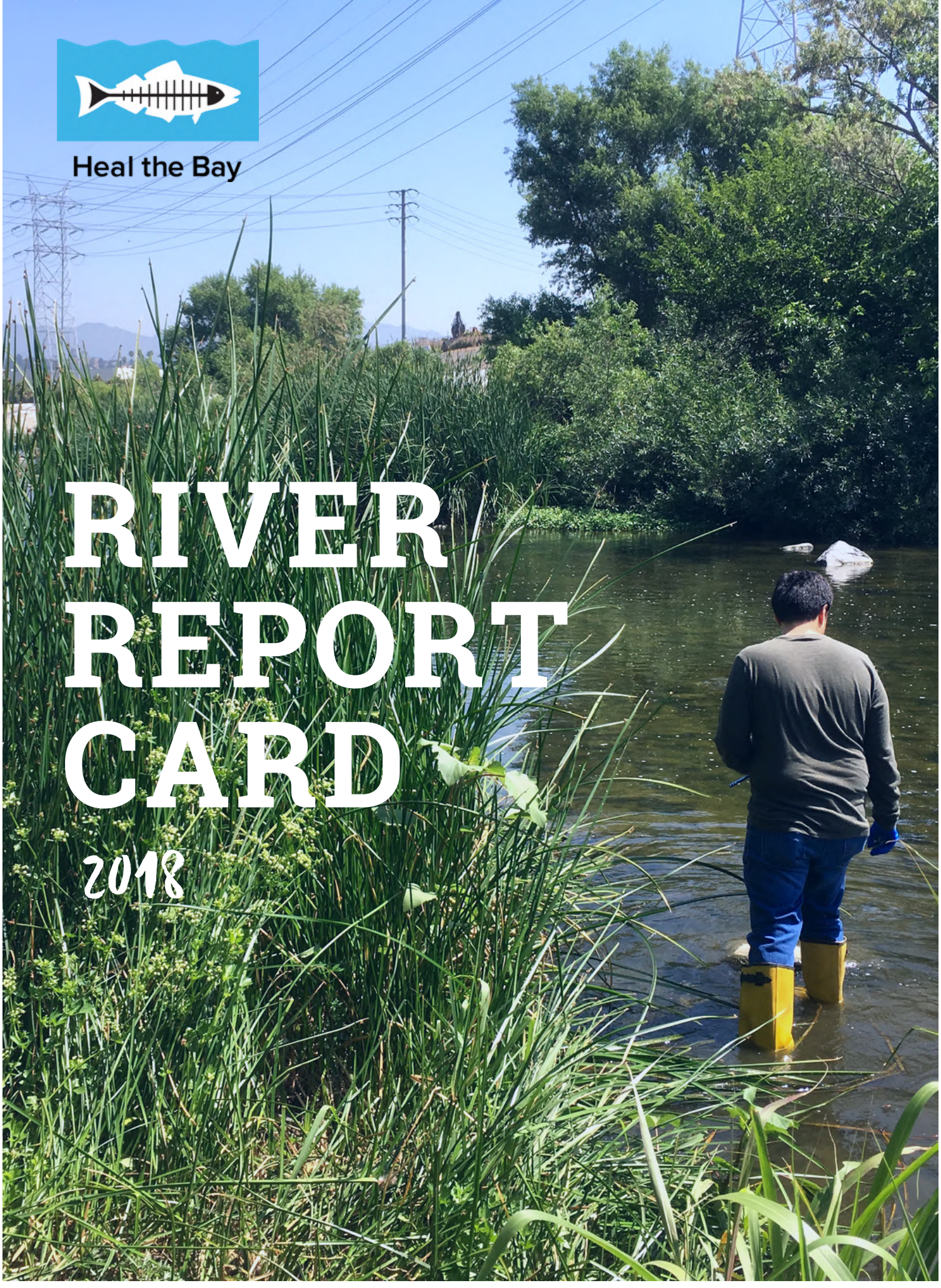
Heal the Bay
RIVER
REPORT
CARD
2018

Heal the Bay

RIVER REPORT CARD

2018

Heal the Bay believes people have a right to know about the quality of the water where they swim and play. We are pleased to provide our community with this science-based, easy-to-use report card. This annual report can be used to make decisions about where to get in the water, as well as policies to protect public health and the environment.

Written by Katherine Pease and Luke Ginger

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WHAT'S INSIDE

HIGHLIGHTS

L.A. River Elysian Valley Recreation Zone

Executive Summary

Freshwater swimming and recreation areas in Los Angeles County provide critical opportunities for people to cool off, enjoy nature, exercise, and appreciate our rivers and streams. Unfortunately, there is little State-mandated water quality monitoring in these locations that meets the needs for public notification and public health protection. As a result, we lack standardized data and the information available to the public is minimal and difficult to interpret.

For over 30 years, Heal the Bay has been dedicated to making the coastal waters and watersheds of Southern California safe, healthy, and clean. We prioritize public health. We have been informing and educating beachgoers about beach water quality through our Beach Report Card (BRC) since 1991. Assessing water quality at freshwater recreation areas in L.A. County and providing information to the public was a clear next step for Heal the Bay. A day spent enjoying the waterways of L.A. County should not make anyone sick, so we began monitoring freshwater recreation sites in 2014 and developed the River Report Card (RRC) program in 2017 to provide easy-to-understand water quality information to the public.

The RRC assigns color grades of Green, Yellow, and Red to sites based on their levels of bacterial pollution. This differs from Heal the Bay's BRC, which assigns A-to-F letter grades to beaches; nonetheless, we consider this assessment a Report Card as well and refer to color codes as grades. We developed a Green, Yellow, and Red grading methodology and graded sites based on fecal indicator bacteria levels. Green indicates good water quality with levels of fecal indicator bacteria all under regulatory and health thresholds. A Yellow grade indicates increased risk where at least one, and up to half of the thresholds exceeded accepted limits. Finally, a Red grade indicates the highest risk where more than half of the thresholds were exceeded.

The River Report Card is the most comprehensive water quality report to date on freshwater recreation areas in the greater Los Angeles area. Data sets were compiled from monitoring conducted by Heal the Bay, the Los Angeles River Watershed Monitoring Program (LARWMP), City of L.A. Bureau of Sanitation and Environment (LASAN), and the San Gabriel River Regional Monitoring Program (SGRRMP). This monitoring covers 27 sites in three watersheds that are used for swimming, wading, fishing, and kayaking. We analyzed dry-weather data from 2017 and 2018 for all sites as well as any older data available, as far back as 2014 for some sites. Monitoring is conducted for fecal indicator bacteria, which are not harmful themselves, but indicate the presence of microorganisms and viruses that can cause infections, skin irritation, respiratory illness, and gastrointestinal illness.

Across all 27 sites, 57% of grades were Green in 2018, 25% were Yellow, and 18% were Red. We found that urban waterways tended to have lower water quality grades than natural areas. The sites in the L.A. River Watershed Recreation Zones are primarily surrounded by urban landscapes and had lower grades than the other sites in this report. Sites in the L.A. River Recreation Zones received 38% Green, 36% Yellow, and 26% Red grades. The San Gabriel River Watershed sites and the Upper L.A. River Watershed sites had the best grades overall, likely because they are in more natural landscapes and do not receive significant urban runoff.

Sites in the San Gabriel River Watershed, which are in less developed areas, received 84% Green, 11% Yellow, and 5% Red grades in 2018; the Upper L.A. River Watershed sites had 70% Green, 13% Yellow, and 17% Red grades. The Malibu Creek Watershed sites are in a State Park and the immediate surroundings are mostly natural, with some urban development upstream. These sites had better grades than the sites in the L.A. River Watershed Recreation Zones, but worse grades than the San Gabriel River sites or the Upper L.A. River Watershed sites; the Malibu Creek Watershed sites received 50% Green, 39% Yellow, and 11% Red grades in 2018.

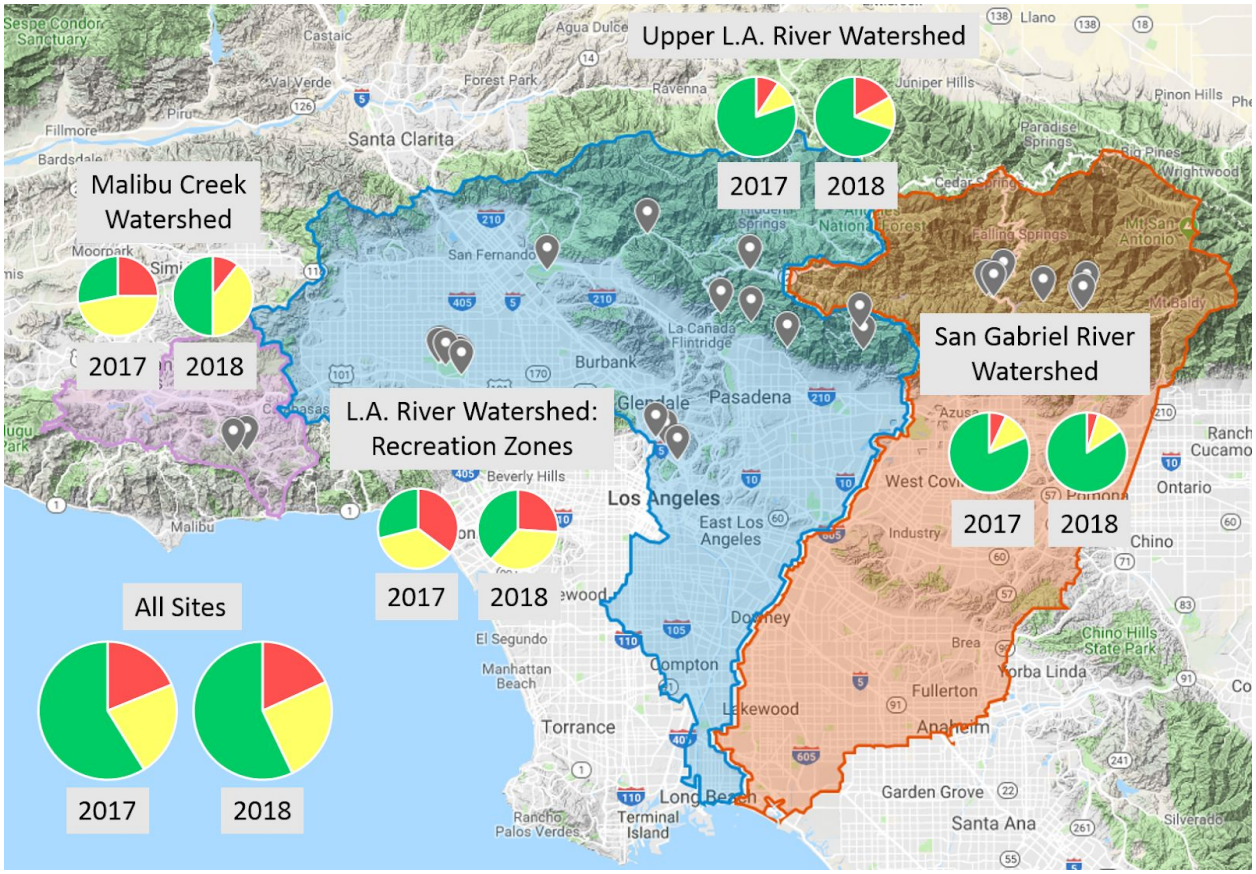


Figure 1: *Water quality grade percentages from 2017 and 2018 for monitoring sites in L.A. County, Malibu Creek Watershed, L.A. River Watershed Recreation Zones, Upper L.A. River Watershed, and San Gabriel River Watershed. Green, Yellow, and Red breakdowns are shown for each area and season.*

We identified ten sites that received the highest percentages of Red grades, the Freshwater Fails, and ten sites that received the highest percentages of Green grades, the Honor Roll. The top two Freshwater Fail sites in 2018 were Hansen Dam (80% Red) in the Upper L.A. River Watershed and Rattlesnake Park (58% Red) in the L.A. River Elysian Valley Recreation Zone. However, six sites on the Honor Roll had 100% Green grades; four of these sites were in the San Gabriel River Watershed and two were in the Upper L.A. River Watershed. Compared to 2017, grades in 2018 improved overall in the Malibu Creek Watershed, in the San Gabriel River Watershed, and in the L.A. River Watershed Recreation Zones (percentage of Green grades increased). Water quality worsened in the Upper L.A. River Watershed sites (percentage of Green grades decreased).

When examining sites individually over time, 15 of the 27 sites had a higher percentage of Green grades in 2018 compared to 2017, indicating an improvement; nine sites had a lower percentage of Green grades in 2018 compared to 2017, indicating worsening conditions, and three sites had no change. Across the whole County, the proportion of Red grades issued from 2017 to 2018 decreased by one percentage point, and the percentage of Green grades issued decreased by two percentage points, indicating a slight decrease in water quality across the board.

People heading to freshwater recreation areas can check Heal the Bay's River Report Card online at healthebay.org/riverreportcard before visiting as well as minimize risks by limiting water contact, avoiding submerging their heads underwater, avoiding hand-to-face water contact, and washing off after contact using soap and water.

Since Heal the Bay began monitoring freshwater recreation sites and making water quality data public, we have seen some positive changes, including:

- Increased bacterial monitoring in L.A. River recreation zones, by LASAN, both in number of sites and frequency
- Increased public notification by LASAN, through posted signs about water quality along L.A. River Recreation Zones
- Increased dissemination of water quality information to the public through emails, websites, and other online means by agencies collecting water quality information (LARWMP, LASAN, and SGRRMP)

Based on this report, we have additional recommendations to protect public health:

- Monitoring and public notification should be standardized across the State and region for freshwater recreation areas; clarify who is responsible and enact legislation similar to the Beach Water Quality Act (AB411) to provide standardized monitoring protocols and funding to counties
- Monitoring should include *Enterococcus* in addition to *E. coli* to be more protective of public health; and, water quality advisories must include consideration of thresholds for geometric means in addition to single samples
- Public notification protocols should include posting signs about water quality at *all* freshwater recreation sites in English and Spanish

Introduction

Every year, multitudes of people swim, kayak, fish, run, bike, and enjoy the natural beauty of Los Angeles County's rivers, streams, and lakes. Recreation in freshwater open spaces is increasingly important in our urban environment as climate changes, populations increase, and open space access is limited for many communities. Unfortunately, when local freshwater sites suffer from bacterial pollution (and many do), there is little official public notification in place to inform users of potential hazards. This means more people are at risk of getting an illness from coming into contact with polluted water.

Many recreational waterbodies in L.A. County are impaired by bacterial pollution according to the State Water Resources Control Board (State Water Board) and U.S. Environmental Protection Agency (U.S. EPA).[1] Impairment indicates that the recreational beneficial use of that site is not being met due to fecal indicator bacteria (FIB) pollution. Bacterial pollution sources are typically from urban runoff, leaks or spills from wastewater collection systems, illicit or illegal discharges, and failing septic systems. FIB are not harmful themselves, but they indicate the presence of microorganisms and viruses that can cause infections, skin irritation, respiratory illness, and gastrointestinal illness.

Unlike ocean beaches, there is little State oversight, standardization, or funding for monitoring and public notification of freshwater swimming and recreation areas. Many freshwater sites are monitored for regulatory purposes, such as stormwater and non-point source pollution. But, the data sets are not compiled in one location, nor shared with the public, in a timely manner. Furthermore, if the monitoring is specifically for stormwater regulation and not recreation, the sampling may not be in the most appropriate location or at a frequency that is protective of public health. For example, water in recreation areas is generally not tested year-round, and there are many sites that are not monitored at all. On top of that, data for monitored recreation zones are often difficult to access and interpret, leaving the public uninformed of potential dangers.

Assessing the water quality of freshwater recreation areas in L.A. County and providing helpful information to the public is an important part of Heal the Bay's work to protect clean water and public health. Heal the Bay collects and analyzes water quality at six recreation sites in L.A. County, compiles water quality monitoring data at an additional 21 locations, and transforms the data into easily understood, color-coded grades of Red, Yellow, and Green. The River Report Card is accessible online to ensure that the information is widely available. Heal the Bay informs the public, public health authorities, regulatory agencies, and policy-makers of potential health risks; advocates for recreation-targeted education; encourages enhanced monitoring, and recommends ways to improve water quality.

[1] https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml

Methodology

Sampling, Locations, and Dates

Heal the Bay collects water samples weekly during summer months at six recreational sites in L.A. County. Two sites are located in the Malibu Creek Watershed and four sites are located in the L.A. River Watershed. Heal the Bay uses the Defined Substrate Technology (DST) method to quantify fecal indicator bacteria (total coliform, *E. coli*, and *Enterococcus*) utilizing Colilert™ and Enterolert™ (IDEXX, Westbrook, ME).

Samples were collected starting in 2014 in the Malibu Creek Watershed and in 2015 in the L.A. River Watershed. Any samples collected within three days of 0.1 inches or more of rain were not included in this analysis because of the negative impact rain has on water quality.

Heal the Bay also compiles water quality data from monitoring programs and government agencies that oversee some of the same locations as well as other locations. Typically, agencies collect samples on a weekly basis and quantify levels of *E. coli* only. For the L.A. River Watershed, data is collected and shared by the Los Angeles River Watershed Monitoring Program (LARWMP)[2] and City of L.A. Bureau of Sanitation and the Environment (LASAN). The locations in the San Gabriel River Watershed are monitored by the San Gabriel River Regional Monitoring Program (SGRRMP).[3] Data have been collected by these groups for many years and were made public in 2017 in the L.A. River Watershed and in 2018 in the San Gabriel River Watershed. Site locations, monitoring groups, and date ranges are detailed in Appendix A.

Heal the Bay began monitoring storm drain outfalls in 2017 in the Elysian Valley Recreation Zone of the L.A. River. Water samples were collected from flowing storm drain outfalls in the recreation zone and upstream of the recreation zone to Glendale Blvd. The right side of the River (facing downstream) was assessed from Oros St. at the downstream end to Glendale Blvd at the upstream end; the left side of the River was assessed for a shorter distance due to limited accessibility, from Glendale Blvd to the Bowtie Parcel. Storm drains were named based on the side of the River (SDR= storm drain right or SDL= storm drain left) and numbered in sequential increasing order from downstream to upstream on the right side and from upstream to downstream on the left side. Storm drain size was also estimated (as diameter, if circular, or height by width, if rectangular). We assessed storm drain flow velocity on the following scale: 0=no flow; 0.5=wet/ponded but not reaching main channel; 1=light/trickle and reaching main

[2] https://www.watershedhealth.org/larwmp
[3] http://sgrrmp.org/

channel; 2=medium/steady flow, higher volume, could carry a leaf; 3=heavy/high flow, large volume, could carry a stick. A full list of outfall locations is in Appendix B.

Complete field and laboratory protocols are available in Heal the Bay's Quality Assurance Project Plans (QAPP), which were approved by the U.S. EPA, reviewers from the California State Water Resource Control Board, and the City of L.A. Bureau of Sanitation and Environment, Environmental Monitoring Division.

Grading

Heal the Bay developed its own grading methodology to transform technical information into an easy-to-understand format. Grades are presented as Red, Yellow, or Green based on up to four parameters: single sample *E. coli* level, geometric mean *E. coli* level, single sample *Enterococcus* level, and geometric mean *Enterococcus* level.

- **Green:** Zero parameters exceeded; low risk of illness when there is water contact.
- **Yellow:** One to half of the parameters exceeded; moderate risk of illness when there is water contact.
- **Red:** More than half of the parameters exceeded; high risk of illness when there is water contact.

A single sample reflects the water quality at the time of sampling while a geometric mean gives an indication of water quality over the last 30-days; it is a type of average that is not as heavily affected by very high or very low values. For each parameter, the value was determined to be under or over the regulatory or health limit (Table 1).

	State Water Board Basin Plan Water Quality Objectives[a]		**U.S. EPA 2012 Recreational Water Quality Criteria[b]**	
			For illness rate of 32 per 1000	
Fecal Indicator Bacteria	Single Sample	Geometric Mean	Statistical threshold value (STV)	Geometric Mean
Enterococcus	N/A	N/A	**110 cfu/100ml**	**30 cfu/100ml**
E. coli	**235/100ml**	**126/100ml**	320 cfu/100ml	100 cfu/100ml

Table 1. *Limits for freshwater fecal indicator bacteria. Heal the Bay uses the bold limits in the River Report Card.*

[a] *State Water Resource Control Board Basin Plan for Coastal Watersheds of Los Angeles & Ventura Counties. Available at: https://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/basin_plan_documentation.html*
[b] *U.S. EPA. 2012. Recreational Water Quality Criteria. Available at: http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/upload/RWQC2012.pdf*

We used the geometric mean and single sample *E. coli* objectives for freshwater designated for water contact recreation (REC-1) from the State Water Board's Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties.[4] The State Water Board updated their bacteria objectives for *E. coli* in freshwater in August, 2018[5]. In our report, we used the standards that were in place during monitoring and will reassess the use of these standards in a future report. For *Enterococcus*, we used thresholds established in the U.S. EPA's 2012 Recreational Water Quality Criteria.[6]

Grades were issued approximately weekly (depending on sampling frequency) during summer months and were determined by the number of bacteria health limits that were exceeded. Sites were graded on the information that was available and the number of parameters varied from one to four, depending on whether both *E. coli* and *Enterococcus* were being measured and whether there were enough samples to calculate a geometric mean. Geometric means were calculated when there were a minimum of four samples within a 30-day period.

Los Angeles Trade Technical College students taking water samples in the L.A. River.

[4] https://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/basin_plan_documentation.html
[5] https://www.waterboards.ca.gov/bacterialobjectives/
[6] https://www.epa.gov/wqc/2012-recreational-water-quality-criteria-documents

LOS ANGELES COUNTY

L.A. River Sepulveda Basin Recreation Zone

Results

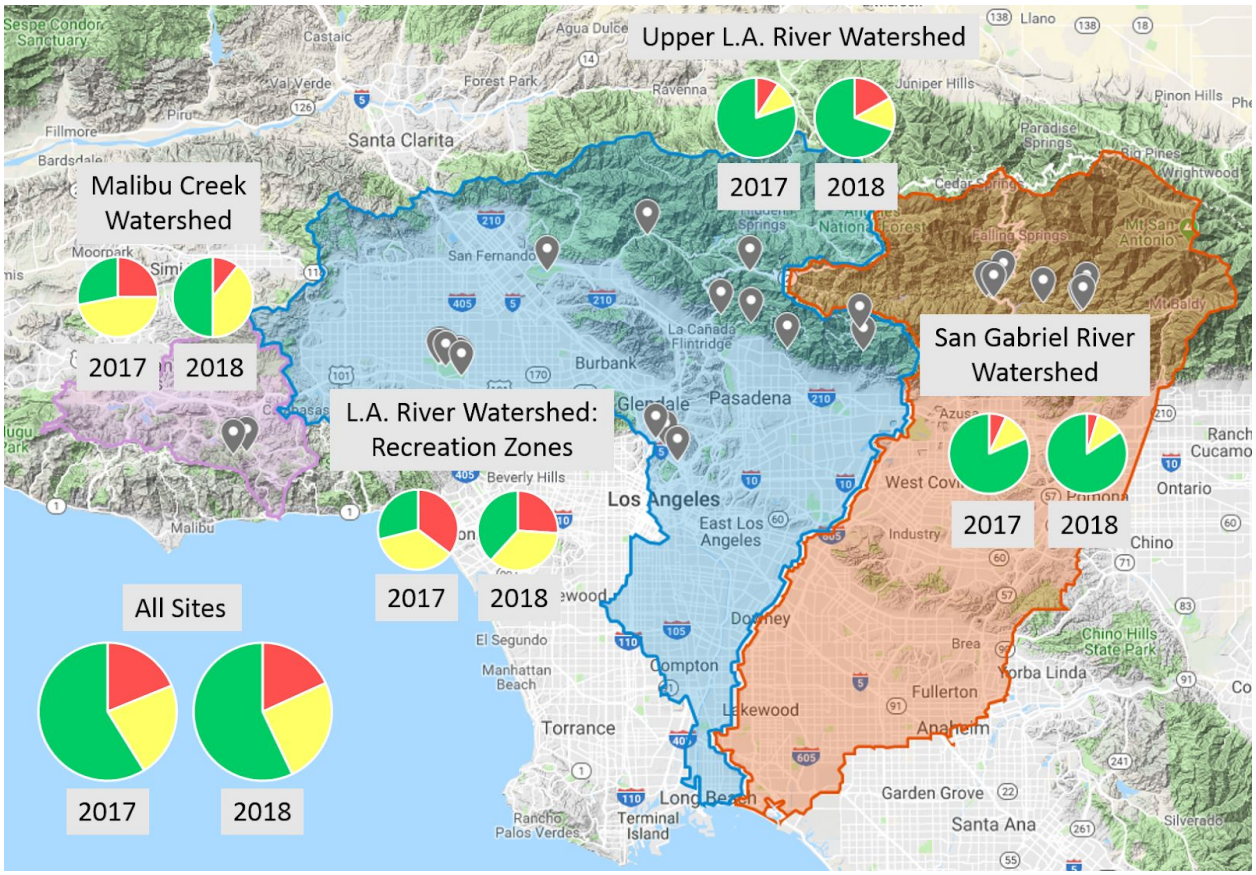


Figure 1: *2017 and 2018 water quality grade percentages for monitoring sites in L.A. County, Malibu Creek Watershed, L.A. River Watershed Recreation Zones, Upper L.A. River Watershed, and San Gabriel River Watershed. Percentages of Green, Yellow, and Red grades are shown for each area and season.*

Grades from 2018 are shown for all sites. Each site was compared to grades across all sites in L.A. County and across all sites in that watershed or zone. Sites were grouped by watershed except the L.A. River Watershed was further split into sites within the official recreation zones and popular swim sites outside of those recreation zones. Grades were also compared to previous years of monitoring (shown in Appendices C & D).

Additional results are available in Appendices E-I, including sample sizes, single sample exceedance numbers and rates, bacteria ranges, and geometric means are shown for each monitoring site and year.

Los Angeles County Overview

Across all 27 sites in 2018, 57% of grades were Green, 25% were Yellow, and 18% were Red (Figure 1). Sites in the L.A. River Watershed Recreation Zones received 38% Green, 36% Yellow, and 26% Red grades. The San Gabriel River Watershed had 84% Green, 11% Yellow, and 5% Red grades; the Upper L.A. River Watershed Sites had 80% Green, 11% Yellow, and 9% Red grades. Malibu Creek Watershed sites received 50% Green, 39% Yellow, and 11% Red grades in 2018 (Figure 1).

Of the 27 sites included in this study, 15 showed an increase in the percentage of Green grades issued from 2017 to 2018, indicating improvement (Appendices C & D).

The San Gabriel River Watershed had the highest number of sites that improved at five, in addition to two sites that had 100% Green grades in 2017 and 2018. Nine of the 27 sampling sites in this study showed a decrease in percentage of Green grades from 2017 to 2018, and of those, four were located in the Upper L.A. River Watershed (Appendices C & D).

Every watershed showed an overall increase in the proportion of Green grades issued from 2017 to 2018 except for the Upper L.A. River Watershed (Appendices C & D), which showed an overall decrease in Green grades by 10 percentage points.

While the L.A. River Watershed Recreation Zone sites had the lowest grades overall, including four of the ten sites on the Freshwater Fails list, the proportion of Green grades issued increased by nine percentage points.

The San Gabriel River Watershed had the smallest increase in Green grades with three percentage points so water quality did not change substantially in this watershed.

Malibu Creek Watershed showed the largest increase in the proportion of Green grades issued with 22 percentage points. Across the whole County, the proportion of Red grades issued from 2017 to 2018 decreased by one percentage point, and the percentage of Green grades issued decreased by two percentage points indicating a slight decrease in water quality across the board (Appendices C & D).

Freshwater Fails

Top 10 Freshwater Sites With High Risk

The Freshwater Fails list is comprised of the recreation sites that received the highest percentages of Red grades during the 2018 recreation season (Table 2). Eight of the ten sites on this list are located in the L.A. River Watershed. One site is in the Malibu Creek Watershed, and one is in the San Gabriel River Watershed. Hansen Dam had the worst water quality by far, receiving Red grades 80% of the time.

Rank	Site	Watershed	% Red
1	Hansen Dam*	Upper L.A. River Watershed	80
2	Rattlesnake Park	L.A. River Watershed: Recreation Zones	58
3	Sepulveda Basin at Burbank	L.A. River Watershed: Recreation Zones	42
4	Sepulveda Basin Middle*	L.A. River Watershed: Recreation Zones	40
5	Eaton Canyon*	Upper L.A. River Watershed	27
6	Steelhead Park	L.A. River Watershed: Recreation Zones	25
7	Las Virgenes	Malibu Creek Watershed	21
8	Bull Creek*	Upper L.A. River Watershed	20
9	Gould Mesa*	Upper L.A. River Watershed	19
10	Lower North Fork*	San Gabriel River Watershed	18

Table 2: *Freshwater recreation sites across L.A. County that received the highest percentages of Red grades from Heal the Bay during the 2018 recreation season. Sites marked with * were graded using only E. coli data.*

Honor Roll

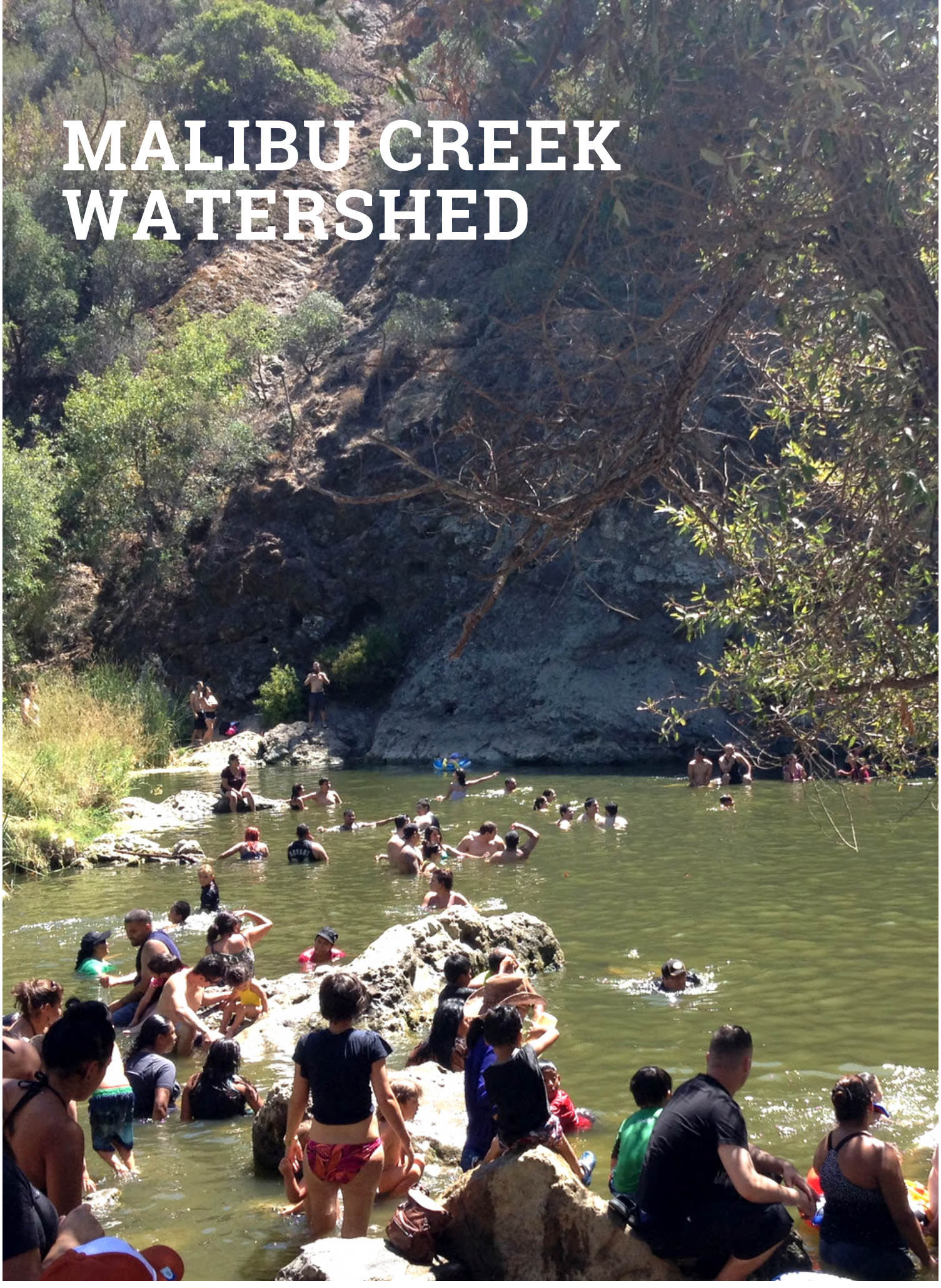
Top 10 Freshwater Sites With Low Risk

The Honor Roll is comprised of freshwater recreation sites with the highest percentages of Green grades issued during the 2018 recreation season. Six of the ten sites on this list are in the San Gabriel River Watershed. Four sites are are in the L.A. River Watershed; three are in the Upper Watershed and one is in the Sepulveda Basin Recreation Zone.

Rank	Site Name	Watershed	% Green
1-6	Upper North Fork*	San Gabriel River Watershed	100
1-6	Upper East Fork*	San Gabriel River Watershed	100
1-6	Upper Cattle Canyon*	San Gabriel River Watershed	100
1-6	Hermit Falls*	Upper L.A. River Watershed	100
1-6	East Fork at Cattle Canyon*	San Gabriel River Watershed	100
1-6	Big Tujunga*	Upper L.A. River Watershed	100
7-8	Switzer Falls*	Upper L.A. River Watershed	95
7-8	Sepulveda Basin Dam*	L.A. River Watershed: Recreation Zones	95
9-10	Upper West Fork*	San Gabriel River Watershed	94
9-10	East Fork at Graveyard*	San Gabriel River Watershed	94

Table 3: *Freshwater recreation sites across L.A. County that received the highest percentages of Green grades from Heal the Bay during the 2018 recreation season. Sites marked with * were graded using only E. coli data.*

MALIBU CREEK WATERSHED



Rock Pool in Malibu Creek State Park

Malibu Creek Watershed Overview

Heal the Bay has monitored two recreation sites in the Malibu Creek Watershed since 2014: Malibu Creek at the Rock Pool and Las Virgenes Creek at Crags Rd. bridge. The sites are swimming holes in Malibu Creek State Park, making them easy to access and popular for recreation.

Both sites are listed as impaired for bacteria by the State Water Board and U.S. EPA. The sites' grades are based on two FIB, *E. coli* and *Enterococcus.*

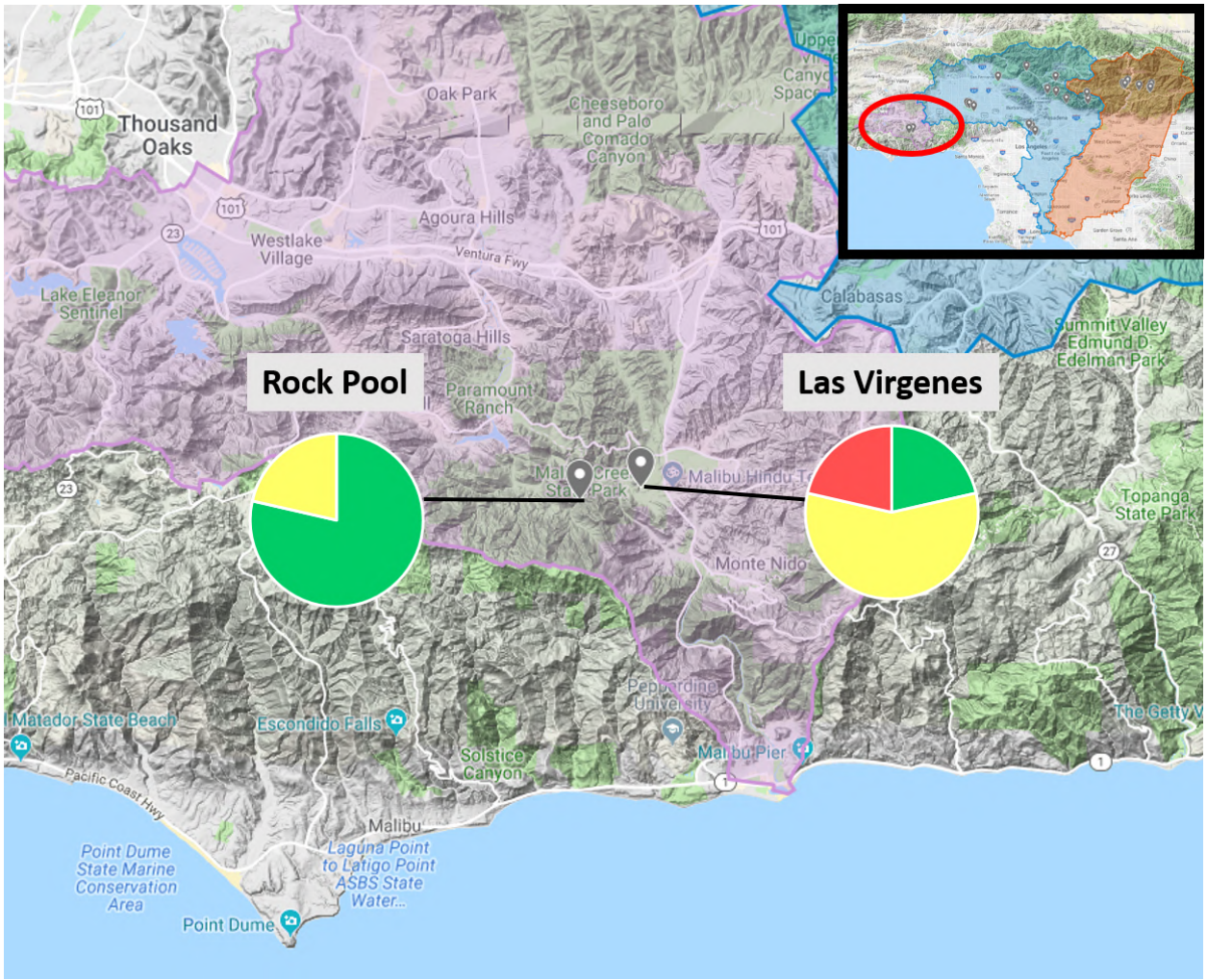


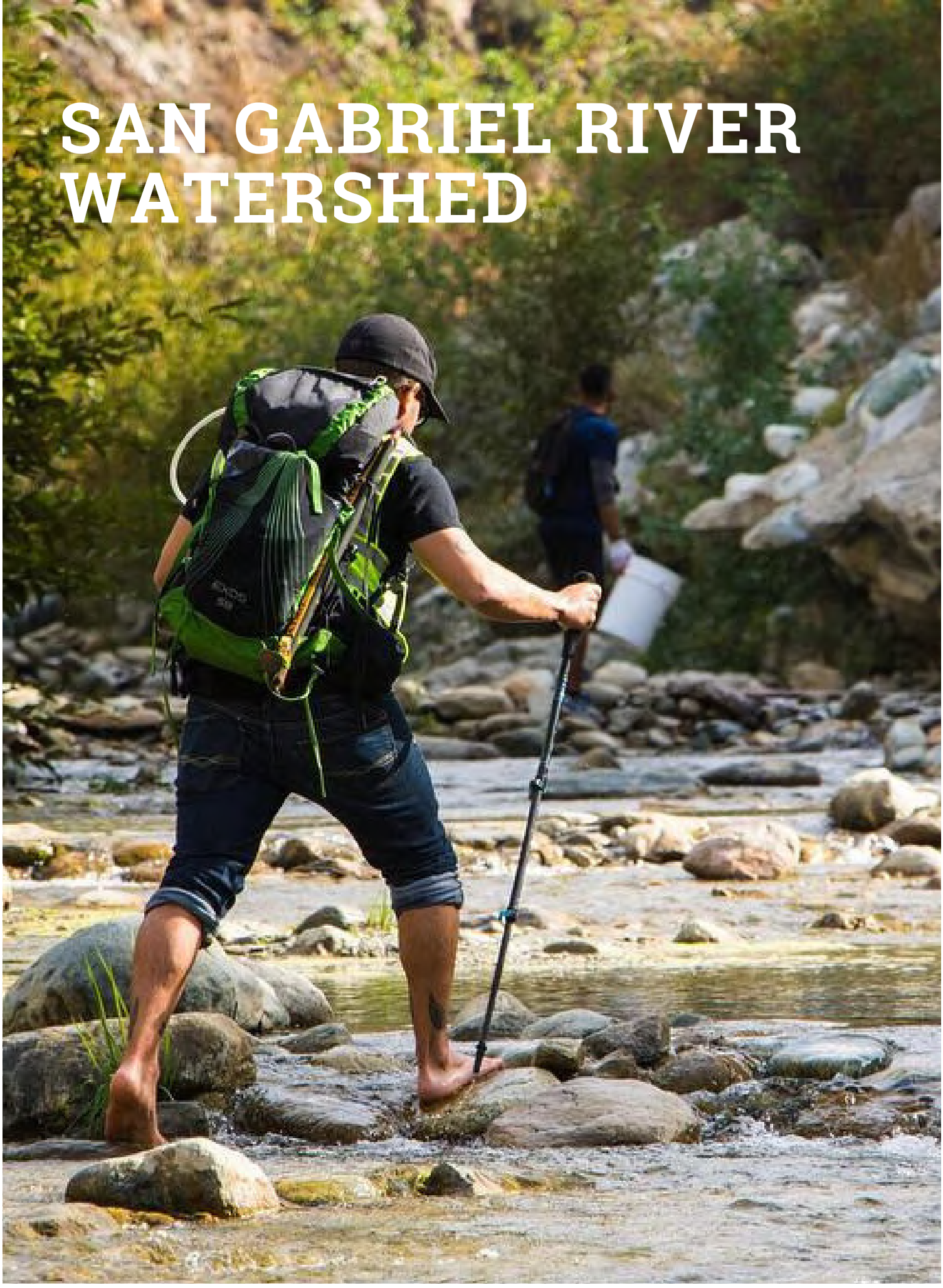
Figure 2: *Malibu Creek Watershed grade percentages for the 2018 monitoring season. Water quality grades were calculated using E. coli and Enterococcus data.*

The Rock Pool had 79% Green, 20% Yellow and zero Red grades in 2018 (Figure 2). This site had more Green grades when compared to all sites in the Malibu Creek Watershed (50%) and L.A. County (57%). Since 2014, the grades at Rock Pool have oscillated from year to year, but at least 33% of its grades have been Green every year with 2015 and 2018 receiving Green grades 80% of the time. This site only received Red grades during two of the five years of monitoring, and Red grades never comprised more than 13% of the grades issued throughout the season (Appendix C).

Las Virgenes had 21% Green, 57% Yellow and 22% Red grades in 2018 (Figure 2). This site had a below average proportion of Green grades when compared to all sites in Malibu Creek Watershed (50%) and L.A. County (57%). Las Virgenes has had lower grades over the past five years compared to Rock Pool. The majority of the grades issued have been Red or Yellow. Over 50% of the grades in 2015 and 2016 were Red, but the proportion of Red grades decreased below 20% in 2017 and 2018. This may suggest that the water quality is improving, however, the proportion of Green grades has not increased in the last three years (Appendix C).

Heal the Bay volunteer during a water quality monitoring visit in Malibu Creek Watershed at Las Virgenes.

SAN GABRIEL RIVER WATERSHED



San Gabriel River - Photo by Mark Davis

San Gabriel River Watershed Overview

The San Gabriel River Watershed contains nine sites that are commonly used for recreation within the Angeles National Forest. Water quality monitoring is conducted by the San Gabriel River Regional Monitoring Program, and includes testing for *E. coli* only. While there are many human visitors to these sites, the National Forest has little urban development upstream.

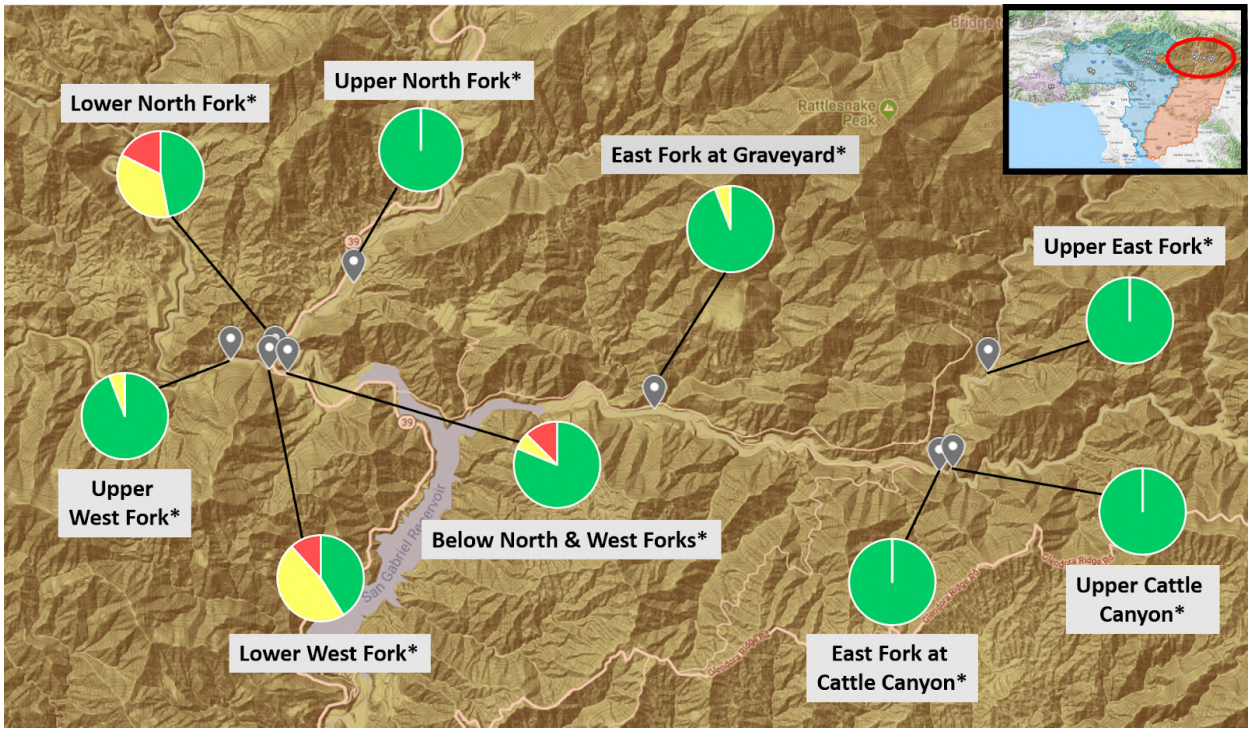


Figure 3: *San Gabriel River Watershed grade percentages for the 2018 monitoring season. Sites marked with * were graded using only E. coli data.*

Upper East Fork and Upper Cattle Canyon sites had 100% Green grades for 2018 (Figure 3). These sites also had 100% Green grades in 2017 (Appendix C). East Fork at Cattle Canyon and Upper North Fork were also issued 100% Green grades in 2018 (Figure 3). In 2017, these sites received some Yellow and Red grades, but they never made up more than 20% of the grades issued (Appendix C). All four of these sites had higher than average percentages of Green grades compared to the San Gabriel River Watershed (84%) and all sites in L.A. County (57%).

The Upper West Fork site received Green grades on 94% of the sampling days and Yellow for 6% in 2018 (Figure 3). This site had Green grades on 100% of the sampling days in 2017, so there was a slight decrease in water quality. However, this site was still issued a higher than average number of Green grades compared to the San Gabriel River Watershed (84%) and all sites in L.A. County (57%).

East Fork at Graveyard also received Green grades 94% of the sampling days and Yellow grades for 6% (Figure 3). This site improved slightly from 2017 when 11% of its grades were Red, and 89% were Green (Appendix C). All six of these sites received more Green grades on average than the San Gabriel River Watershed (84%) and all sites in L.A. County (57%).

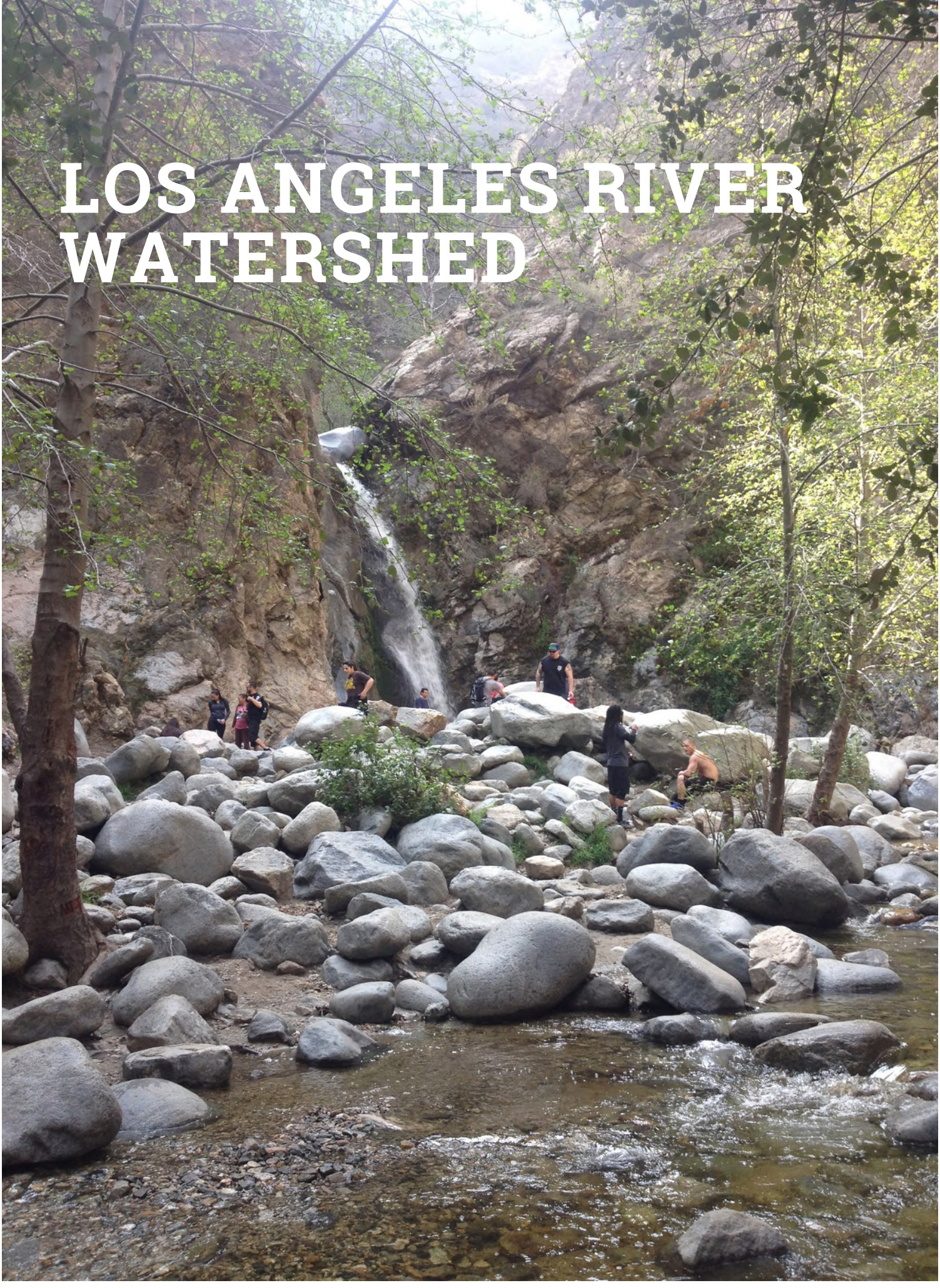
The San Gabriel River, below the North and West Forks site, received 81% Green, 6% Yellow and 13% Red grades in 2018 (Figure 3). The percentage of Green grades is slightly below that of the San Gabriel Watershed average (84%) but above average for all sites in L.A. County (57%). In 2017, this site had fewer Green grades (67%) and fewer Red grades (11%), so there was a slight improvement in 2018 (Appendix C).

The Lower West Fork site had 41% Green, 47% Yellow and 12% Red grades in 2018 (Figure 3). The percentage of Green grades is below average for all sites in the San Gabriel Watershed (84%) and L.A. County (57%). In 2017, this site had Green grades over 75% of the time, which means there was an overall decrease in water quality at this site (Appendix C).

The Lower North Fork site had 47% Green, 35% Yellow and 18% Red grades in 2018 (Figure 3) giving it a below average percentage of Green grades compared to the San Gabriel Watershed (84%) and L.A. County (57%). In 2017, this site had lower water quality with 28% Green grades and 28% Red grades issued over the summer (Appendix C).

A view along the San Gabriel River Bike Trail - Photo by Albert Licano

LOS ANGELES RIVER WATERSHED



Eaton Canyon Falls

Upper Los Angeles River Watershed Overview

Nine swimming sites in the L.A. River Watershed were monitored by LARWMP. These sites are in tributaries of the L.A. River Main Channel, and many of them are within the Angeles National Forest. Grades for these sites are based only on *E. coli*.

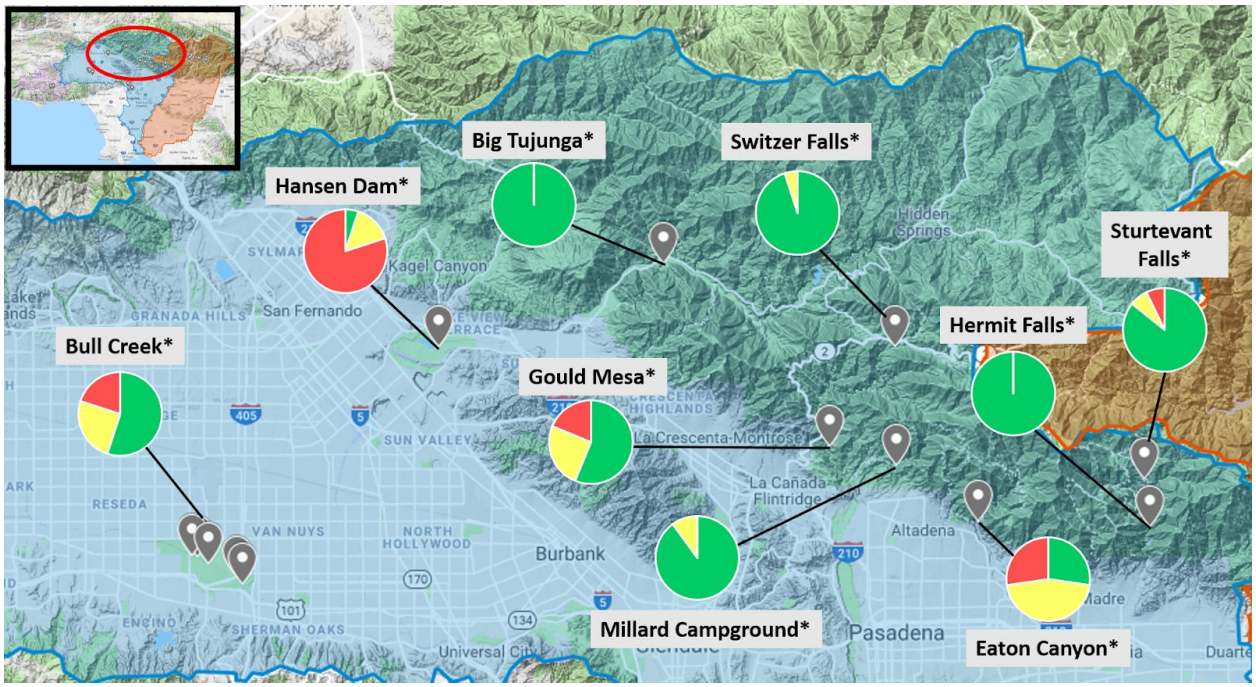


Figure 4: *L.A. River Upper Watershed grade percentages for the 2018 monitoring season. Sites marked with * were graded using only E. coli data.*

Hermit Falls received 100% Green grades during the 2017 and 2018 seasons (Figure 4 & Appendix C) indicating that it had a higher than average number of Green grades issued compared to all sites in the Upper L.A. River Watershed (70%) and L.A. County (57%).

The Big Tujunga site received 100% Green grades in 2018 (Figure 4), which is higher than the average percentage of Green grades for all sites in the Upper L.A. River Watershed (70%) as well as L.A. County (57%). Water quality showed a small improvement from 2017 when 94% of its grades were Green and 6% were Yellow (Appendix C).

Switzer Falls received 95% Green, 5% Yellow, and zero Red grades in 2018 (Figure 4), which is a higher percentage of Green grades on average than all sites in the Upper L.A. River Watershed (70%) and L.A. County (57%). The grade composition for this site in 2017 was similar with a slight increase in the number of Green grades in 2018 (Appendix C).

In 2018, Millard campground received 90% Green, 10% Yellow, and zero Red grades (Figure 4), which is higher than the average percentage of Green grades for all sites in the Upper L.A. River Watershed (70%) and L.A. County (57%). Water quality at this site

decreased slightly from 2017 when it was issued Green grades for 100% of the sampling days (Appendix C).

Sturtevant Falls received 86% Green, 7% Yellow and 7% Red grades in 2018 (Figure 4) which is higher than the average percentage of Green grades for all sites in the Upper L.A. River Watershed (70%) as well as all L.A. County sites (57%). The grade composition for this site in 2017 was similar with a slightly lower number of Green grades compared to 2018 (Appendix C).

Bull Creek received 55% Green, 25% Yellow and 20% Red grades in 2018 (Figure 4), which is a lower than average percentage of Green grades compared to all sites in the Upper L.A. River Watershed (70%) and L.A. County sites (57%). However, water quality did improve from 2017 when it only received Green grades for 44% of the sampling days (Appendix C).

Gould Mesa received 56% Green, 25% Yellow, and 19% Red grades in 2018 (Figure 4), giving it a lower than average percentage of Green grades compared to all sites in the Upper L.A. River Watershed (70%) and L.A. County sites (57%). Water quality decreased at this site from 2017 when 88% of the grades issued were Green, and only 12% were Red (Appendix C).

In 2018 Eaton Canyon received 27% Green, 45% Yellow and 28% Red grades (Figure 4), giving it a lower than average percentage of Green grades compared to all sites in the Upper L.A. River Watershed (70%) and L.A. County sites (57%). This is a large decrease in water quality from 2017 when 94% of its grades were Green, and only 6% were Red (Appendix C).

Hansen Dam received 5% Green, 15% Yellow and 80% Red grades in 2018 (Figure 4), giving it a lower than average percentage of Green grades compared to all sites in the Upper L.A. River Watershed (70%) and L.A. County sites (57%). Water quality in 2017 was slightly better with 35% Green grades, but 47% of the grades were still Red (Appendix C).

Los Angeles River Watershed Recreation Zones Overview

Heal the Bay monitored four sites in the Los Angeles River Watershed Recreation Zones; one site is in the Sepulveda Basin recreation zone and three sites are in the Elysian Valley recreation zone. These sites are kayak entry and exit locations, and were selected as locations where people were most likely to come into contact with the water.

The three Elysian Valley sites were also monitored by LASAN beginning in 2017. An additional three sites were monitored by LASAN in the Sepulveda Basin Recreation Zone in the San Fernando Valley as part of their monitoring for the Tillman Water Reclamation

Facility. In 2018, LASAN increased sampling to twice a week in the L.A. River Recreation Zones. The grades for sites monitored by Heal the Bay are based on *E. coli* and *Enterococcus,* while the grades for the sites that are only monitored by LASAN are based solely on *E. coli.* For the sites that are monitored by Heal the Bay and LASAN, grades are based on both fecal indicator bacteria, however, samples collected by LASAN were tested only for *E. coli.*

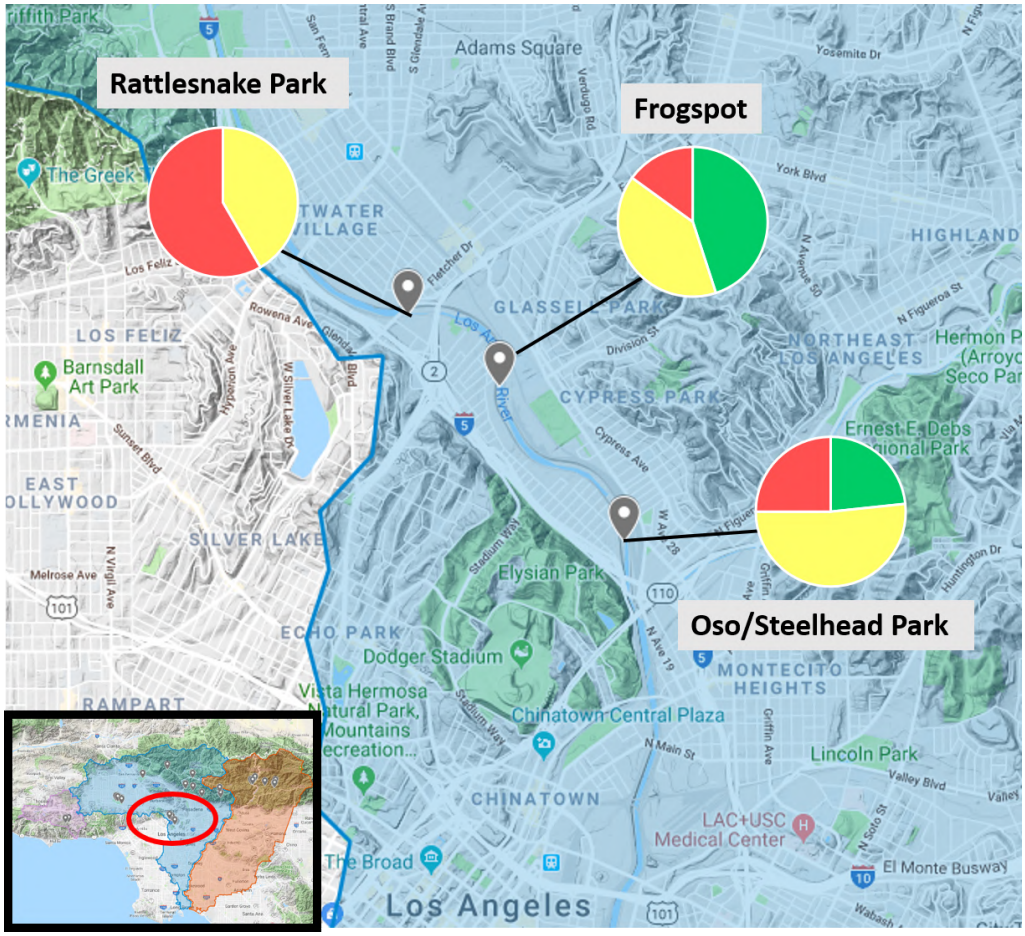


Figure 5: *L.A. River Watershed Elysian Valley Recreation Zone grade percentages for the 2018 monitoring season. Water quality grades were calculated using E. coli and Enterococcus data.*

For the 2018 season, the Elysian Valley Rattlesnake Park received zero Green, 42% Yellow and 58% Red grades (Figure 5). This is below the average percentage of Green grades for all L.A. River Watershed Recreation Zone sites (38%) and L.A. County sites (57%). Since 2015, Rattlesnake Park has had mostly poor water quality receiving no Green grades in three out of the last four years. The number of Red grades in 2018 declined from 2015 and 2016, possibly suggesting an improvement in water quality (Appendix C).

Frogspot (the middle location in the Elysian Valley) received 45% Green, 40% Yellow and 15% Red grades in 2018 (Figure 5). This site does have a higher proportion of Green grades than all L.A. River Watershed Recreation Zone sites (38%), but it is below average

when compared to all sites in L.A. County (57%). Since 2016, Frogspot has seen an improvement in water quality. In 2016, no Green grades were issued for the site, but the number of Green grades increased to 32% in 2017 and 45% in 2018 (Appendix C).

In 2018, Steelhead Park (the most downstream location and kayak exit spot in the Elysian Valley) received 23% Green, 52% Yellow and 25% Red grades (Figure 5). This is below the average number of Green grades for all L.A. River Watershed Recreation Zones sites (38%) and all L.A. County sites (57%). Steelhead Park has improved slightly since 2015 as the number of Red grades issued has decreased. However, the number of Green grades has not increased substantially (Appendix C).

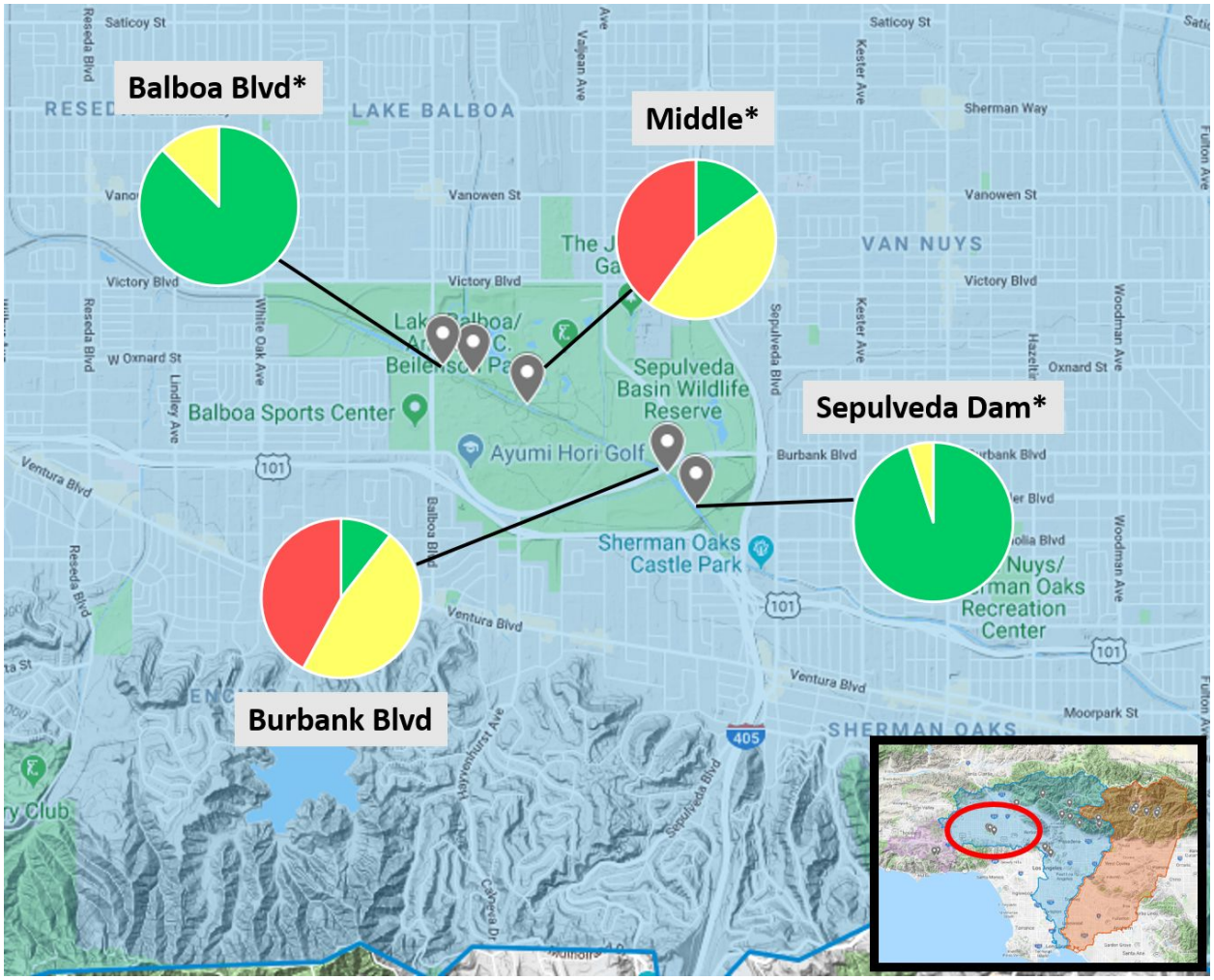


Figure 6: *L.A. River Watershed Sepulveda Basin Recreation Zone grade percentages for the 2018 monitoring season. Sites marked with * were graded using only E. coli data.*

The Sepulveda Basin site at Balboa Blvd received 87% Green, 13% Yellow and zero Red grades during the 2018 monitoring season (Figure 6). This is better than the average percentage of Green grades for all sites in the L.A. River Watershed Recreation Zones (38%) and L.A. County (57%). The 2018 grades for this site are a major improvement from 2017 when the site received Red or Yellow grades 75% of the time (Appendix C).

The Middle site at Sepulveda Basin received 15% Green, 45% Yellow and 40% Red grades in 2018 (Figure 6). This is lower than the average Green grade percentage for all L.A. River Watershed Recreation Zone sites (38%) and all L.A. County sites (57%). The Middle site experienced a decrease in water quality from 2017 to 2018 as the number of Green grades decreased from 48% to 15% in 2018 (Appendix C).

In 2018, the Sepulveda Basin site at Burbank Blvd received 11% Green, 42% Yellow and 43% Red grades (Figure 6), giving it a lower than average percentage of Green grades compared to all sites in the L.A. River Watershed Recreation Zones (38%) and L.A. County (57%). Since 2015, the number of Green grades decreased from 20%, and the number of Red grades increased from 20%. The majority of this site's grades have been Yellow in all years of monitoring (Appendix C).

The Sepulveda Dam site received 95% Green, 5% Yellow and zero Red grades in 2018 (Figure 6). This is better than the average proportion of Green grades for all L.A. River Watershed Recreation Zone sites (38%) and L.A. County sites (57%). This site had a large improvement of water quality compared to 2017 when 48% of the grades issued were Green, and 19% were Red (Appendix C).

Los Angeles River Watershed Storm Drain Outfalls Overview

Beginning in 2017, Heal the Bay investigated sources of bacterial pollution impacting the recreation zones in the L.A. River by monitoring storm drain outfalls in the Elysian Valley Recreation Zone (Appendix B). We monitored storm drains for twelve weeks in 2017 and eight weeks in 2018. The Fletcher storm drain outfall was monitored for more time because it was located directly upstream from a regular in-stream site, Rattlesnake Park.

We compared bacteria levels to the thresholds in Table 1 even though these values are typically only used for ambient water quality and not outfalls. We found that many storm drains were consistently flowing throughout the summer despite little rainfall, and many of these storm drains had high levels of *E. coli* and *Enterococcus* (Figure 7 and Appendices B and I). For instance, SDL10 and SDL30 had consistent flows and levels of FIB were over the thresholds in every sample that was taken. SDL40, SDL50, Fletcher, SDR30, SDR20, and SDR10 all had fairly regular flows and high levels of FIB. Interestingly, water quality at Fletcher storm drain worsened in 2018 compared to 2017, with both *E. coli* and *Enterococcus* levels and exceedances increasing in 2018. Storm drains SDR20, SDR30, SDL10, SDL30, SDL40, and SDL50 are larger storm drains (diameter or length is approximately 7 ft. or larger). Storm drains that had the highest average flows included: SDL50, Fletcher, SDL40, SDR30, and SDL30 (Appendix B).

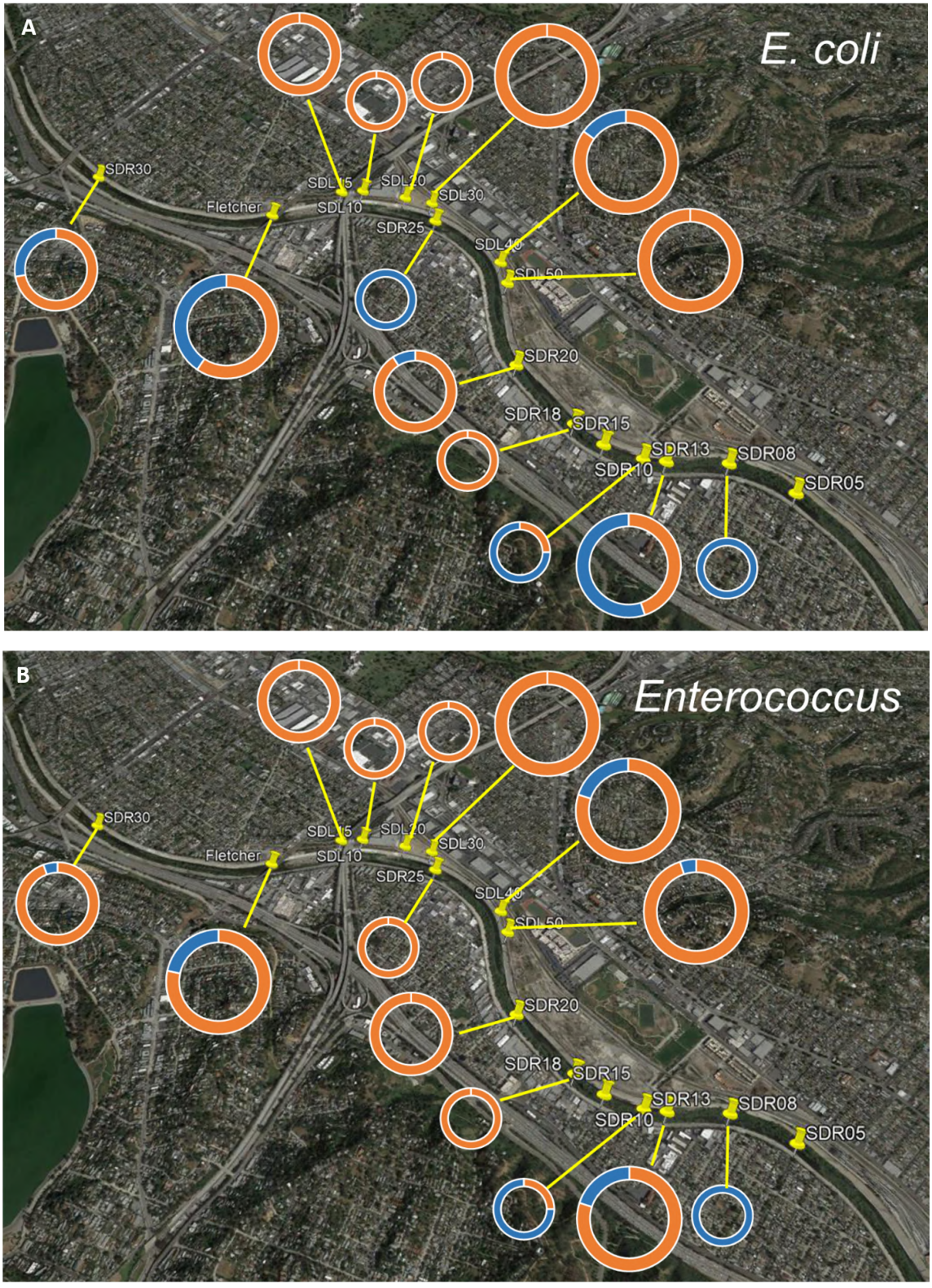


Figure 7: *Rates of fecal indicator bacteria exceedances at storm drain outfalls in the Elysian Valley Recreation Zone of the L.A. River. Samples were combined from collection in the summers of 2017 and 2018. The pie charts show the percentage of samples that exceeded the thresholds in orange and the percentages of samples that did not exceed the threshold in blue. The sizes of the pie charts correspond to the number of samples taken; small=1 to five samples taken, medium=6 to 19, large=20 to 37. Exceedance rates are shown for A) E. coli and B) Enterococcus.*

Conclusions

Most water quality grades are Green in natural environments and Red in developed areas.

Bacteria levels are generally below the regulatory standards on any given dry-weather day and there is a low risk of illness when coming into contact with the water. However, there is still a significant risk of getting sick from water contact 43% of the time during dry weather, which is high. To protect public health in these valuable recreational areas, government agencies must increase water quality monitoring and public notification while improving water quality at these sites.

Areas with urban development tended to have lower grades than natural areas, and most sites on the Freshwater Fails list are in urban landscapes (Table 2). The sites in the L.A. River Watershed Recreation Zones are primarily surrounded by development and tended to have lower grades than the other sites in this report. This pattern is also supported by the results from our storm drain outfall monitoring in the L.A. River Watershed Elysian Valley Recreation Zone. We found that many storm drains were flowing consistently in dry weather and had high levels of bacteria, acting as sources of contamination to the L.A. River Watershed Recreation Zones. Sites in the San Gabriel River Watershed and Upper L.A. River Watershed are in less developed areas and are likely not impacted by urban runoff. Unsurprisingly, the Honor Roll mainly consists of sites in these areas.

In the future, there should be more sites on the Honor Roll that are located in urban landscapes, and there should be more than six sites in L.A. County that receive 100% Green grades. The percentages of Red grades for sites on the Freshwater Fails list should decrease as well. County and municipality officials must continue to work on mitigating the impacts that runoff has on water quality.

While some areas improved, there is a general downward trend.

Three out of the four watersheds included in this study had increases in the proportion of Green grades issued from 2017 to 2018, but across the whole County the proportion of Red grades issued from 2017 to 2018 decreased by one percentage point, and the percentage of Green grades issued decreased by two percentage points. Therefore, despite the increases in water quality, the decreases observed outweighed them. For example, most of the sites on the Freshwater Fails list show a downward trend in water quality, indicating that water quality is getting worse in sites that already have poor water quality. Meanwhile, the San Gabriel River Watershed did have an increase in the proportion of Green grades, but it was not large (three percentage points).

The number one Freshwater Fail site, Hansen Dam, received only one Green grade in 2018, indicating that bacteria levels were over the limit every day except one. In addition, this site decreased in water quality from 2017 when it had Green grades issued 35% of the time. The number two Freshwater Fail site, Rattlesnake Park, received zero Green grades in 2018, indicating that there was an exceedance every day this site was monitored. Similar to Hansen Dam, Rattlesnake Park also experienced a large (31 percentage points) decrease from 2017 in the number of Green grades issued. In total, six of the ten sites on the Freshwater Fails list experienced a decrease in water quality from 2017 to 2018. This is an alarming trend that must be reversed to protect public health.

There are differences between *E. coli* and *Enterococcus.*

Grades that included *Enterococcus* as an indicator were generally lower than grades with only *E. coli* and caution should be used when directly comparing grades for sites using different fecal indicator bacteria. For sites where we had both *Enterococcus* and *E. coli* data, we graded both indicators and found that grades worsened with both indicators compared to when we graded with *E. coli* only (Figure 8).

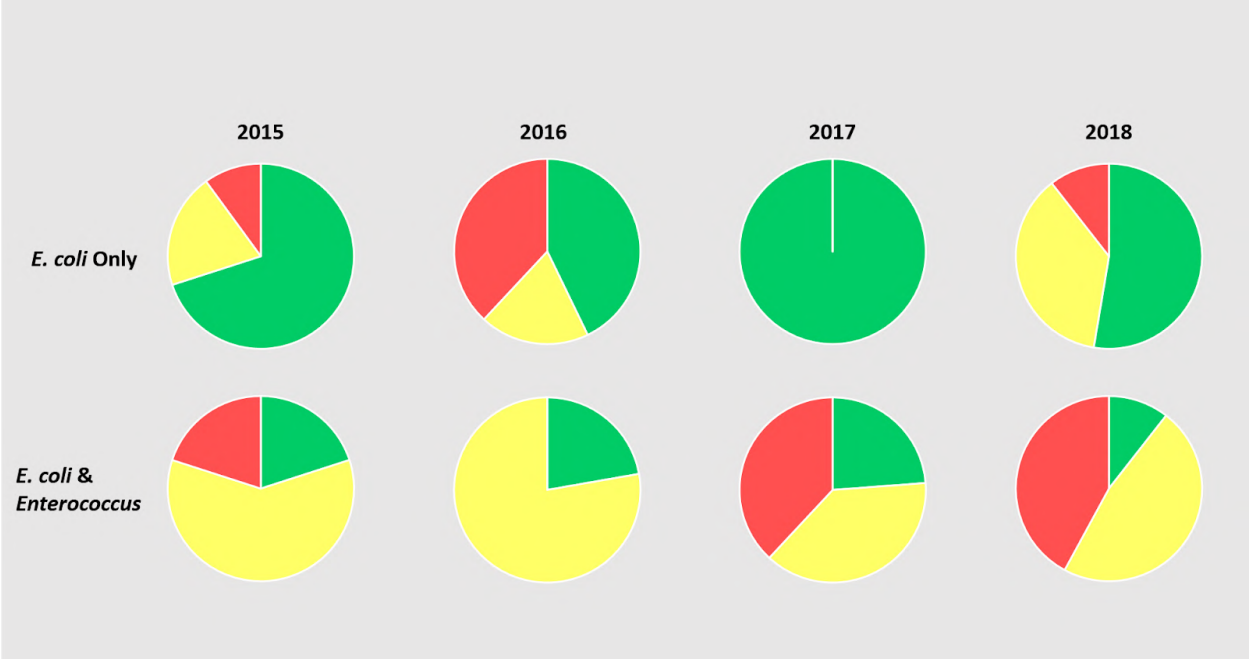


Figure 8: *Differences in grade composition between E. coli only data and E. coli & Enterococcus combined data for the Sepulveda Basin site at Burbank Blvd. across all monitoring years.*

This is likely due to the high exceedance rates of *Enterococcus* for both single samples and the geometric mean. Despite this, six of the ten sites on our Freshwater Fails list (including the #1 Freshwater Fails site) are only monitored for *E. coli*. Therefore, including *Enterococcus* in our grades is not the driver of poor water quality in this study.

This is also backed up by the strong trend we observed in land use and water quality. There were very few *E. coli* exceedances independent of an *Enterococcus* exceedance, but there were many *Enterococcus* exceedances that were not coupled with *E. coli* exceedances. We draw two conclusions from this: 1) *Enterococcus* is a good indicator because *Enterococcus* exceedances capture nearly all of the *E. coli* exceedances; 2) *E. coli* is a less protective indicator because there can be high levels of *Enterococcus* on days where *E. coli* measurements are low. Solely monitoring for *E. coli* might be putting the public at unnecessary risk.

Successes

In the years since Heal the Bay started monitoring freshwater recreation areas and publicizing the results, water quality monitoring and public notification by government agencies has improved. LASAN added monitoring locations in the L.A. River Recreation Zones in 2017 at Heal the Bay's urging and are now testing water quality twice a week for the entire recreation season. LASAN has posted signs along the Los Angeles River notifying users of the potential health risks of coming into contact with the water.

Water quality warning sign posted in the L.A. River Watershed Recreation Zones by LASAN.

LASAN has also since developed a water quality notification and site closure protocol, as well as a website[7] sharing data and closure information. The L.A County Department of

[7]https://www.lacitysan.org/san/faces/home/portal/s-lsh-wwd/s-lsh-wwd-wp/s-lsh-wwd-wp-ewmp/s-lsh-wwd-wp-ewmp-wq/s-lsh-wwd-wp-ewmp-wq-larq?_afrLoop=4184786752395285&_afrWindowMode=0&_afrWindowId=null&_adf.ctrl-state=10azldfn1z_1#!%40%40%3F_afrWindowId%3Dnull%26_afrLoop%3D4184786752395285%26_afrWindowMode%3D0%26_adf.ctrl-state%3D10azldfn1z_5

Public Health now has a web page[8] devoted to educating the public about recreational water quality in rivers, streams, and lakes. The SGRRMP began distributing water quality data via email to interested stakeholders in 2018 and the Program is exploring options to post data online as it is collected.

Heal the Bay will continue to work with LARWMP, LASAN, SGRRMP, and L.A. County Department of Public Health to improve monitoring and public notification. Heal the Bay is also part of the State Water Board's Inland Beaches Working Group, which will provide guidance to water quality monitoring agencies statewide.[9]

Heal the Bay has partnered with Los Angeles Trade Technical College (LATTC) for the last two years, hiring students to monitor, analyze, and present L.A. River water quality information. Students learn valuable field and lab techniques, make presentations about their work to schools and stakeholders, and train new team members in water quality monitoring and data analyses.

Recommendations

Given the lack of oversight of freshwater swimming and recreation areas by the State, and the lack of consistency in public notification, Heal the Bay recommends the following actions to protect beneficial uses and public health.

1. Additional outreach and education

Outreach and education about water quality in freshwater recreation areas needs to be improved, especially with communities and groups that live near and use these areas. The public has a right to know about water quality in order to make informed decisions about how they enjoy rivers and swimming holes. Specifically, we recommend the following:

Water quality information should be readily available to the public.

At a minimum, all sites should have permanent signs in English and Spanish that incorporate universal symbols and provide web links to additional resources and information. Further, freshwater recreational sites should be "posted", similarly to beaches. This means that a sign is posted when a single sample or geometric mean has been exceeded for any indicator bacteria. Posting would entail signs being put up and taken down throughout the summer season depending on water quality. Heal the Bay will continue to make water quality data and color grades available on our River Report

[8] http://publichealth.lacounty.gov/eh/EP/rw/rw_freshwaterswimarea.htm
[9] https://mywaterquality.ca.gov/monitoring_council/swim_workgroup/inland_beaches.html

Card website at healthebay.org/riverreportcard and promote the website through public events, talks, social media, and partners.

The City of L.A. has posted informational signs in the recreation zones of the L.A. River Watershed, developed monitoring and notification protocols for the L.A. River, and launched a website[10] that provides water quality data and information about river closures in the Recreation Zones. These are positive steps and should be carried out for other freshwater recreation areas as well.

Unfortunately, the freshwater recreation areas in the Upper L.A. River, the San Gabriel River, and the Malibu Creek Watersheds do not have signs in place to inform the public of water quality conditions or how to obtain information. Landowners such as California State Parks and the U.S. Forest Service must work with L.A. County Department of Public Health and other stakeholders to design and post signs.

Sewage spills happen frequently in L.A. County and can create dangerous conditions for people coming in contact with waterbodies downstream from spills. Public agencies and municipalities must refine and update their sewage spill notification protocols to prioritize coordination and public notification. The public should be notified immediately on agency websites and with signs posted at the recreation sites if there has been a sewage spill. The sewage spill protocol should also apply to areas outside of recreation zones including beaches as sewage will travel downstream. Further, because waterbodies such as the L.A. River pass through many cities, coordination is needed among municipalities on reporting sewage spills and ensuring that information is shared with the public.

Swimmers, waders, anglers, and kayakers can follow best practices to minimize their risk of getting sick.

We recommend that people heading to freshwater recreation areas check out Heal the Bay's River Report Card before visiting. If water quality is poor (Yellow or Red), people should consider choosing a site that has good water quality, if possible. A user can minimize risk by limiting water contact, avoiding submerging their head underwater, avoiding hand-to-face water contact, and washing off after contact using soap and water.

For all water recreation, users should avoid entering the water with an open wound, if immunocompromised, or after a rainfall. Official regulatory signage posted nearby should always be followed. Swimming is prohibited in the L.A. River main channel.

[10]https://www.lacitysan.org/san/faces/home/portal/s-lsh-wwd/s-lsh-wwd-wp/s-lsh-wwd-wp-ewmp/s-lsh-wwd-wp-ewmp-wq/s-lsh-wwd-wp-ewmp-wq-larq?_afrLoop=4185502393798245&_afrWindowMode=0&_afrWindowId=null&_adf.ctrl-state=10azldfn1z_74

2. Improvements to water quality monitoring

We are pleased that a large number of swimming and recreational sites are currently being monitored for water quality during summer months on a weekly basis or even more frequently. Continuous assessment is needed to identify areas that are being used by the public, but are not being monitored. For instance, sites in the L.A. River Recreation Zones were selected based on kayak entry and exit spots. There are additional locations that are popular with anglers, which could be good locations for monitoring. Further, we appreciate that data is now being shared publicly as it is being collected by LASAN, LARWMP, and SGRRMP. Prior to 2017, water quality data was being collected but was not shared with the public in a timely manner.

Water quality monitoring and messaging should be standardized and protective of public health.

Despite the fact that monitoring is occurring, there is little standardization among programs, or oversight by the State. For ocean beaches, the Beach Water Quality Act, Assembly Bill 411, passed in 1998 and created statewide standards for beach water quality, established a public notification and closure system, and mandated beach water quality monitoring. Similar legislation is needed for freshwater recreation areas, to provide standardized monitoring, notification, and closure procedures with clear direction on responsible agencies and funding sources.

Current monitoring across L.A. County is not standardized, and the monitoring by LASAN, LARWMP, and SGRRMP only includes *E. coli*, which is in accordance with the State of California bacterial objectives for freshwater recreation. However, the U.S. EPA does have criteria for *Enterococcus* for freshwater recreation[11]. Studies have shown that *E. coli* and *Enterococcus* behave similarly in freshwater, so it is premature to discount *Enterococcus* and only monitor *E. coli*[12,13]. Additionally, there have been no current epidemiological studies conducted that support dropping *Enterococcus* as a FIB in freshwater. These lines of evidence, along with our results on the differences between *E. coli* and *Enterococcus*, indicate that solely monitoring for *E. coli* may not adequately protect public health. New FIB objectives should be developed as long as they are supported by epidemiological studies that show a strong correlation between illness and the presence of FIB. Until more research is done, *Enterococcus* should be used as a FIB in addition to *E. coli* for freshwater recreation.

[11] https://www.epa.gov/wqc/2012-recreational-water-quality-criteria-documents
[12] Odonkor, S. T., J. K. Ampofo. *Escherichia coli* as an indicator of bacteriological quality of water: an overview. 2013. Mibiology Research volume 4:e2
[13] Byappanahalli, M. N., M. B. Nevers, A. Korajkic, Z. R. Staley, V. J. Harwood. Enterococci in the Environment. 2012. Microbiology and Molecular Biology Reviews volume 76: 685-706.

Messaging about water quality by LASAN is not adequately protective of public health. LASAN and LARWMP monitor 15 sites in the L.A. River Watershed and provide data and advisories for those sites on a website.[14] Currently, these monitoring programs do not calculate or display a geometric mean, as advised by the State. The bacterial objectives for the State require advisories to be based on geometric means rather than single samples, because the means indicate long-term trends in FIB counts and are not readily skewed by infrequent spikes or drops in bacteria levels. LASAN and LARWMP should measure *E. coli* and *Enterococcus* and use geometric mean calculations as well as single sample measurements when issuing advisories.

The Limited REC-1 standard used by LASAN is not appropriate in the L.A. River. The L.A. River is designated with the beneficial use of REC-1 in the Basin Plan[15] and this is the standard that should be consistently applied. On the City of L.A.'s public notification website, sites that exceed the single sample REC-1 limit for *E. coli* (235 MPN/100ml) are colored yellow with a gray background, and sites that exceed the Limited REC-1 standard (576 MPN/100ml) are colored red. While kayaking may be less likely to result in full water contact compared to swimming, it still fits within the REC-1 definition of "activities involving body contact with water, where ingestion of water is reasonably possible". REC-1 includes "swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs."[16] There should be more rigorous and protective grading methodologies when sites are in exceedance of the single sample or geometric mean REC-1 standard for any FIB.

Heal the Bay's River Report Card grading methodology is continually being refined.

The River Report Card grading methodology is continually assessed and refined to more accurately reflect the risk of illness due to poor water quality. Our current method relies on binary assessments of water quality data where each parameter either exceeds or does not exceed an objective. A sample that is slightly higher than the objective is treated the same as a sample that is much higher than the objective. Since a higher concentration of bacteria equates to poorer water quality, we may revise the grading methodology to take into account the degree to which an objective is exceeded. Further, similar to our Beach Report Card, we may choose to differentially weight bacterial indicators, as well as single sample and geometric mean values, based on the scientific literature and threat to public health. We may also explore assigning A-to-F letter grades

[14]https://www.lacitysan.org/san/faces/home/portal/s-lsh-wwd/s-lsh-wwd-wp/s-lsh-wwd-wp-ewmp/s-lsh-wwd-wp-ewmp-wq/s-lsh-wwd-wp-ewmp-wq-larq?_afrLoop=4185502393798245&_afrWindowMode=0&_afrWindowId=null&_adf.ctrl-state=10azldfn1z_74#!%40%40%3F_afrWindowId%3Dnull%26_afrLoop%3D4185502393798245%26_afrWindowMode%3D0%26_adf.ctrl-state%3D10azldfn1z_78

[15] https://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/

[16]https://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/electronics_documents/Chapter2Text.pdf

instead of color grades. Additionally, we plan to assess the effects of season and temperature, as well as the number of users, on water quality. The methodology for our Beach Report Card changed and evolved over time and was vetted by a Technical Advisory Committee as well as the State Water Resources Control Board. We envision a similar process for our River Report Card.

3. Source investigation, identification, and abatement of pollution

Pollution abatement can occur through a variety of mechanisms, such as enforcement, best management practices (BMPs), education, and behavioral changes. Actions can be led by government agencies, non-profits, or community members and can take place through a regulatory process or non-regulatory process. Pollution abatement typically requires identifying and prioritizing pollution sources.

We recommend source investigation and identification analyses to elucidate sources of bacterial pollution in freshwater recreation sites with poor water quality to develop specific plans for water quality improvements.

Heal the Bay initiated some of this work by conducting storm drain monitoring in the Elysian Valley of the L.A. River. Based on our bacteria results in conjunction with storm drain size, consistency and volume of flow, we prioritized storm drains for possible best management practices (BMPs) and analyses (see storm drain locations in Appendix B, and bacteria data in Appendix I):

- Highest Priority Storm Drains: SDL50, SDL40, SDL30, SDR30
- High Priority Storm Drains: SDR20, Fletcher, SDL10
- Medium Priority Storm Drains: SDR10

Measures should be taken at these storm drains to stop runoff from entering the River or alternatively to clean the water. The sub-watersheds draining to these storm drains need to be identified and sources of water (such as landscaping, washing sidewalks, illegal connections or discharges) should be addressed through community education, outreach, and enforcement, if appropriate. Possible BMPs could also be installed such as bioswales or rain gardens to treat the water before it enters the River. The runoff could also possibly be diverted to the sewer system for treatment.

Given that recreational use in the Los Angeles River has changed drastically since 2008, there is an increased urgency to improve water quality and see results of bacterial abatement measures. Any effort to reduce bacterial inputs in the short-term should be fully explored, particularly in dry weather. We recommend additional storm drain monitoring at other freshwater recreation sites. For many of the sites in more natural areas, runoff from the storm drain system is not the likely culprit and would not

necessarily be helpful in source identification. We also recommend that microbial source tracking studies be conducted at freshwater recreation areas in L.A. County. Modern techniques exist for bacterial source identification that use genetic methods to identify whether fecal contamination is from humans, birds, dogs, or other animals. Identification of sources can help assess risk levels and identify solutions to lowering pollution levels. It is also important to note that bacterial pollution from animals and wildlife is not necessarily without risk to humans.[17]

Best management practices can also include providing services that result in reduced pollution. For instance, many of the swim sites in the Upper L.A. River, San Gabriel River, and Malibu Creek Watersheds are lacking in services such as restrooms or trash cans. Sites are heavily visited in the summer months and without these basic services, it is no surprise that water quality is poor at many locations.

The SGRRMP found that bacteria levels were higher at all San Gabriel River sites on weekends and holidays, times when visitorship also increased.[18] We encourage landowners like the U.S. Forest Service and California State Parks to provide additional services to visitors to improve water quality as well as the overall visitor experience.

Many of L.A. County's waterways and riparian corridors are used for shelter and basic needs of washing and drinking by people experiencing homelessness. Without access to clean water and sanitation, this community can be disproportionately affected by and may unintentionally contribute to poor water quality. With the recent passage of L.A. City and L.A. County funding measures meant to provide services and housing to people experiencing homelessness, basic services must be provided for those living along and using our waterways. Drinking water, showers, and restrooms should be available to all people and would protect the health of all users of L.A. County waterways.

L.A County and cities must also comply with water quality permits and regulatory plans in a timely manner. Many of the waterbodies that are used for freshwater recreation have plans in place to address bacterial pollution, known as Total Maximum Daily Loads (TMDLs). The TMDL for bacteria in the Malibu Creek Watershed has a compliance date of January 24, 2012 for dry weather; as of that date, with weekly sampling, streams in that watershed (like Las Virgenes Creek and Malibu Creek/Rock Pool) are allowed *one* single sample exceedance of *E. coli* annually during dry weather, but we found 2-5 exceedances of *E. coli* every summer in Las Virgenes Creek since 2014. The San Gabriel and Los Angeles Rivers also have bacteria TMDLs in place but their final compliance dates have not passed yet. The final compliance deadline for the San Gabriel River is not

[17] Soller, J. A., M. E. Schoen, T. Bartrand, J. E. Ravenscroft, N. J. Ashbolt. 2010. Estimated human health risks from exposure to recreational waters impacted by human and non-human sources of faecal contamination. Water Research 44: 4674-4691.
[18] http://sgrrmp.org/

until 2026 for dry weather. For the Los Angeles River Watershed, compliance with the Bacteria TMDL varies by reach; dry weather compliance for some tributaries is in 2023 but not until 2030 for some of the Recreation Zones, with the final wet weather compliance for all reaches by 2037. More immediate water quality improvements and pollution abatement, particularly in areas utilized by the public for recreation, are needed.

In addition to TMDL compliance, a strong municipal stormwater permit is essential to addressing sources of pollution to freshwater recreation areas. Urban runoff remains the number one source of coastal pollution and is the main reason many of our beaches, rivers, and creeks remain chronically polluted. Each day roughly 10 million gallons of urban runoff flow through L.A. County storm drains, picking up pollutants and eventually reaching the Pacific Ocean without the benefit of any treatment. On a rainy day, that volume can escalate to 10 billion gallons. To fully realize healthy watersheds, we must address urban runoff.

Cities are held responsible for their urban runoff and the associated pollutants through the Los Angeles County municipal stormwater permit, or MS4 permit. The MS4 permit is renewed every five years and is now being updated for renewal in 2020. The updated permit should be simple and clear in its requirements, measurable to ensure compliance, and enforceable to encourage action before TMDL deadlines lapse. The existing permit accepts planning efforts (e.g. modeling for project development) instead of requiring cities meet applicable water quality objectives. In many cases, project development has been significantly delayed, postponing actions necessary to achieve water quality improvements in our waterways.

4. Support for multi-benefit watershed health projects

Heal the Bay's science, policy, and outreach team works to ensure stormwater management includes nature-based, multi-benefit solutions that increase and improve green space while capturing runoff for local re-use or recharging groundwater. This includes working with state and local governments to find creative ways to fund stormwater programs that capture and treat polluted runoff and then recycle it or use it to recharge our aquifers.

A recent success for L.A. County's water quality was the passage of Measure W in November 2018. Heal the Bay played an integral role in the passing of Measure W, which will fund stormwater improvement projects around the County. Heal the Bay, and the OurWaterLA Coalition that we belong to, are currently working on obtaining seats on various Measure W committees to ensure that nature-based, equitable, and multi-benefit projects are prioritized and implemented. Heal the Bay will also track progress of the funding measure and projects that are implemented. As projects are implemented in the

coming years, we anticipate an overall improvement in water quality at recreational areas across L.A. County.

Heal the Bay supports projects that improve watershed health and water quality, such as projects that address stormwater runoff and expand and improve greenspace. Parks represent precious open space in the paved landscape of Los Angeles. Parks have the capacity to help protect and restore local water resources, capture stormwater, create linear greenways along our rivers, and cool our cities - in addition to their traditional roles of providing safe places to play. Heal the Bay supports new parks in regions with high need, and making existing parks safer, to make our region more resilient. Creating and improving parks can help ameliorate the negative effects of pollution from stormwater and urban runoff, resulting in cleaner water in our rivers. Improving water quality improves recreation in addition to other beneficial uses that our rivers and creeks provide such as diverse wildlife, groundwater recharge, and wetland habitat.

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Appendices

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