			
Station	Year	Wet Weather	Dry Weather
Upper Las Virgenes Creek (TS25)	2012-13	6	6
	2013-14	2	5
	2014-15	7	5
Malibu Creek Cheseboro Canyon (TS26)	2012-13	7	6
	2013-14	4	6
	2014-15	12	4
Lower Lindero Creek (TS27)	2012-13	8	4
	2013-14	2	5
	2014-15	9	4
Medea Creek (TS28)	2012-13	6	5
	2013-14	3	4
	2014-15	11	4
Liberty Canyon Channel (TS29)	2012-13	10	9
	2013-14	4	4
	2014-15	9	2
PD 728 at Foxfield Drive (TS30)	2012-13	5	3
	2013-14	2	3
	2014-15	8	3
*See data limitations			

Total Exceedances at Mass Emission Stations* (2009 - 2017)		
Year	Wet Weather	Dry Weather
2009-10	44	36
2010-11	53	8
2011-12	64	13
2012-13	90	14
2013-14	58	8
2014-15	53	12
2015-16	44	7
2016-17	16	5
*See data limitations		

Data

We assessed the extent to which receiving water samples exceeded WQOs for the most recent year of data (2016-2017) and then looked at trends in annual data starting in 2013.

For monitoring years 2013-2015, we used data from the DPW's Annual Stormwater Monitoring Reports, obtained from the DPW website.[138] The County collected samples at seven mass emission monitoring stations (MES) that monitor runoff from major county watersheds. Monitoring was also conducted at six tributary stations to assess sub-watersheds. The County's monitoring report includes all dry and wet monitoring events at each MES or tributary station, as well as information on the parameters assessed, and whether a sample exceeded the WQO for each parameter. Wet weather samples were collected during storm events. The following ten pollutant categories were monitored: conventional constituents, general minerals, nutrients, metals, semivolatile organics, base neutral, chlorinated pesticides, polychlorinated biphenyls (PCBs), organophosphate pesticides, and herbicides.[139]

For the 2015-2017 monitoring years, we used water quality data collected by the County as part of a CIMP program (per a data request to the County). County monitoring at the tributary stations ended after the 2014-15 monitoring year, therefore only mass emission stations were assessed for monitoring years 2015-2017.

EXCEEDANCES OF WATER QUALITY OBJECTIVES IN RECEIVING WATER

Summary of Wet Weather Metals Exceedances at Mass Emission Stations (2008-2017)*

Year	Dissolved Copper	Dissolved Lead	Dissolved Zinc
2008-09	27%	0%	21%
2009-10	32%	0%	18%
2010-11	7%	0%	56%
2011-12	71%	10%	58%
2012-13	71%	2%	57%
2013-14	67%	4%	67%
2014-15	76%	19%	67%
2015-16	26%	0%	4%
2016-17	19%	0%	14%

*See data limitations

Findings

- Results for the most recent year of monitoring data (2016-17) at the mass emissions stations showed WQO exceedances for several parameters in Ballona Creek, Malibu Creek, Dominguez Channel, and the Santa Clara River, in both wet and dry weather. The L.A. River exceeded WQOs for only one monitoring event (in dry weather), and there were no monitoring event exceedances in Coyote Creek or the San Gabriel River. Note, data for the L.A. and San Gabriel Rivers, especially for E. Coli and metals, was extremely surprising in light of the historic water quality at those sites. For example, water quality data from the recent Heal the Bay River Report Card (2019) covered both the L.A. (15 sites with 9 in the upper watershed and 6 along the main stem from Sepulveda Basin to Frogtown and Steelhead Park) and San Gabriel River (9 sites in the upper watershed) watersheds. For 2018 dry weather, 62% of the monitoring sites in the L.A. River received red (frequent and high exceedances of bacterial standards) or yellow grades while the San Gabriel River only had 16% of the sites with yellow or red grades.

- The most common parameters exceeding WQOs at mass emission stations in 2016-17 were E. coli, dissolved oxygen, dissolved copper, and dissolved zinc.

- The number of total exceedances during wet weather monitoring greatly exceeded those during dry weather across all years (2009-17), because stormwater discharges scour pollutants off impermeable surfaces, thereby increasing pollutant loads entering water bodies.

- The mass emission stations at Malibu Creek (S02), San Gabriel River (S14), and Santa Clara River (S29) had consistently low numbers of exceeding samples from 2013 to 2017. In contrast, the mass emission stations at Ballona Creek (S01) and the Dominguez Channel (S28) had consistently high numbers of exceedances over this same period.

- The total annual number of exceedances at tributary stations (all located in the Malibu Creek watershed) did not markedly improve from 2012 to 2015. There are similar numbers of exceedances at each tributary monitoring station.

- From 2008 to 2017, a significant portion of wet weather samples exceeded dissolved copper and dissolved zinc WQOs, while few exceeded dissolved lead WQOs. The majority of samples from 2011 to 2015 exceeded dissolved copper and dissolved zinc WQOs. The percentage of exceeding samples greatly decreased in the 2015-16 and 2016-17 monitoring years for these two parameters, compared to the previous five years.

- The 2016-17 monitoring year was the first year to use CIMPs data and had noticeably fewer exceedances at mass emission stations compared to 2009 to 2016 monitoring years. Water quality data for the next several monitoring years is necessary to determine if this is representative of a trend toward improvements in water quality, or if this is particular to the 2016-17 year due to factors such as rainfall or a new monitoring program approach.

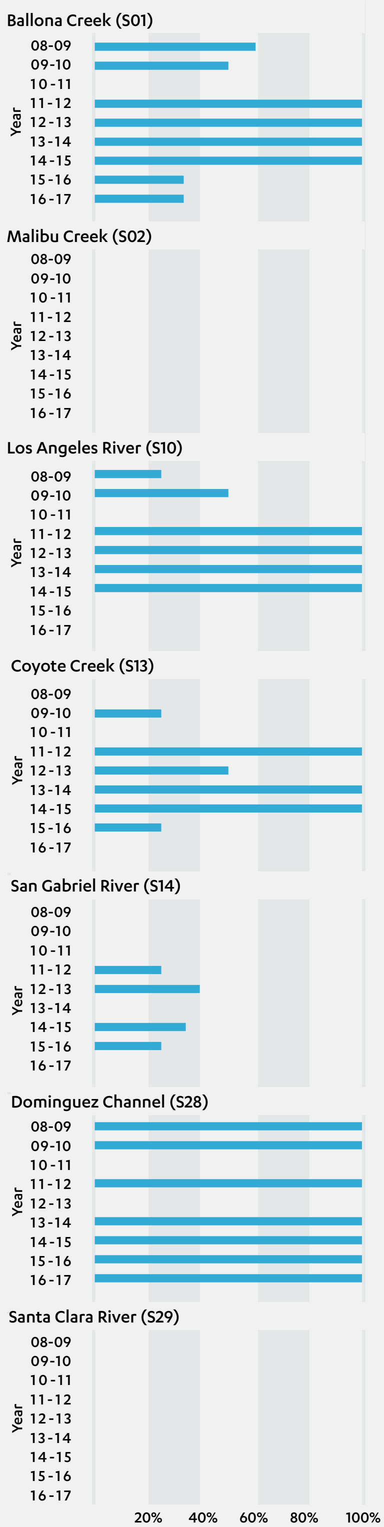
Data Limitations

- The number of samples taken during each wet and dry weather monitoring event varies from year to year and from station to station, and there are often fewer samples taken during dry weather events than wet. This makes it challenging to compare between stations and over time.

- County monitoring at the tributary stations ended after the 2014-15 monitoring year, so we did not have tributary water quality data for the most recent years.

EXCEEDANCES OF WATER QUALITY OBJECTIVES IN RECEIVING WATER

Percent Dissolved Copper Exceedances for Wet Weather Samples at Mass Emission Stations (2008-2017)*

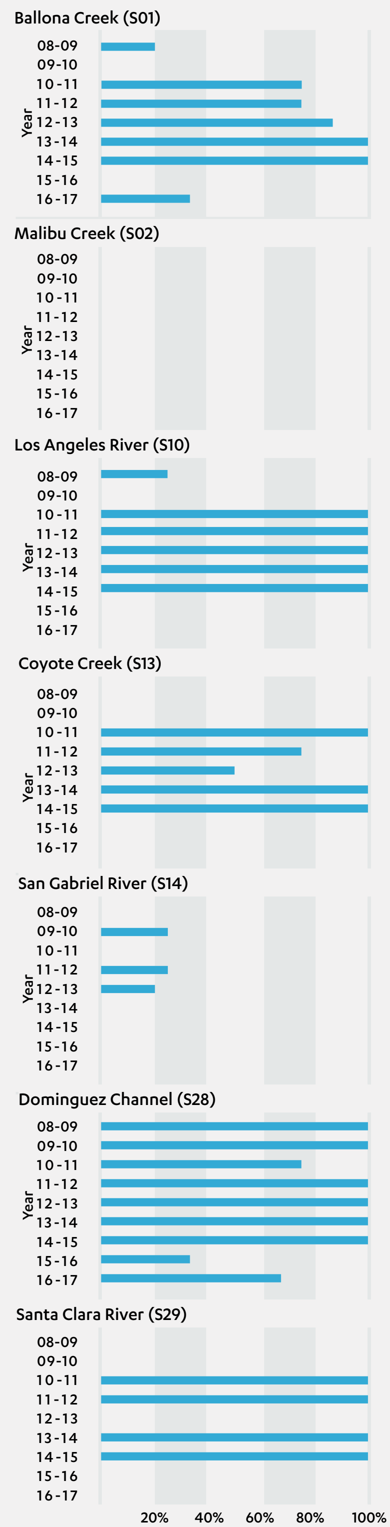


*See Data Limitations

Percent Dissolved Lead Exceedances for Wet Weather Samples at Mass Emission Stations (2008-2017)*

*See Data Limitations

Percent Dissolved Zinc Exceedances for Wet Weather Samples at Mass Emission Stations (2008-2017)*



*See Data Limitations

grade D/ incomplete

for surface water quality

L.A. County's surface waters regularly exceed water quality standards. The vast majority of local rivers, lakes, wetlands, estuaries, and coastal waters were listed as impaired under the Clean Water Act for a wide variety of pollutants. As a result, local waters have not been safe for swimming, safe for drinking, or even safe for aquatic life. Because the state has not been regularly assessing the status of local impaired waters, the public is not clear whether water quality is getting better or worse over the last five to ten years. L.A. County stormwater quality data demonstrates that numerous rivers and creeks, especially Dominguez Channel and Ballona Creek, frequently exceed water quality standards for toxic heavy metals and fecal indicator bacteria. Although trash is ubiquitous in L.A. area water bodies, there is no regular monitoring effort that quantifies trash in rivers, lakes or coastal waters. With the passage of Measure W, help should be on the way soon, but it is imperative that dollars are invested wisely to ensure that all water quality standards can be consistently met throughout L.A. County.

6

INDUSTRIAL & SEWAGE TREATMENT PLANT DISCHARGES

Overview

Since data on receiving water quality is limited spatially and temporally, we chose to include an additional category focusing on the discharge of pollutants to surface waters. Overall, we know that the quality of effluent from water treatment plants and industrial dischargers has improved greatly over the last few decades. In particular, pollutant loads of metals and sewage solids have decreased dramatically over the last 40 years. As a result, Santa Monica Bay no longer has a dead zone and fish have not had tumors or fin rot for over twenty years. Also, the frequency of sewage spills has decreased tremendously with increased investments in sewer infrastructure and enhanced inspection and maintenance programs. These improvements have been an extraordinary success story; however, there is still work to be done in the region.

The major categories of dischargers we evaluated were publicly owned treatment works (POTWs) and large industrial facilities, both of which are regulated under the Clean Water Act through individual National Pollutant Discharge Elimination System (NPDES) Permits, and are required to conduct self-monitoring and report results to the Regional Water Board. Some NPDES permit limits reflect Total Maximum Daily Loads (TMDLs) that have been developed for impaired waterbodies to which these facilities discharge. We also looked at hazardous materials spills to water.

INDICATOR • INDUSTRIAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM VIOLATIONS

Introduction

Large industrial facilities are regulated under the Clean Water Act through individual National Pollutant Discharge Elimination System (NPDES) Permits, and are required to conduct self-monitoring and report results to the Regional Water Board.[140] Some NPDES permit limits reflect Total Maximum Daily Loads (TMDLs) that have been developed for impaired water bodies to which these facilities discharge. Compliance with NPDES Permits have a direct impact on water quality and is an important indicator of the effectiveness of the NPDES program.

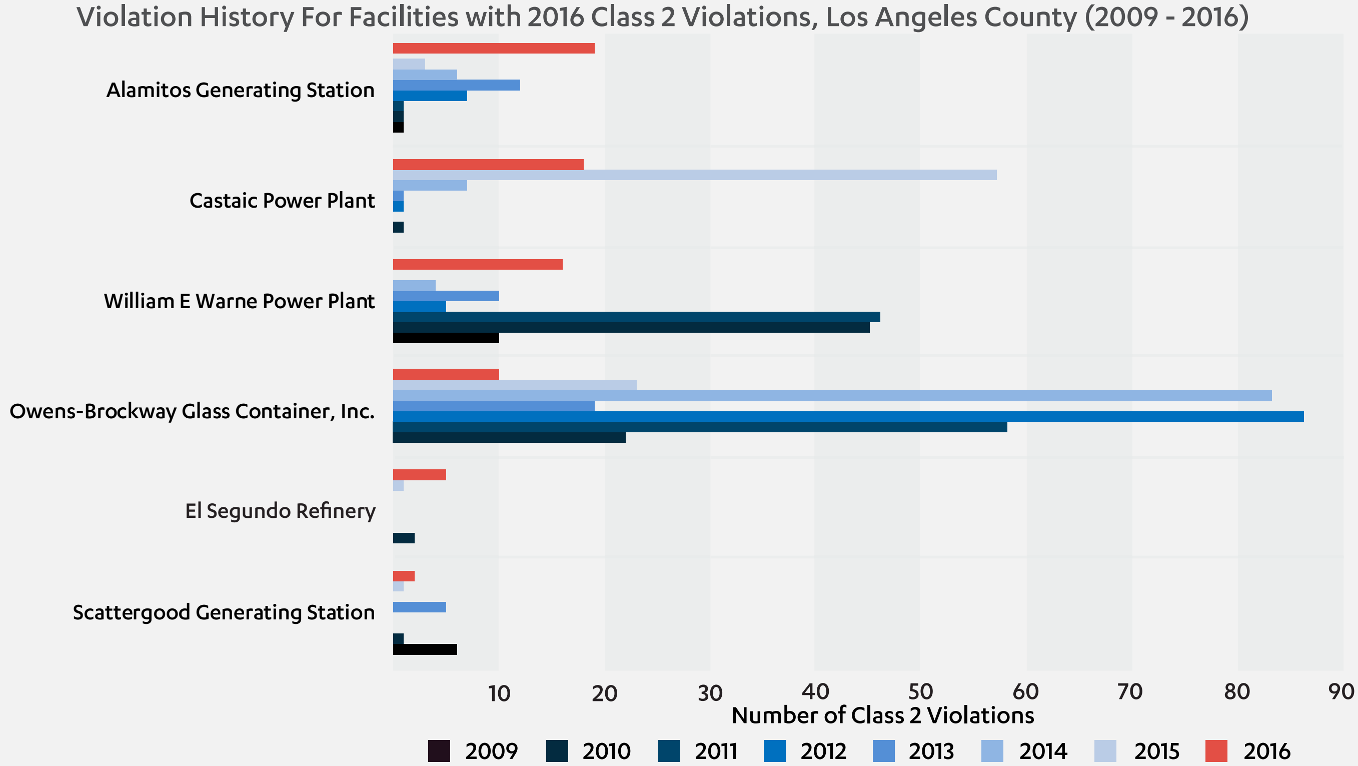
Data

NPDES compliance data were generated using the California Integrated Water Quality System (CIWQS) database interactive violation reports tool.[141] We focused on the most significant violations for large industrial facilities: Class 1 and Class 2 Violations, defined as follows:[142]

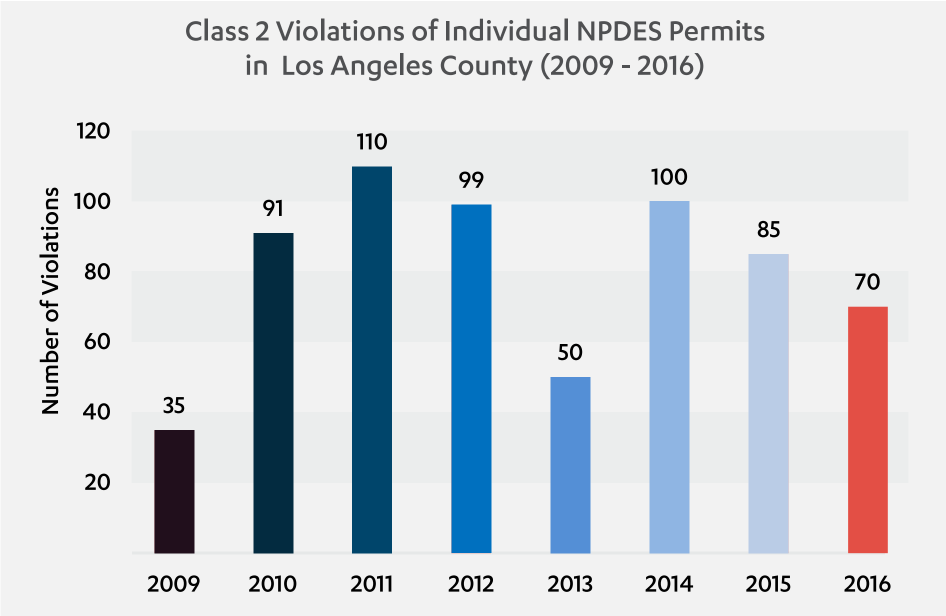
- Class 1 violations pose an immediate and substantial threat to water quality and have the potential to cause significant detrimental impacts to human health or the environment. Violations involving recalcitrant parties who deliberately avoid compliance are also considered Class 1.
- Class 2 violations pose a moderate, indirect, or cumulative threat to water quality and, therefore, have the potential to cause detrimental impacts on human health and the environment. Negligent or inadvertent non-compliance with the potential to cause or allow the continuation of unauthorized discharge or obscuring past violations are also Class 2 violations.

We looked at Class 1 and Class 2 violations for the most recent complete year of data, 2016, as well as for the previous seven years (2009-2015). Violation numbers are per CIWQS reports downloaded in the Fall of 2017. Note that the database is continuously updated, and therefore this number may be less than the actual values. We also looked at the facilities with Class 1 or 2 violations in 2016, and detailed their violation history for previous years.

Violation History For Facilities with 2016 Class 2 Violations, Los Angeles County (2009 - 2016)



INDUSTRIAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM VIOLATIONS



Findings

- There were no Class 1 violations for 2016, nor have there been any since 2009.
- There were 70 Class 2 violations in 2016 across 6 facilities.
- More than half of the 2016 violations were from two facilities: Alamitos Generating Station and Castaic Power Plant. According to personal communication in May 2018 with Regional Board staff, the Alamitos Generating Plant had an additional 4 violations in 2017-18, and the Castaic Power Plant had no violations during that time.
- Owens-Brockway Glass Container, Inc., in Vernon, is the largest repeat offender, with over 300 Class 2 Violations from 2009-2016.
- Since 2009, the annual number of Class 2 violations ranged from a low of 35 to a high of 110. There is no clear trend over the period of review.

Data Limitations

- Violation numbers are per CIWQS reports downloaded in the Fall of 2017; however, since that time, violations listed as unclassified may have been subsequently classified as Class 2 by Regional Board staff.
- Many or all violations may have been addressed by Regional Board enforcement actions; however, it was not possible to readily understand enforcement status through the CIWQS database and therefore we did not include an evaluation of enforcement actions within the scope of this report.
- While violations are relatively easy to quantify for large facilities with individual NPDES permits, there are thousands of small industrial facilities, covered under the Industrial General Permit, whose compliance status is much harder to determine. We were unable to include compliance information for these small facilities within this report.

INDICATOR • PUBLICLY OWNED TREATMENT WORKS MASS DISCHARGES



Introduction

The major categories of dischargers are wastewater treatment plants, known as publicly owned treatment works (POTWs), and large industrial facilities, both of which are regulated under the Clean Water Act through individual NPDES Permits. These facilities are required to conduct self-monitoring and report results to the Regional Water Board. Some NPDES permit limits reflect Total Maximum Daily Loads (TMDLs) that were developed for impaired water bodies to which these facilities discharge.

Data

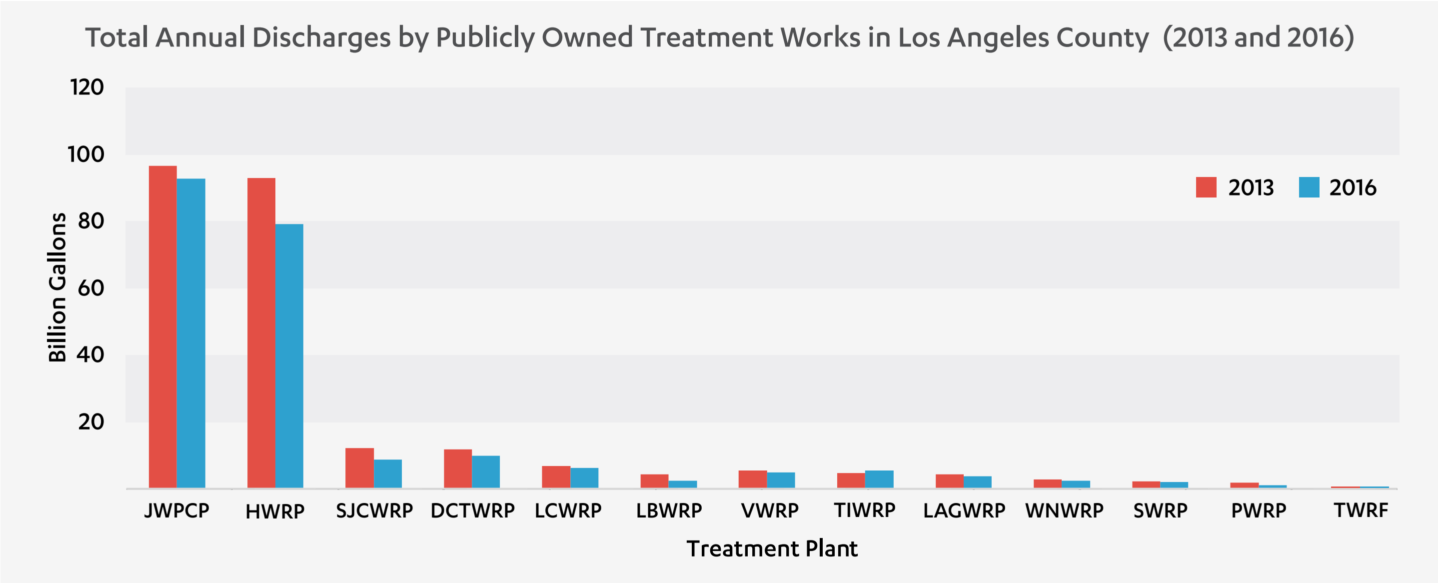
We used data from the 2016 annual reports for 13 of the largest wastewater treatment plants (eight operated by the L.A. County Sanitation Districts, four operated by the City of L.A., and one operated by the Las Virgenes Municipal Water District), to calculate total mass discharges of the following pollutants:

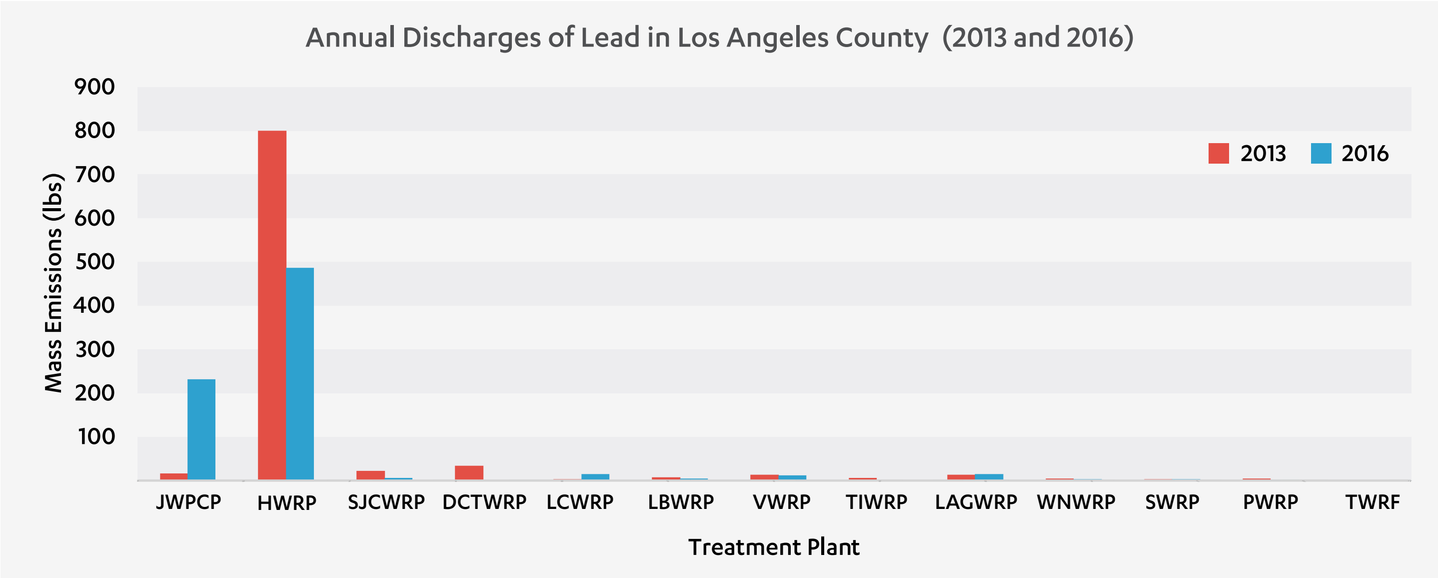
Lead, Arsenic, Copper, Zinc, Nickel, Mercury, Ammonia, and Nitrate + Nitrite Nitrogen. Data for L.A. County Sanitation Districts facilities were obtained from Annual Reports available through CIWQS.[143] Data for L.A. City Sanitation District facilities were not readily available on the CIWQS website. L.A. City Sanitation data were obtained through special requests from direct contacts through the L.A. City Sanitation website.

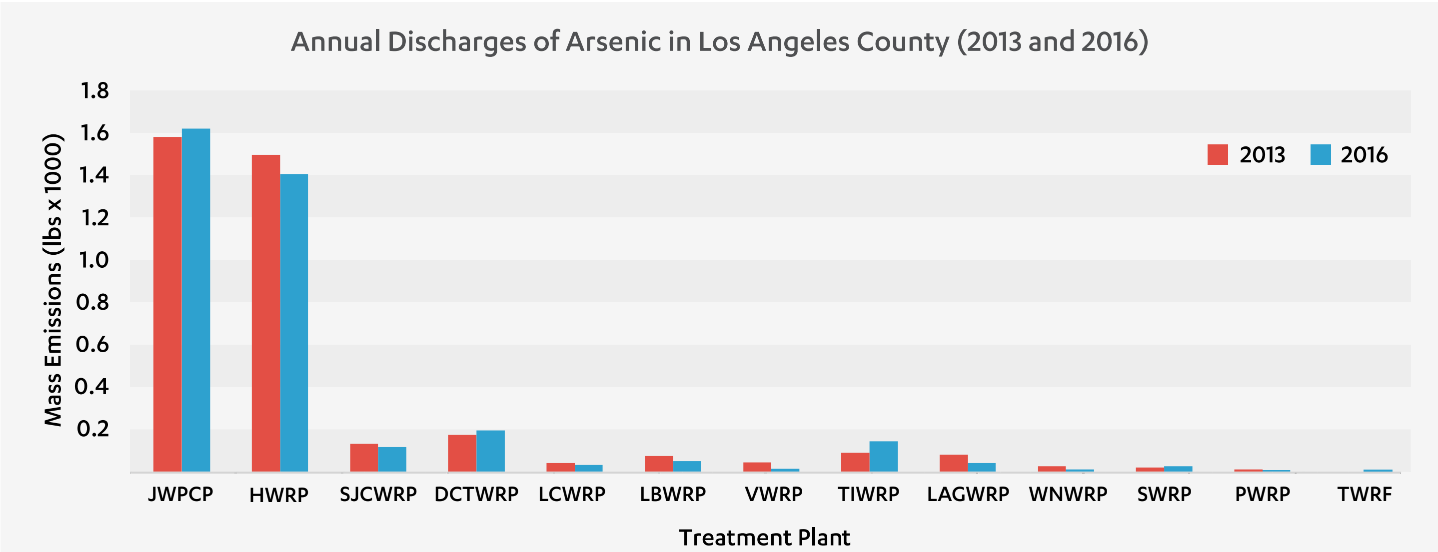
Publicly Owned Treatment Works and Receiving Waters (2016)

Treatment Facility	Receiving Water
Joint Water Pollution Control Plant (JWPCP)	Pacific Ocean
Hyperion Water Reclamation Plant (HWRP)	Pacific Ocean
San Jose Creek Water Reclamation Plant (SJCWRP)	San Gabriel River
Donald C. Tillman Water Reclamation Plant (DCTWRP)	Los Angeles River
Los Coyotes Water Reclamation Plant (LCWRP)	San Gabriel River
Long Beach Water Reclamation Plant (LBWRP)	Coyote Creek
Valencia Water Reclamation Plant (VWRP)	Santa Clara River
Terminal Island Water Reclamation Plant (TIWRP)	Los Angeles River
Los Angeles-Glendale Water Reclamation Plant (LAGWRP)	Los Angeles River
Whittier Narrows Water Reclamation Plant (WNWRP)	San Gabriel River
Saugus Water Reclamation Plant (SWRP)	Santa Clara River
Pomona Water Reclamation Plant (PWRP)	San Jose Creek
Tapia Water Reclamation Facility (TWRF)	Malibu Creek

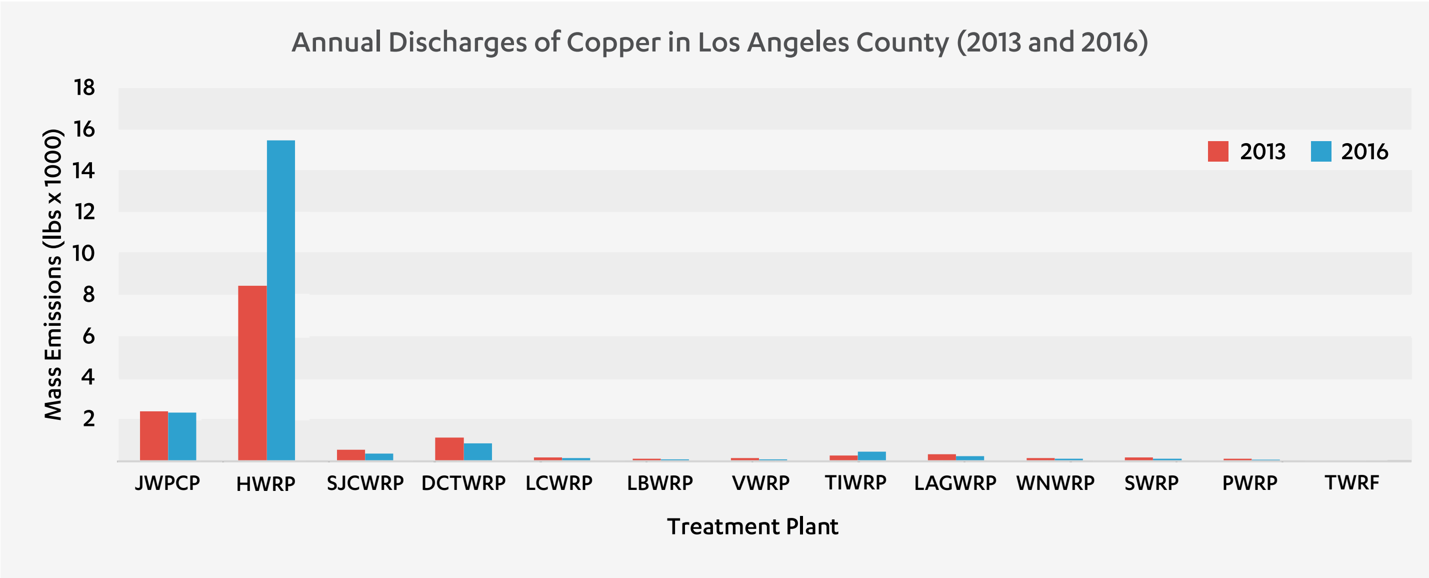
PUBLICLY OWNED TREATMENT WORKS MASS DISCHARGES

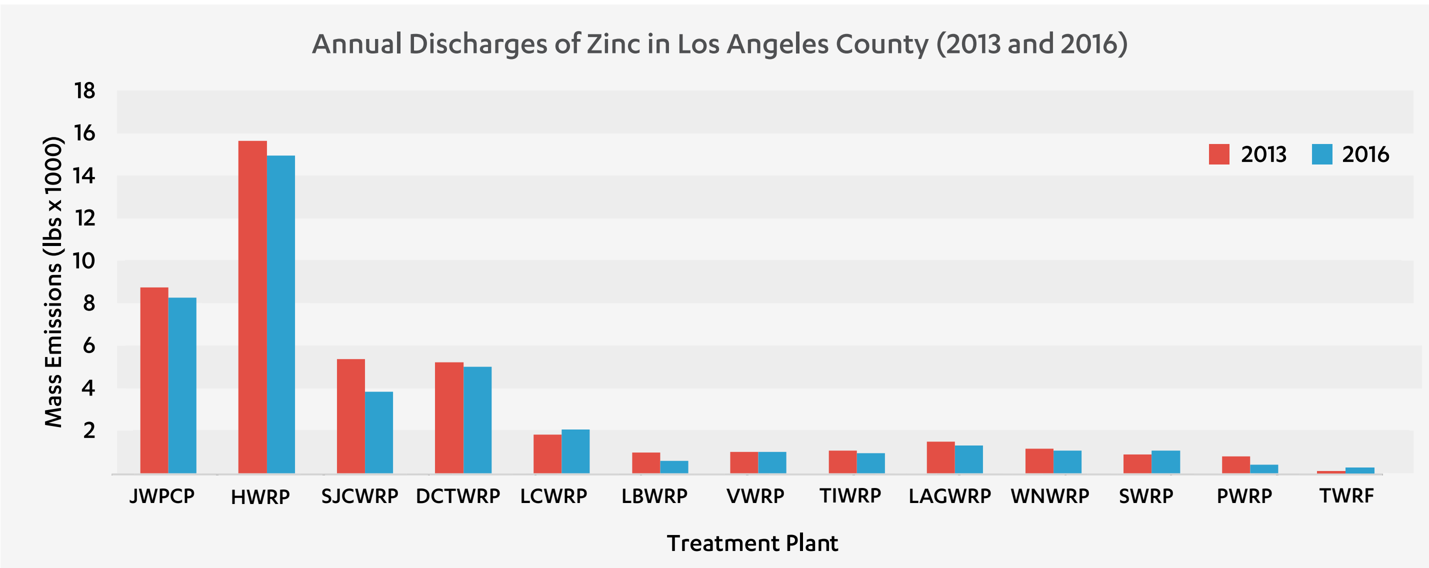


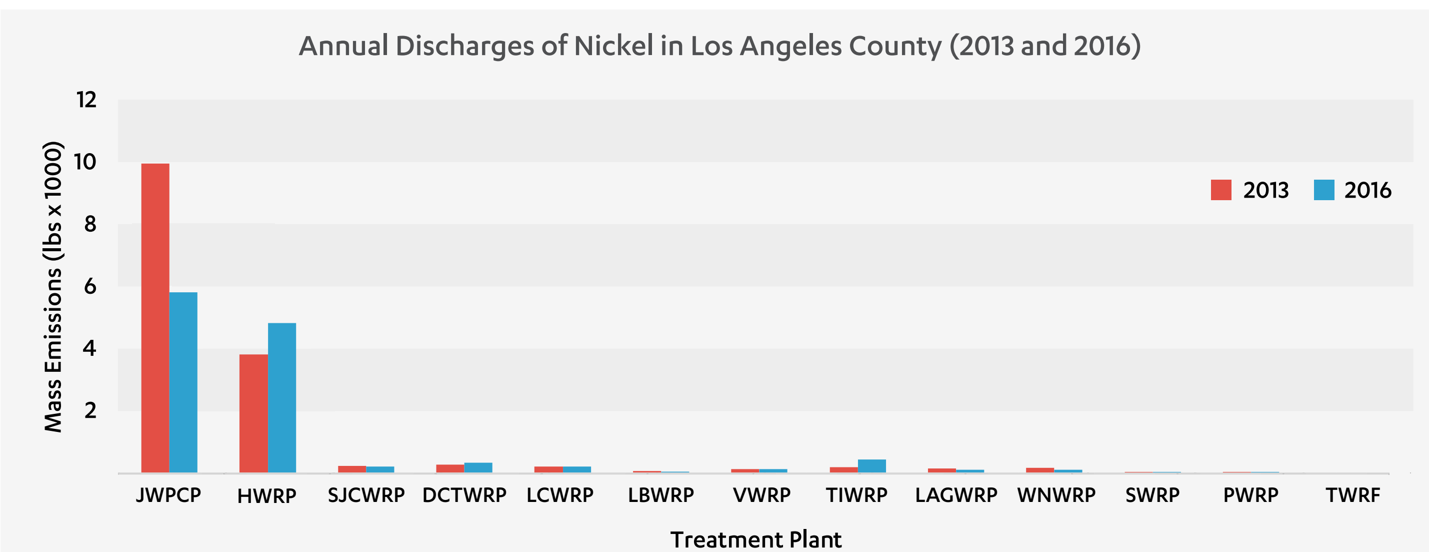




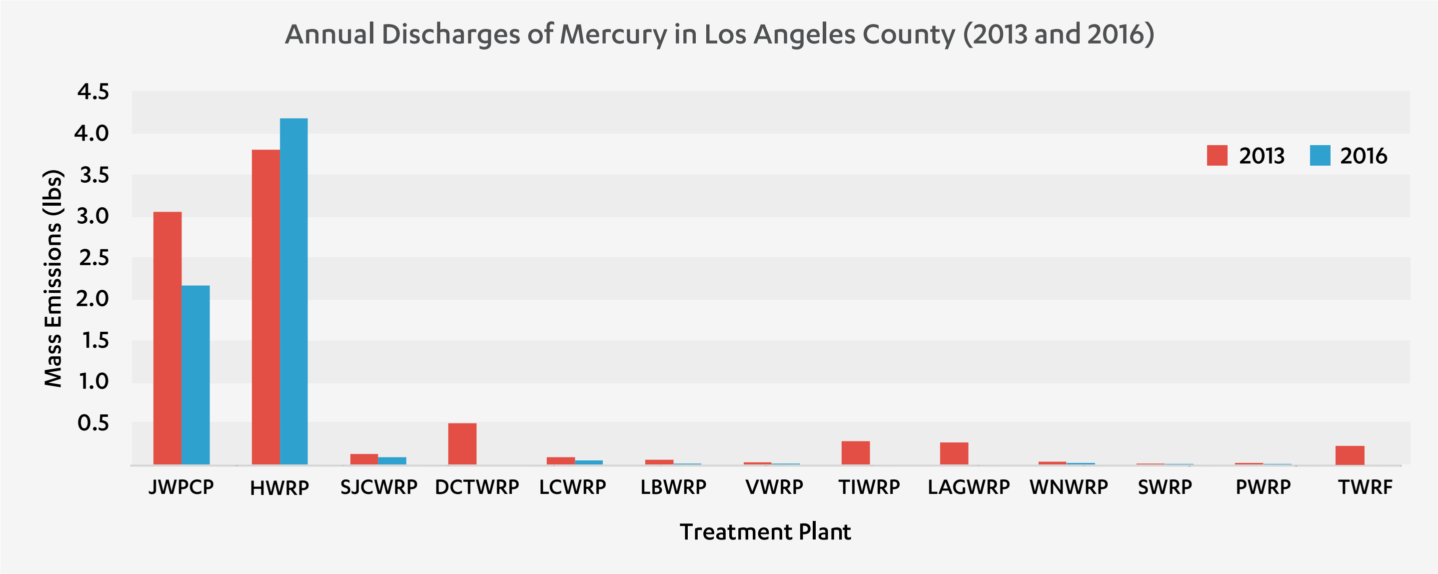
PUBLICLY OWNED TREATMENT WORKS MASS DISCHARGES

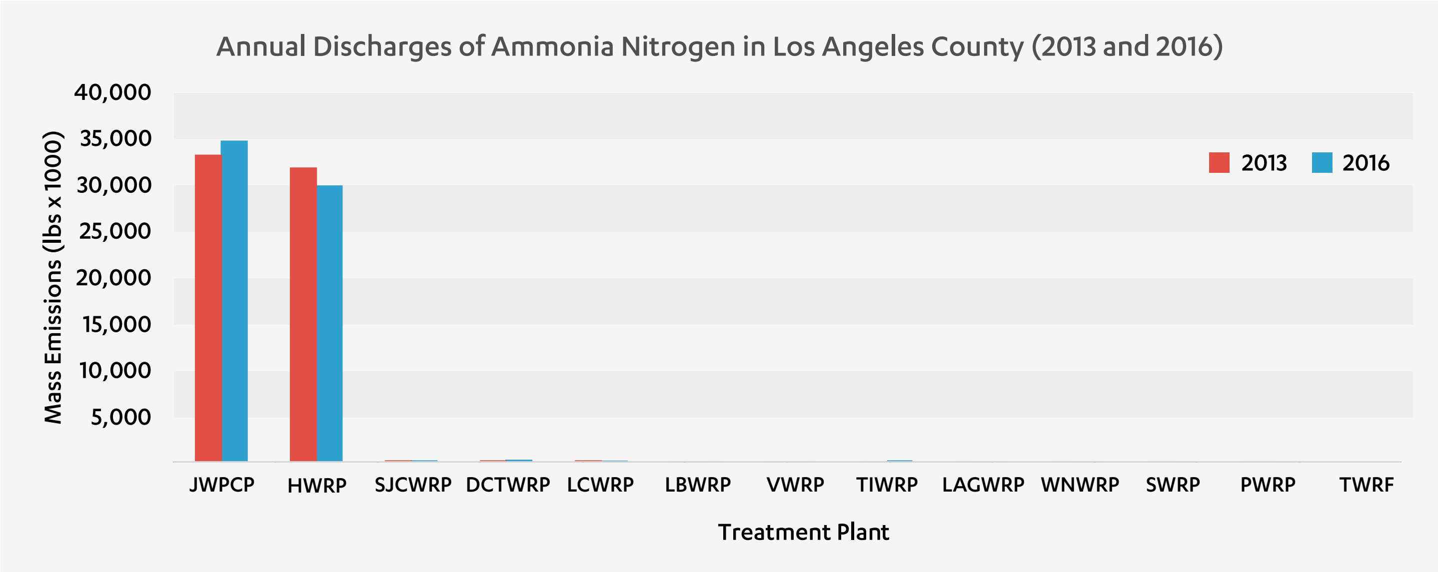


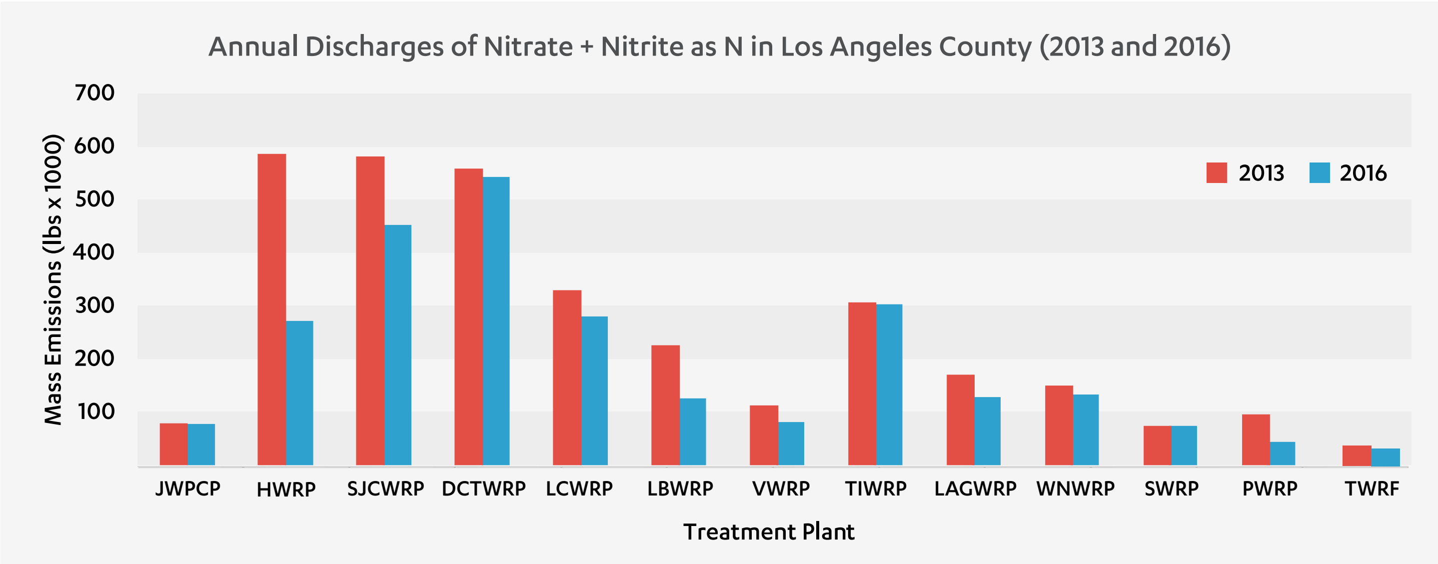




PUBLICLY OWNED TREATMENT WORKS MASS DISCHARGES







PUBLICLY OWNED TREATMENT WORKS MASS DISCHARGES

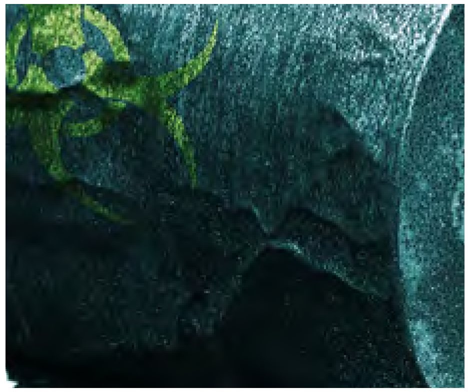
Findings

- All but two of the treatment plants had lower annual discharge volumes in 2016 compared to 2013. These reductions were likely due to increased water conservation efforts during the drought.
- Overall discharge volumes from all 13 facilities evaluated were just over 216 billion gallons in 2016, compared to just under 244 billion gallons in 2013, an 11% decrease.
- Total lead mass discharges decreased from just over 930 pounds in 2013 to about 780 pounds in 2016. This is approximately a 16% decrease. Specifically, lead mass discharges from JWPCP increased by a factor of 14 over the three-year period assessed, despite its overall discharge volume decreasing by 3.9%
- Overall, arsenic mass discharges decreased by 2.6%.
- Total copper mass discharges increased by approximately 47%. L.A.'s Hyperion Treatment Plant had an 83% increase.
- Annual discharges of Nitrate + Nitrite as Nitrogen decreased by about 23% from 2013 to 2016.
- Despite the 11% reduction in sewage volumes, ammonia annual discharges remained relatively constant from 2013 to 2016, thereby indicating that ammonia concentrations generally increased in sewage discharges.

Data Limitations

- Lack of uniformity between certain facility data reports made it challenging to compare discharges between 2013 and 2016.
- In 2013 and 2016, measurements of Nitrate + Nitrite as Nitrogen were only taken four months of the year at Hyperion Treatment Plant.
- Feedback from some facilities suggests that due to sampling frequencies, some average concentration values overestimate mass discharges for some constituents and may be the reason for year-to-year changes in pollutant mass discharges.

INDICATOR • HAZARDOUS MATERIALS SPILLS DISCHARGED INTO WATER



Introduction

Pollutants can reach surface waterbodies through a number of pathways. In addition to ongoing discharges from wastewater treatment plants and industrial facilities, and wet season stormwater flows, waterbodies may be periodically impacted by accidental releases of hazardous materials from stationary or mobile sources. Under the federal Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA), all releases of hazardous materials exceeding reportable quantities must be reported to the National Response Center (EPA). Additionally, in California, any significant release or threatened release of a hazardous material requires immediate reporting by the responsible party to the California Office of Emergency Services, among other agencies.

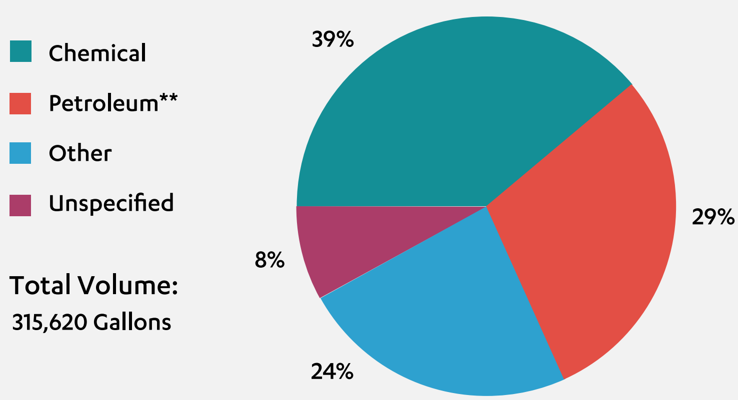
Data

We obtained information from the California Governor's Office of Emergency Services (Cal OES) on reported hazardous material spills in L.A. County from 2012-2016.[144] The Cal OES database classifies spills into 5 major categories:

1. Chemicals - such as coolants or solvents;
2. Petroleum;
3. Sewage;
4. Other - such as cooking oil; and
5. Unspecified – such as soot or paint residue.

Additional data fields included spill date, substance spilled, quantity, and whether the spill reached water, among others. We excluded sewage spills from this analysis since they are addressed in another category/ indicator.

Reported Hazardous Materials Spills* to Water by Volume in Los Angeles County (2016)

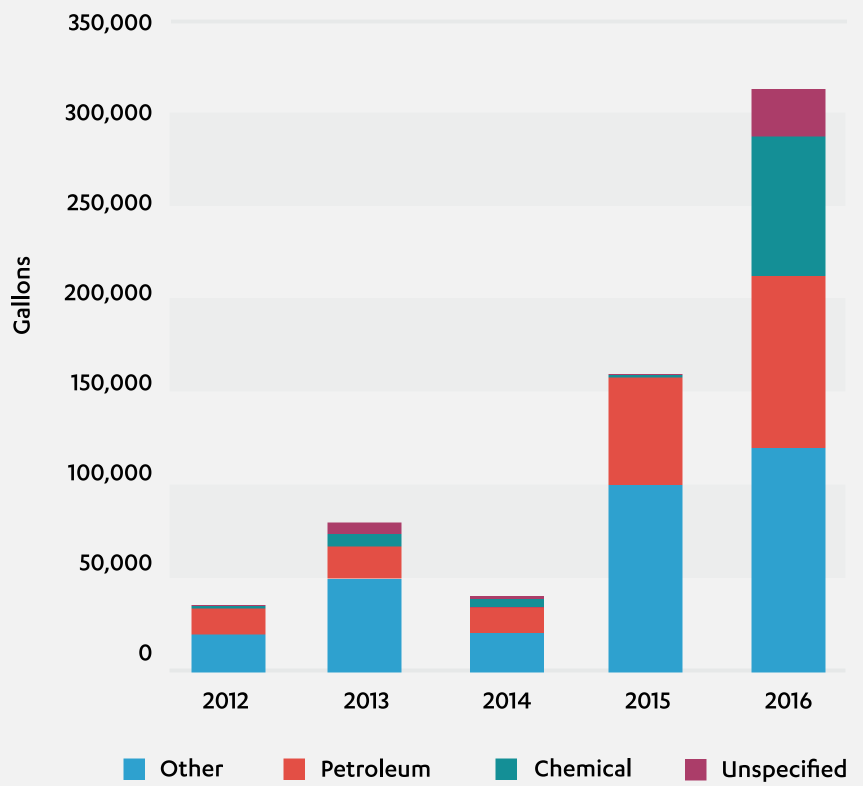


*Excluding sewage spills

**In addition to the volume listed, a total of over 100 square miles of sheen was reported.

HAZARDOUS MATERIALS SPILLS DISCHARGED INTO WATER

Total Volume of Reported Hazardous Materials Spills to Water in Los Angeles County (2012 - 2016)



Note: Does not include the million+ gallon spills of drinking water and secondary treated wastewater in 2014 and 2015.

Findings

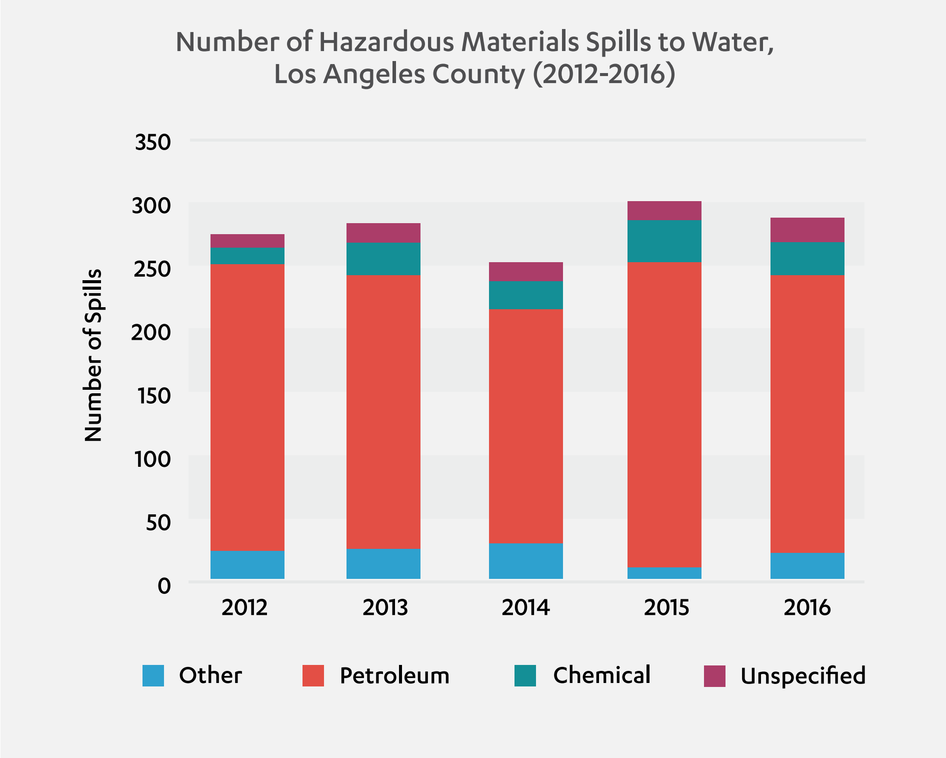
- A total of 286 spills of non-sewage hazardous materials to water occurred in 2016; the total volume spilled was 315,620 gallons. A majority of the spills were petroleum spills (216), while chemical spills accounted for the largest percent volume (39%).
- The total number of spills each year between 2012 – 2016 varied from a low of 350 (in 2014) to a high of 457 (in 2013). The number of spills in 2016 was nearly equal to the average value for the time period. There was no clear trend in number of spills over time.
- The total volume of spills was lowest in 2012 (~226,000 gallons), and the volume spilled in 2016 (315,620 gallons) was greater than the volume spilled over the previous three years combined.
- In both 2014 and 2015 there were single incidents of extremely large spills reported in the Cal OES database: 20 million gallons of drinking water and approximately 10-100 million gallons of secondary treated wastewater, respectively. Given the nature (clean or relatively clean water) and size of these spills, we chose not to include them in the figures for clarity, and to keep the focus on hazardous substances.

Hazardous Materials Spills to Water by Type (2016)

Category	Volume (gal)	Total # of spills
Chemical	121,704	26
Petroleum*	93,193	216
Other	75,024	25
Unspecified	25,700	19
Total	315,620	286

*In addition to the volume listed, a total of over 100 square miles of sheen was reported.

HAZARDOUS MATERIALS SPILLS DISCHARGED INTO WATER



Data Limitations

- The Cal OES database contains many erroneous entries and preliminary information that have yet to be updated/ verified. For example, nearly two dozen quantities of petroleum spills were entered as UNKNOWN or in date format (for example, shown as "20-Feb" instead of a volume value).
- A number of spills of petroleum and sewage were reported as rates in gallons/min, with no indication of the duration of the spill. These events represent potentially very large spills that we were unable to include in our overall summary statistics.
- A large number of petroleum spills were reported as "sheen" in units of area. We were unable to include volumes for these spills because we had no basis for calculation.
- As part of a check on the Cal OES database completeness, we looked for known spills to see how they were reported. We found the Santa Barbara Refugio Oil Spill of May 19, 2015 listed as a ¼ mile sheen. This spill was reported in the L.A. Times as having resulted in a discharge of at least 100,000 gallons of oil.[145] This significant discrepancy, coupled with other issues listed above, shows that the database was not being updated with new/ final spill information after the initial entry was made, and therefore it fails to support assessment efforts that are critical to accountability and improvement.

grade **B-**

for industrial & sewage treatment plant discharges

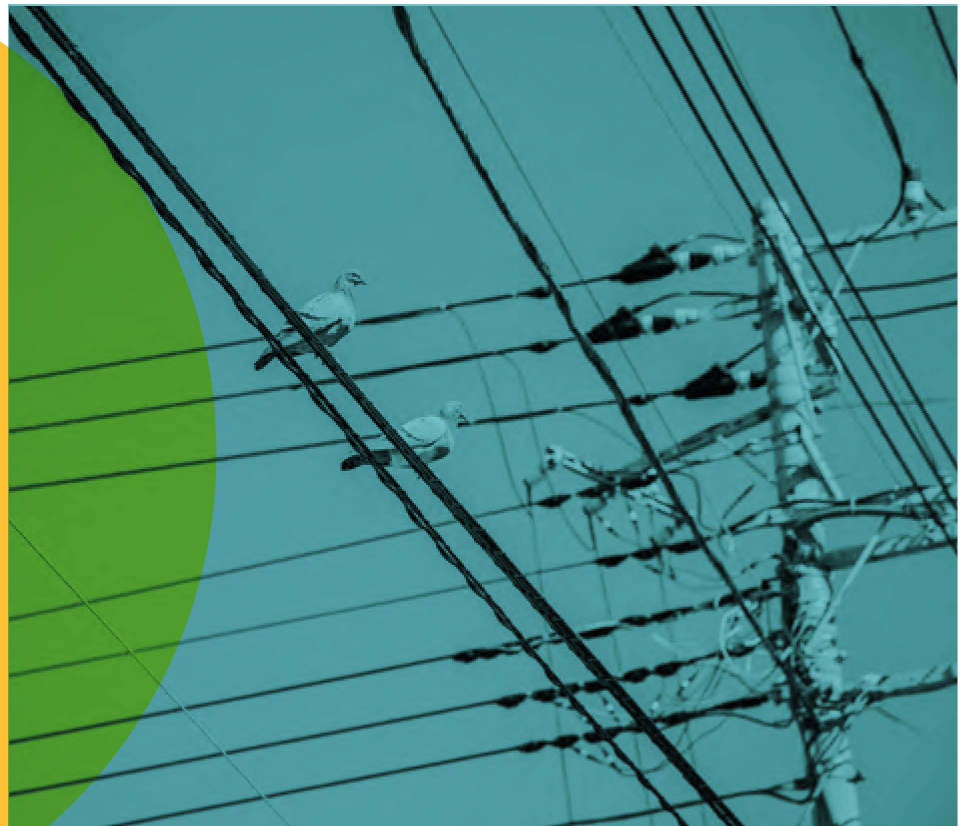
The pollutant loads from sewage treatment plants have decreased or remained constant over the last few years after decades of major pollutant load reductions. And although the number of sewage spills has markedly declined over the years, it has remained relatively constant over the last few years. Unfortunately, there are still hundreds of petroleum spills annually; and chemical spills, although less frequent, are still a major concern. There were no Class 1 violations by large industrial dischargers from 2009-2016, but also no evidence of a decreasing trend in the number of Class 2 violations. We were not able to look at violations of stormwater permits by industry or construction sites, but NRDC's "Omission Accomplished" report released in April 2019 documents the lack of municipal stormwater enforcement in the L.A. Region.[146] Improvements in these indicators have stagnated over the review period, and the database of hazardous materials spills is insufficient to support accountability and trend assessment.

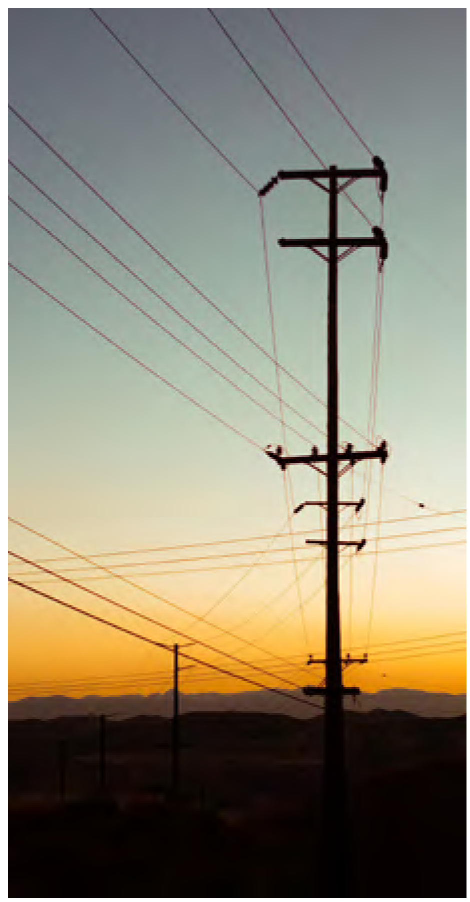
7

WATER-ENERGY NEXUS

Overview

Since climate change is the planet's most critical environmental issue, there is increasing focus to reduce greenhouse gas emissions (GHGs) and energy use in all sectors, including water supply. According to the California Department of Water Resources, approximately 12% of the state's energy use goes to water related uses including pumping, conveyance, treatment, and heating/ cooling of water.[147] In particular, the energy demand is extremely high to pump water from the Bay-Delta to the State Water Project and over the Tehachapi Mountains to L.A. It also takes a great deal of energy to pump water from the Colorado River up to L.A. All of the energy needed to pump imported water over 200 miles to the L.A. region results in high greenhouse gas emissions. However, there is one trend going in the right direction to reduce the impacts of our water supply on climate: a shift from fossil fuel energy generation to GHG emission-free renewables. Also, as we increase reliance on local water supplies – a lower energy alternative to imported and purchased water from the Metropolitan Water District, GHG emissions will decrease. Of course, energy is also involved in local water and wastewater treatment – more or less depending on the process used and level of treatment on the source water.





INDICATOR • ENERGY AND GREENHOUSE GAS EMISSIONS OF WATER SUPPLY

Introduction

Both water and energy are fundamental drivers of urban development. Understanding the energy-water nexus is a complex but essential component of sustainability planning. Several recent studies by the California Public Utilities Commission have attempted to characterize the interdependencies of these two infrastructure systems within the state.[148,149,150]

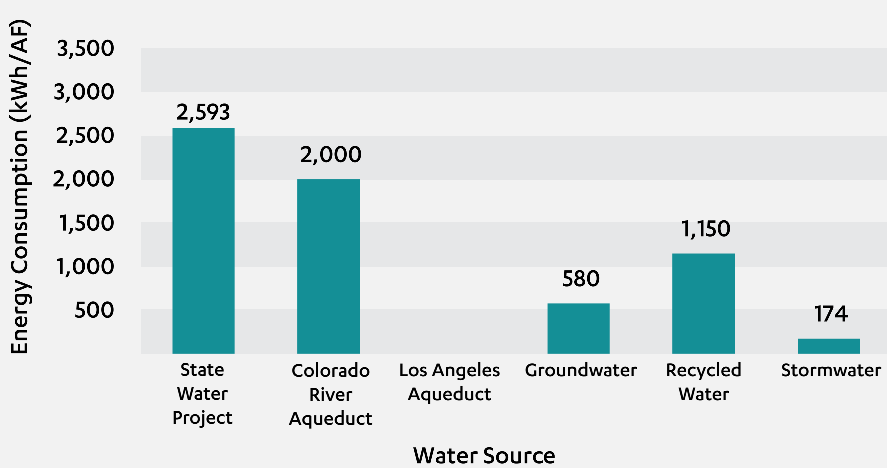
Historic policy and planning decisions around L.A. water supply have resulted in an energy-intensive system in which water is imported from great distances. L.A. water is imported via three main routes:

1. The State Water Project (SWP) is over 600 miles long and moves water from northern California through the Sacramento-San Joaquin Delta and over the Tehachapi mountains (a nearly 2,000 ft elevation change) to Southern California.[151,152]
2. The Colorado River Aqueduct (CRA) extends 240 miles starting from the California- Arizona border, and lifts water 1,600 ft to travel over desert mountain ranges.[153]
3. The Los Angeles Aqueduct (LAA) is about 400 miles long and brings water from Owens Lake, located northeast of L.A. County; it is completely gravity-powered.[154]

There is a growing understanding of the need to reduce reliance on imports by improving water conservation efforts and increasing the use of local supplies (local groundwater and surface water reservoirs, captured stormwater, and recycled wastewater). This transition has important implications for energy conservation and GHG reduction.

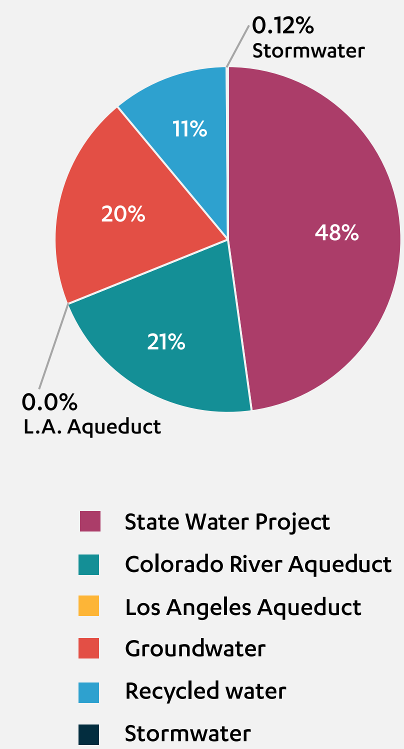
In this indicator, we sought to quantify the GHG emissions associated with L.A. County's water use from 2010-2016 by looking at the energy required for pumping and conveyance. This does not include the energy used for water treatment, which is discussed in a related highlight.

Energy Intensity for Los Angeles County Water Supply (2016)



State Water Project Energy Intensity here refers to Net Energy Intensity, which takes into account hydroelectricity generated during the conveyance process. GHG intensity for the SWP accounts for this electricity generation, therefore GHG emissions are calculated using gross energy intensity to avoid double counting of the electricity generation.

Breakdown of GHG Emissions for Los Angeles County Water Supply (2016)



ENERGY AND GREENHOUSE GAS EMISSIONS OF WATER SUPPLY

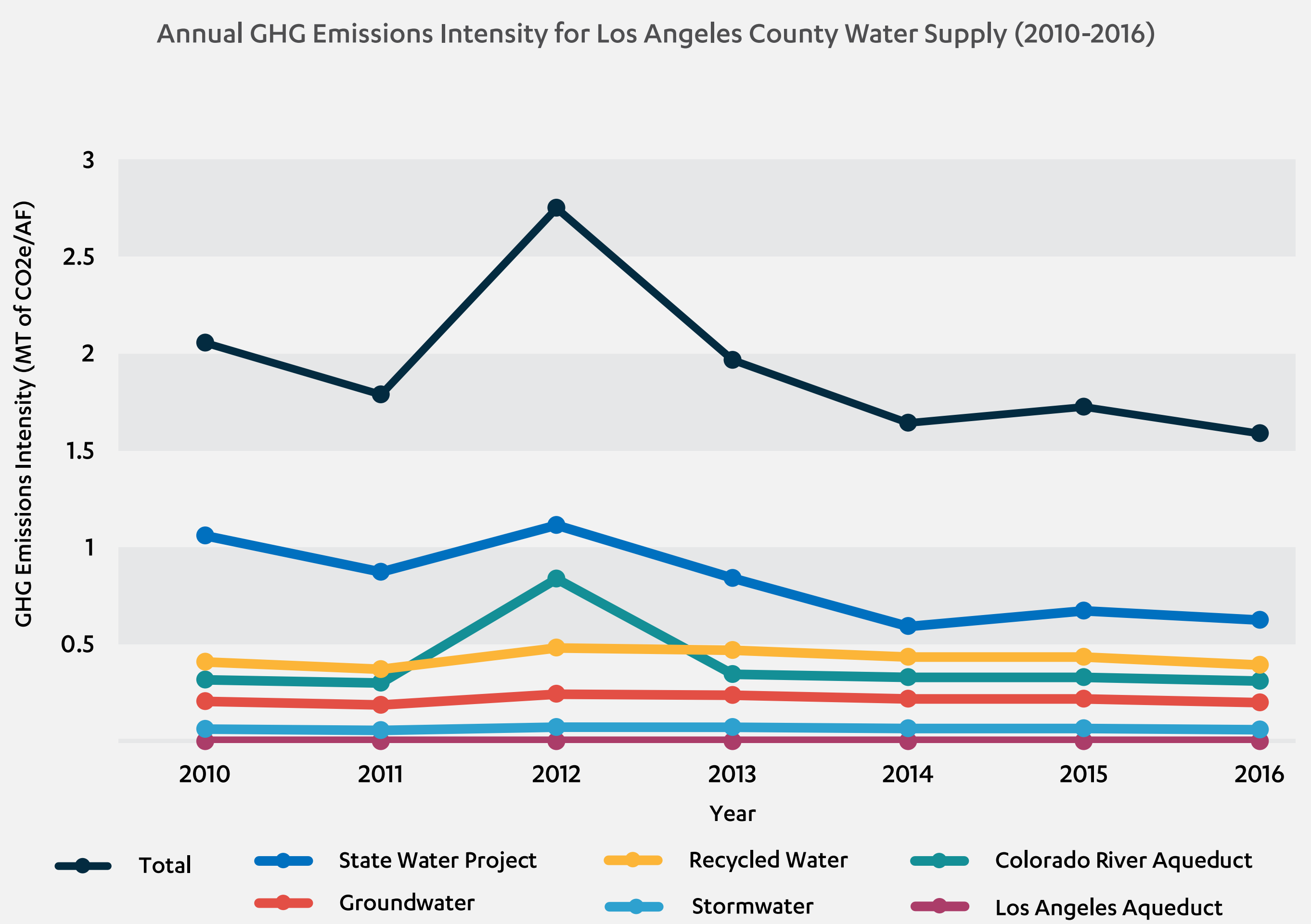
Data

Annual supply volumes for each water source were obtained through a data request to the Metropolitan Water District of Southern California (see information in the Water Supply indicator). GHG intensity (CO2e/MWh) of the State Water Project over the past 5 years was obtained from the Department of Water Resources. GHG intensity for all other water sources was calculated using power mixes in SCE's Annual Power Portfolio, which provides annual updates on SCE's energy sources. Emission factors for the different energy sources were obtained from The Climate Registry (TCR), with the exception of nuclear energy values and wind energy values, which came from an industry association report and a peer reviewed journal article, respectively.[155,156] Global warming potential (GWP) values (as CO2e) for methane (CH4) and nitrous oxide (N2O) were obtained from the Intergovernmental Panel on Climate Change.[157] To compare all GHG emissions on the same scale, the total metric tons (MT) of CH4 emissions and N2O emissions were multiplied by their respective GWP. The Electric Power Sector Protocol provided by TCR was used in the presented analysis since it provided the capacity to associate GHG emissions rates with specific power sources, and thus to address GHG emission changes that result from portfolio shifts.

There are three main factors involved in this indicator: 1) Energy intensity (kWh/AF); 2) Acre-feet supplied in any given year (see Water Supply indicator); and 3) GHG emissions intensity (MT of CO2e/AF).

Findings

- Each water supply source has an inherent energy consumption per volume that accompanies the process of conveyance. This energy intensity (kilowatt hours per acre-foot [kWh/AF]) is constant from year-to-year. However, greenhouse gas emissions will vary annually based on changes in the power portfolio and water supply volumes.
- The SWP is the most energy-intensive water source, consuming over 2,500 kWh/AF, even when accounting for hydroelectricity



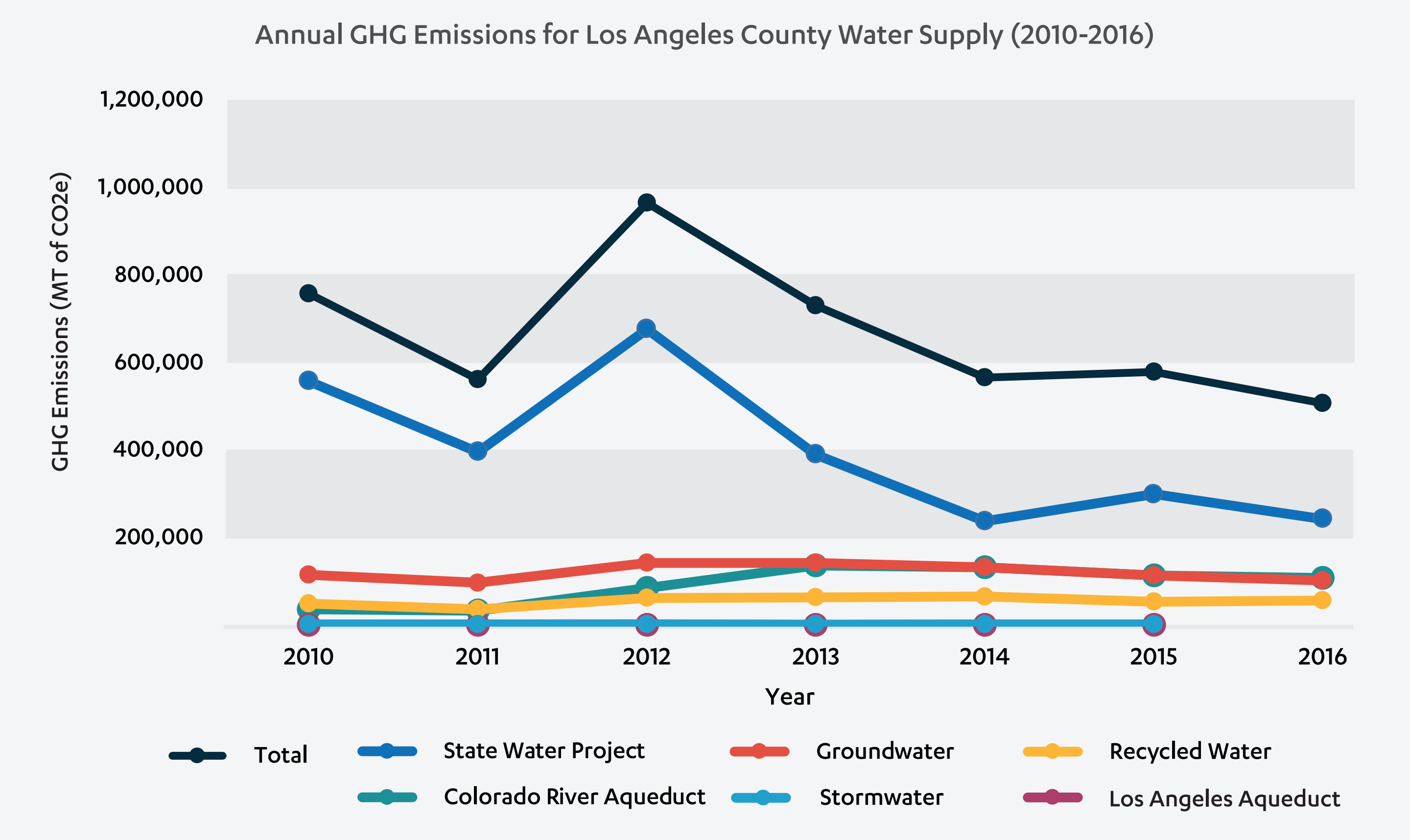
ENERGY AND GREENHOUSE GAS EMISSIONS OF WATER SUPPLY

generated by the SWP. The CRA has the second-highest energy requirement. The LAA does not require any energy for pumping or conveyance since it is entirely gravity-powered.

- Recycled water represents almost a halving of energy intensity compared to the CRA, and less than one-third of the SWP, while stormwater has an intensity of about 15% of recycled water.
- In 2016, the SWP's GHG emissions comprised close to half of the total GHG emissions of L.A. County's water supply and provided 26% of the total water supply. Groundwater and the CRA, with supply volumes of about 512,000 AF and 344,000 AF respectively, each comprised approximately 20% of the total GHG emissions.
- Although recycled water requires a significant amount of energy, it did not contribute significantly to GHG emissions of the water supply in 2016 due to low supply volumes. Recycled water represented 11% of the total GHG emissions. Stormwater also represented a minimal impact on total GHG emissions (0.1%).
- Overall, L.A. County decreased its water supply-related GHG emissions by 33% between 2010-2016, due primarily to a shift away from the use of coal for energy generation.
- There was an increase in total GHG emissions from 2014 to 2015, and then a decrease in 2016. This reflects a larger proportion of supply from the energy-intensive SWP in 2015 than in 2014 and a larger share from the gravity-fed LAA in 2016.
- One would expect L.A. County's GHG emissions intensity and GHG emissions to decline from 2017 to the present because of the high rainfall and snowpack experienced in the Sierra in 2017 and 2019. Furthermore, the city of L.A. maximized use of the gravity powered LAA during that time period, which will likely contribute to the expected overall reductions.

Data Limitations

- Local surface water in the MWD supply was assumed to be stormwater and is referred to as such.
- Unspecified power in the SCE Power Portfolio (varying from 5-12%) was assumed to be natural gas.
- 'Biomass & Waste' as an energy type is extremely broad and there is lack of information for a specific emissions factor for this energy type. This unreliability led us to use the emission factor for nuclear energy for biomass because nuclear energy has the closest GHG emissions rate to biomass among the energy types that we considered.[158]
- A separate emission factor for small hydroelectric plants was not available, therefore all hydroelectric power was assumed to have the same GHG emissions factor.
- Energy required to recycle water is highly dependent on the treatment technology, and numbers used here are just one example of a variety of possibilities.
- We used GHG emissions already calculated by DWR for the SWP.
- Energy Intensity for the State Water Project refers to net energy intensity. See footnote below 'Energy Intensity of L.A. County Water Supply'.



HIGHLIGHTS

Energy Used in Water and Wastewater Treatment

The energy needed for water/ wastewater treatment varies widely depending on the quality of the source water, the intended end-use, and the specific treatment technologies employed.

Typical energy requirements for conventional drinking water treatment using UV or chlorine disinfection are lower compared to ozone disinfection, but actual values can vary based on the strength of the treatment required for the source water.

For wastewater treatment, the largest energy expenditure comes from the aeration stage of secondary treatment. However, energy expenditures during wastewater treatment may be offset by the generation of energy through biogas produced during the breakdown of organic matter in anaerobic digesters. Further treatment of wastewater for reuse can be achieved using reverse osmosis (RO) or membrane bioreactors; both methods are energy intensive but can produce extremely high quality, potable water. RO is the preferred technology used in desalination and recycled water plants today; note that recycling water using RO requires less than a third of the energy needed for desalination.

Energy Used in Water and Wastewater Treatment Processes (2013)

Process	Typical Energy Use (kWh/AF)
Drinking water treatment	
Onsite chlorine generation for disinfection	28
Ozone disinfection	46
UV disinfection	20
Wastewater treatment	
Primary treatment	178
Secondary treatment	
Aeration without nitrification	858
Aeration with nitrification	976
UV disinfection	73
Advanced treatment	
Membrane bioreactors	2,700
Reverse osmosis	1,274
Desalination	3,909

Source: *Electricity Use and Management in the Municipal Water Supply and Wastewater Industries*, Water Research Foundation, and Electric Power Research Institute, 2013.

Water Use Associated with Energy Production

A discussion of the water-energy nexus is not complete without looking at water use in energy infrastructure. The main aspects of water use in the energy sector are the quantities of water consumed, the impacts to water quality, and the effects on aquatic ecosystems.

With the exception of hydropower, in which water is stored in reservoirs for electricity generation, water is used for two primary purposes during energy production –for cooling/ operational maintenance and for fuel extraction.[159] Furthermore, there are two ways in which the water is 'used' – withdrawal and consumption. The former refers to water that has been removed from the system but could be either returned or used elsewhere, while the latter refers to water lost from the system.[160,161] Therefore, the amount of water actually consumed varies both with the type of energy and in the case of cooling, the type of system., For cooling purposes, a typical combined-cycle natural gas turbine using a once-through cooling system withdraws between 104-105 L/MWh and consumes in the range of 102-103 L/MWh. Among renewable energy technologies, wind does not require any water for cooling purposes; solar photovoltaic uses water in the range of 5-102 L/MWh (includes water for cleaning); and concentrated solar power uses between 102-103 L/MWh.

In terms of fuel extraction, the main water needs come from coal production, conventional oil production, unconventional oil and gas production, and biofuel production. Coal and conventional oil production have a withdrawal and consumption between 103-104 L/ton. Water needs for biofuels range from 103 to over 106 L/ton depending on the source of fuel (e.g., corn, soybean). Unconventional oil and gas production refers to hydraulic fracturing; in the United States, this production method used nearly 250 billion gallons of water between 2005 and 2014.[162] While this is only 1% of total annual industrial use in the U.S., the need for large amounts of water can prove to be a major problem in water-stressed regions where there are competing uses.[163]

Effects on ecosystems and water quality are also an important area of concern.[164] For coastal once-through cooling power plants, cooling water withdrawals from the ocean pass through a primary screening process, during which aquatic organisms can be harmed through impingement (when organisms are trapped against the screen due to the force of the water) and entrainment (when small fish, eggs and larvae are pulled into the cooling system).[165] At the end of the cooling process, water is released back into the ocean at a higher temperature, which can be up to 18°F higher in summer months.[166] Excessive thermal pollution is a threat to marine species in the area of release. In California, recent policy changes are leading to the elimination of most of the once-through cooling systems due to these ecosystem impacts. For example, all coastal power plants in the L.A.[167] region will eliminate once-through cooling by or before 2029. Furthermore, hydropower has impacts on land use, wildlife, and river flows.[168]

In terms of water quality, there are major concerns with water contamination generated by hydraulic fracturing (aka, fracking). Fracking fluids are a combination of water and a complex mixture of chemical compounds.[169] Wastewater resulting from fracking operations is often disposed of in aboveground pits or underground injection wells, and represent a contamination threat to freshwater aquifers.[170] A recent study estimated flowback and produced water volume from unconventional oil and gas wells to be 0.45 to 3.8 million gallons per well.[171]

Water Used in Energy Production (2011)	
Energy Type	**Typical Range Water Consumption Factors (gal/MWh)**
Renewable	
Wind	0
Photovoltaic	26
Biopower	35 - 533
Concentrated Solar Power	5 - 1,000
Geothermal	0 - 4,784
Hydropower	4,491
Non-Renewable	
Natural Gas	2 - 826
Coal	42 - 942
Nuclear	269 - 672
Source: National Renewable Energy Laboratory, March 2011, 'A Review of Operational Water Consumption and Withdrawal Factors for Electricity Generating Technologies'	

grade **C+**

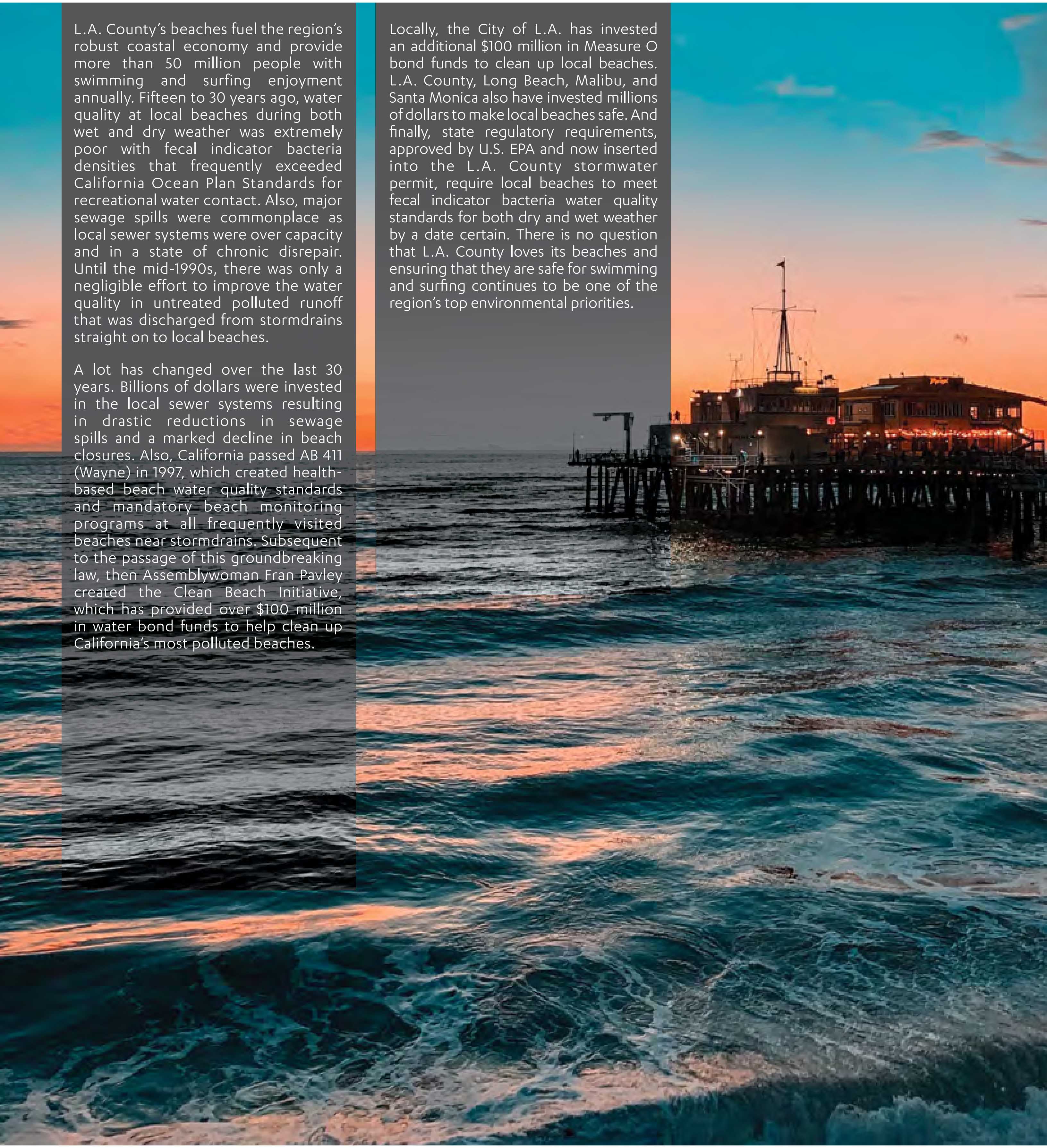
for water-energy nexus

During drought years, roughly 50% of L.A. County's water supply is purchased from the MWD. Since all of MWD's water comes from the State Water Project or the Colorado River Aqueduct, this water is very energy intensive. During wet years like 2017, only a third of the county's water supply came from MWD, and over a quarter of the supply came from the gravity fed supply of the LAA. As a result, 2017 energy use and GHG emissions were substantially lower than the previous 5 years. But one wet year does not lead to a positive water-energy nexus grade. GHG emissions and energy demand will drop in coming years as the energy portfolio standard shifts from coal and natural gas to renewables, and as the county becomes more reliant on local water supplies and reduces MWD water supply purchases. However, there is a need for more explicit, integrated consideration of energy demand in water supply planning.

8

BEACH WATER QUALITY

Overview



L.A. County's beaches fuel the region's robust coastal economy and provide more than 50 million people with swimming and surfing enjoyment annually. Fifteen to 30 years ago, water quality at local beaches during both wet and dry weather was extremely poor with fecal indicator bacteria densities that frequently exceeded California Ocean Plan Standards for recreational water contact. Also, major sewage spills were commonplace as local sewer systems were over capacity and in a state of chronic disrepair. Until the mid-1990s, there was only a negligible effort to improve the water quality in untreated polluted runoff that was discharged from stormdrains straight on to local beaches.

A lot has changed over the last 30 years. Billions of dollars were invested in the local sewer systems resulting in drastic reductions in sewage spills and a marked decline in beach closures. Also, California passed AB 411 (Wayne) in 1997, which created health-based beach water quality standards and mandatory beach monitoring programs at all frequently visited beaches near stormdrains. Subsequent to the passage of this groundbreaking law, then Assemblywoman Fran Pavley created the Clean Beach Initiative, which has provided over $100 million in water bond funds to help clean up California's most polluted beaches.

Locally, the City of L.A. has invested an additional $100 million in Measure O bond funds to clean up local beaches. L.A. County, Long Beach, Malibu, and Santa Monica also have invested millions of dollars to make local beaches safe. And finally, state regulatory requirements, approved by U.S. EPA and now inserted into the L.A. County stormwater permit, require local beaches to meet fecal indicator bacteria water quality standards for both dry and wet weather by a date certain. There is no question that L.A. County loves its beaches and ensuring that they are safe for swimming and surfing continues to be one of the region's top environmental priorities.

INDICATOR • BEACH REPORT CARD SCORES

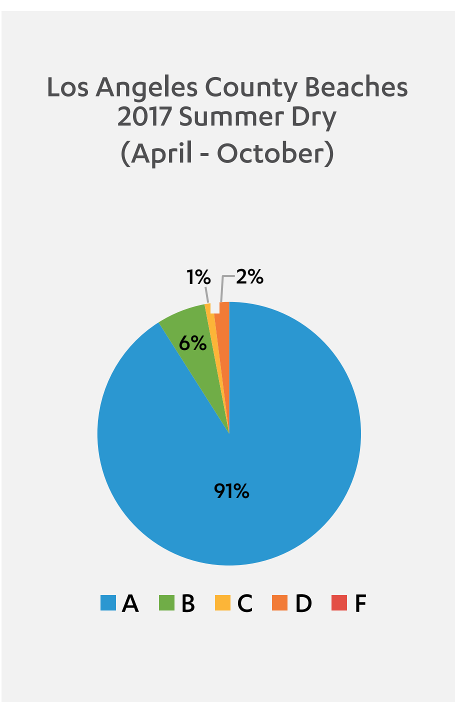
Introduction

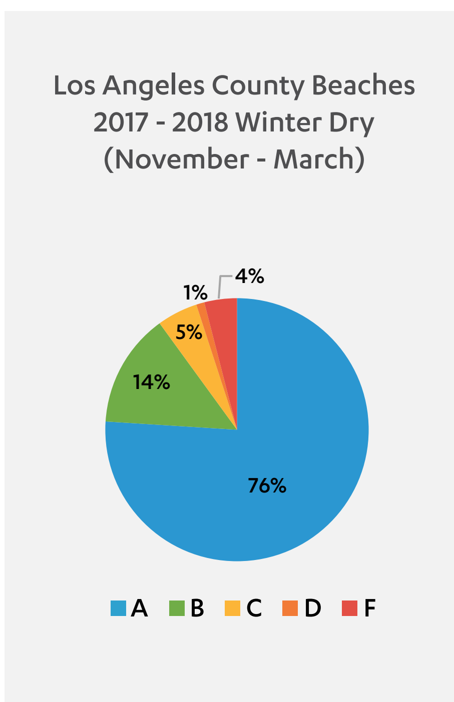
Over 50 million residents and visitors enjoy swimming and surfing at L.A. County's beaches every year. Maintaining high levels of water quality is vital for public safety and enjoyment of these iconic landscapes.

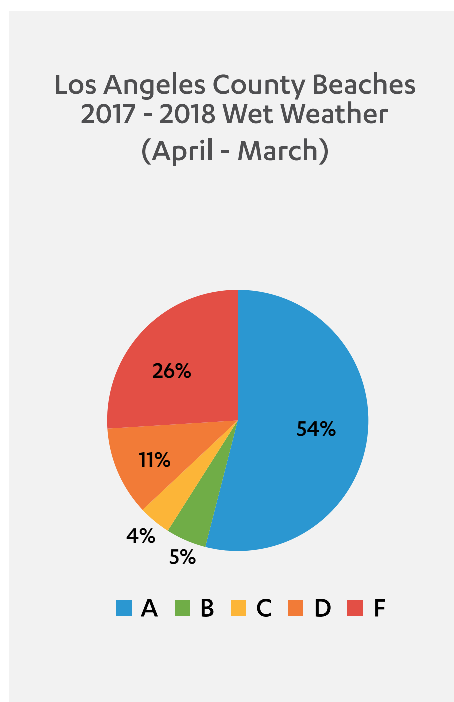
Data

We used grades and analyses from Heal the Bay's 2017-2018 Beach Report Card,[172] which uses a 12-month grading period from April to March. We looked at seasonal patterns and spatial distribution of the 2017-2018 grades, as well as trends over the last five years. As defined in AB 411 in California, the summer dry grading period is from April through October. The winter dry weather grading period is from November through March. The year-round wet weather conditions are graded from April through March. Values may not add to 100% due to rounding.

Note that in our findings and discussion we consider the most recent Beach Report Card (2018-2019) grades,[173] which was released after the original analysis was completed.





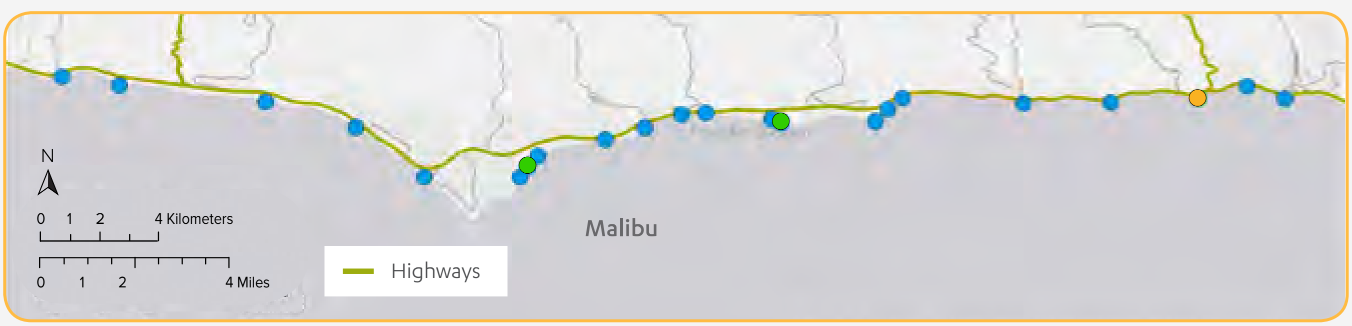


BEACH REPORT CARD SCORES

Five-Year Seasonal Average Grades in Los Angeles County (2012 - 2017)			
	Summer Dry	Winter Dry	Wet Weather
A	82%	76%	31%
B	9%	9%	14%
C	4%	5%	11%
D	2%	3%	5%
F	3%	7%	38%

Summer Dry Beach Grades in Los Angeles County (2013 - 2017)					
	A	B	C	D	F
2013	78%	12%	5%	2%	2%
2014	87%	7%	1%	1%	4%
2015	86%	6%	3%	1%	3%
2016	93%	4%	1%	2%	0%
2017	91%	6%	1%	2%	0%

Beach Report Card Grades during Summer 2017, Malibu



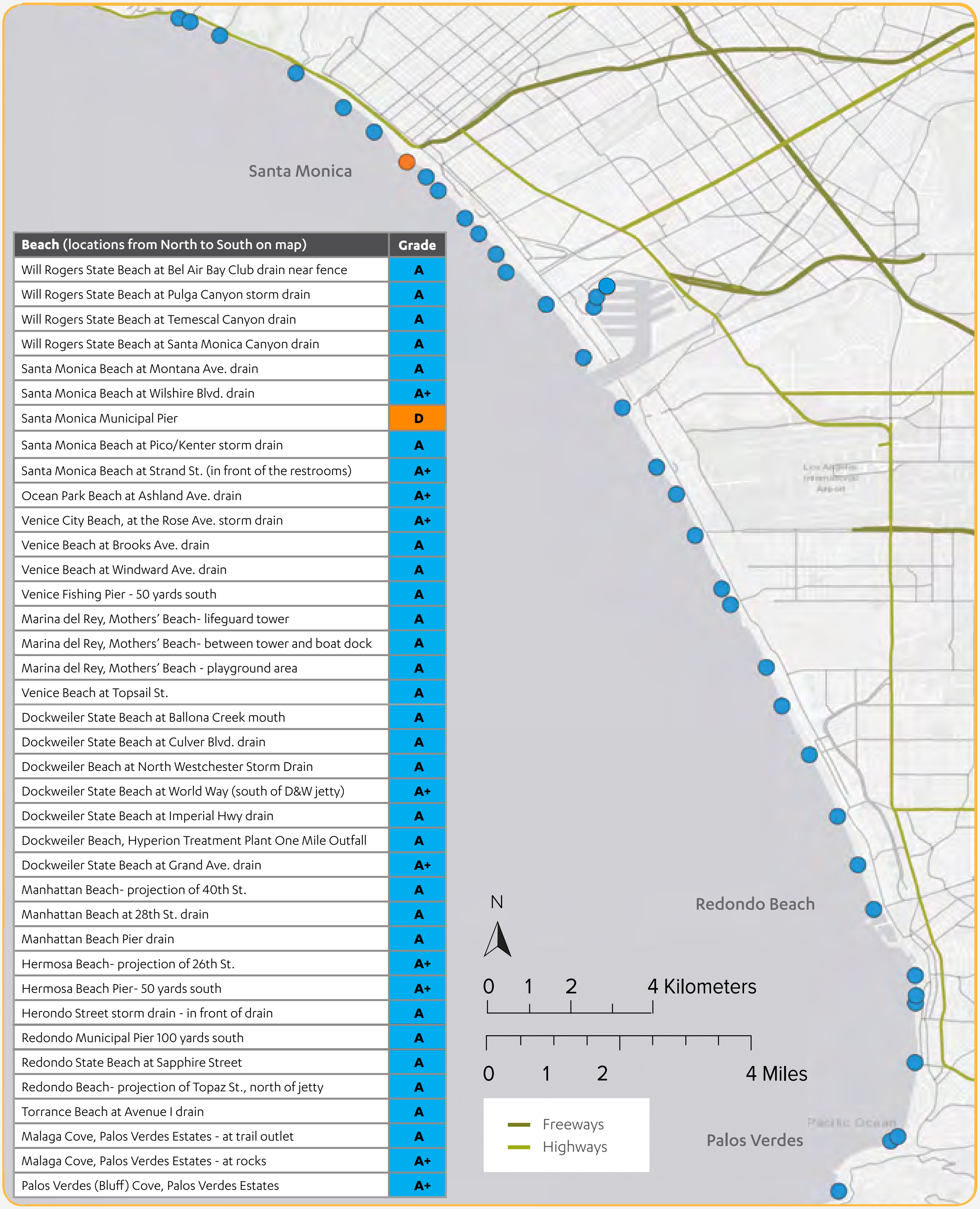
Beach (locations from West to East on map)	Grade
Leo Carrillo Beach, at Arroyo Sequit Creek mouth	A
Nicholas Beach at San Nicholas Canyon Creek mouth	A+
Encinal Canyon at El Matador State Beach	A+
Broad Beach at Trancas Creek mouth	A
Zuma Beach at Zuma Creek mouth	A
Walnut Creek outlet, projection of Wildlife Road	A+
Unnamed Creek, projection of Zumirez Dr. (Little Dune)	B
Paradise Cove Pier at Ramirez Canyon Creek mouth	A
Escondido Creek, just east of Escondido State Beach	A+
Latigo Canyon Creek mouth	A
Solstice Canyon at Dan Blocker County Beach	A+

Beach (locations from West to East on map)	Grade
Puerco State Beach at creek mouth	A
Unnamed Creek, adjacent to public stairway at 24822 Malibu Rd.	A+
Marie Canyon storm drain at Puerco Beach, at 24572 Malibu Rd.	B
Malibu Point	A
Surfrider Beach, breach point	A
Carbon Beach at Sweetwater Canyon	A+
Las Flores State Beach at Las Flores Creek (point zero)	A
Big Rock Beach at 19948 PCH stairs	A+
Topanga Beach at creek mouth	C
Castle Rock Beach just west of drain	A+
Santa Ynez drain at Sunset Blvd.	A

Source: Heal the Bay; ESRI

BEACH REPORT CARD SCORES

Beach Report Card Grades during Summer 2017, Santa Monica Bay

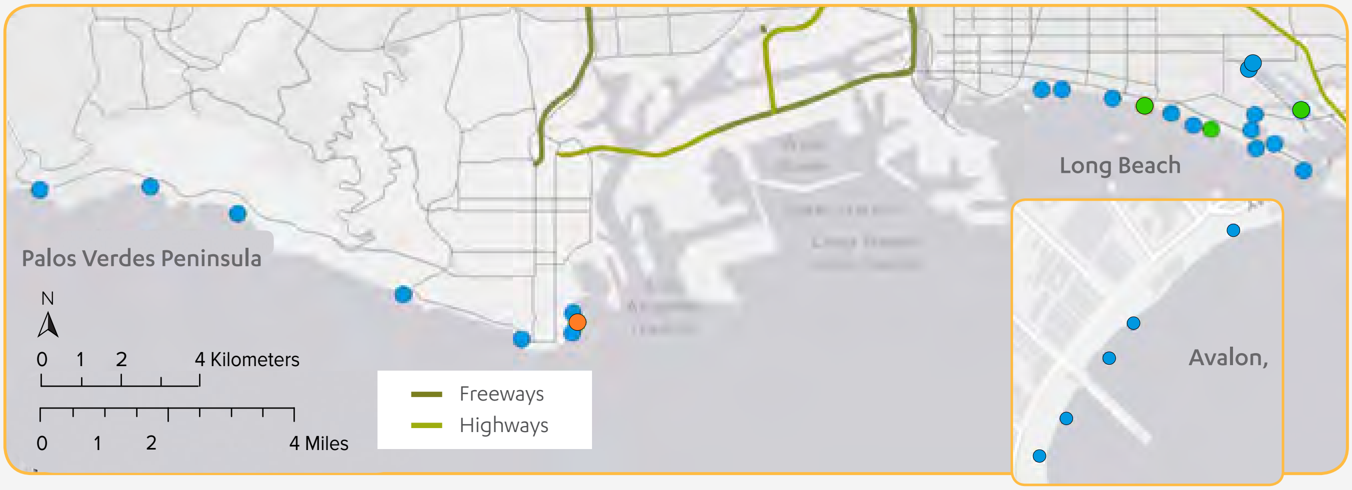


Beach (locations from North to South on map)	**Grade**
Will Rogers State Beach at Bel Air Bay Club drain near fence	A
Will Rogers State Beach at Pulga Canyon storm drain	A
Will Rogers State Beach at Temescal Canyon drain	A
Will Rogers State Beach at Santa Monica Canyon drain	A
Santa Monica Beach at Montana Ave. drain	A
Santa Monica Beach at Wilshire Blvd. drain	A+
Santa Monica Municipal Pier	D
Santa Monica Beach at Pico/Kenter storm drain	A
Santa Monica Beach at Strand St. (in front of the restrooms)	A+
Ocean Park Beach at Ashland Ave. drain	A+
Venice City Beach, at the Rose Ave. storm drain	A+
Venice Beach at Brooks Ave. drain	A
Venice Beach at Windward Ave. drain	A
Venice Fishing Pier - 50 yards south	A
Marina del Rey, Mothers' Beach- lifeguard tower	A
Marina del Rey, Mothers' Beach- between tower and boat dock	A
Marina del Rey, Mothers' Beach - playground area	A
Venice Beach at Topsail St.	A
Dockweiler State Beach at Ballona Creek mouth	A
Dockweiler State Beach at Culver Blvd. drain	A
Dockweiler Beach at North Westchester Storm Drain	A
Dockweiler State Beach at World Way (south of D&W jetty)	A+
Dockweiler State Beach at Imperial Hwy drain	A
Dockweiler Beach, Hyperion Treatment Plant One Mile Outfall	A
Dockweiler State Beach at Grand Ave. drain	A+
Manhattan Beach- projection of 40th St.	A
Manhattan Beach at 28th St. drain	A
Manhattan Beach Pier drain	A
Hermosa Beach- projection of 26th St.	A+
Hermosa Beach Pier- 50 yards south	A+
Herondo Street storm drain - in front of drain	A
Redondo Municipal Pier 100 yards south	A
Redondo State Beach at Sapphire Street	A
Redondo Beach- projection of Topaz St., north of jetty	A
Torrance Beach at Avenue I drain	A
Malaga Cove, Palos Verdes Estates - at trail outlet	A
Malaga Cove, Palos Verdes Estates - at rocks	A+
Palos Verdes (Bluff) Cove, Palos Verdes Estates	A+

Source: Heal the Bay; ESRI

BEACH REPORT CARD SCORES

Beach Report Card Grades during Summer 2017, Long Beach and Avalon



Beach (locations from West to East on map)	Grade
Long Point, Rancho Palos Verdes	A
Abalone Cove Shoreline Park	A+
Portuguese Bend Cove, Rancho Palos Verdes	A+
Royal Palms State Beach	A+
Wilder Annex, San Pedro	A+
Cabrillo Beach- oceanside	A+
Cabrillo Beach - harborside at restrooms	D
Cabrillo Beach- harborside at boat launch	A
Long Beach City Beach- projection of 5th Place	A
Long Beach City Beach- projection of 10th Place	A
Long Beach City Beach- projection of Molino Ave.	A
Long Beach City Beach- projection of Coronado Ave.	B
Belmont Pier - westside	A
Long Beach City Beach- projection of Prospect Ave.	A
Long Beach City Beach - projection of Granada Ave.	B

Beach (locations from West to East on map)	Grade
Colorado Lagoon - south	A
Colorado Lagoon - north	A
Alamitos Bay, 2nd St. Bridge & Bayshore	A
Alamitos Bay - shore float	A
Long Beach City Beach- projection of 55th Place	A
Alamitos Bay - 56th Place - on bayside	A
Mother's Beach - Long Beach - north end	B
Long Beach City Beach - projection of 72nd Place	A

Catalina Island (inset, locations from West to East on map)	Grade
Avalon Beach - east of the Casino Arch at the steps	A
Avalon Beach - 100 feet west of the Green Pleasure Pier	A
Avalon Beach - 50 feet west of the Green Pleasure Pier	A+
Avalon Beach - 50 feet east of the Green Pleasure Pier	A+
Avalon Beach - 100 feet east of the Green Pleasure Pier	A

Source: Heal the Bay; ESRI

Findings

- Summer 2017 dry weather water quality in L.A. County was excellent with 97% A or B grades and zero F grades, better than the average for the last 5 years. The 2018 summer grades were slightly worse with 91% A's and B's and 1% F grades.

- Winter dry weather grades for 2017-18 were slightly better than the average over the previous five years, with 91% A or B grades and 4% F grades. However, the 2018-19 winter grades were much worse with 70% As and Bs and 6% Fs.

- Wet weather water quality continues to be an area of concern, with only 60% A or B grades, and with 26% receiving F grades in 2017-2018. However, this is an improvement over 2016-2017, and better than the average over the previous 5 years. The 2018-2019 report card demonstrated that L.A. County beaches had the poorest wet weather water quality in years with only 30% A and B beaches and an astounding 56% of the beaches receiving F grades. In particular, the Malibu beaches downstream of the Woolsey Fire, often some of the cleanest in the region during wet weather, had extremely poor grades after the fire.

- L.A. County has two of the ten beaches on the statewide Beach Bummer list for 2017-18: Santa Monica Pier, which has been on the list since 2014; and Cabrillo Beach in San Pedro, which was on the list from 2004-2015.

- There has been an overall upward trend from 78% to 91%, in the percentage of beaches with summer dry A grades in the past five years, with a corresponding reduction in the number of B and C grades over that period. Less than 5% of beaches received F's each year since 2013, with the most recent year receiving no F grades at all in L.A. County.

INDICATOR • BEACH CLOSURES

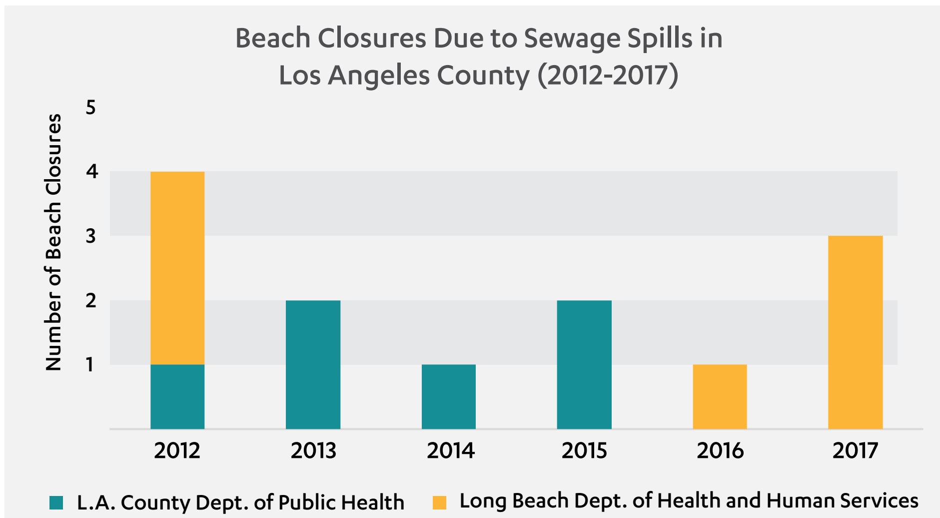
Introduction

Beach closures may be caused by sewage spills, but can also result from oil or fuel spills.[174] California issues different types of warnings about the water quality at beaches using bacterial levels as an indicator. While beach postings or advisories are placed when bacterial samples surpass water quality standards, beach closures occur when sewage has been spilled or is expected to be discharged into a beach area.[175] In L.A. County, the L.A. County Department of Public Health's Environmental Health Division (LADPH) and the City of Long Beach Department of Health and Human Services (LBDH) are responsible for managing closures of beaches in their respective jurisdictions.[176,177] These public health departments receive Hazardous Materials Spill Reports from the California State Warning Center (CSWC), and then make the determination if recreational water areas within their jurisdictions need to be closed.[178]

If a beach closure is necessary, the public health departments place "closed" signs on the beaches and update the public through their website.[179] Due to the elevated risk of becoming sick from water contact, announcements about beach closures are crucial to protect the health and safety of the public.[180] Closed beaches are reopened once water samples reach the required state standards.[181]

Data

Data on beach closures comes from the LADPH and the LBDH. We used the Sewage Discharge Incident Report Tool on the LADPH website to generate reports detailing the number of beach closures for each year from 2012 to 2017.[182] For the City of Long Beach, we used the Consumer Protection Program Recreational Water Monitoring monthly sample results on the LBDH website to determine the number of beach closures annually.[183]



Findings

- There were three beach closures in 2017, all occurring within the Long Beach Department of Health's jurisdiction.
- There have been less than five beach closures annually since 2012.
- 2014 and 2016 were the years with the lowest number of beach closures.
- The number of beach closures are an order of magnitude less than the number of sewage spills that reached water bodies for each year.
- Reporting between the state's CIWQS website and the LADPH and LBDH websites is not consistent. Only six out of the thirteen total number of closures are reported in CIWQS. One beach closure under LADPH jurisdiction was reported on CIWQS, whereas most of the beach closures reported by LBDH are reported on CIWQS.

Data Limitations

- There are no centralized data sources for identifying beach closures in the state; the Interactive SSO Reports Tool on the CIWQS SSO statewide database provides data on beach impact, but not on beach closures specifically.[184]

grade **B+**
for beach water quality

After decades of major investments through California's Clean Beach Initiative, L.A.'s Measure O and Santa Monica's Measure V on dry weather runoff diversions, runoff capture and storage projects, and runoff treatment plants, water quality at local beaches has improved dramatically, especially during dry weather. Nearly all beaches (over 90%) received "A's" on Heal the Bay's 2017 Beach Report Card during the summer months and over 75% received "A's" during winter dry weather. The only time local beaches experience water with high fecal bacteria indicator densities is during wet weather, where over a quarter of the beaches received "F's" and 11% of the beaches received "D's" during wet weather in 2017-18. The 2018 Beach Report Card also demonstrated that beaches were largely clean and safe during the summer. However, the combination of a wet precipitation year and the Woolsey Fire led to extremely poor beach water quality during the winter months, especially during wet weather. Beach water quality received a high grade because of the largely ongoing trend of excellent water quality during the summer months when most people visit the beach. However, many people surf and swim at local beaches year-round and the Beach Report Card grades demonstrate that the region has yet to successfully improve beach water quality in wet weather. The extent of that problem is magnified during wet years and at beaches downstream of large burn zones. Major City and L.A. County Sanitation Districts investments in sewer infrastructure have decreased the number of beach closures to three or less per year for the five-year period from 2013-2017: a tremendous improvement from the 1980s, 90s and 00s.

Overall Conclusions

Despite L.A. County's C+ student status on Water, there is reason for optimism in the quest to make Los Angeles the world's first sustainable megacity. The passage of L.A. County's Measure W (November 2018) promises a new funding source for stormwater capture and cleaning projects beginning in 2020. Previously, the responsibility for funding L.A. County projects was left to individual cities (L.A.'s Proposition O, Santa Monica's Measure V) or state water bonds (Propositions 50, 84, and 1). Measure W funding has great potential to enable regional stormwater projects that help clean up surface water and localize the water supply.

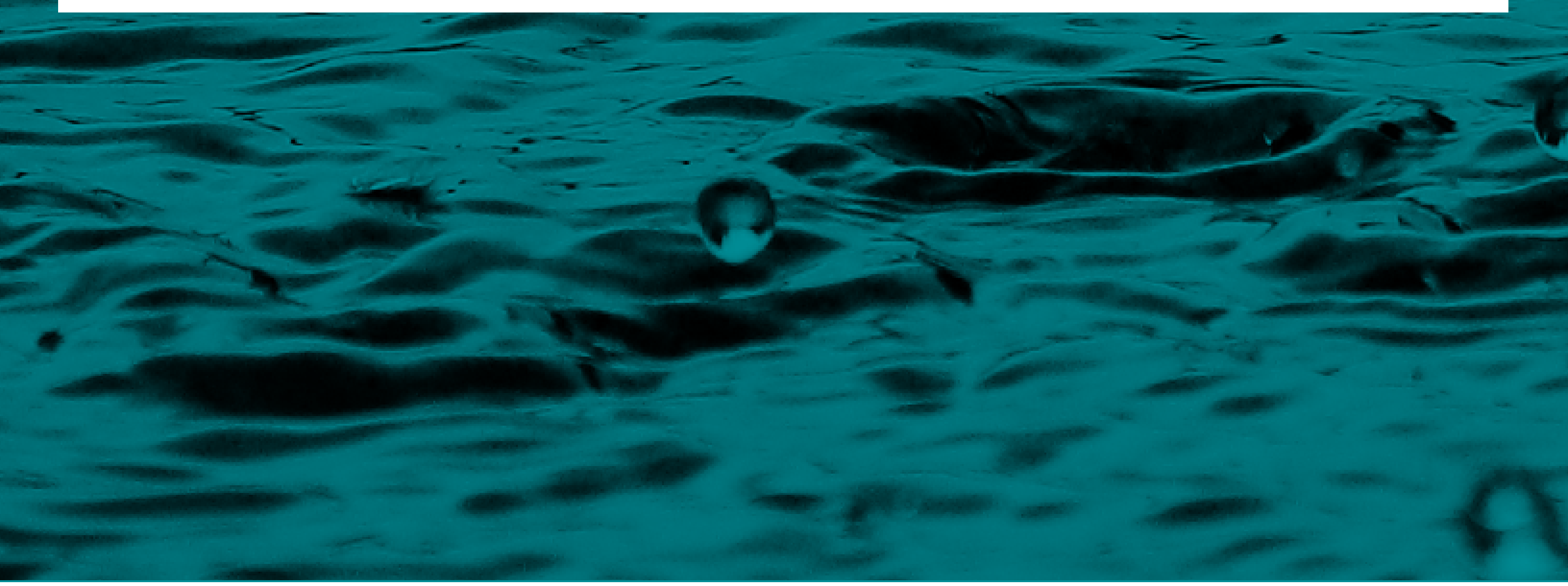
L.A. County demonstrated its ability to reduce water demand in response to Governor Brown's drought declaration. However, water consumption has increased since the Governor declared the drought over, suggesting that there is progress yet to be made in making water conservation a way of life. Furthermore, L.A. County still imports approximately 60% of its water supply and the City of L.A. has imported over 90% of its supply over the last two years. With the current demand and the current supply available, L.A. County has significant progress to make to reach 100% local water. Looking forward, together, developing an integrated regional water recycling system (supported by the City of L.A.'s goal of recycling 100% of wastewater by 2035), and accelerating stormwater projects' construction through Measure W, both have potential to help work toward closing this gap.

L.A. County's strongest water quality grades are in summer beach water quality and, to an extent, drinking water quality. With many years of investments from California's Clean Beach Initiative, L.A.'s Measure O, and Santa Monica's Measure V on dry weather runoff diversions, runoff capture and storage projects, and runoff treatment plants, water quality at local beaches has improved dramatically, especially during dry weather. In addition, based on the available drinking water quality data, the County provides excellent drinking water quality to its 10 million residents, with infrequent primary MCL violations impacting a tiny fraction of residents. However, there are far too many people in L.A. County that receive discolored, smelly water from the tap, and that is unacceptable. The lack of publicly available data on exceedances of secondary MCLs makes it very difficult to adequately assess the county's drinking water quality.

The dramatic improvements needed in L.A. County's surface waters will face major challenges, including a lack of waterbody assessment data. The vast majority of local waterbodies are listed as impaired under the Clean Water Act for a wide variety of pollutants, making them unsafe for recreation, drinking, or even aquatic life habitat. Because the state has not been regularly assessing the status of local impaired waters, the public does not have a clear picture of whether water quality has been improving or worsening over the last five to ten years. Rectifying the lack of timely assessment of monitoring data is key to comprehensively improving surface water quality.

Another major area for improvement is L.A. County's groundwater basins. California's Sustainable Groundwater Management Act, signed into law in 2014 in response to California's recent drought, became the state's first framework for regulating groundwater management. Although groundwater basins are largely managed well through adjudications throughout much of the County, poor groundwater quality continues to be prevalent in numerous local aquifers. Strong, health-based standards are necessary to ensure pollutant concentrations are reduced to safe levels. L.A. County requires commitment to reducing groundwater threats and remediating contaminated aquifers to fully capitalize upon the local supply of groundwater resources.

The good news is that since UCLA launched the Sustainable LA Grand Challenge in 2013, both state and local governments have passed legislation to support and fund a sustainable water system. Local plans have rolled out even more ambitious goals of localizing the water supply, including the 2019 L.A. County Sustainability Plan goal of sourcing 80% of water locally by 2045, and the 2019 City of L.A.'s Green New Deal goal of sourcing 70% of the city's water locally by 2035. However, this 2019 Sustainable LA Grand Challenge Environmental Report Card on L.A. County Water demonstrates that despite the promise of goals and plans for sourcing water locally, recycling wastewater, and constructing stormwater capture and cleaning projects, L.A. County has a long way to go to implement these plans before becoming an A student.




CONCLUSIONS

ABOUT THE UCLA SUSTAINABLE LA GRAND CHALLENGE

University of California, Los Angeles (UCLA) research predicts that a future Los Angeles will be hotter, with more frequent and dangerous heat waves, increased wildfire risk, and less snowpack to feed local water supplies that are imported from over 200 miles away.[185,186] By 2050, L.A. County will also be more crowded, with an estimated population of 11.3 million residents.[187] A hotter and more populous region means increased pressure on energy, transportation, and water infrastructure, exacerbated public health problems, and stressed ecosystems and habitats.

To ensure a thriving future for the megacity of L.A. in a changing climate, UCLA Chancellor Gene Block launched the first-ever university-led Grand Challenge in 2013 – the Sustainable LA Grand Challenge, thriving in a hotter Los Angeles (SLA GC). SLA GC goals are to transition L.A. County (which includes the City of Los Angeles, plus 87 other cities and over 120 unincorporated areas) to **100-percent renewable energy** (including transportation), **100-percent local water**, and **enhanced ecosystem health** by 2050 in a way that will secure the County's long-term welfare and economic prosperity while preserving its cultural identity.[188,189] Unlike traditional campus-wide research initiatives, the SLA GC provides a framework to organize research, education, and partnerships around ambitious long-term, time-bound implementation goals. Together, the SLA GC and its partners are transforming the climate crisis and urban sustainability from a challenge into an opportunity, for Los Angeles and beyond.

UCLA has more than 200 faculty and researchers from across disciplines who have expressed interest and are involved in the research necessary to inform a sustainability implementation plan for L.A. County that will be developed together with local and state government, businesses, community groups, non-government agencies, and other stakeholders. The SLA GC will strengthen partnerships with stakeholders and galvanize the next generation of sustainability leaders committed to improving the region's environment, economy, and social equity – serving as a model for other universities and urban areas around the globe.

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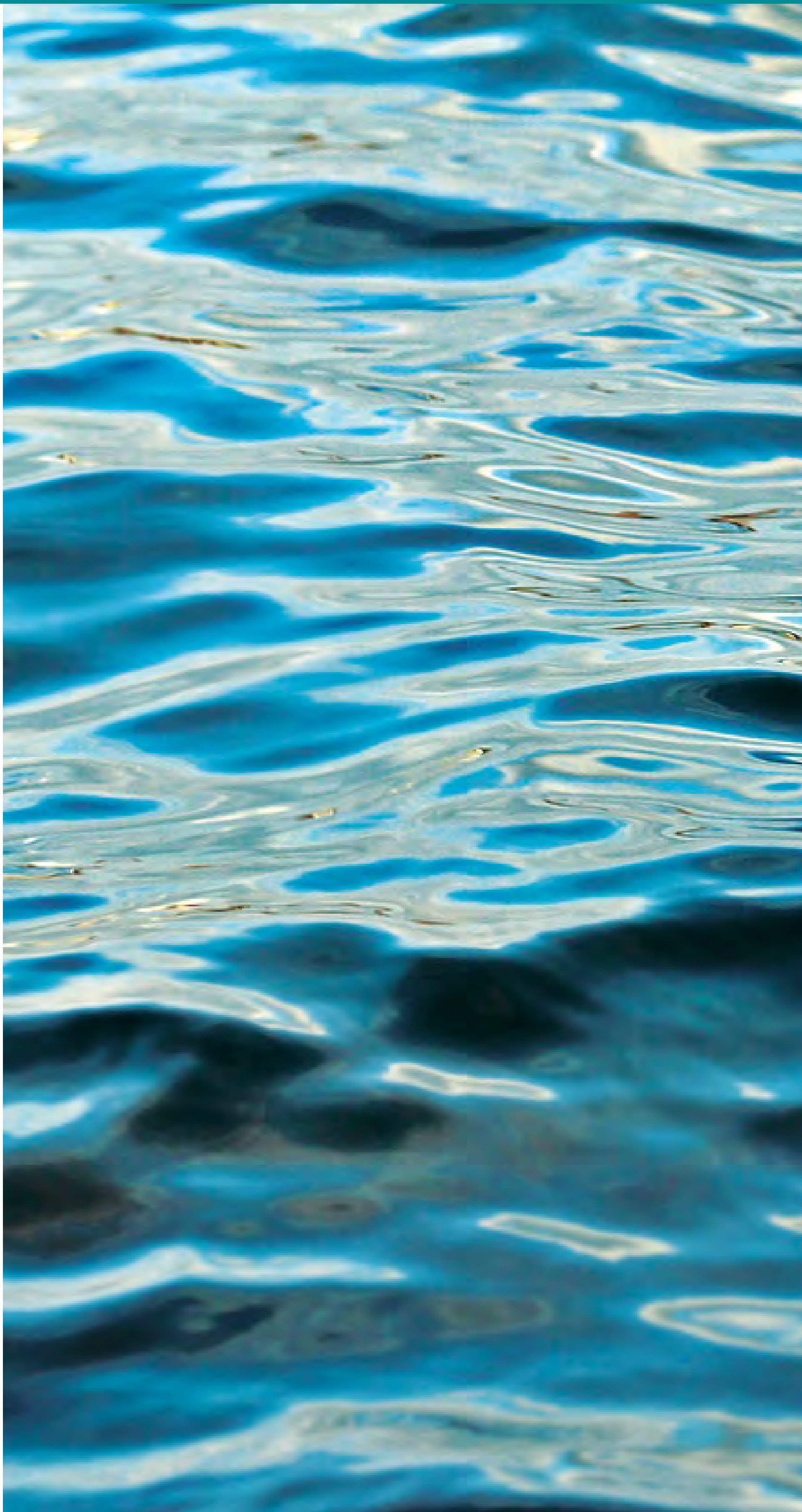

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