

## The mysterious case of the SF Peninsula's poop-polluted beaches

BY PETER BELLER , NOVEMBER 22, 2022, 4371 VIEWS

Some of the Bay Area's most heralded coastline is infested with fecal bacteria. No one really knows why or what to do about it.



The view of the coastline southward from atop the bluffs at Fitzgerald Marine Reserve, one of San Mateo County's most treasured beaches. (Photo by Charles Russo)

By Peter C. Beller and Kate Bradshaw

It's a foggy June morning in Pacifica and time is wasting for Noah Katz and his two colleagues, Nicole Schmidt and Cynthia Vazquez. The three water quality scientists point wearily to a sign, universally ignored, warning visitors not to swim at Pacifica's surfer-friendly beach because of high bacteria levels. Then they get to work. Starting at the mouth of San Pedro Creek, between Soul Grind Coffee and Linda Mar Beach's famous Taco Bell, the trio scoops a sample of creek water into a small vial and puts the vial into a cooler filled with ice, then moves on.

The trio repeats this process as they hike upstream, donning waders as the muck deepens and their path becomes clogged with brambles and slippery rocks. Katz, Schmidt and Vazquez work for an obscure quasi-governmental agency, the San Mateo Resource Conservation District, with an outsized role in protecting the Peninsula's water. Over the course of several hours the team will stop at 15 sites to fill their vials with creek water, sometimes dangling a bucket on a string

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ing up a storm sewer grate to get at a creek that meanders among neighborhoods and hillsides. When they've collected all the samples they rush them to a county lab for testing, with time being a factor in how good the data are.

The work can be rough going, especially during or after rainfall when the creek swells with runoff, but Katz, who manages the RCD's Water Quality Program, has been at it for years, oftentimes working solo, and says the goal is simple: to find out how much fecal bacteria, the kind that the sign on the beach warns about, are contaminating our local waters and emptying onto our beaches.

The San Francisco Peninsula's coastline is studded with breathtaking views, world-class surf breaks, [wildflower-dappled hiking trails](#) and [charming seaside towns](#). In the last several years, though, it's become notorious – at least among surfers, scientists and environmental activists – for having some of the most polluted beaches in all of California. Advocacy group Heal The Bay dinged [Linda Mar in Pacifica](#), where Katz started his sampling, with its lowest grade for water quality every week between mid-May and mid-September this year and put the popular surf spot on its annual list of most polluted beaches in California in [2018](#), [2019](#) and [2020](#).

Nicole Schmidt collects a water sample from San Pedro Creek while Noah Katz and Cynthia Vazquez observe. (Photo by Kate Bradshaw)

Down the coast in El Granada, Capistrano Beach is popular with families and has received a [constant stream of F grades](#) this year from Heal the Bay and made the most-polluted list in 2020. Even Fitzgerald Marine Reserve, a [protected stretch of Instagrammable tidepools](#) filled with anemones and octopi, sees its [water quality crash](#) when it rains and scored the title of most polluted in the state in 2020.

Particularly galling to proud locals is the fact that the Peninsula's coast looks pristine and its hills are largely reserved for nature – unlike Southern California, where a chunk of the coastline is dotted with oil rigs and titanic wastewater treatment plants, and where even a light drizzle tends to create migratory schools of diapers and grocery bags. Yet SoCal has made huge strides in recent years to clean up its coastal waters (in fact, SoCal beaches dominated Heal the Bay's [honor roll this year](#)).

Santa Cruz even [cleaned up notoriously foul Cowell Beach](#), a surfing mecca that was named the most polluted in the state back in 2011. Meanwhile, Linda Mar Beach in Pacifica, the place many San Franciscans first try surfing, and Pillar Point Harbor in El Granada, among others, are frequently [awash in poo](#). (The Peninsula's Bayside beaches are also heavily polluted with feces, but scientists are less surprised, if still dismayed, by that: The Peninsula's baylands are typically enclosed and have poor water circulation to flush away contaminants.)

The reasons why the San Francisco Peninsula's ocean beaches are so filthy are complicated, and few of the many experts we talked to for this story agreed on what exactly is happening in the water or on what can or should be done about it. But one thing they all agreed on is that the problem isn't going away despite years of study, many thousands of volunteer hours and tons of pressure on regulators and politicians to fix it. To some extent the problem is invisible, even to swimmers and surfers who dive into it daily.

The consequences of fecal pollution can manifest as ear, skin, eye and respiratory infections. Any frequent surfer you talk to will have a story of getting sick, usually if they ignored conventional wisdom and surfed shortly after it rained, but there is currently no mechanism for tracing these illnesses back to specific concentrations of pollution. What is obvious from speaking to experts is that a labyrinth of laws and government agencies, from local municipal utilities to the federal EPA, has sometimes served to stymie accountability and delay action instead of facilitating them.

## A small beach with big pollution problems

Keith Mangold sounded exhausted and annoyed when we talked this summer. "It only drains something like 2 square blocks," Mangold pleaded, explaining how limited the possibilities for pollution sources are at tiny Capistrano Beach. "It's in an area that used to be a marsh going back to the 1860s and that got filled in."

Mangold has spent years trying to solve the mystery of why Capistrano has such high counts of fecal indicator bacteria, which are just what they sound like: single-celled organisms like *enterococcus* and *E. coli* that don't cause illness themselves but do indicate the presence of human or animal feces which typically contain pathogens. The sources of those feces can be anything from leaking sewers to livestock to boaters to wildlife, which makes the problem of finding the source that much more difficult. Runoff from storm drains is the biggest conduit for beach water pollution in California, says Heal the Bay, but the Peninsula also has many year-round and seasonal creeks that bring runoff directly onto beaches as well.

A retired consultant who volunteers with Surfrider, Mangold may not have academic credentials in the areas of bacterial fecal contamination or the physics of tidal basins, but he knows Capistrano and, in particular, the 3-foot-wide culvert that spills onto its sand. If the polluting of Capistrano is a crime, then Mangold is the dogged detective who can't let the case go cold.

Along with like-minded environmentalists, he's drilled holes in the parking lot of Half Moon Bay Brewing Company to sample groundwater, pored over old maps of the area looking for long-paved-over artesian wells and even interviewed business owners about their waste disposal practices.

"Bottom line: It's not groundwater," he said with resignation. Neither is the pollution from ocean water nor have he and his fellow sleuths found leaking sewers or some other culprit. Yet Capistrano, a beach popular with families because it sits within the protection of Pillar Point Harbor's seawall, experiences sky-high levels of bacteria on a regular basis.

"When I first started doing the tests, the northwest part of the harbor was pristine," Mangold said. "The water was just as clean (inside the harbor) as it was outside the gate. That's not true anymore. Things are definitely getting worse." Having crossed off the usual suspects, he thinks the culprits include people bringing their dogs to the beach or, maybe, a colony of rats known to frequent the storm sewers.

Pillar Point Harbor behind Sam's Chowder House in Half Moon Bay. With high pollution levels for years, the harbor is now subject to a remediation plan known as a TMDL.  
(Photo courtesy Julie Shenkman)

Contamination of the Peninsula's ocean beaches is the opposite of an overlooked environmental problem. Mangold is just one of a veritable dream team of experts and activists who live on the Peninsula and who have vowed to get to the bottom of beach pollution only to see their early hopes dashed. His sometimes-collaborator, Ed Larenas, is another.

A one-time surfer, sailor and retired scientist elected almost six years ago to the county's Harbor Commission, Larenas helped the local Surfrider chapter get its own local water quality testing lab up and running around the turn of the millennium. The idea was to employ volunteers to essentially duplicate the bacterial testing mandated by state law and carried out by San Mateo County, providing additional data points from the same locations up and down the coast.

State law mandates that county health departments test for fecal bacteria at beaches weekly, and it's the reason why data on water quality in California is so plentiful and reliable, if not always easy to find or use (how data are released varies from county to county). For example, Heal the Bay's beach grades come straight from crunching county health department testing data. But AB 411, the law that mandates county data collection, has only baby teeth when it comes to addressing water contamination: Polluted beaches must have signs warning the public about the risks of swimming, but the law says nothing about fixing the pollution. Even closing the beach off requires a suspected or actual sewage spill, not just evidence of contamination.

When we spoke, it had been a few days since Larenas had taken his regular turn volunteering to collect water samples for Surfrider at Capistrano. The results had come in 10 times above the EPA limit set for safe human contact, a result Larenas said was not unusual for the site.

"You have to post a sign. We've watched signs come and go," said Larenas with frustration in his voice. "They rust away, they go right back up. You'll go sample at Capistrano, the water that's coming out of that storm drain is highly polluted. There's a little sign somewhere and you see kids playing, getting in the water to do sand castles."

On another sampling trip, this one in October, Larenas collected vials from Capistrano that yielded bacterial counts 150 times the EPA standard.

Larenas and Surfriders thought that by conducting their own testing, they would both be able to hold the county accountable and learn enough about the science to work within the bureaucracy to save the beaches they loved to surf. And in some ways it has worked. Surfrider led a study of San Vicente, the creek that empties into Fitzgerald's otherwise pristine tidepools, recruiting volunteers to walk from its mouth to its headwaters under Montara Mountain, negotiating with private landowners to sample water along its length. They found horse-boarding facilities with manure piled up next to the creek and trailers emptying human waste into the water. The study group worked with landowners and residents to fix those problems and, says Larenas, bacteria counts did come down drastically. The EPA sets safe bacterial counts for a single sample at 104 bacterial units per 100 ml of water. Prior to Surfrider's study, San Vicente would often hit 20,000 and sometimes even 200,000. Today, counts are typically much, much lower.

Yet Surfrider's readings from San Vicente in late summer were still above the EPA standard, and as recently [as October 2021 the creek hit 8,000](#), according to Surfrider's own sampling. Fitzgerald and San Vicente may be the most vexing of the Peninsula's creek-beach systems, depending on whom you talk to, but it's not unusual. Pillar Point Harbor, including Capistrano, has foiled Larenas and an army of volunteers and policymakers. Its fecal pollution is so intense and persistent that earlier this year the state finally decided to step in.

Workers with the San Mateo Resource Conservation District collect water samples starting at the mouth of San Pedro Creek in Pacifica, where signs posted advise avoiding contact with the water. (Photo by Kate Bradshaw)

## A cleanup plan with few teeth

Under the federal Clean Water Act, bodies of water used for recreation that consistently fail to meet standards can become subject to what's called a Total Maximum Daily Load, a plan coordinated by the regional and state water quality control boards that's supposed to identify and fix the sources of pollution. It has more teeth than AB 411 and can, for example, require local sewer operators and private businesses to get a handle on how they're contributing to pollution.

The Bay Area's regional water quality control board, the arm of the state agency that enforces the Clean Water Act, approved the TMDL for Pillar Point and nearby Venice Beach in early 2021, and in a [staff report that accompanied the action](#) hinted at just how complex the task will be to fix Half Moon Bay's beaches and waters. Both the harbor and Venice Beach have been on the state's watch list for bacterial contamination since 2002, and in a decade of testing for the bacteria *Enterococcus*, the harbor exceeded the allowable concentrations over half the time, while the beach exceeded it a quarter of the time. That's despite enough scientific inquiry to fill a good-sized academic journal. In one instance in 2008, scientists used dyes and buoys to determine if lack of water circulation was the root cause of the harbor's contamination, but the study actually showed a fairly healthy exchange of water between the open ocean and the marina behind the seawall.

Another study lasting from 2008 to 2012 used techniques to differentiate bacteria from different species found that wildlife and dogs were likely contributing the most to pollution, all but ruling out illicit poop-dumping from live-aboard boats in the marina. More studies were conducted, and in the end the report notes that what we know about how pollution gets onto our beaches is less than what we don't know: Rain contributes by flushing contaminants downhill, dogs are a problem and bacteria grow quickly but also can be flushed away or die off just as fast, making the reliability of data even murkier.

"Bacteria data is noisy and variable and not as traceable," says Kevin Lunde, a scientist with the regional water quality control board who's worked on TMDLs around the Bay Area. "When we do upstream and downstream testing we think, 'Aha! We're gonna find this source.' It doesn't work as often as we'd like. We often don't get that silver bullet in bacteria-based studies."

The agency's plan for Pillar Point calls for an extensive list of plans, enforcement actions, studies and infrastructure fixes – everything from better enforcement of leash ordinances to looking for illicit connections to stormwater sewers – affecting an alphabet soup of government municipalities and agencies, but many of its grandest goals are explicitly about complying with existing rules and set goals for five or 10 years from now. That has Ed Larenas and others groaning in frustration.

"TMDLs are actually enforceable but that being said, then you have the matter of are they actually enforced. And the answer to that is very rarely and the Bay Area is probably the most strict when it comes to enforcement," says Luke Ginger, a staff scientist with Heal the Bay who oversees the beach grading system based on county data.

Lunde, the water quality board scientist, is as vexed as anyone by Fitzgerald's stubborn pollution problem, but points to the TMDL his agency implemented for Pacifica and Linda Mar Beach back in 2013 as a success story, and in a way Pacifica points to how challenging it is to both fix pollution and declare victory. Despite improving numbers, Heal the Bay gave Linda Mar an F grade indicating its lowest rating for water quality in 2018 and 2019 and for part of 2020. Sources we spoke to for this story were split on whether the pollution there is real or actually a data problem.

San Mateo County halted its entire monitoring of beaches for a portion of the pandemic, a decision adopted by no other California county, Heal The Bay [noted dryly in its 2021 report](#) (the county, through a spokesperson, said sampling at most sites was stopped for two and a half months to comply with public health orders). The way the state mandates that samples are collected also changed back in 2015, scrambling years of data collection efforts and potentially making some beaches, like Pacifica's, possibly look dirtier than they really are.

San Mateo County says that it's doing everything from outreach to pet owners to aggressive street sweeping to inspecting storm drains and horse facilities to help solve the poop pollution, but that without a clear indication of what's causing it, these efforts may not work.

"Bacteria source control is a complicated issue that the County, and several other municipalities across the State, are working to address," said Susan Wright, the county's program manager for the Office of Sustainability's stormwater management program, in written responses to questions. "There is not a clearly identified bacteria source in the County contributing to the higher bacteria concentrations, introducing additional challenges at mitigating the problem."

## Fatbergs and mislabeled sewer lines

If there's one person who sits at the node connecting scientists, regulators and activists it's Katz, the water program manager for the San Mateo Resource Conservation District. The RCD has just 22 staff across all of its programs, but it and Katz have played a central role in gathering data on the Peninsula's water. The RCD has been involved in or primarily responsible for carrying out many of the studies that Ed Larenas and the TMDL for Pillar Point Harbor cite. Year after year,

Katz and his colleagues are slowly working their way uphill from polluted beaches to the upper reaches of the watersheds that eventually spill onto them. He's not over-confident that he'll find out where the poo is coming from, but he's not pessimistic, either, and he's had some memorable experiences.

One was the discovery of a massive deposit of fat and grease – what's *known as a fatberg* – inside a storm sewer leading to Pillar Point Harbor, a location Katz termed "unusual." Removing the fatberg temporarily improved water at the harbor which, to Katz, just highlighted how complicated the ecosystem of fecal bacteria really is, with sugars and fats coming out of homes and restaurants playing a role in where and when bacterial populations explode in number.

A stormwater drain in Pacifica, where water is sampled. (Photo by Kate Bradshaw)

As Katz and his team moved farther up the San Pedro watershed on their water sampling quest in June, they entered neighborhoods where the creek became less accessible. The team switched from dipping vials to throwing a bucket on a rope down into weed-choked culverts. Where there wasn't enough water for a bucket to scoop, they attached the sampling vial to a stick and lowered it by hand.

At one site, Katz pulled up a heavy drain grate only to realize it was a sewer, not a storm pipe, both of which are unhelpfully labeled with a giant "S."

"My hope is always that we'll find some sewer line that's leaking or some septic tank that's leaking that no one knew about," says Katz. But he's resigned to the lack of certainty and thinks that influencing how the public behaves may be more effective than years of studies or looking for specific DNA markers in water. Katz manages the RCD's First Flush program, which recruits citizen scientists to help the district measure pollutants after the first big rainfall of the fall or winter.

"It gets people engaged in water quality issues," says Katz. "They see the worst day of the year for water quality."

Linda Mar is widely considered one of the most beginner-friendly beaches in the Bay Area, but it also receives polluted water from San Pedro Creek. (Photo by Nick Paz)

It's easy to imagine that some combination of science and public policy will eventually clean up the Peninsula's beach waters, just as happened in other parts of California (Cowell Beach in Santa Cruz, for instance, was plagued by bird feces among other sources of pollution that a task force was able to identify after careful study.) But focusing on the minutiae of a particular culvert, or a data sampling site, may be missing the larger point, says Stanford professor Alexandria Boehm.

"The truth is, humans are everywhere along the coast and humans are influencing the water quality of nearly every coastline," Boehm says.

Boehm has spent 20 years studying San Pedro Creek in Pacifica and its interactions with Linda Mar Beach, sending grad students out to collect samples every now and then, and is perplexed as to why bacterial counts remain so high but not surprised.

"The world is covered in a thin layer of feces," she says. "Our population is increasing. Show me a pristine creek in an area that's inhabited and I'll be surprised."

Then, maybe realizing how fatalistic she sounded, Boehm mentions she still occasionally surfs at Linda Mar.

"We don't want to lose our coast. It's not only a place for people to recreate and fish, it's also a spiritual place for many people," Boehm says. "Going surfing is a way of forgetting about your horrible day. You're alone, facing open ocean, and you forget about the people on your backside while waiting for the wave to come."

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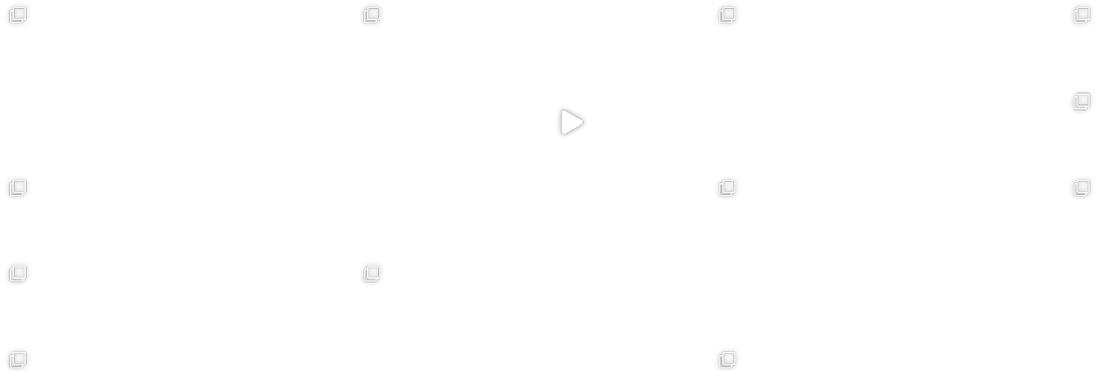
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