APPENDIX E - Community Outreach

Published Articles

1. Solving the whodunit of Topanga Beach, zev.lacounty.gov
2. Topanga Beach Water Quality Update: What microbes can tell us about water quality, Topanga Messenger
3. Crayfish article
4. Drought, dogs and crayfish, Topanga Messenger May2014

Volunteer Training

1. Volunteer Training Agenda, December 1, 2012
2. Topanga Source ID Study Protocol
3. Volunteer Water Quality Monitoring - Topanga Watershed, Water Quality Testing

School Program 2013

1. Topanga Creek Watershed: What makes it so special? Spring 2013
2. Topanga Creek Watershed: Wet, Wild, and Wonderful!
3. Topanga Creek Water Quality Field Study, Program for 5th Grade, Spring 2013
4. Topanga Source ID Student Projects, 2013
5. UCLA Day, May 17, 2013

School Program 2014

1. Poster contest flyer 2014
2. Topanga Source ID Student Projects, 2014

Community Meeting May 2013

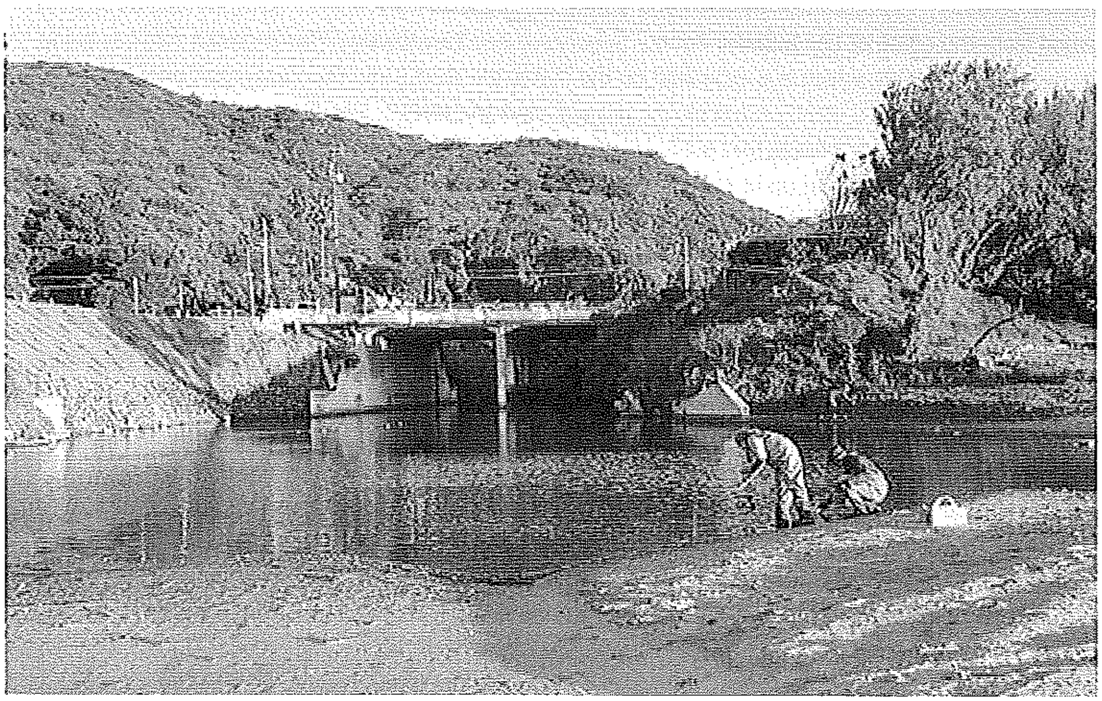
1. Topanga Beach Water Quality Update: What microbes can tell us about water quality - What we are learning and how you can help.
2. PowerPoint presentation - Is it safe to swim at Topanga Beach?, Rosi Dagit
3. PowerPoint presentation - Public Meeting: UCLA Data, Tim Riedel

Community Meeting May 2014

1. Drought, Dogs and Crayfish: update on water quality and quantity in Topanga Creek
2. PowerPoint presentation – Bacterial sources at Topanga Beach presented by Dr. Vanessa Thulsiraj
3. PowerPoint presentation – Drought, Dogs and Crayfish: update on water quality and quantity in Topanga Creek, Presented by Rosi Dagit
4. PowerPoint presentation – Crayfish Removal Project, Presented by Lizzy Montgomery and Crystal Garcia

http://zev.lacounty.gov/news/environment/solving-the-whodunit-of-topanga-beach

Solving the whodunit of Topanga Beach



Scientists from UCLA and Santa Monica Mountains Resource Conservation District take samples from the Topanga Lagoon. Photo/Rosi Dagit

It has been a mystery now for almost a decade: What's polluting the water at Topanga State Beach?
Once regarded as one of the cleanest stretches of ocean in Los Angeles County, Topanga fell from grace around 2003, when high bacteria levels sank its water quality score on Heal the Bay's annual**Beach Report Card.**

Although cleanup efforts were diligent, testing methods couldn't pinpoint the source of the problem. Theories abounded. Was it someone's leaky septic system? Birds and coyotes? Illegal dumping upstream in Topanga Creek?

"We thought it might be the old septic system at the public restrooms," says Rosi Dagit, senior conservation biologist for the Santa Monica Mountains Resource Conservation District. "So that was redone and replaced with a state-of-the-art system. Then we thought it might be the old septic systems in the rodeo grounds upstream from the lagoon, so those were removed, too."

But the problem remained. "We kept taking out potential sources of bacteria," Dagit says, "and the beach kept getting these high numbers." Consequently, even though other types of pollution are markedly low at Topanga, the beach has been more or less a regular on Heal the Bay's official"**Beach Bummers"** 10-worst-beaches list.

Now Topanga Beach has become the focus of an in-depth study that will seek to finally nail down the reason behind the chronically high levels of total coliform, fecal coliform and enterococcus bacteria, which may make swimmers sick.

Piggybacking on a **larger statewide look** at beach pollution hotspots that began in 2010, the new, two-year look at Topanga, which began in November, will sample water up to twice monthly from as many as 10 locations on Topanga State Beach and along the lower section of the creek that feeds the lagoon there. The samples then will be subjected to rigorous DNA testing.

The study also will examine the connection between tiny invertebrates and nutrient levels in the water, along with why the generally normal bacteria levels in the creek tend to spike when the water hits the lagoon and ocean, says Dagit. There'll also be an educational component, with opportunities for school children to visit the testing labs at UCLA and learn how to help keep Southern California's water clean.

The added scrutiny—expected to cost $550,000 during the study's two years—is being funded through an allocation from the office of Los Angeles County Supervisor Zev Yaroslavsky. The Topanga effort is being jointly overseen by UCLA, which is a local lead on the statewide study, and the Resource Conservation District. Dagit, the county's point-person on the project, says the tests are complex and relatively new.

"You have to collect the samples before sunlight hits the water," she says, "because the sun makes bacteria go crazy. So we've been getting up at night and going down to the water before sun-up. Our last sampling was December 19, and let me tell you, it was cold."

The tests also are expensive—about $200 per half-gallon water sample—but have come down markedly in cost over the past few years.

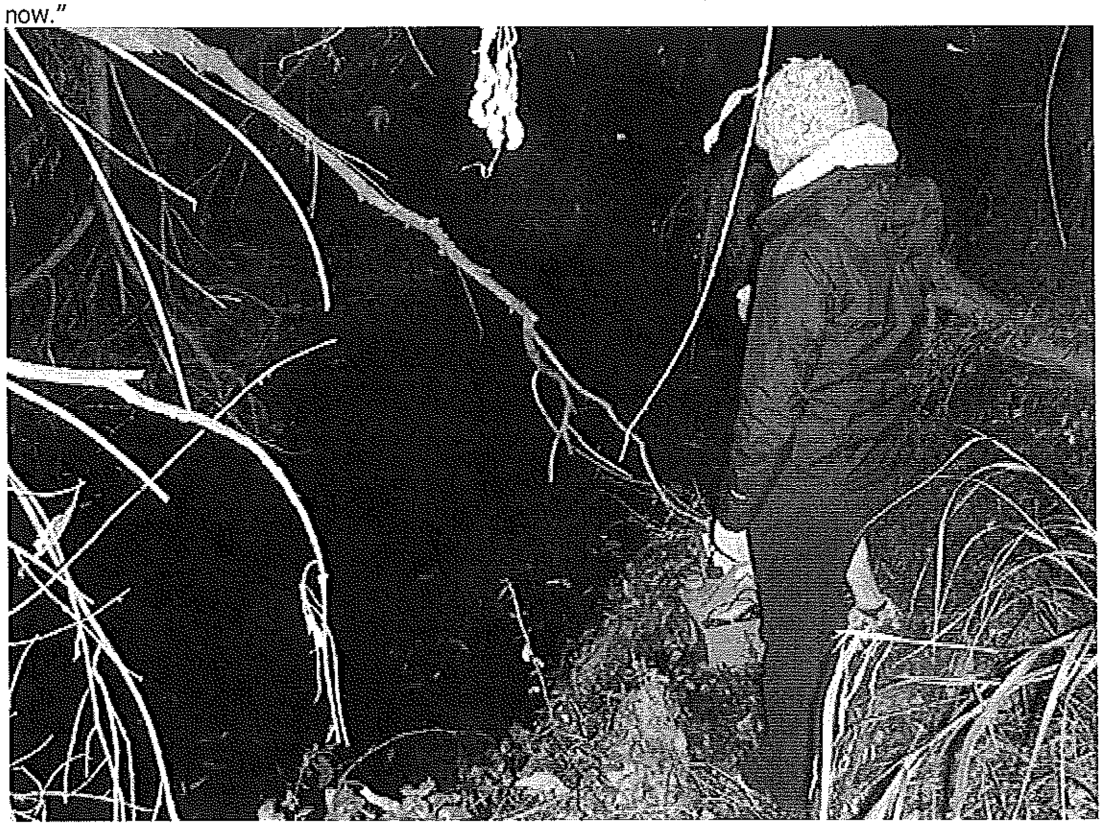
Scientists are enthusiastic about the study's prospects.

"It's like DNA fingerprinting of bacteria," says Dagit. "We'll be able to find out not only whether the source is human or non-human, but if it's non-human, whether it's from gulls, dogs, coyotes or horses and whether it came from a direct deposit on the beach, or from gray water or a septic system."

That's important, she says, because bacteria from a natural source, such as wildlife, requires a different set of solutions than does bacteria from the feces of pets and humans. "Suppose those bacteria levels are because of a lot of gulls roosting at Topanga Lagoon," Dagit says. "We don't want people swimming in water with high bacterial levels, but we don't want to get rid of the gulls."

Dagit says that, by this time next year, scientists should have many more clues to the mystery at Topanga Beach.

"It should be pretty amazing," she says. "We haven't really had the technology to do this kind of study until now."



UCLA grad student Amy Zimmer-Faust and Senior Conservation Biologist Rosi Dagit collect bacteria samples by night in Topanga Creek. Photo/Tim Riedel *Posted 1/2/13*

TOPANGA BEACH WATER QUALITY UPDATE
What microbes can tell us about water quality

Submitted to the Topanga Messenger 6 May 2013
by Rosi Dagit, Sr, Conservation Biologist, RCDSMM

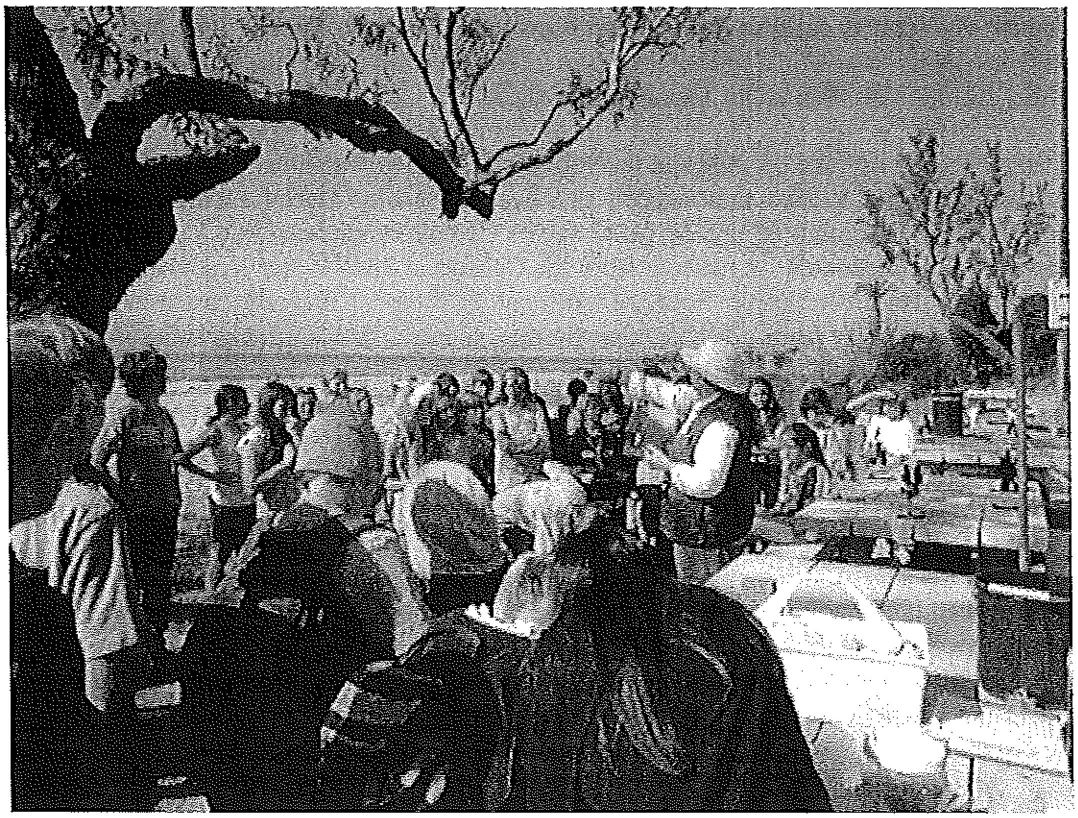
Since fall 2012, a team of dedicated scientists from the Jay Lab at UCLA and the RCDSMM Topanga Creek Stream Team have been waking up really early and hiking into Topanga Lagoon and Creek before the sun rises to collect water samples. The goal is to figure out what is causing high bacterial levels at Topanga Beach. The preliminary results are pretty interesting, and will be presented at a community meeting on Thursday, 30 May from 6:30 – 8pm at the Topanga Library.

Topanga Beach has been on the Heal the Bay list of "Beach Bummers" for several years, with water quality grades that exceed the Fecal Indicator Bacteria (FIB) standards regularly. With funding provided by Los Angeles County Supervisor Zev Yaroslavsky, District 3, and augmented by funding from the California State Water Resources Control Board (Clean Beach Initiative, Source Identification Protocol Project), researchers have been testing samples from possible contributing sources, and applying state-of-the-art molecular testing to identify if the bacterial sources are human, dog, gull or something else. The sampling strategy is designed not only to identify the source of the problem, but to clarify what contribution, if any, is coming from Topanga Creek.

The team from Dr. Jenny Jay's lab is using both the traditional culture based analysis called IDEXX to count the number of total coliform (TC), *Escherichia coli* (EC) and enterococcus (ENT), which is consistent with the methodology used by the City of Los Angeles and required by the Regional Water Quality Control Board. While useful in providing a snapshot of overall bacterial levels, they do not specifically tell us from what animal the bacteria originates. Using molecular markers, the Jay lab has been able to determine that the lagoon waters appear to be the most significant contributor of FIB to the beach, and that while human markers have been detected, the high levels of gull and dog markers indicate that they are also important contributors to the high bacterial levels.

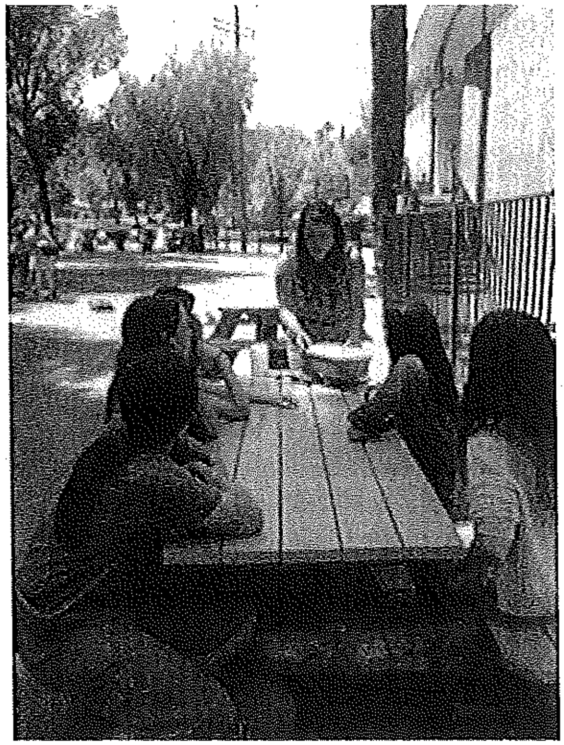
UCLA students Jennifer Yang and Uriel Cobian holding the IDEXX bacteria trays.
Photo by Rosi Dagit, RCDSMM

Investigating further, samples have been collected upcoast from the lagoon, just west of the metal groin at the west end of Topanga Beach, as well as from several locations moving upstream in the lagoon and creek. Samples from the lifeguard septic system have also been tested. The patterns are a bit baffling. It makes sense that the levels are low in the creek, increase in the lagoon, and then get diluted in the surf, but we did not anticipate finding high levels upcoast.

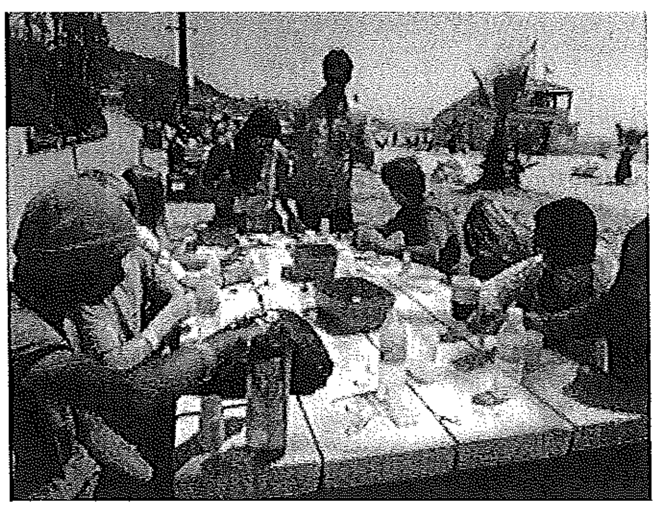


Topanga Mountain School and Topanga Elementary School 5th graders gather to conduct their research on Topanga Beach. Photo by Jenny Jay, UCLA

The mystery continues, but to help us learn more, we enlisted the aid of 5th graders from Topanga Elementary School and 6-8th graders from the Topanga Mountain School. Working with UCLA undergraduate student mentors taking a service learning class with Dr. Jay, the Topanga students are conducting microbe safari's to learn more about bacterial sources. Students collected samples on petri dishes at school, and prepared IDEXX samples of sand and water during a field trip to Topanga Beach.



UCLA student mentor Raven Logiurato leads Topanga Mountain School students Jonathan Goldberg, Jensen Schmitt, Akasha Ross, Mandy Deitelbaum and friends on their microbe safari. Photo by Rosi Dagit, RCDSMM

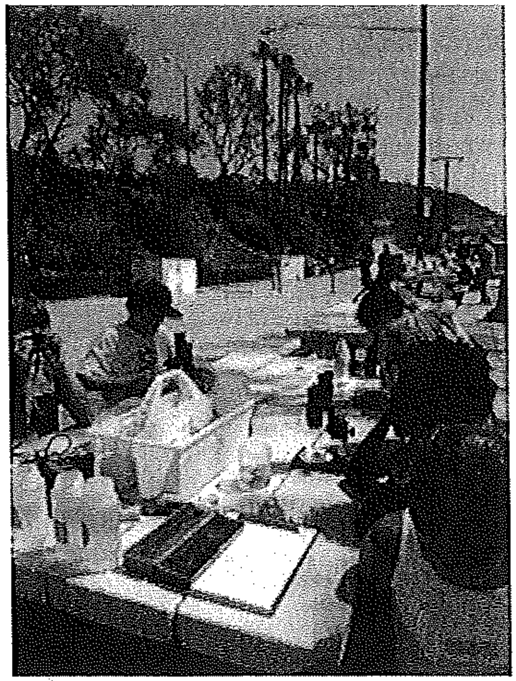


Topanga Mountain School students Girnar Joshi, James Werbe, John Kahle, Mandy Deitelbaum, Akasha Ross and friends prepare their bacterial cultures with UCLA student mentor Joshua Kameel-Ishmael. Photo by Rosi Dagit, RCDSMM

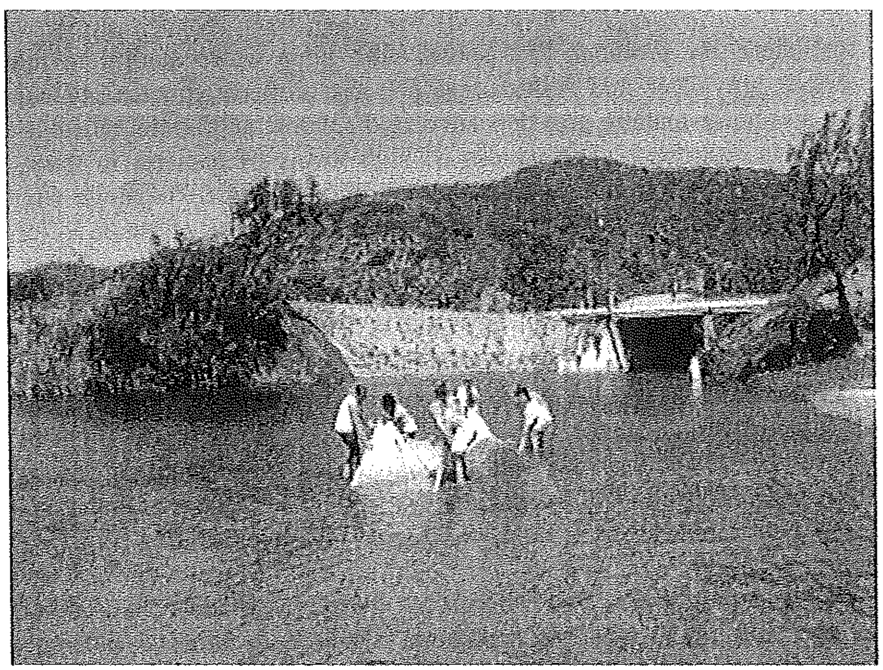
William Larkins, Parker Rhodes, Zia Hicouri, Ava Dingley, Myanno Miller, Topanga Elementary School Teacber Sondra Tapper, Kiara Bremner, Madison Snow, Leya Herrera work with their UCLA student mentor to test bacteria.
Photo by Rosi Dagit, RCDSMM

"I was so excited that our students could be a part of this project," Nicole Sheard, principal at Topanga Elementary added. "Not only did I think they would really enjoy it, but I loved the idea of them learning about something so meaningful and close to home. It is my hope that they can take the information and knowledge they gained to help educate others about the steps they can take to improve the water at our beloved Topanga Beach and beyond." The students will be getting their results back soon and working with their UCLA mentors to present posters of their research both at UCLA and at the community meeting on 30 May.

But the study is not just limited to bacteria.....Topanga Creek is unique. It is the only creek in the Santa Monica Mountains that still retains much of its ecological function and biodiversity, while supporting over 10,000 human residents. We have all three native fish species, and many of the native insects that they rely upon for food. While the students were at the beach, they bad a cbance to work with the RCDSMM biologists to try and identify the bugs found in the creek, test salinity and pH, and also seine for fish in the lagoon. Tying together how the bacteria and water quality factors influence the diversity and health of macro-invertebrate and fish communities is another facet of the study. The student results will be added to the observations collected by the Topanga Creek Stream Team as they re-visit study sites throughout the creek.



William Larkins, Parker Rhodes, Zia Hicouri, Ava Dingley, Myanno Miller, Leya Herrera test salinity and look for bugs. Photo by Rosi Dagit, RCDSMM



Topanga Elementary 5th graders Leya Herrera, Myanno Miller, Zia Hicouri, Ava Dingley, Parker Rhodes, Hunter Steinman, Luca Frye, Alden Silvestre seining for fish. Photo by Jenna Krug, RCDSMM

Since 2000, the Topanga Creek Stream Team has monitored the same 500 meter reaches of creek near the Backbone Trail in Old Topanga Canyon, along the main stem of the creek from Greenleaf Road to Highvale Road, and at two locations within lower Topanga State Park. Each spring, we count every frog, tadpole, dragonfly nymph, newt, eggs masses, fish, snakes, and whatever else we can find in the creek. This year, we are also collecting samples of diatoms and algae. Pulling together 13 years of data on these indicators of creek health will give depth to our understanding of the overall ecology of the creek.

Pacific tree frog all excited to see us. Photo by Jayni Shuman, RCDSMM

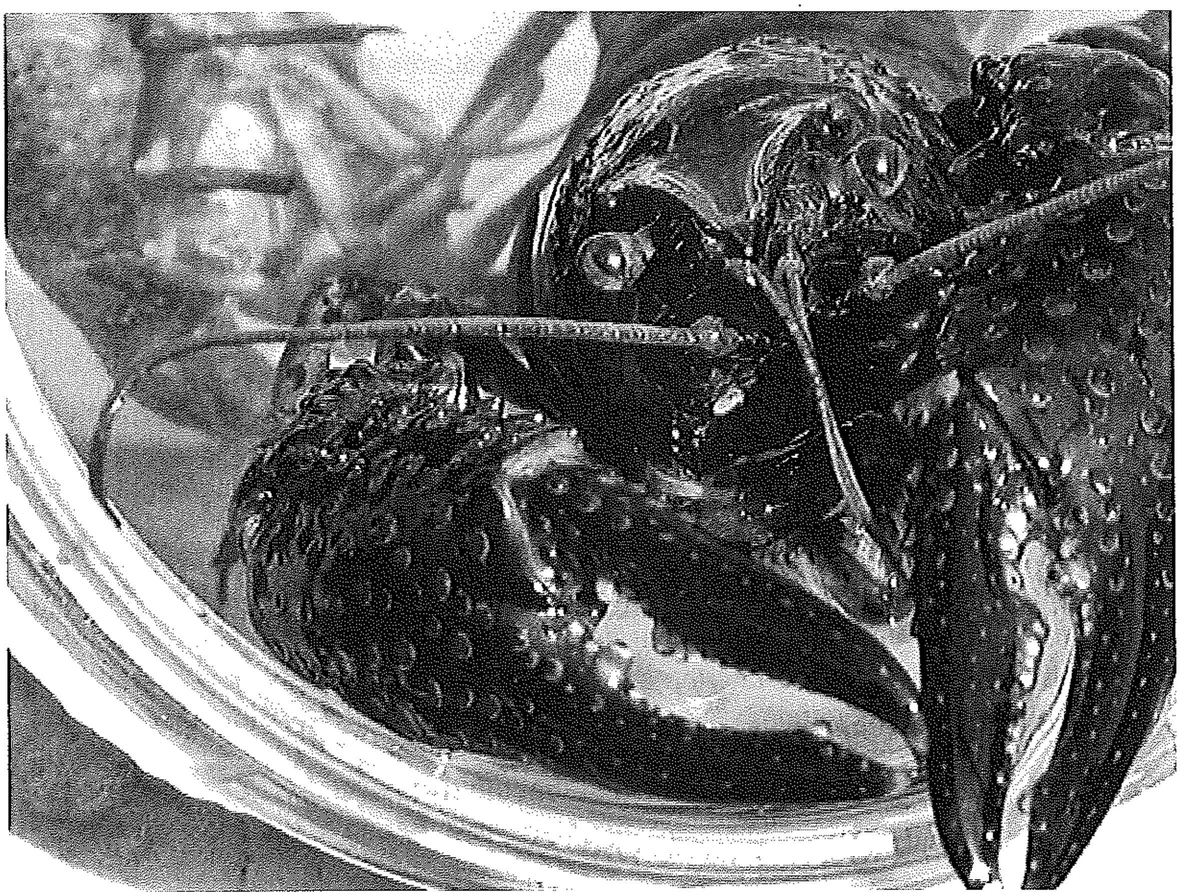
We know that there are problem "hot spots" with poor water quality in the upper watershed, where graywater and septics that are not properly functioning can cause problems, dog and horse manure gets deposited in the creek, and homeless folks use the creek rather than a restroom. The pattern of high levels of bacteria in town, which naturally gets cleansed as it moves downstream through lower Topanga State Park appears to be holding, but we still are not sure how much we can continue to input into the system before it stops working.

Whicb brings us back to the mystery of what is causing tbe bacterial problems at Topanga Beach. As part of this study, Richard Sherman of Topanga Underground is working with State Parks to test the septic systems at the Feed Bin, Reel Inn, the ranger residence at Topanga Rancb Motel, the Rosenthal Winery, Wylie's and Cholada's. The goal is to determine if any of these systems are contributing to the problem. BioSolutions has been maintaining the state-of-the-art septic system that serves the lifeguard station on Topanga Beach, and samples from there do not appear to be contributing bacteria.

To learn more about the details, enjoy discussing the problem and results identified by the students, and learn about what steps you can take to help improve water quality at Topanga Beach, please join us at the library on Thursday, 30 May.

The creature from Topanga Creek

May 28, 2014



The Intruder. Photo/Resource Conservation District of the Santa Monica Mountains Stream Team

Louisiana red swamp crayfish may be a delicacy in the gumbo pot, but these voracious Cajun imports are an unwelcome ingredient in Topanga Creek, where they cloud the water and chow down on native fish, bugs and amphibians.

They've been in residence since 2001, when a local resident is said to have dumped a batch of live crayfish into the creek in hopes of cultivating a perennial free bait supply. Since then, there have been intermittent community clean-ups, and those efforts—coupled with winter storms that traditionally have washed many of the crustaceans out to sea—were usually enough to keep the population in check. But a lack of significant rainstorms since March 2011 has spawned a crayfish baby boom.

"We've had perfect growing conditions for crayfish. The water is slow-moving. It's warm. And they have gone berserk," says Rosi Dagit, a senior conservation biologist with the Resource Conservation District of the Santa Monica Mountains. "They're a very intense predator…It's kind of gotten out of control."

That's bad news for the health of the creek and also for creatures like the California newt, a snack of choice for hungry crayfish.

"One day we literally witnessed a newt in the hands of five crayfish," says Lizzy Montgomery, 25, a Watershed Stewards Project intern working at the site. Montgomery and her fellow intern, 24-year-old Crystal Garcia, are in the midst of a crayfish research and removal plan now underway at the creek.

They rescued the newt, but the sight of the near-carnage was enough to help Montgomery get over her qualms about dispatching the crayfish with extreme prejudice. (The creek is clean but the crayfish are bottom-feeders and probably not suitable for people to eat, Dagit says. The collected specimens have been frozen and donated to the Nature of Wildworks wildlife center as food for raccoons being rehabilitated there.)

The interns haven't been working alone. Starting in October, they mobilized a brigade of local schoolchildren from Calvary Christian School in Pacific Palisades and the Topanga Wildlife Youth Project to conduct weekly crayfish removals in a section of the creek. Their haul to date: more than 400 crayfish.

With the end of the school year, the program has gone on hiatus but Montgomery and Garcia say they hope to bring it back. Supervised removals are important because of Topanga Creek's delicate eco-system; the creek is home to several endangered or threatened species and fishing is prohibited, with special permission required for any crayfish removal, Dagit emphasizes.

Meanwhile, Montgomery and Garcia also are conducting scientific research comparing the cleaned-up area with an adjacent part of the creek where the crayfish continue to run wild. They've already created a scientific poster that they've presented at two conferences, and hope eventually to have their findings published by the Southern California Academy of Sciences.

Their internships, funded by a grant from the office of Supervisor Zev Yaroslavsky, are set to end in August. After that, it will be time for an all-too-common Southern California pastime—hoping for rain. Even a wet winter probably wouldn't be enough to completely eliminate the crayfish, which Dagit says are now established in most of the creeks in the Santa Monica Mountains. But it would help keep the invaders in check.

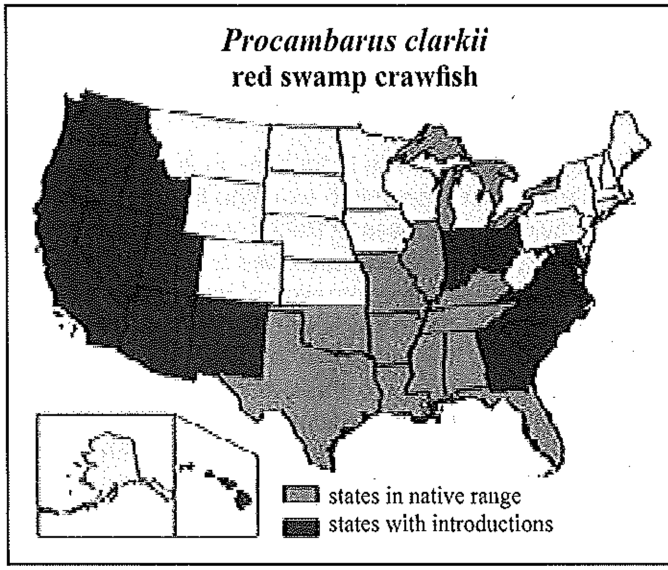
"What we're hoping is that we'll get some really good rains and that the population will get severely diminished," Dagit says. "And at that point we will mobilize people as best we can to do a really concerted removal."

For a peek at how it's done, check out the YouTube video below.

P. clarkii - A March to Conquer the World: A Literature Review

BY LIZZY MONTGOMERY
PLACED AT RCD SANTA MONICA MOUNTAINS

Procambarus clarkii have invaded Topanga Creek. In fact, this mudbug has found its way into non-native streams on a global scale. They are invasive crawfish on the march, and researchers are worried. Could non-native crawfish be the culprit in observed declines of amphibians like newts, frogs, and toads? Their generalist grazing patterns do include the consumption of amphibian eggs and larva. Other critters are potentially at risk; all three species of crawfish native to Northern California are facing significant decline or extinction. The trade of P clarkii as fishing bait, food, or pets, and their inevitable escape, is thought to be one way these creatures are introduced to new places. Procambarus clarkii, the American red swamp crawfish, has become a widespread threat in Southern California.



Nestled in a Santa Monica Mountain canyon, Topanga Creek is a prime example of one stream affected by these far-flung crustaceans. I have observed on recent snorkel surveys that red swamp crawfish, native to southeast US, are quite a common sight, while our native CA newt, CA red-legged frog, CA and Pacific tree frogs are rarely sighted. Could P. clarkii, who came to Southern CA as early as 1924, be waging war against our native amphibians? Can the global decline of the amphibian class be linked to non-native species invasions, or are other phenomena to blame? And finally, if crawfish are the culprit, can they be stopped? I've turned to the literature to find out more.

The first report comes from Seth Gamradt and Lee Kats[1], who observed the relationship between mosquitofish (an intentionally introduced non-native... can you guess for what purpose?), invasive red swamp crawfish, and the native California Newt. According to amphibian surveys conducted from 1981-1986, a total of 10 Santa Monica Mountain streams contained California Newts. When the surveys were repeated in 1994, 3 of those 10 streams were suddenly newt-less. Alarmed, the researchers brought everyone back to the lab: mosquitofish, crawfish, and newts. They found that while both predators were snacking on newt larva, their consumption varied. In a 24 hour period of enclosure, 13% of newt larva survived play time with mosquitofish while 0% survived the crawfish. P. clarkii, not mosquitofish, also consumed newt egg masses, rendering them doubly taxing opponents in a laboratory setting.

Gamradt and Kats' theory that P. clarkii was a detriment to newt populations in the Santa Monica Mountains was upheld the following year: after heavy winter rains washed the crawfish out, newt egg masses, larva, and adults were present the following spring. The fact that adults returned to a stream they had previously left, lead the researchers to include another theory in their report that newts will select for streams in which crawfish are absent. While there are few to no mosquitofish in the main stem of Topanga Creek, the presence of P. clarkii seems to be a likely factor contributing to missing newts due to both avoidance and predation on eggs and larvae.

To gain an international perspective, our next study brings us to Northern Italy. Here, the spread of P. clarkii has been observed since 2006. Ficetola et al.[2] set out to find what sort of effects red swamp crawfish were having on the breeding habits and aquatic larval abundance of nine local amphibians including newts, toads, and frogs. One-hundred and twenty-five wetlands were surveyed for P. clarkii and for amphibian breeding sites. Amphibian larvae and crawfish were also collected from 34 wetland ponds. Ficetola's crew found that the presence of crawfish reduce the number of newt, salamander, toad, and tree frog breeding sites, while 3 other frog species remained unaffected. In contrast, there was a negative association between larval abundance and crawfish presence across all seven species sampled. One frog species, who did not hesitate to breed in crawfish waters, had a near zero success rate in terms of larval abundance. While newts and other amphibians avoided crawfish infested wetlands, some frogs continued to breed in these areas spending precious, yet possibly futile time and energy. The authors conclude that measures should be taken to prevent the spread of crawfish and emphasize that removal efforts should be directed towards wetlands most suitable for amphibians.

Back in the Santa Monica Mountains in 2013, UCLA's Pease and Wayne[3] set out to examine the morphological and behavioral responses of Pacific tree frog tadpoles to red swamp crawfish predation. They explain how native species can adapt to the intrusion of non-native predators through morphological or behavioral adaptations. From 2007-2009 they collected tadpoles from six Santa Monica Mountain streams, three of which harbored crawfish. Between sites they found a significant difference in the body shape of tadpoles; those from crawfish-bearing streams had a deeper head and body and a shallower upper tail fin and tail muscle than those from crawfish-barren streams. They also found that tadpoles exposed to 'crayfish chemical cues' significantly altered their behavior, by moving less or resting more. This response was found among both groups of tadpoles, no matter the origin. Despite these noted morphological or behavioral changes, the survival rates of experimental tadpoles were equal and did not depend on previous crawfish experience. Citing this and the fact that that other local species, like the CA newt, are fewer in number than the Pacific tree frog, it is recommend that the effort to remove and control the spread of P. clarkii is continued.

Finally, a 2013 article from Gherdari et al.[4] speaks to address how the increase in global average temperature that we are currently experiencing could affect P. clarkii invasions in the future. Understanding that changes in climate can lead to shifts in territory and interactions between antagonistic species, this group of European researchers conducted a laboratory experiment to compare how three species of invasive crawfish would respond to increased water temperatures. The behavior of O. limosus, P. leniusculus, and P. clarkii, all North American natives, was observed in 20oC (current maximum in study region) or 27oC (IPCC expected temp. in 80 years under most pessimistic model) water temperatures. They found that with increased temperatures, O. limosus spent more time being inactive and P. leniusculus became more subordinate during fights. However, P. clarkii did not have a behavioral response to the increased temperature and in fighting would outcompete both O. limosus and P. leniusculus. They fear that if Procambarus clarkii is more able than other competitors to thrive under conditions of increased temperature, they continue to invade new areas and impoverish biodiversity.

Currently, amphibian populations are on the decline. Nearly one-third of Earth's 6,800+ amphibians are becoming or have become extinct. According to a United States Geological Survey report, amphibian populations are declining 3.7 percent on average each year in the United States.[5] While many reasons are speculated upon, few provide comprehensive explanations. Deforestation, pollution, climate change, disease, and invasive species are all weighed on local and global scales. In Topanga Canyon, could the introduction of P. clarkii be contributing to the observed losses of native newts, frogs, and toads? Or are the fates of our local amphibians linked to other global phenomena? Perhaps, more than one factor is at play.

As the march of red swamp crawfish continues on, so do the efforts of scientists and researchers to address these questions. As WSP members with the Resource Conservation District of the Santa Monica Mountains, my site partner Crystal Garcia and I are currently part of a research project that aims to determine how the removal of Procambarus clarkii from certain reaches of Topanga Creek might affect different environmental factors, and if removal efforts can be sustained successfully. To be continued...

Works Cited

[1] Gamradt, Seth and Kats, Lee 2002. Effect of Introduced Crayfish and Mosquitofish on California Newts. Conservation Biology. Vol 10; No. 4: pp. 1155-1162.

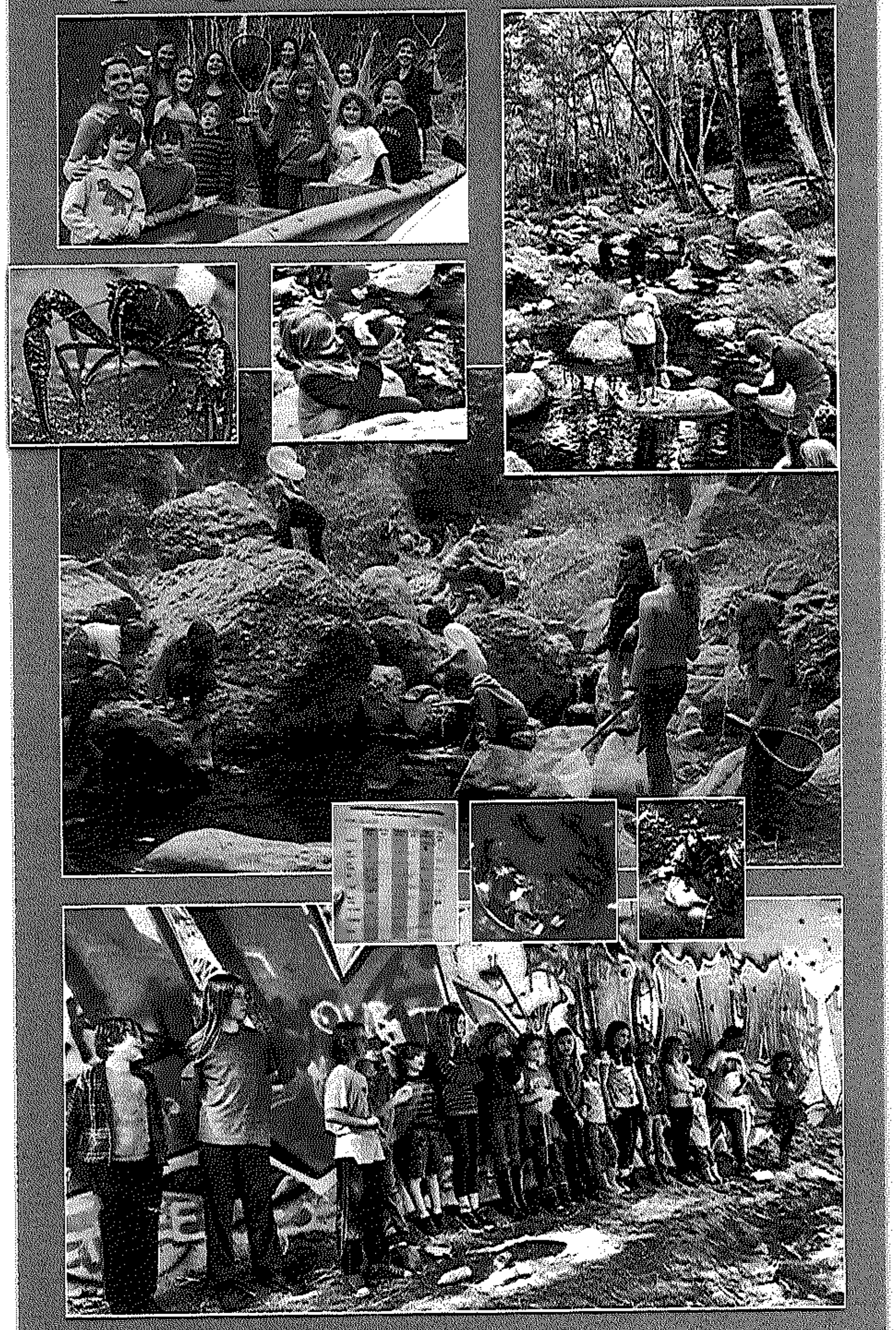
[2] Ficetola, Gentile et al. 2011. Early assessment of the impact of alien species: differential consequences of an Invasive crayfish on adult and larval amphibians. Diversity and Distributions. Vol. 17; No. 6: pp. 1141–1151.

[3] Pease, Katherine and Wayne, R. 2013. Divergent responses of exposed and naive Pacific tree frog tadpoles to invasive predatory crayfish. Oecologia. Vol. 2; No. 174(1): pp. 241-252.

[4] Gherardi, Francesca et al. 2013. Climate warming and the agonistic behaviour of invasive crayfishes in Europe. Freshwater Biology. Vol. 58; No. 9: pp. 1958-1967.

[5] Adams et al., Trends in amphibian occupancy in the United States. Plos ONE 8:e64347 CrossRef, Medline.

Topanga Wildlife Youth Project



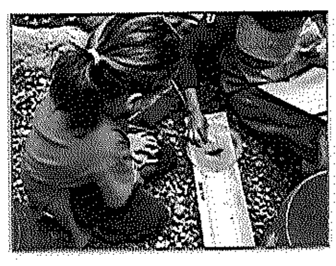
Invasive Species

Jude Klemp

Have you ever heard of the python problem in the everglades? The wild boars in Texas? Rabbits in Australia! All are non-native animals that were brought by people, and all are now causing a severe impact on the environment. Some people believe that setting their pets free is doing them a favor, but they rarely think of the consequences. Here are just a FEW reasons the release of non-native species is bad for native animals, causes lasting harm to the ecosystem and ultimately doesn't help the released pet.

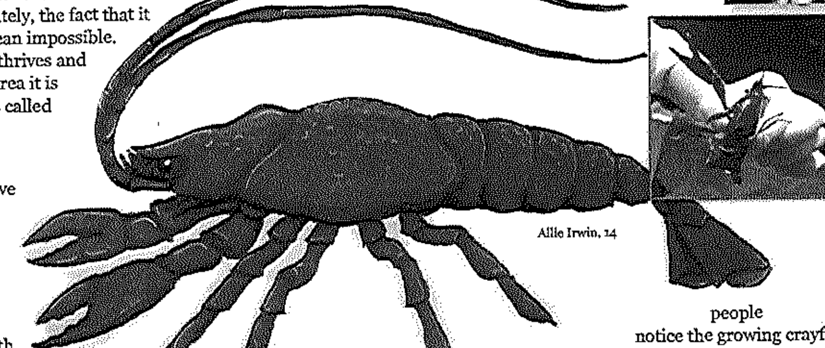
When people release a pet, not only do they not consider the impact on the environment, they also assume the animal will thrive in the nature. They were wild at one point weren't they? In reality, most pets lack the instincts to survive. It is rare that the area a domesticated animal is released into is enough like its native land for it to thrive. Unfortunately, the fact that it is rare doesn't mean impossible. When an animal thrives and multiplies in an area it is not native to, it is called invasive.

Invasive means that the non-native animal competes with native animals for food, territory, or shelter. Some native animals can't compete with invasive species. For example; there is a fish called a snakehead which was brought to the U.S as a pet and a food source. The snake head is a vicious predator and is very adaptable. It also has an unique ability to survive out of water for up to four days! All of these traits allow the snakehead to thrive in U.S waters. Many species of fish have been declining in numbers since the arrival of the snakehead and other invasive fish species. Invasive species have the potential to destroy whole ecosystems!



People don't always care about the environment. It's easy to forget about others problems when you have so many of your own... but what happens when invasive species become our problem? Wild boars have become a serious problem in the U.S. Wild boars can be very aggressive and have been known to kill livestock and, on rare occasion, people! Though native to Eurasia, the pigs seem to be able to survive in almost any terrain and have invaded at least 39 states and four Canadian provinces. In April 2013, *Popular Science* magazine said "Wild pigs stick to one area until all food sources are tapped out. Their method of rooting up food creates large swaths of cratered barren terrain." These boars have been known to reach up to 200cm in length, not counting the tail, and have a average weight of 110 - 200lbs. Because of their extreme size wild boars have no natural predators and have reached such a huge population that hunters are encouraged to shoot them on sight. In 2013 it was estimated that wild boars had destroyed $1 billion dollars worth of property damage in the U.S per year! That is what happens; the released animal becomes everyone's problem.

You may not even realize an animal is doing harm to an ecosystem. In the Los Angeles watershed, crustaceans called crayfish (also known as crawfish, crawdads, red swamp crayfish, and Louisiana crayfish) have completely taken over many creeks. Crayfish, measuring 2.2 - 4.7 in (5.5 - 12 cm) long, do not look particularly threatening. The only thing of notice about crayfishes is their bright red color. But crayfish are, in fact, wreaking havoc on the ecosystem. Being able to survive harsh water conditions, eat almost anything, and walk over dry land makes them very hard to kill. Crayfish have no problem killing other animals however. Even though they may not look it, they are fierce predators. They prey on mostly small fish and occasionally small amphibians, but they will really eat anything they come across, including steelhead trout. Steelhead trout (also known as rainbow trout) are considered endangered species in Southern California and have been severely impacted by a growing crayfish population. I once went with a group of people to survey the crayfish population in a small stretch of creek. After a few hours we had caught around 200 crayfish in just a few pools of water! But few people notice the growing crayfish population because, unless you look for them in the murky water, they're hard to notice and don't impact human life directly (yet).



Allie Irwin, 14

It's too late to take back the damage caused by invasive species, but that doesn't mean you can't help! A good place to start is to not release your pets. Instead, take any unwanted pets to an animal shelter or pet rescue. Philip Willink, an ichthyologist at Chicago's FieldMuseum, says in relation to invading fish vs. native fish species "We're just trying to preserve what is left [of native fish species], because once it's gone, it's gone." Many, if not all, of the animals discussed in this paper were released into the environment by humans on purpose. Releasing an unwanted pet is not the answer for it, our native species, or the ecosystem. —*Allie Irwin, 14*

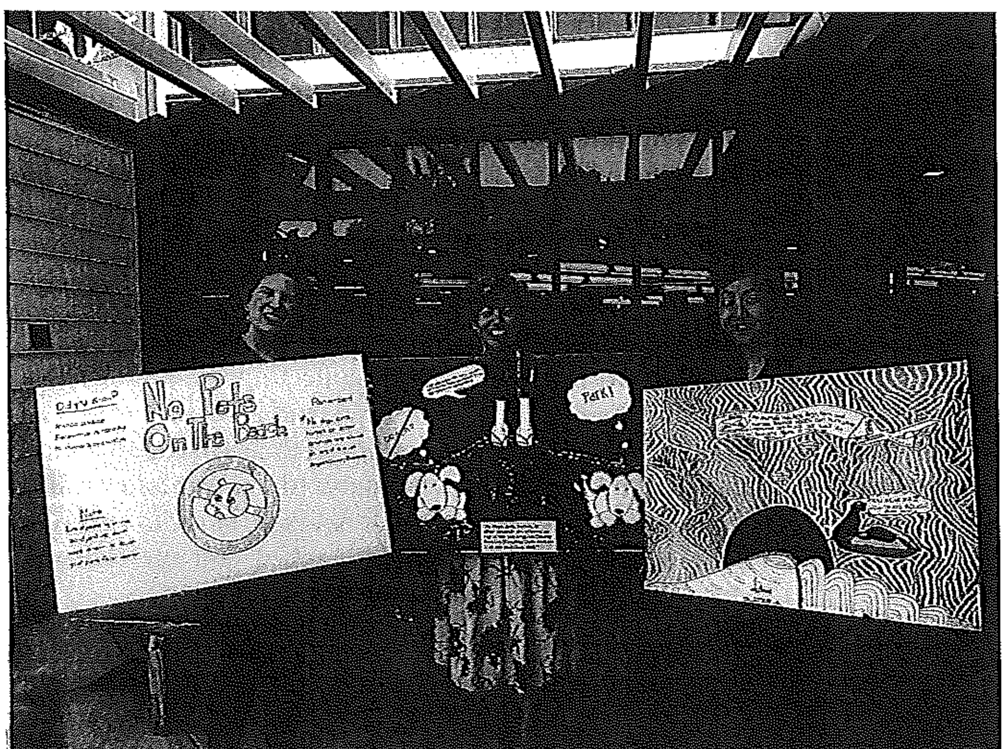
Drought, dogs and crayfish

Submitted by Rosi Dagit,
Sr. Conservation Biologist, RCD of the Santa Monica Mountains

On Wednesday, 28 May, Topanga Library was covered with posters created by the 5th graders at Topanga Elementary School and students from the Topanga Mountain School and Topanga Youth Wildlife Project.

Designed by students to help educate beach visitors about how dogs on the beach can lead to bacterial exceedances, the posters reflected the creativity and passion of our students. The posters were closely examined by judges Stacy Sledge and Tanya Starcevich of the Topanga Town Council, Susan Nissman, deputy for Supervisor Yaroslavsky, and Lucie Kim, representing the LA County Department of Beaches and Harbor, and Watershed Steward Project members Lizzy Montgomery and Crystal Garcia. After much deliberation, first place went to Slater Anton, 2nd place to Maya Demontreux and 3rd place to Jason Fannon.

The posters will be made into signs and posted at Topanga Beach by LA County Department of Beaches and Harbors to help with public outreach efforts. In addition, the Town Council provided ADOPT A DOLPHIN kits from the Ocean Conservation Society as prizes, which allows the students to follow the adventures of a local dolphin online, while cuddling up with a soft dolphin pillow pet.



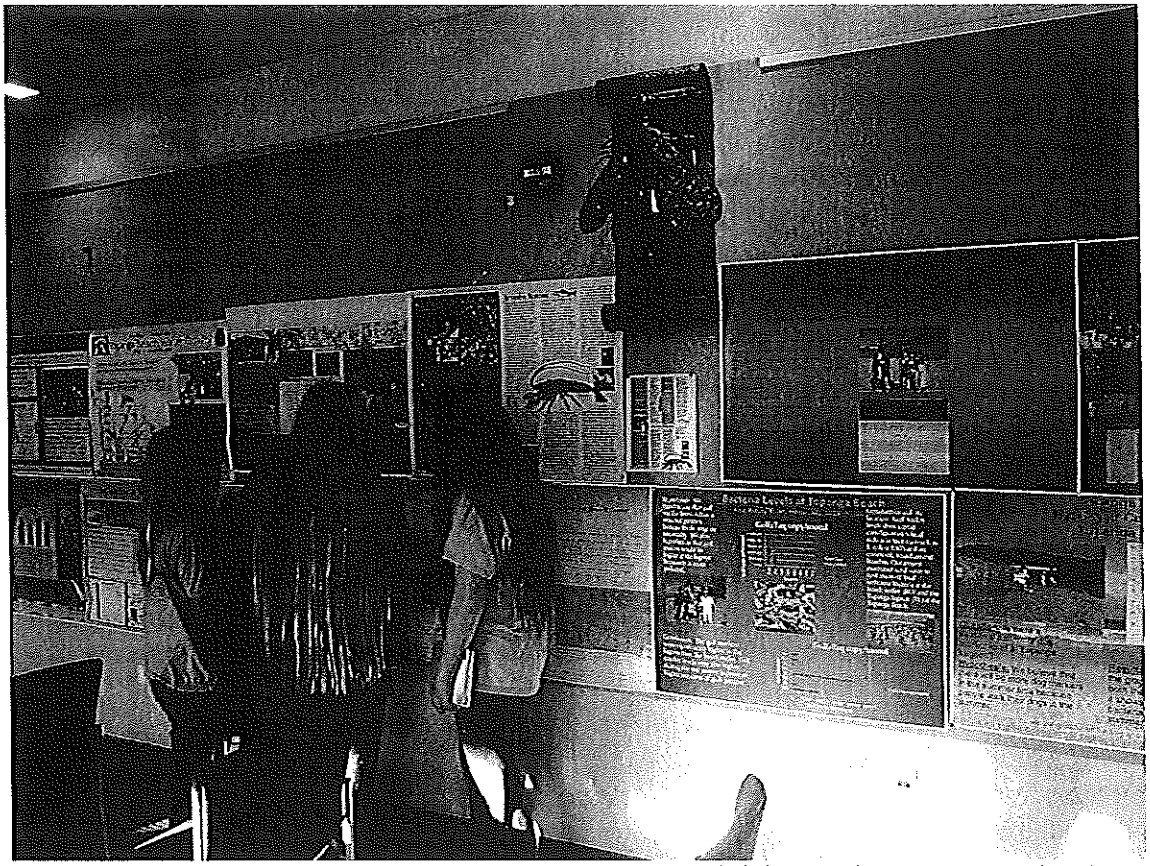
Stacy Sledge holding Jason Fannon 3rd place, Susan Nissman holding Maya Demontreux 2nd place, and Lucie Kim holding Slaton Anton's 1st place posters. Photo by Rosi Dagit.

On Friday 30 May, the judges presented the prizes to the students at morning assembly.

Jason Fannon, Maya Demontreux, Susan Nissman, Stacy Sledge and Tanya Starcevich with the winning posters.

In addition to the poster contest, the may 28 Topanga Library meeting highlighted the collaboration of local students with UCLA undergraduates under the direction of Dr. Jenny Jay. As part of their service learning class with Dr. Jay, the UCLA undergrads assisted the local students with data collection and analysis during a field trip to Topanga Beach on Friday 2 May. The research effort involved students collecting and testing sand samples to see if there is a reservoir of bacteria living in the sand, and if so, how that might contribute to the bacteria counts in the ocean. Working with their UCLA mentors, the local students developed hypotheses, collected samples, analyzed the data and wrote up their conclusions. The research posters were presented at a field day at UCLA on 16 May, as well as at the library. There were lots of good questions asked, and interesting thoughts developed!

This educational element is part of a larger Topanga Source Identification Study, which began in 2013 and will conclude in October 2014. The RCD of the Santa Monica Mountains continues to work with Dr. Jay and others to identify sources of bacterial contamination at Topanga Beach, and develop recommendations on how to reduce those problems.



Julian Najah, Allie Irwin and Olivia Irwin (Topanga Wildlife Youth Project members) reading the research posters.

Preliminary study results were shared with the group of community members attending the 28 May poster contest and meeting. Rosi Dagit started by outlining the impacts of the drought on Topanga Creek, and highlighting ways we can all help reduce the stress on our creek. In addition to the lack of rainfall, what makes this drought event a bit more challenging than those in the past is that not only are there fewer individuals remaining in our endangered fish population, the drought is exacerbated by an increased number of hot days. Over the past few years, a study by UCLA climatologists has found that the number of days with temperatures over 95 degrees has increased, a trend predicted to continue in the immediate future. Portions of Topanga Creek that have not been dry since the early 1990's are already without water, and it is only May. This forces all the aquatic species into sharing refugia pools that are fed by seeps and springs. Numbers of native frogs, newts and fishes are low this year compared to past years throughout the creek. In light of this sobering reality, every small action we can take to conserve water can make a difference.

With the hottest months ahead of us, we need to do everything we can to prevent pollution from getting into the creek, and from taking water out of the creek. Several strategies were discussed, including recycling pool water for irrigation, reducing water use in washing dishes, taking shorter showers and using shower water to flush toilets, and using clever strategies for reusing washing machine water for irrigation.

At the meeting, Dr. Vanessa Thulsiraj, a postdoctoral fellow in Dr. Jay's lab provided a more technical update of the bacterial source studies. Based on the preliminary results, the bacteria are generated either within Topanga lagoon, or at the beach. Using molecular markers, the Jay lab has been examining the sources of bacteria, and it appears that gulls, dogs and humans all share some responsibility. The most interesting observation was the pattern of dog inputs. During the summer months when there is more activity at the beach, the dog contribution is less. During the winter months, the contribution of dogs increases significantly. Clearly dog poop on the beach is contributing to the bacterial exceedance problem.

Like all the beaches in southern California, Topanga Beach got fairly good grades from the Heal the Bay Beach Report Card for 2013-2014, as compared to previous years when it landed on the beach bummer list as one of the 10 worst beaches. The challenge is to develop strategies to improve beach water quality when the rains return. The RCDSMM and UCLA teams are investigating several possible solutions, but by far the most important is to restore the function of Topanga lagoon, so that it changes from a source of bacteria to a solution for recycling and naturally cleansing the water.

The grand finale of the evening was a presentation on the crayfish removal project by Crystal Garcia and Lizzy Montgomery. At least one local who wanted a source of fishing bait introduced crayfish into Topanga Creek around 2000. Other introductions may have followed. There have been examples of releasing non-native species into the creek throughout the mountains, but Topanga was one of the last creeks to be invaded. Working with student volunteers from the Topanga Wildlife Youth Project and Calvary Christian School, over 400 crayfish have been hand captured and removed since September 2013. The Topanga Wildlife Youth Project students have contributed to the outreach effort by developing a website and ecozine (which you can check out at www.topangawildlife.org), and they actively participate in hands on efforts to learn about local ecosystems.

The weekly effort by student volunteers resulted in over 1,000 hours of fishing and allowed comparison of the 200 meter reach where crayfish were removed with another 200 meter reach where they remained. Crystal and Lizzy have analyzed data collected not only with student help, but also during snorkel surveys and annual stream surveys. It appears that in addition to the drought impacts, the crayfish are also wreaking havoc in the creek. Comparison of aquatic bug numbers and species suggests that crayfish are using that food source and changing the community composition of the bugs. The number of newts and newt egg masses has plummeted as the crayfish population has exploded. The snorkel team even rescued a newt being attacked by crayfish in April.

Unfortunately the crayfish have taken advantage of the low flow and warmer water to spread throughout the creek. Crayfish invasions of drought-time Mediterranean wetlands are currently occurring on a global scale. It is not realistic to think we can remove them all, especially since the creek below town is totally closed to fishing of any kind, in order to protect our endangered fishes. The RCD has a special permit to supervise the hand removal effort, but no traps of any kind are allowed.

So, what to do? Well, we are all praying for good rains to return this winter, that's for sure! Monitoring in Trancas Creek by Dr. Lee Kats of Pepperdine University has shown that crayfish get washed out in big storm events, and that is the time to really put effort into removal. While we wait and see if the rains come, we can just continue with our small effort and hope that Topanga Creek remains resilient enough to recover. We hope to share the final results of all this research in the fall.

If you are interested in helping protect and preserve Topanga Creek, sign up and become a Topanga Creek Stream Team volunteer. Over 150 of your friends and neighbors already help with creek clean ups, water quality testing, crayfish and invasive plant removal, and other creek adventures. To get on the listserve, email Rosi at rdagit@rcdsmm.org.

TOPANGA SOURCE ID STUDY
2012-2014

Volunteer Training and Sampling Schedule
1 December 2012
Topanga Ranch Motel 10 am - Noon

Training Agenda

Introductions and sign in

Safety Consideration

Expectations for volunteers: What to wear, where to meet, and commitment

Sampling Timing- before daylight hits the water!

What we are sampling and why: Hypothesis testing

Water Quality Testing Parameters
- UCLA Fecal Indicator Bacteria
- Chemical parameters
- Flow
- Algae

Sampling Site Locations

Data Sheet Review and Practice Sampling
- Comparison of hydrolab to other probes

Sampling Schedule (Subject to change with rain!)

Month	**Wednesday**	**Sunday**
December 2012	19	9
January 2103	9	27
February 2013	6	24
March 2013	27	10
April 2013	10	28
May 2013	8	

TOPANGA SOURCE ID STUDY PROTOCOL

GUIDING THOUGHTS
Come prepared for the weather and to get wet up to your knees.
Closed toe shoes or waders required. No sandals, even in the ocean! EVER!

Safety comes first!
Be careful walking to the sites, and follow standard protocol for handling the various chemicals and equipment. If for some reason collecting the data is not safe for any reason, STOP and discuss situation with the team leader. If the ocean waves are too high, do not collect the sample.

Be aware of the sources of potential sources of error when taking measurements and take the time to do things in consistent sequence correctly. If you goof, do it again!

Calibration is CRITICAL!!!! The level of error tolerable for this study is very low and therefore all equipment must be carefully calibrated prior to each sampling event.

Patience is a virtue when collecting water data! It takes between 3-5 minutes for the hydrolab and DO probes to stabilize at each location. Ditto for air temperature.

Back in the lab, pay close attention to possible sources of error, such as measuring out reagents and processing samples within the time restrictions for each test. Watch the meniscus and pay attention to drop size.

Confirm each reading by having more than one person "read" the output. If the measurement does not make sense, DO IT AGAIN! Record all readings if there is a difference.

Common Problems to Avoid.......
Make sure the membrane on the DO meter is tight with no air bubbles. If it has gotten dried out between events, replace the membrane.
Make sure the batteries for the flow meter are ok. They run out fast!
Ditto batteries for the pH and conductivity probes.

Important contact info:
Rosi Dagit 310-488-6381
Jenna Krug 732-682-5159
Tim Riedel 323-698-6898
Vanessa Thulsiraj 714-315-3810
Amy Zimmer-Faust 310-528-3833
Jenny Jay 310-866-2444
County Lifeguards: DISPATCH 310-394-3261 ask to be connected to TOPANGA
Section Chief Mickey Gallagher 310-394-3261
Regular Topanga Lifeguards: Bill Mount and Sam

Day before sampling event:
UCLA team:

1. Calls RCD lead to confirm team, meeting place/time and request waders by size
2. Prepares and labels FIB sample bottles
3. Calibrates the hydrolab
4. Stages all equipment including:
   - Gloves
   - Sample bottles
   - Ice chests and ice, with thermometer attached
   - bridge sampler (may be stored at RCD shed)
   - pole sampler
   - headlamps

RCDSMM team:

1. Prints out data sheets (Rite in the rain paper in wet months!)
   Clipboards, pencils, sharpies and gloves
2. Confirms team and meeting place/time
3. Stages waders and calibrates equipment including:
   - DO meter – make sure membrane is good!
   - Refractometer
   - Air thermometer
   - Conductivity meter
   - pH meter
   - meter stick
   - Flow meter and pole
   - Meter tape
   - Grab sample bottles
   - Cooler and ice with thermometer attached to side
   - Algae id sheet
   - Headlamps
   - Flashlight
   - Distilled water to rinse probes
   - CHECK ALL BATTERIES AND TAKE SPARES
   - Camera
   - First Aid Kit
   - Laptop and camera card reader

Determine if VIRUS or DIATOM sampling will occur and make arrangements for getting them to the labs.

DATA SHEETS needed for each event:

- Upper Topanga Sites
- Beach Sites
- Flow sheet for each site (4-6 copies)
- Chain of custody form
- Nutrient testing data sheets – upper and beach

Sampling Event:
Arrive at the Topanga Ranch Motel at meeting time to carpool.
Turn on the YSI DO meter at least 15 minutes before sampling begins.

PUT ON YOUR GLOVES!
Prepare the FIB sample bottles as follows:

1) Shake acid already in bottle vigorously -- enough to cover all surfaces (for tea bottles make sure handle gets some acid too).
2) Pour out acid from sample bottle into waste bottle.

Before leaving the cars, make sure all equipment is in hand.

It is really important that data collection be done in the same sequence and at consistent locations. Please follow the steps below at each site.

When walking to the site, avoid stirring up sediments!

Take a photo of the site from the photo documentation point.
It is important to stand in the same place, face the same direction and frame the photos consistently month to month so we will have a photo sheet to refer to.

Feel free to take any additional photos to illustrate flow conditions or other things of interest.

Getting a group shot of the sampling team is also great if there is time!

IMPORTANT NOTE FOR LAGOON TEAM-
Stop by the Lifeguard Station and upload the photos and get calendar notes on lagoon-ocean condition.

It is really important to sample at the same location consistently!

Procedure for Collecting FIB, VIRUS and Nutrient samples
Walk along the bank to the sampling location, or cross the creek at least 5 meters away from the sampling location to avoid stirring up the sediments.
If it is not possible to reach without stepping into the creek, then use the pole sampler to gather the water sample and disturb the sediment as little as possible.

Remove the cap, submerge the bottle at the site and fill half way.
Put cap back on, shake well and discard the water on the bank, not into the creek. Dump the water in the same spot to further dilute any acid washed out.
Repeat this three (3) times.
Note the time on the data sheet.

> **Creek:** Sample upstream of other measurements. Point mouth of bottle upstream and ahead of your body. Do not use your hand or lid to strain water. Collect as

little of bottom sediment or surface scum as possible. Ideally the bottle will collect water 4-6 inches below the surface, but if creek is too shallow just get what you can. Fill bottle at least 75% full, but if creek is too shallow just get what you can.
Ocean: Collect incoming waves with mouth of bottle seaward and ahead of your body in approximately knee deep water. Fill bottle at least 75% full.

Place bottle in ice chest within 15 minutes of sampling. Be sure that samples are not exposed to direct sunlight.

Repeat with the Nutrient Grab Sample bottle after recording the bottle number on the data sheet.

COLLECT extra sample at first site for sample blank calibration.

If VIRUS samples are collected, repeat this process and fill the virus sample bottle.
We will provide DIATOM sampling methods when available.

Change gloves between each site.

Procedure for Collecting Water Quality Data
Upon arrival at the sampling location, set down tote in the shade on the bank.

Place the air thermometer on the tote in the shade. Allow at least 3 minutes before reading.

Place the probe of the YSI 55 or hyrdolab into the water and allow it to sit for at least 5 minutes to equilibrate.

(If using the hydrolab, be sure the propeller is turned on! Probe can rest on its side on the substrate. Record all data.)

Measure salinity using the refractometer. Lift the cover. Place several drops of water on the glass plate, drop the cover and hold the instrument towards a light source. Salinity is read by looking at where the blue area meets the white area. Numbers are on the right side of the center line.

For the YSI 55 DO meter, enter the altitude (refer to data sheet for each site) and the salinity. Gently swirl the probe with the silver probe section just below the surface of the water until the DO reading stabilizes. Record the DO both in mg/l and in % saturation. Rinse the probe with distilled water and re-insert into the side housing.

Use the water temperature reading from the YSI 55. Record.

Measure pH by submerging the probe into the grab sample bottle. Record

Measure conductivity by submerging the probe into the grab sample bottle. Record

Turn over data sheet and record the weather conditions and observations.

Before leaving the site, make sure all probes are rinsed with distilled water and placed into the tote.

Review the data sheet and make sure all data has been properly recorded.

NOTE: Turbidity, Nutrient tests and FIB tests will be completed back at the lab.

Hydrolab Protocol

1) Remove storage cup from sensors (try to keep tap water in it) and cover sensors with protective guard.
2) Rinse sensors liberally with DI water squirt bottle. Make sure this wash water goes on the bank and not into the creek.
3) Submerge probe (with guard on) gently into creek or lagoon and let it lay on the creek bottom. Try to avoid stirring sediments when submerging and once deployed.
4) Turn Hydrolab controller on and also turn on the propeller by pushing the exit button.
5) Wait at least 5 minutes until measurements have stabilized, and then record measurements in order from top to bottom: Water temp, conductivity (SpC), DO, pH, (skip depth),

    Press enter (arrow key) to go to next screen. Record:
    Battery voltage, salinity, DO %, ORP, turbidity.

6) Measure depth with yard stick at location of Hydrolab sensor.
7) Turn propeller off and pull sensors out of creek.
8) Remove sensor guard. Wipe any dirt off from o-ring and cover sensors with storage cup. Cup should have tap water in it (needs to be at least half full). If the tap water spills out fill cup with creek water.
9) Leave Hydrolab controller on between sites. Transport in backpack which has some protective foam.

Note 1. Get Hydrolab sensors into site water as soon as you arrive at new site in order to start equilibrating the sensors.
Note 2. The sensor cup and guard can be very difficult to remove if dirt gets embedded in the o-ring. We have noticed that it helps if they are only pushed on and NOT twisted into the locked position. We have never had either the cap or guard fall off when only pushed on.

Procedures for Measuring FLOW and ALGAE 2 people needed
Each site requires a unique data sheet, so be sure you have one for each location where flow will be measured.

Place the 0m end of the meter tape on the west bank of the channel (left side looking upstream) and pull straight across the channel and hold tightly using a rock and your feet.

Note the wetted channel width on data sheet. Data recorder also can hold one end of the tape.

Flow recorder stands on the downstream side of the tape.

At each distance, record the depth and flow. Be sure the flow head is pointing directly upstream and is 1/3 of the depth up from the bottom. You can either just hold it in place or adjust the head on the pole.

Wait until the flow reading stabilizes, then record.

Note if there is algae under the point generated by the random number table, and if so, what type.

If no algae is present, note substrate type or other vegetation type as shown on the back of the flow data sheet.

IMPORTANT TIME INFORMATION

The holding time for the FIB and VIRUS samples is no more than 6 hours from the time collected to processing in the lab. Samples should be on ice at all times during transport.

Holding time for Nutrient sampling is no more than 24 hours, although within 8 hours is preferable. Samples should be on ice at all times during transport.

AT THE END of the sampling event……

All gear and waders will be rinsed and returned to either the RCD shed or back to UCLA. If any equipment needs repair or maintenance, this will be done asap.

UCLA team will head back to the lab to process the samples.

RCD team will head to RCD office to input data, download and label photos and do nutrient testing.

All data sheets will return to the RCD office for entering and be archived there.

As soon as the FIB and DNA data is available, it will be provided to the RCD and included into the central database.

CHAIN OF CUSTODY

Because we want to use this data in a regulatory setting, documenting who has physical control of each sample at ALL TIMES is a standard operating procedure that we MUST follow. Please be sure that the name and times are correct for each step of the process.

Time and Name of person who collected the sample
Time and Name of the person who transports the sample to the lab/RCD
Time and Name of the person who fixes or manipulates the sample for testing
Time and Name of the person who reads the results
Time and Name of the person who enters the data

VOLUNTEER WATER QUALITY MONITORING - TOPANGA WATERSHED
Prepared by Deborah Low

WATER QUALITY TESTING

WHY MONITOR RIPARIAN WATER QUALITY?

- Riparian data is commonly used to:
  - Establish baseline conditions
  - Determine water quality changes through time
  - Identify current and emerging problems
- Useful monitoring data should accurately portray current physical, chemical and biological status. With baseline data established, changes can be tracked.

WHAT IS "QUALITY ASSURANCE"?

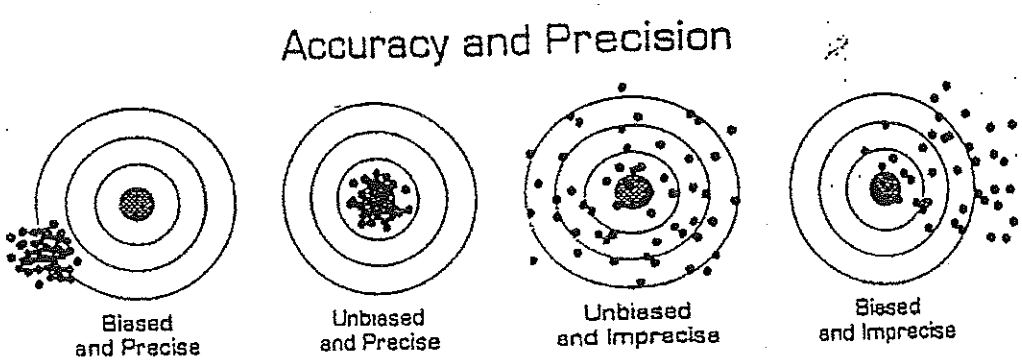
QA is the overall strategy that ensures high standards.

WHAT IS "QUALITY CONTROL"?

QC is the procedure used during a particular analysis which makes that analysis more accurate and precise. What is the difference between accuracy and precision?

Accurate = extent to which results agree with true or expected value

Precise = degree of agreement among repeated measurements



Source: K. Hamilton and E.P. Bergersen, Methods to Estimate Aquatic Habitat Variables, U.S. Fish & Wildlife Service and Bureau of Reclamation

PARAMETERS AND EQUIPMENT

1. Dissolved Oxygen ("DO") is the amount of oxygen in the water. It is critical for the survival of most aquatic animals and is one of the best indicators of a stream's health, with natural readings ranging from 7 - 14 parts per million (ppm). Natural sources include wind, waves and running water. During daylight hours, plants add oxygen to the water via photosynthesis. At night, plant respiration consumes oxygen and produces carbon dioxide. Therefore, the water is supersaturated during the day and low at night. Oxygen solubility is poor in water, even well aerated cold (0 degree C) fresh water can only hold 14.2 milligrams per liter (mg/L) when fully saturated. Salt water can absorb even less. Most animals and plants can grown and reproduce when DO levels are greater than 5 mg/L. If the level drops to 3-5 mg/L, the organisms become stressed. If levels drop below 3 mg/L a condition called hypoxia occurs and the organisms will die or move away. Anoxia is the total depletion of oxygen, less than 0.5 mg/L and death is probable for all organisms that require oxygen.

Additional conditions affect DO such as:
- when temperatures increase, DO decreases,
- as salinity increases, DO decreases,
- as altitude increases, DO decreases, and
- as mineral content increases, DO decreases.

Equipment used to record DO:
• Meters (mg/L) YSI 55 and YSI 57

• LaMotte kit (ppm)

2. Water Temperature is a function of depth, season, temperature of water flowing, and human influences in the stream. The specific ecosystem must be understood to apply acceptable natural ranges. Maximum temperatures tolerated by organisms depend on the species. The following chart illustrates some examples.

Maximum weekly average temperature for growth and short-term maximum temperatures for selected fish (°C or °F) *Adapted from EPA's Draft Volunteer Stream Monitoring: A Methods Manual.*

Species	Growth	Maxima	Spawning**	Embryo Survival**
Bluegill	32°C (90 °F)	35°C (95 °F)	25°C (77 °F)	34°C (93 °F)
Carp		21°C (70°F)	33°C (91 °F)	
Channel catfish	32°C (90 °F)	35°C (95 °F)	27°C (81 °F)	29°C (84 °F)
Largemouth bass	32°C (90 °F)	34°C (93 °F)	21°C (70 °F)	27°C (81 °F)
Rainbow trout	19°C (66 °F)	24°C (75 °F)	9°C (48 °F)	13°C (55 °F)
Sockeye salmon	18°C (64 °F)	22°C (72 °F)	10°C (50 °F)	13°C (55 °F)

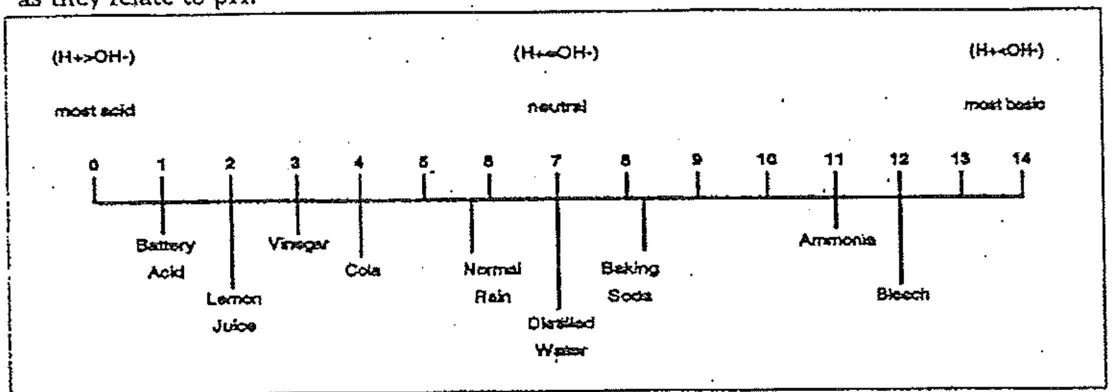
* The optimum or mean of the range of spawning temperatures reported for the species.
** The upper temperature for successful incubation and hatching reported for the species.

To test for temperature, the equipment used is a waterproof thermometer, recorded in degrees Celsius. Leave the thermometer in the main water source as you take the reading and wait at least 3 minutes before you record the reading. Temperatures change rapidly and will not be accurate if taken from the sample bottle.

4. Air Temperature can be a significant component to water quality. Seasonal variations will have impacts on the water conditions. A reliable dry thermometer, recorded in degrees Celsius is used for this parameter. Allow at least 3 minutes for the thermometer to adjust and take the reading in a shady spot. Hot, direct sun will not give an accurate reading for the site.

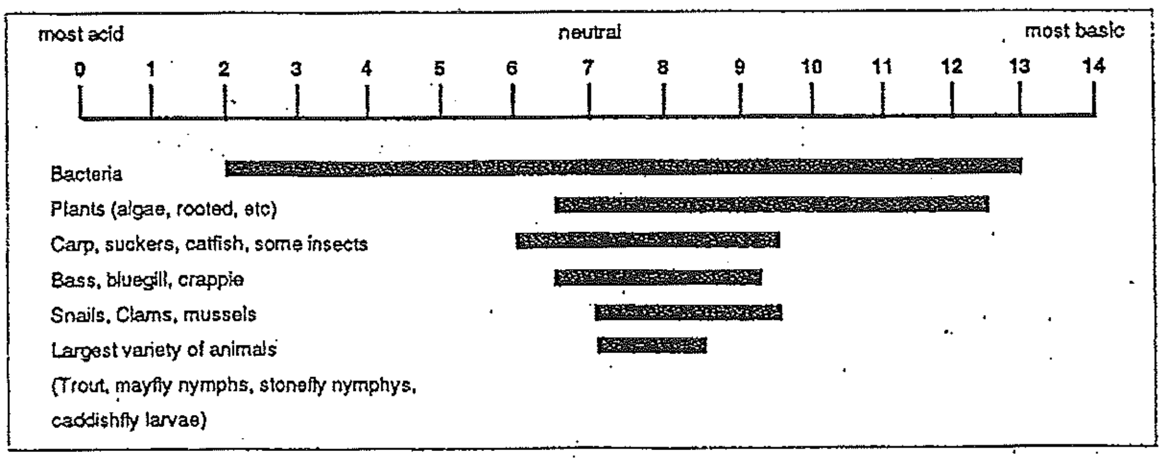
3. pH is a parameter that quantifies acidity (H+, hydrogen ions) and alkalinity (OH-, hydroxyl ions) on a scale from 0 to 14. The scale is logarithmic, so each change of one unit

in value represents a change of 10 in acidity or alkalinity. Natural sources include acid rain, industrial pollution, and chemicals. The following diagram illustrates some common items as they relate to pH.



pH scale showing the values of some common substances. (Source: U.S. Fish and Wildlife Service.)

pH is an important parameter as extreme values can begin to cause physical damage to organisms and changes may alter the concentrations of other substances in the water to a more toxic form. Natural readings generally range from 6.5 - 8.5, with the exception of bogs that have a natural acidity as low as 4.2. A buffer can neutralize acids or bases when it is added to the water. Natural buffers include CO_2 from the air which dissolves to form carbonic acid H_2CO_3. Minerals such as calcium and magnesium, coming from limestone, will dissolve in the water and also act as a buffer, affecting the pH reading. Other natural influences on pH include type of trees (conifer needles are acidic, maple leaves are basic) and the type of stream bottom (gravel vs. silt). In fresh water, pH decreases as water temperature increases. The following chart shows acceptable ranges.



pH ranges that support aquatic life.

Equipment used

- Waterproof meter

- pH paper

4. **Conductivity/Total Dissolved Solids and Salinity** are related parameters. Conductivity is the ability of water to conduct an electrical current and salinity is the amount of salts in the water. Dissolved ions, such as sodium, calcium, potassium and magnesium, in the water are conductors. Conductivity will vary with the water source and can indicate groundwater seepage or a sewage leak. Salinity will increase with the number of dissolved ions, such as sodium, chloride, carbonate and sulfate, and also is a determinate in the types of plants and animals capable of living in zones of water. Freshwater salinity is considered to be less than 0.5 parts per thousand (ppt) while sea water ranges from 33 - 37 ppt. Freshwater conductivity ranges from 0.5-3.0 µS for distilled water to 30-1500 µS for potable water in U.S. Melted snow can be 2-42 µS.

Equipment used:

- Refractometer that registers salinity as a value obtained from changes in direction of light caused by the amount of salt in the water. Units are parts per thousand (ppt).

- TDS/Conductivity meter records units of µmhos/cm or microseimens (µS) and parts per million (ppm) for TDS.

5. **Water Depth and Sample Depth** are important measurements in the overall monitoring protocol. The depth should be estimated for the deepest section at the site, in centimeters (cm). The sample depth should be below the surface at least 5 cm and deeper if possible. At most sites the sample will be collected as a "grab", using a clean plastic bottle with screw cap. Dip the bottle and cap below the surface to the level sampling at, remove the lid and allow the bottle to fill. Tilt slightly to allow the air bubbles to escape and cap the bottle while still underwater. Place sample into the coolers provided for transport. Indicate on the data sheet the number on the bottle. Meter sticks may be available and also measuring tapes.

6. **Flow** is an important factor in water quality as it indicates the rate of water movement. Generally a section of the streambank is measured off and an orange peel floated from one end to the other, recording the number of seconds needed to travel the determined distance. Oranges are biodegradable and have the ability to float with enough weight to move with the flow, not with the wind.

7. **Visual Observations** include a visual survey of the site, approximately 20 feet upstream and 20 feet downstream. A separate data sheet is completed with the results, such as evidence of trash, type of trash, percent of algae, type of algae, presence of foam or oil, and other debris. In addition, water color and water smell are recorded. Use the collected sample to evaluate color as the streambed can hamper the value . Water color is related to the type of particles present. Smell the water in the sample bottle by "whiffing" your hand over the top and toward your nose. Odors often indicate the presence of pollutants or natural biological processes. Sometimes the entire site will have a prominent odor and this should be indicated. . Any unusual items should be noted, such as dead fish, or excess trash, etc.

8. **Weather Conditions** will have an effect on water quality. These are recorded on the same data sheet as the visual observations and include cloud coverage, wind direction, wind strength and current weather. A Beaufort Scale is included that indicates wind speed values.

9. **Time of day** is important to record for each site monitored.

The following parameters will not be measured in the field but are extremely important in assessing the health of the water. The samples collected by volunteers will be tested by RCD staff or an independent lab.

10. **Turbidity** determines the amount of suspended particles, phytoplankton, zooplankton, pollutants and fragments of dead plants. Water that appears clean does not mean it is clear. Natural causes of turbidity include runoff, wave action, storm turbulence, and local stream morphology. Turbidity has an impact on aquatic organisms. For example, filter feeders are harmed by foreign suspended matter and experience increased difficulty in spotting prey. Also, suspended particles diffuse sunlight and absorb heat.

Equipment used:
- A turbidity meter is used to measure the amount of suspended particles. Light is scattered when directed at a water sample at 90 degrees. Nephelometric turbidity units are recorded as NTUs.

11. **Phosphates** can appear in the water as a result of detergents, natural chemical reactions, sewage and other pollutants. Phosphorus exists in the water in several forms and is critical for the metabolic processes which involve the transfer of energy at the micro-cell level. Organic phosphate (PO_4) results from plant and animal wastes and decomposition of plants and animals; orthophosphate (inorganic phosphate) comes from fertilizers, and polyphosphate will be found more likely in polluted areas. Natural readings range from 0.0 - 0.65 ppm.

Equipment used:
- LaMotte Test Kit, measured in parts per million (ppm)

12. **Nitrogen-Nitrates** are significant as the primary role of nitrogen is protein synthesis and photosynthesis. Nitrate (NO_3) and nitrite (NO_2) are also byproducts of the breakdown of ammonia (NH_3); a waste product of animals and product of decomposition. Nitrate will predominate in unpolluted waters. Natural sources include animal wastes, fertilizers, and pollutants such as car exhaust. Natural readings range from 0.0 - 0.08 ppm.

13. **Ammonia-Nitrogen** is generally measured as total ammonia, the sum of both NH_3 (un-ionized state) and NH_4 (ionized state). Ammonia is the preferred nitrogen-containing nutrient for plant growth and can be converted to nitrite (NO_2) and nitrate (NO_3) by bacteria, and then used by plants. Ammonia is excreted by animals and produced during decomposition of plants and animals and is how nitrogen is returned to the aquatic system in the nitrogen cycle. An increase in readings of nutrients (ammonia, nitrates, phosphates) will cause an increase in phytoplankton which will cause an increase in DO in the surface water. The phytoplankton will die, sink, and decompose via the oxygen consuming bacteria and the DO levels will decrease near the bottom of the water. The availability of nutrients, such as nitrogen, can limit the growth of aquatic plants. Excess nutrients may seasonally deplete DO and the aging process of filling in a body of water, called eutrophication, may occur over a longer time frame. Current standard and limit for

ammonia-N in ambient cold freshwater streams (15 degree C) is 2.05 mg/L. For ambient warm freshwater streams (25 degree C) the standard and limit is 1.42 mg/L.

Equipment used:
- LaMotte Test kit, unit of ppm (=same as mg/L)

14. Total/Fecal Coliform bacteria are used to indicate the potential for pathogenic bacteria in surface water. Coliform bacteria is naturally produced by plants and may be present in water. Fecal coliform is that bacteria produced by warm-blooded organisms, such as birds, livestock, and humans. The following chart indicates levels desirable and permissible.

Significant Bacteria Levels

Fecal Coliform Bacteria per 100 mL of Water		Water Use
Desirable	Permissible*	
0	0	Potable and well water (for drinking)
<200	<1,000	Primary contact water (for swimming)
<1,000	<5,000	Secondary contact water (for boating and fishing)

* Contact your state, regional, or local health department or the regional EPA office for specific requirements.

Source: LaMotta Company, 1992. The Monitor's Handbook. Chestertown, MD.

15. Metals include copper, lead, nickel, chromium and zinc. The independent lab will be analyzing the samples for these elements.

BEAUFORT SCALE

NUMBER	DESCRIPTION	WIND (MPH)	SEA SURFACE
0	CALM	0	LIKE A MIRROR, SMOKE RISES VERTICALLY
1	LIGHT AIR	1-3	RIPPLES, SMOKE DRIFTS SLIGHTLY
2	LIGHT BREEZE	4-7	SMALL WAVELETS, NOT BREAKING, LEAVES ON TREES RUSTLE, WIND FELT ON FACE
3	GENTLE BREEZE	8-12	LARGER WAVELETS, SCATTERED WHITECAPS, FLAGS EXTENDED
4	MODERATE BREEZE	13-18	SMALL WAVES, NUMEROUS WHITECAPS, LOOSE LEAVES, LITTER AND DUST RAISED UP
5	FRESH BREEZE	19-24	MODERATE WAVES, MANY WHITECAPS, SOME SPRAY, SMALL TREES BEGIN TO SWAY
6	STRONG BREEZE	25-31	LARGE WAVES, WHITECAPS EVERYWHERE, MORE SPRAY, LARGE TREE BRANCHES SWAY, WIND WHISTLING IN WIRES
7	MODERATE GALE	32-38	FOAM FROM BREAKING WAVES BLOWN IN STREAKS, WHOLE TREES MOVE, RESISTANCE FELT WHEN WALKING AGAINST WIND
8	FRESH GALE	39-46	MODERATE HIGH WAVES OF GREATER LENGTH, TWIGS AND SMALL BRANCHES BROKEN OFF TREES, PROGRESS IMPEDED WHEN WALKING
9	STRONG GALE	47-54	HIGH WAVES, SEA BEGINS TO ROLL, SPRAY REDUCES VISIBILITY, ROOF TILES BLOWN OFF
10	WHOLE GALE	55-63	VERY HIGH WAVES WITH OVERHANGING CRESTS, HEAVY ROLLING & POOR VISIBILITY, TREES BROKEN OR UPROOTED

NOTE: BEAUFORT SCALE HAS HIGHER NUMBERS OF 11 - 17 WHICH RELATE TO INTENSE TROPICAL STORMS AND HURRICANE CONDITIONS. THESE ARE RARELY EXPERIENCED ON LAND.

pH Ranges That Support Aquatic Life

MOST ACID ——— NEUTRAL ——— MOST ALKALINE

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Bacteria	1.0 — 13.0
Plants (algae, rooted, etc.)	6.5 — 13.0
Carp, suckers, catfish, some insects	6.0 — 9.0
Bass, crappie	6.5 — 9.0
Snails, clams, mussels	7.0 — 9.0
Largest variety of animals (trout, mayfly, stonefly, caddisfly)	6.5 — 7.5

Temperature Ranges (Approximate) Required for Certain Organisms

Temperature	
Greater than 68° F. (20° C)- warm water	Much plant life, many fish diseases Most bass, crappie, bluegill, carp, catfish, caddisfly
Middle range: 55° - 68° F (12.8 - 20° C)	Some plant life, some fish diseases Salmon, trout, stonefly, mayfly, caddisfly, water beetles
Low range: Less than 55° F (12.8° C) - cold	Trout, caddisfly, stonefly, mayfly

Dissolved Oxygen Requirements for Native Fish and Other Aquatic Life

D.O. in parts per million

(below 68° F.)	(above 68° F.)
Cold-water organisms, including salmon and trout	Warm-water organisms (including fish such as bass, crappie, catfish and carp)
6 ppm	5 ppm

From "A Lesson Plan for Some Water Investigations," *Investigating Your Environment Series*, U.S. Forest Service, Revised 1977. Printed with permission.

RESOURCE
CONSERVATION DISTRICT
OF THE
SANTA MONICA MOUNTAINS

818.597.8627 phone
818.597.8630 fax
info@rcdsmm.org

30000 Mulholland Highway, Agoura Hills, CA 91301
Mail: PO Box 638, Agoura Hills, CA 91376-0638

TOPANGA CREEK WATERSHED
What makes it so special?

Spring 2013

What is a watershed?

A watershed is a geographic area that collects all the rainfall into a series of drainages and creeks, eventually reaching the sea. The water that runs off every roof, every driveway, and every road eventually finds its way into Topanga Creek. At 18 square miles (12,800 acres), Topanga Creek is the third largest drainage into the Santa Monica Bay. The largest watershed is Malibu Creek (109 square miles) and the second largest is Ballona Creek (88 square miles).

What makes the Topanga Creek Watershed Unique?

Think about the community we call Topanga. It is the creek that defines the community on many levels, from placement of the homes, utilities and roads (along the floodplain), to how natural disasters like wildfires and floods impact our lives. The center of town is where the main stems of the Creek meet from Old Topanga and along Topanga Canyon Blvd from the Top of Topanga. Most of the creek banks are held in place by native trees and plants, creating a beautiful landscape. The life of the creek is punctuated with catastrophic events that can change it dramatically.

Topanga Creek has the greatest diversity of native plants and animals found in any watershed in the Santa Monica Mountains. From endangered steelhead trout and rare western pond turtles, to the majestic coast live oaks and CA sycamores that frame the creek, the community of Topanga extends a welcome to over 22 amphibian and reptile species, 3 species of native fish, 9 species of bats, numerous rare mammals like ringtail cats and badgers, as well as over 100 resident and migratory birds. Unlike other nearby creeks, only small, isolated populations of exotic animals like crayfish and bullfrogs are found. While invasive plants like Giant Bamboo (Arundo) and Cape Ivy are a problem, they have not yet overwhelmed the natural vegetation.

We have not yet lost our creek. The goal is to encourage voluntary stewardship efforts that will keep our creek healthy. That is why education is so critical. If all residents of the watershed learn about how their actions can make a real difference, then together we can find the patb to living in harmony with our watershed.

What can you do to make a difference?

As teachers, you can lead the way to greater understanding of how all our actions are directly connected to the long-term sustainability of Topanga Creek. We all live and work somewhere in the watershed, and as the saying goes, everything does move downhill! So each class you teach, each lesson shared on our role as stewards, has direct impacts on the health and well being of the entire Topanga Creek Watershed.

Like the ripples of a pebble thrown into the creek, your teaching efforts spread the understanding our connectedness throughout the community. With your help, the Topanga Creek Stream Team and the RCDSMM hopes to educate the current and future residents of Topanga in meaningful ways that translate into direct benefits, to not only the human community, but to all the plants and animals that share our home. Thanks so much for your help in this important effort.

Topanga Creek Watershed: Wet, Wild and Wonderful!

By Rosi Dagit

Reprinted with permission from the Topanga Messenger, Vol 21, No. 18, September 1997 and updated in March 2013 to reflect current knowledge

Topanga Canyon folks know where we live. Or do we? We talk about "the Canyon", but what defines our boundaries? Unlike other communities where borders are based on streets and politics, Mother Nature has defined our space.

Imagine a large teardrop bowl, slightly misshapen by the cosmic potter's hand. Saddle Peak, Red Rock, Calahasas Motorway, Henry Ridge, Top of Topanga, Summit Pointe, Viewridge, Santa Maria, the hackside of Paradise Lane, Eagle Rock and the Parker Mesa Ridge create the rim. All the rain that falls within this area finds its way into Topanga Creek and to the ocean. The 18 square miles containing 12,400 plus acres have intertwined drainages, which hecome the Topanga Creek Watershed.

What difference does a watershed make? A lot. Either you're in or you're out. The amount of run-off during a storm determines the fate of our roads. Some 200 homeowners along the Creek need to know if floods will endanger their homes. Surfers and swimmers are concerned ahout water quality down at the beach. Approximately 750,000 people visit Topanga State Beach each summer. We are fortunate to have so many "Topangans in spirit", even if they're not "Topangans in drainage".

Systems of watersheds collectively drain into larger geographic areas. The Santa Monica Bay has 28 different watersheds that supply fresh water to the ocean. Malibu Creek Watershed at 109 square miles is the largest. Tuna Canyon Watershed at 1.47 square miles is one of the smallest. Each has different characteristics due to steepness, geologic features and vegetation. In some watersheds, the majority of the main creeks and channels are now concrete flues with little hiological function left. Just look at what was once the LA River.

Topanga Watershed is the third largest in the Santa Monica Bay system and one of the least altered. Although some sections of the creek are armored with concrete, old stone walls or piles of boulder riprap, much of our streamheds are still stabilized by trees and shrubs. Upslope development has generally left hillsides intact, only slightly modifying the lay of the land and water flow.

Most unique is the amount of protected open space within the watershed. Over 2/3 of the watershed is undeveloped, with close to 8,000 acres contained in local parks. With the 2001 addition of the Lower Topanga Park, and various smaller parcels in the upper watershed, a vast majority of the land is permanently protected. Studies are underway to evaluate the feasibility of restoring the historic Topanga Lagoon, which once covered almost 16 acres at the mouth of the Creek. With this opportunity comes responsibility. Those of us who live or work in the watershed need to he careful stewards in order to ensure the long-term viahility of the entire community.

THE WET PART

Much of the process has been shaped by water - how much and how long it flows. Topanga Creek is quite young in geologic terms, a baby at 14-18 million years old. Young streams are known to be unruly, eventually wearing down even the most stalwart rocks. They don't like confinement and take every opportunity to explore new paths, meandering at will. This is a lively process to watch unless you happen to live in the floodplain. It's not too amusing when the stream leaps over its banks and into your living room - a fairly common occurrence along boisterous young streams in full run.

The more sober minded engineers and hydrologists responsible for keeping people safe have tried many different ways to impose constraints on these rowdy events. First, they examine closely the shape, width and depth of the stream channels. Then using computer models, they calculate how much water could be expected to flow through the channels under specific storm conditions. They are always talking about 2, 5, 10, 20, 50 and 100 year storms. These "design storms" refer to modeled predictions of how often storms of different intensities are likely to occur. For example, 1980 was considered a 83 year storm, while 1995 was only a 13 year storm according to LA County DPW. The winter of 1982-83 was very wet, but the 1997-98 El Nino did not cause a major problem in Topanga.

Sometimes the models are not in sync with reality. Stream gages, which actually measure creek flow are used to make real world corrections to the models. The gage in Topanga Creek blew out in the 1980 flood, again from 1990 – 1996 and was only replaced in 1998. Since 2010, the main creek flow has meandered away from the gage, so it is high and dry, even when the creek is still flowing. The expected "normal" flow is estimated to be roughly 13,000 cubic feet per second during the wet season. LA County Dept. of Public Works estimates that under 50 year "design storm" conditions, 22,000 cubic feet per second flows down the Topanga Watershed, through the lagoon and into the Bay. This is based on an extremely rare scenario - a 50 year storm event following a fire throughout much of the watershed.

The piecemeal approach to problem solving along the creek could be replaced by a more coordinated vision that incorporates downstream impacts. Using information in the Topanga Creek Watershed Management Plan (2002) and tbe Topanga State Park General Plan (2012) as guidance, the goal is to eventually manage the watershed as an integrated whole, recognizing that grading and drainage changes at the top of the hills, driveway and roof runoff, stabilizing streambanks, pruning roadside trees and clearing brush all have an effect on how the creek responds during storm events.

To that end, the Topanga Creek Lagoon and Watershed Restoration Feasibility Study (2002) developed the baseline information needed in order to better understand the complicated interactions between the creek, roads, utilities and homes competing for space along the narrow canyon corridors. Funded by grants from the CA Coastal Conservancy and the Santa Monica Bay Restoration Project, a series of studies began to compile the historic picture of creek flow related to precipitation since 1938, the changes in the creek and lagoon since 1876, impacts from flood events, the background levels of erosion and sediment delivery, and the relationship of present land use and road maintenance practices to the stability of the creek banks

A comprehensive model of the watershed was constructed after careful calibration using real storm event data. This information will lead to informed planning to deal with several known problem locations in the watershed, including several landslides, and areas of unstable streambanks. Most importantly, it will provide direction on how restoration of the historic lagoon that used to cover over 16 acres at the mouth of Topanga Creek could be accomplished. . Numerous studies have built upon this information, resulting in the restoration of the Rodeo Grounds area of lower Topanga State Park in 2008.

In addition to the amount of water moving through the creek, there is tremendous concern about the quality of the water. The Los Angeles Regional Water Quality Control Board is preparing Total Maximum Daily Load (TMDL) limits for all pollutants of concern that end up in the Santa Monica Bay. Topanga Creek has been listed for lead problems in the upper watershed and for bacteria problems at the beach. In order to learn more about the water quality status, the Topanga Stream Team was formed in 1996.

The volunteers of the Topanga Stream Team collected water quality data and samples from 15 locations throughout the watershed each month from July 1999 to June 2001, again in 2003-2004. In summery, it was found that there are no heavy metal or nutrient loading problems in the upper watershed. Several "hot spots" where fecal bacteria counts were consistently high were found, including Entrado Rd., Highvale Rd., Falls Dr. and behind the Topanga Market. Despite these higher than acceptable contributions, when the water reached the bridge 2 miles upstream from the ocean, it was fine, except immediately following big storm events.

It appears that there is no present substantiation for the lead listing, and the data collected should be sufficient to have that listing reconsidered. A closer look at the lagoon/ocean interface indicates that the bacteria problems at Topanga Beach come from a source below the bridge. When the sand berm forms each summer, water quality improves. When the creek breaches the lagoon connecting it to the ocean following storm events, there are bacteria problems at the beach.

Starting in 2012, the RCDSMM began working with Dr. Jenny Jay's lab at UCLA to better understand the possible sources of bacterial contamination of the beach. Thanks to funding from Los Angeles County Supervisorial District 3, the study hopes to identify the likely sources (both physical location and source, i.e., human, bird, dog, horse, etc.) of bacterial contamination at Topanga Beach by testing the creek from Topanga Canyon Blvd. Bridge at MM 2.02 to the beach to test the hypothesis that the creek is grade "A", and to also test in and around the lagoon to fine tune our understanding of when and investigate why it gets grade "F". This will lead us to possible solutions that can be implemented to reduce bacterial contamination, or at least understand where it comes from. By investigating all the possible sources such as septic tanks along PCH, the lifeguard station restrooms, road runoff, impacts from transient encampments, as well as upstream inputs, we can develop a suite of Best Management Practices, or on-the-ground solutions to prevent and reduce the problem.

THE WILD PART

In addition to being young and feisty, Topanga Creek Watershed embraces diversity of all kinds. Thanks to our streamside woods, and oak- chaparral covered hillsides, there is food and shelter for a buge variety of plants and animals.

Take the creepy crawlies for example. A 1986 survey of reptiles and amphibians found that 22 species make their homes among us. Other large watersheds like Arroyo Sequit, Trancas and Zuma have at most 9 species. But that's just the beginning. Since spring 2000, local biologists and Topanga Stream Team Volunteers have been conducting yearly surveys to see how many species remain. It was reassuring to find dozens of California Newts, Two Striped Garter Snakes, Canyon Tree Frogs and Western Toads. The resurging population of Western Pond Turtles, with new sightings at 3 locations in the canyon is very encouraging.

Gerry Haigh, Ken Wheeland and the birders of Topanga estimate that at least 111 kinds of feathered friends either live here or stop in for seasonal visits. Over 35 different species are confirmed breeders. The hawks that we take for granted here, are protected by either State or Federal law, due to their scarcity in other places. Some 10 different kinds of birds we commonly see really are that rare.

Among the furry folk, we have everytbing from tiny field mice and opportunistic pack rats, to bats roosting under the bridges. Predators like badgers, skunks, foxes, ringtail cats, bobcats, coyotes and mountain lions prowl the night, taking advantage of the open spaces and abundance of small yummy meals. Badgers and ringtails are still found in Topanga, even though they are loosing ground in other parts of the Santa Monica Mountains. Even the skunks are still here in number!

We even have several species of plants found in only a few other places. Clusters of endangered Santa Monica Dudleya can be found clutching precariously to the volcanic slopes. Big Leaf Maples, and cottonwoods still can be found along the creek. Our trees hide the Arboreal Salamander and the ensantina, both declining in other areas of the mountains.

Perhaps most exciting is the April 2000 discovery of adult steelhead trout in the Creek. An on-going study indicates that spawning is taking place and baby trout are trying to make their way through the dry season and out to sea when the rains begin. Since 2008, the RCDSMM has been tagging individual fish and tracking them over time. Many of our fish live for 3-4 years, patiently waiting for the conditions to be right so they can migrate out to the ocean. Another endangered fish, the Tidewater Goby was also documented in Topanga Lagoon. Schools of native Arroyo Chub can be found in every stretch of the Creek. Careful searching indicates that Topanga Creek hosts only native fish species, with few of tbe introduced exotic predators like crayfish, mosquitofish and bullfrogs that can decimate local species.

Loss of habitat overall makes the pockets remaining in the Topanga Creek Watershed especially critical. This variety of rare or threatened animal and plant populations makes Topanga one of the more ecologically important watersheds in the Santa Monica Mountains.

THE WONDERFUL PART

Whether you know the boundaries or not, chances are you still appreciate just how wonderful it is to live, work and play in the Topanga Creek Watershed. Like our plant and animal neighbors, the human residents of Topanga enjoy the wild nature of the watershed, except when the fires rage, the floods roar and the earth trembles! Or maybe it is because Topangans have survived these forces of nature, that we are trying to live with, rather than exert control over, the world of our Creek. But becoming integrated into the watershed requires a delicate balancing act.

Topangans have a responsibility to think ahead, plan carefully. Everything we do from the ridges down to the Creek adds up. If we want to enjoy the exuberance of our creek, then we need to think before we act. Where does all that pollution go when we wash cars in our driveway or let graywater from washing machines drain right into the creek? What will happen if the hilltop is leveled? How can we balance the need to protect our homes from fire and still prevent erosion and flooding downslope? How can the trees be pruned to provide line clearance and still hold up the slopes? Being a part of the watershed means asking these questions and more, and seeking realistic answers.

Perhaps we should take our cue from Tao te Ching who said, " The highest motive is to be like water. Water is essential to all living things, yet it demands no pay or recognition. Rather it flows humbly to the lowest level. Nothing is weaker than water, yet for overcoming what is hard and strong, nothing surpasses it."

Topanga Creek Water Quality Field Study
Spring 2013

Provided by RCD of the Santa Monica Mountains, Dr. Jenny Jay, UCLA
Funded by the Office of Supervisor Zev Yaroslavsky, Third District

Background
In order to be successful in reducing pollutants entering Topanga Creek, Lagoon and Beach, an on-going education program is needed to complement the research effort focusing on identifying the sources of bacteria that are contaminating Topanga Beach. Outreach to 5th grade students within the watershed through watershed classes conducted at Topanga Elementary School and Topanga Mountain School is a great way to teach about the connections between what goes into the watershed- trash, pet droppings, fertilizers, washing machine water, pesticides, etc. that can end up polluting the creek and the beach. Getting the students into the creek and ocean to collect and analyze samples is the best way to engage them in making these connections.

The RCDSMM has been offering hands-on field based environmental education programs for many years. At Topanga Beach, our trained docents work with small groups of students as they rotate through a variety of stations where they use microscopes to identify plankton and benthic macro-invertebrates, test for water quality, seine for fish, and participate in the steelhead trout game. These interactive activities directly connect students to their watershed and provide opportunties to think about how their actions can make a difference.

Over the past ten years, the Jay Lab has developed and orchestrated a community-based research project in which 5th grade students work collaboratively with UCLA undergraduate students taking a two unit course to develop hypotheses regarding beach microbiology, design and execute research plans during a field trip to the beach, and analyze the results. Fifth grade students then present their findings in a culminating poster session at UCLA, and do a follow up presentation on their topics for parents and the community. Because 5th grade students will work with the same UCLA undergraduate students throughout the spring, they will gain valuable mentoring in addition to the laboratory experience.

5th grade students participating in this program will have a unique opportunity to assist in an on-going research project, learn hands on methods for investigating questions, and share their knowledge with the broader community. This program complies with the CA State Science Standards for Grade 5.

Thanks to funding from the office of Supervisor Yaroslavsky, we are able to offer the students an opportunity to contribute to our understanding of local water quality issues by combining these two programs as follows.

Program Elements

1. Introductory classroom visit (1 hour)
Dr. Jay and UCLA undergraduates will provide introduction to the basic concepts in microbiology. Students will pour a Petri plate and do a "microbe safari". Students will learn about coastal water quality issues, focusing on the connection between Topanga Creek and Topanga Beach. Small groups of 5th grade students will work with UCLA undergraduate students to develop their own hypotheses regarding Fecal Indicator Bacteria (FIB) in the ocean compared to the lagoon and creek. For example, one group may want to study FIB as a function of depth in the wave zone, while another may want to study the perimeter of the lagoon; another may look at the FIB community upstream of the lagoon in the Snake Pit area.

2. Field trip to Topanga Beach from 9am – 1pm with buses provided if needed.
Students and UCLA undergraduates will rotate between stations so that each student has time to 1) use the microscopes to identify plankton and benthic macro-invertebrates, 2) seine for fish and learn about endangered southern steelhead trout and tidewater gobies, and 3) collect field samples for microbiological testing in the Jay Lab. Samples will be collected by student groups and partially processed in the field. At a brown bag lunch on the beach, students will share what they learned and the hypothesis they are testing!

3. Classroom visit (1 hour).
Students will work with their UCLA mentors to analyze their field samples and examine their results. Students will prepare a power point poster with their UCLA mentors summarizing their project.

4. UCLA Campus visit from 9am - 1 pm (buses provided if needed).
Students will visit the UCLA campus, meet with undergraduate student mentors who will present a panel on college life, and then Topanga Students will present their posters at UCLA.

5. Community and Parent Presentations (2 hours)
The RCDSMM and UCLA research team will be hosting a community meeting to share the results of the on-going water quality study thus far, provide Best Management Practices ideas, and students will be invited to present their posters and discuss what they learned.

Pre- and post surveys for both the UCLA undergraduates and 5th grad students will assess increases in: 1) interest in science, 2) efficacy of civic engagement, 3) interest in higher education.

Proposed dates (to be refined with teachers and school calendars)
(Fridays work best for the UCLA students as that is their class day)
April 19 Classroom presentation (1 hour)
April 26 Field trip to Topanga Beach 9am – 1pm
May 10 Classroom visit to prepare presentations (1 hour)
May 17 UCLA visit 9am – 1pm

LINKS TO CA SCIENCE STANDARDS for GRADE 5

This program will directly address the following elements of the science standards.

Earth Science

3. Water on Earth moves between the oceans and land through the processes of evaporation and condensation. As a basis for understanding this concept:

a. Students know most of Earth's water is present as salt water in the oceans, which covers most of Earth's surface.
b. Students know when liquid water evaporates, it turns into water vapor in the air and can reappear as a liquid when cooled or as a solid if cooled below the freezing point of water.
c. Students know water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, hail, sleet, or snow.
d. Students know that the amount of fresh water located in rivers, lakes, underground sources and glaciers is limited and that its availablity can be extendece by recucling and decreasing the use of water.
e. Students know the origin of the water used by their local communities.

Investigation and Experimentation

6. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

a. Classify objects (e.g. fish, plankton, macro-invertebrates) in accordance with appropriate criteria.
b. Develop a testable question.
c. Plan and conduct a simple investigation based on student-developed question and write instrucitons others can follow to carry out the procedure.
d. Identify the dependent and controlled variables in an investigation.
e. Identify a single independent variable in a scientific investigation and explain how this vairable can be sued to collect information to answer a question about the results of the experiment.
f. Select appropriate tools (e.g. thermometers, meter sticks, balances, and graduated cylinders) and make quantitative observations.
g. Record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data.
h. Draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion.
i. Write a report/poster of an investigation that includes conducting tests, collecting data or examining evidence and drawing conclusions.

TOPANGA SOURCE ID STUDENT PROJECTS
2013

Contacts: Rosi Dagit, RCDSMM rdagit@rcdsmm.org
Dr. Jenny Jay, UCLA jennyayla@gmail.com

Why we are doing this study:
Topanga Beach has a problem with high bacteria levels. We are trying to find out the source of these bacteria and develop a way to reduce the levels if possible.

How Students can help:
Working with their UCLA undergraduate student mentors, students will develop a hypothesis and then test it by collecting water or sand samples for bacteria.

Classroom visit 1. Thursday, 25 April from 12:30- 1:30pm
It will be most efficient if the students can be in 5 small groups (7 or less students per group) when we arrive. The background introduction for the project will be done in small groups by the UCLA mentor students.

Small group discussion: 15 minutes
General WQ in Southern CA
Health risks of swimming near storm drains (Haile study)
Indicator bacteria—pros and cons of using *E. coli* and enterococci
Growth of bacteria and how it relates to measurement

Activity: Microbe safari: 15 minutes
We will bring a Petri dish for each student that has been divided into two sections. Students will create and test their own hypotheses about growth of bacteria. For example, a student may wish to compare the bacteria growth resulting from contact with an unwashed hand and a washed hand.

Small group discussion: Topanga field site : 15 minutes
WQ background for Topanga
Hypothesis testing exercise—Small groups will be assigned a research sampling plan and they can brainstorm about the research questions they will be able to answer when they see their data as well as the data of the other groups.
They will design the specifics of their sampling plan, marking their locations on an aerial photo of the site.

Students will be introduced to how IDEXX works so they are familiar before the field day. UCLA students will have the field kit, gloves and can walk them through the analysis. The materials used in this experiment are non-toxic.

IDEXX is a method for quantifying bacteria growth from aqueous samples. It is a nationally-recognized method as it is often used to see how much *E.coli* and Enterococci there are in the water sample. This number is compared to the water quality standard for *E.coli* and Enterococci and is used to determine whether a beach is closed for the day. There are advantages and disadvantages to using IDEXX, which will be discussed during the classroom visit.

Research plans for different groups:

Samples taken at different locations along the shore.
Wet sand samples taken at different locations along the shore.
Sand taken in a transect perpendicular to the shore.
Water samples taken along the edge of the lagoon
Sand samples taken along the edge of the lagoon
Samples of water from the creek, lagoon, and ocean.

Half of the groups can measure *E. coli* for one of the above plans, and half will measure enterococci for one of the above plans.

Field Day at Topanga Beach Friday 26 April

Students will need to come prepared to get wet to the knee, and have shoes that can get wet. No flip flops or tevas. Old sneakers that tie on are best.

They should also bring:
Backpack or bag with towel, change of clothes if desired, hat, sunscreen, water bottle, lunch/snack

We will provide data sheets, testing equipment and pencils in the field.

9- 9:30 a.m. Meet at Topanga Beach near the Lifeguard Station.

9:30-10:30 TES students Groups A and B (30 students) work with UCLA mentors to collect and process
samples

9:30 – 10:00 TMS Group C (20 students) - macro-invertebrate id with microscopes
TMS Group D (20 students) - fish seining

10:00- 10:30 TMS Group C - fish seining
TMS Group D - macro-invertebrate id with microscopes

10:30-11:30 TMS Groups B and C (40 students) work with UCLA mentors to collect and process samples

10:30 – 11:00 TES Students Group A (15 students) – macro-invertebrate id with microscopes
TES Student Group B (15 students) – fish seining

11:00-11:30 TES Students Group B (15 students) – macro-invertebrate id with microscopes
TES Student Group A (15 students) – fish seining

11:30- 12:00 Students present their hypothesis and methods to the group

12:00- 12:30 Lunch on the beach

In the field research rotation, students will collect the samples according to the sampling plan. They will process the samples, pouring reagent into bottles of water, adding sample, mixing, and pouring into analysis trays. Trays will then be sealed and labeled, and brought back to UCLA.

UCLA mentors will count the bacteria growth, process the numbers, and have data prepared in Excel spreadsheets for the next classroom visit.

Classroom visit 2 Thursday 9 May 12:30-1:30pm

UCLA mentors will come prepared with laptops preloaded with a Powerpoint template, the Excel data, photos of the group, and an aerial photo of the site and sampling plan. Students will work in their small groups with their UCLA mentor and get to participate in graphing, importing data, images and graphs to Powerpoint, choosing photos, and writing results and conclusions. They will also, time permitting, practice a short oral presentation.

UCLA mentors will print out the posters prepared by the students to give out at the UCLA Field Day.

UCLA Field Day, Friday 17 May

Students should bring a lunch and drink in a backpack, and should wear comfortable clothes.

9:30 am Students arrive at UCLA(bus and cars will drop off students at Ackerman Turnaround, 308 Westwood Plaza, near the information kiosk) and will walk with their chaperones to the Court of Sciences. One UCLA student will be available to guide the whole group. The rest of the mentors will be setting up and waiting by their demonstrations in the Court of Sciences. TMS drivers can purchase a daily parking permit ($11) at the kiosk and park in Lot 8, 9 or 2.

9:45- 11:00 Students will divide into 3 groups (20-25 students in each group, integrating both schools) and rotate through several stations on climate science including solar cars, solar oven and ocean acidification

11:00-11:30 Students will speak with Jay lab graduate students in the large outdoor hallway outside lab. Small group will take turns touring the lab and seeing the plates they made in the Microbe Safari.

11:30-12 Students will eat lunch at the inverted fountain (very close to Court of Sciences) with their chaperones. UCLA student mentors will be setting up the posters.

12:00 – 1:00 Poster Session in the Court of Sciences

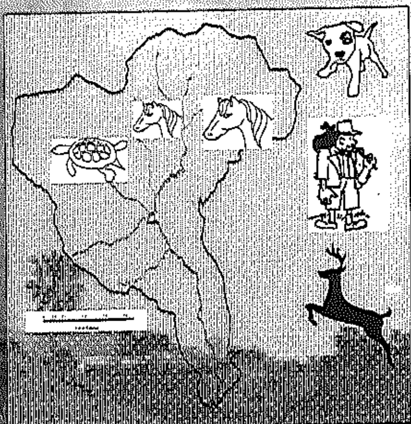
Posters will already be printed and ready for the students by the time they arrive. Easels will be provided. Students can describe their hypothesis, methods and results to attendees. Attendees include undergraduate mentors from other groups, faculty, student researchers, and other UCLA students.

1:00-1:15 TES students and teachers/parents walk back to meet the bus and return to TES.
TMS students and parents return to their cars.

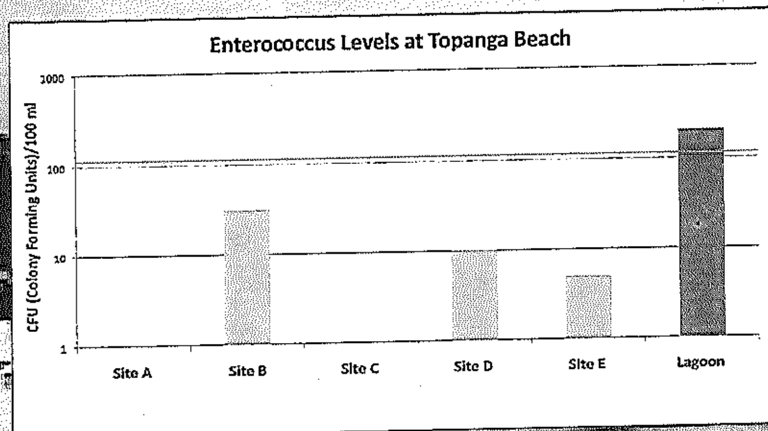
Topanga Creek Watershed (2012-2013)

Chloe, Zofia, Scarlett, Jade, Swampy, Betsey, Damon, Chris, and Sharon

Hypothesis: The ocean water will be the dirtiest of our samples, when compared the other sites.



Introduction and group location: We tested the water and sand at Topanga State Beach to discover which sample was the dirtiest. Our hope is to be able to answer the question of why the aforementioned beach is dirty.



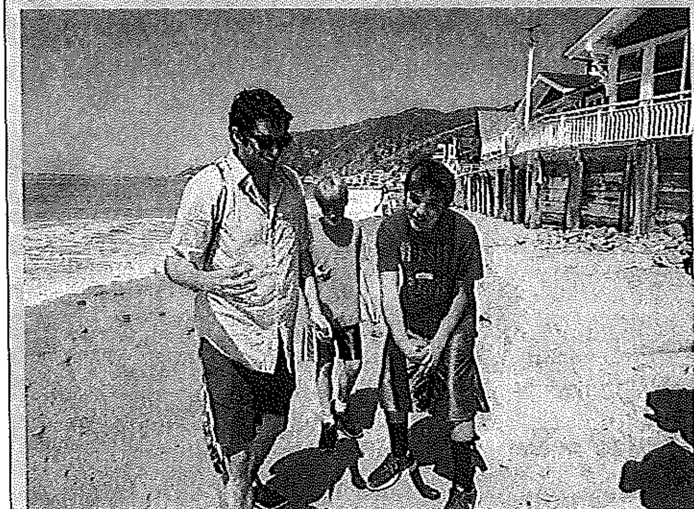
Analysis: We analyzed the water at different sites and we saw that there are different Enterococcus (ENT) levels for each sample. The samples could have varied because of bird fecal, animal fecal and wave or lack of wave action.

Conclusion: Our hypothesis was incorrect. Our results showed that the Topanga lagoon had the most ENT when compared to our seven other water samples. The results show that there is a higher number of ENT in the Topanga lagoon than the ocean. This could be attributed to a number of factors ranging from the local wildlife to natural tidal patterns.

Acknowledgements: We are grateful for financial and/or logistical support from Los Angeles County, Rosi Dagit and everyone at Santa Monica Mountains Resource Conservation District, Jay and Wallace labs at UCLA, UCLA Office of Instructional Development, Topanga Elementary School, Topanga Mountain School

Bacteria in Sand Samples Taken at Topanga State Beach

Maya Silardi, Allie Torrey, Ozzy Adlon, James Werbe, John Kahle, Mira Domberg, Kestral Bruce, and Joshua

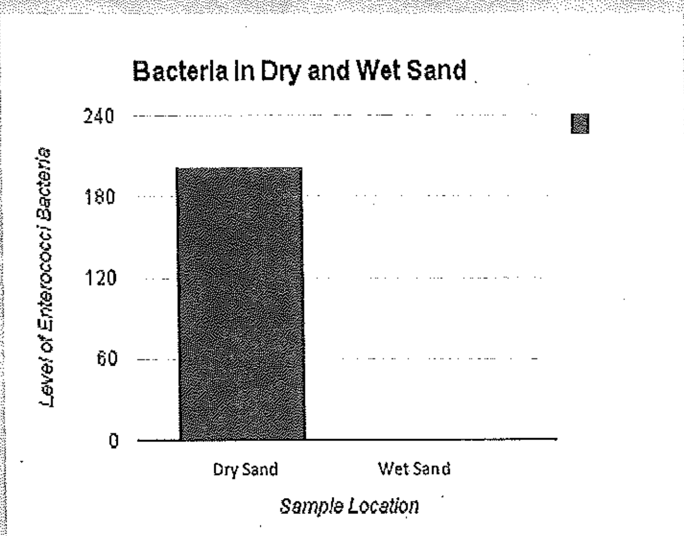


Hypothesis:

Our hypothesis is that the dry sand is dirtier (has unhealthy levels of bacteria) than the wet sand because on the dry sand, there is more feces, decomposition of animals, waste (litter), and runoff (from the street, houses, etc.). We think that there is high levels of enterococci and E. ccoli in the dry sand.

Method:

- We took sand samples at the Topanga Beach which often ranked as one of CA's 10 dirtiest beaches.
- We took samples of sand above the shoreline and samples of sand in the water (this sand was wet and had been touched by the ocean). The dry sand had substantially more bacteria than the wet sand.



Results:

-The average enterococci levels for the dry sand samples were 203mpn whereas the wet sand was 0.

-The average for the dry sand sample is higher than the healthy baseline for enterococci.

-Note: High level of enterococci and eccoli indicate an unhealthy amount of feces.

Why did this happen?

- There is a higher chance that the E. ccoli and enterococci will remain on the land because of feces (avian species, animals, native and domestic), people, litter, etc.
- There is a higher chance because it is a public beach that many people come to daily.

Acknowledgements: We are grateful for financial and/or logistical support from Los Angeles County, Rosi Dagit and everyone at Santa Monica Mountains Resource Conservation District, Jay and Wallace labs at UCLA, UCLA Office of Instructional Development, Topanga Elementary School, Topanga Mountain School.

Sand Quality: Topanga Beach Site

Marcus St. Julian, Anastasiya L. Gromova, Darya A. Mirafshar, Lola Hiland, Carolina
Salas, Sam Mindel, Caroline Bremner

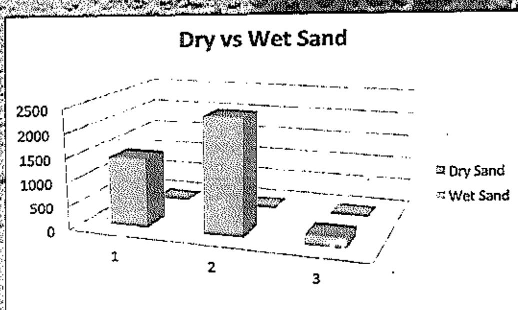
Topanga Beach Overview:

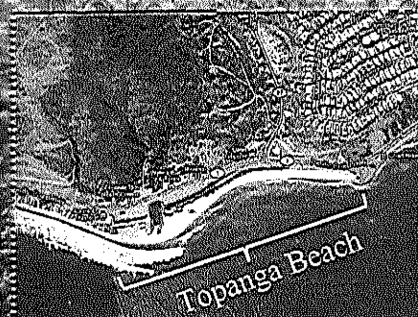
Topanga State Beach is rated one of the top 10 most polluted beaches in California. Previous UCLA data indicated human, gull, and dog fecal contamination at both the lagoon and beach. Our project observes data taken in April 2013 at various sites of Topanga State Beach. The objective is to look at the cleanliness of the water and sand of this area and at the factors which may affect it.

Hypothesis:

1)We supposed that the E.Coli and Enterococci bacteria count would be higher in the sand nearby the trees than in other areas of the beach. In fact, sunlight diminishes microbial survival whereas the <u>shade</u> provided by the trees encourages their growth. Furthermore, the birds coming onto the trees and the other <u>animals</u> inhabiting them increase the amount of bacteria present in that region.

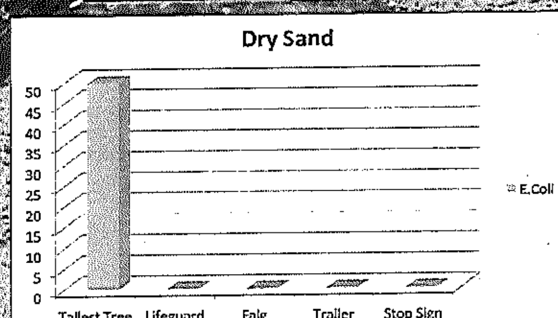
2)We supposed that the EM count in the dry sand would be higher than that in the wet sand due to the sanitizing effect of the <u>ocean water</u>.





Conclusion:

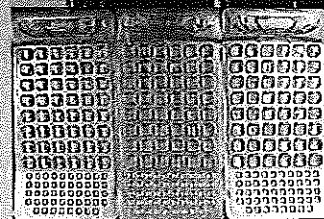
We conclude that our hypothesis was correct. From the data and the graphs obtained from the site, it is observed that the E.Coli and the Enterococci counts near the trees were higher than those of the dry sand in the rest of the beach (50 versus <10) and that the EM count in the wet sand is relevantly lower.



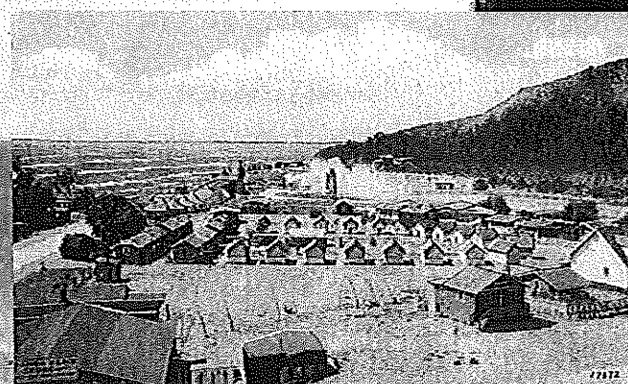
<u>Acknowledgements</u>: We are grateful for financial and/or logistical support from Los Angeles County, Rosi Dagit and everyone at Santa Monica Mountains Resource Conservation District, Jay and Wallace labs at UCLA, UCLA Office of Instructional Development, Topanga Elementary School, Topanga Mountain School.

The Rainbow Trout

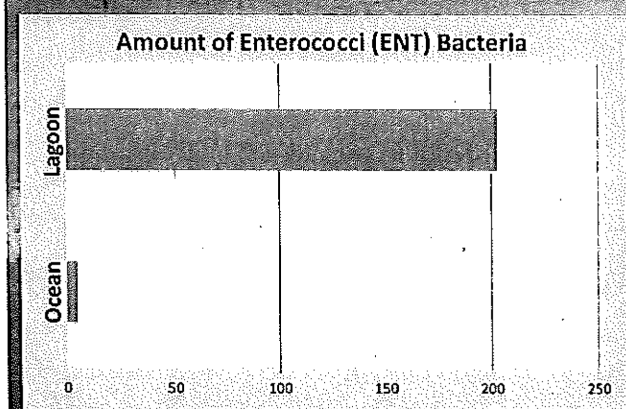
What We Did:
We tested levels of Enterococcus in the ocean and lagoon of Topanga.



Hypothesis:
We think that the lagoon will have the highest levels of bacteria because of the birds that live there



History/Background:
-Topanga State Beach has a history of poor water quality at the beach
-Beach often ranked as one of CA's 10 dirtiest beaches



Results/Conclusion:
[illegible] ENT in the ocean received levels of [illegible] and 62 while the lagoon received 2[illegible] and 8[illegible]. The lagoon had much more bacteria than the ocean.

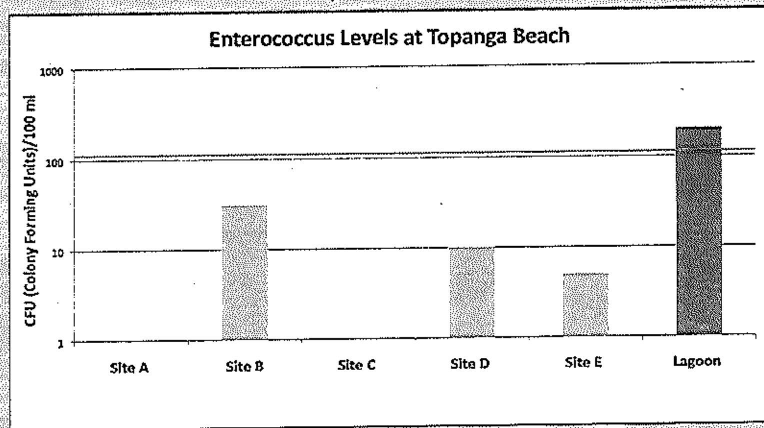
Acknowledgements:
We are grateful for financial and/or logistical support from Los Angeles County, [illegible] and everyone [illegible] Resource Conservation District, [illegible] Wallace labs at UCLA, UCLA office [illegible] Development, Topanga [illegible], Topanga [illegible]

By: Sharla Steinman, Jamie Mazur, Alden Silvestre, Himalya Joshi, Elizabeth Scott, Ashana Ross, Luca Frye, Hunter Steinman

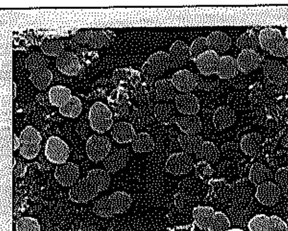
Topanga Beach Pollution Studies

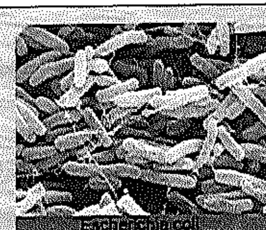
Akasha Ross, Gaea Adrian, Girnar Joshi, Jensen Schmitt, Jonathan Goldberg, Mandy Deitelbaum, Puma Buck

PURPOSE: OUR PROJECT WAS TO TEST FOR FECAL CONTAMINATION BY COLLECTING AT TOPANGA BEACH, AND TO SEE IF IT WOULD MEET WATER QUALITY STANDARDS FOR BEACH CLEANLINESS.



Hypothesis: There will be higher levels of fecal pollution in the water of the lagoon compared to the water along the shoreline. The lagoon will have a negative effect on the water quality of the topanga shore line.





Analysis:

The Enterococcus levels graph supports our hypothesis. We found that there were significantly higher levels of Enterococci in the lagoon water compared to the water samples collected from the ocean along the shore.

The lagoon samples reveal that there was 203 CFU/ml, whereas the samples taken along the shore decreased from north to south. While site "A" and site "C" didn't show any indication of E0nterococci present, site "B" had an average of 30 CFU/ml, site "D" had 10 CFU/ml, and site "E" had 5 CFU/ml. Also, there were no findings of E. coli in the samples that we took along the shore.

Also, it should be recognized that out of the 40 samples taken, only about 6 showed any concentration.

Acknowledgements: We are grateful for financial and/or logistical support from Los Angeles County, Rosi Dagit and everyone at Santa Monica Mountains Resource Conservation District, Jay and Wallace labs at UCLA, UCLA Office of Instructional Development, Topanga Elementary School, Topanga Mountain School

Conclusion:

Although the data shows that are some levels of fecal contamination in the ocean, it is still much lower than the EPA water quality standards of 104 CFU/ml for a clean and healthy beach.

We believe that there was a possible source of contamination near or north of site "B". We found that this potential contamination (i.e. small septic leak) decreased as it moved south With the ocean currents.

In contrast, the lagoon is far BELOW the water quality standards. IT is suggested there be no recreational activity there.

E. COLI IN LAGOON VS OCEAN IN TOPANGA

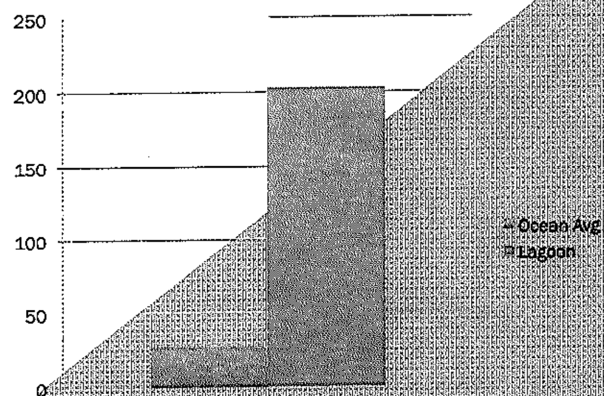
MACAYLA, JAELYN, ATTICUS, KRISTIN, SARAH, TRISTAN, RANDOM ,and VAN TRAN

Our hypothesis was that the water in the lagoon would have more bacteria than the ocean.

Our project was to collect water samples in different places in Topanga Beach such as the lagoon, ocean, and creek. We quantified bacteria growth in each sample and analyzed them.

UCLA data indicates human, gull, and dog fecal contamination at both the lagoon and beach.

Topanga Beach is often ranked as one of CA's 10 dirtiest beaches, which means it is not the best environment for the animals living there or for beach-goers.



Gray is the amount of E. coli in the ocean and orange is the amount of E. coli in the lagoon.

The amount of *E. coli* in the Lagoon was 203 colonies per 100 ml, and the amount of E. coli in the ocean was about 27.3. colonies per 100 ml. The water quality standard is 400 colonies per 100ml.

A reason that the lagoon had more *E. coli* than the ocean is because it's a still body of water, so bacteria hasa chance to grow.

Topanga lagoon

Fecal pollution is present in upper watershed, but may not be reaching the beach.

Acknowledgements: We are grateful for financial and/or logistical support from Los Angeles County, Rosi Dagit and everyone at Santa Monica Mountains Resource Conservation District, Jay and Wallace labs at UCLA, UCLA Office of Instructional Development, Topanga Elementary School, Topanga Mountain School

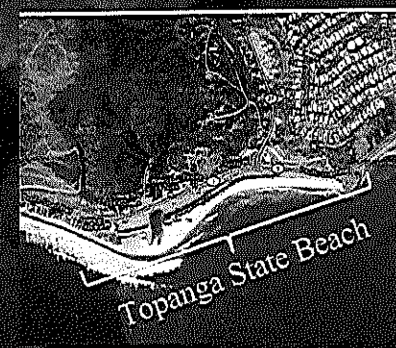
Presence of Enterococci in Topanga Beach Sand

Skyler Caceres, Noam Feinberg, Lily Hill, Dylan Hirshhorn, Mohammed Magee, Lucien Meschin
UCLA Undergraduate: Uriel Cobian

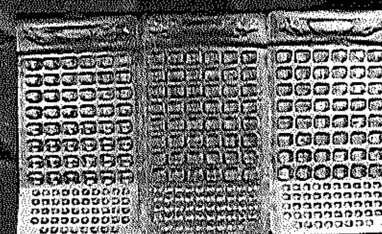
Sampling at the Beach

Introduction:

-At Topanga Beach we tested for Enterococci bacteria using IDEXX tests
-Enterococci indicates the presence of fecal matter
-Standards indicate what levels of enterococci are unsafe for human health
-We compared bacterial levels for wet and dry sand

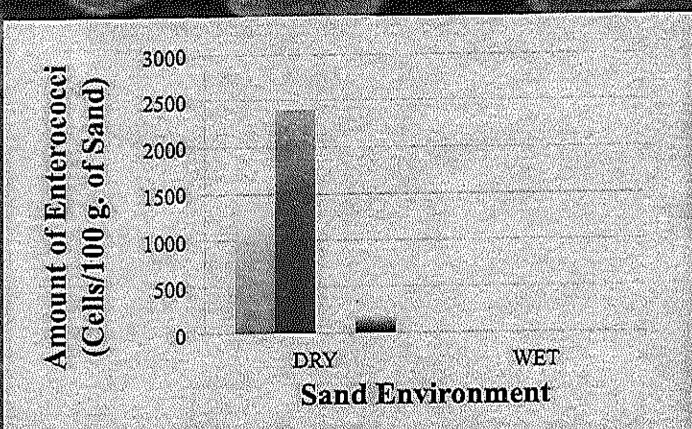


Hypothesis: We expect lower levels of bacteria in the wet sand due to the ocean washing the bacteria away.



IDEXX Trays

Local Wildlife



Microbe Levels for dry and wet sand samples

Conclusions:

- We found lower levels of bacteria in the wet sand, which could be attributed to the wave activity pushing bacteria back into the water, away from the sand.
- Salt water from the ocean could also have created a harder living environment for the bacteria.

Acknowledgements: We are grateful for financial and/or logistical support from Los Angeles County, Rosi Dagit and everyone at Santa Monica Mountains Resource Conservation District, Jay and Wallace labs at UCLA, UCLA Office of Instructional Development, Topanga Elementary School, Topanga Mountain School.

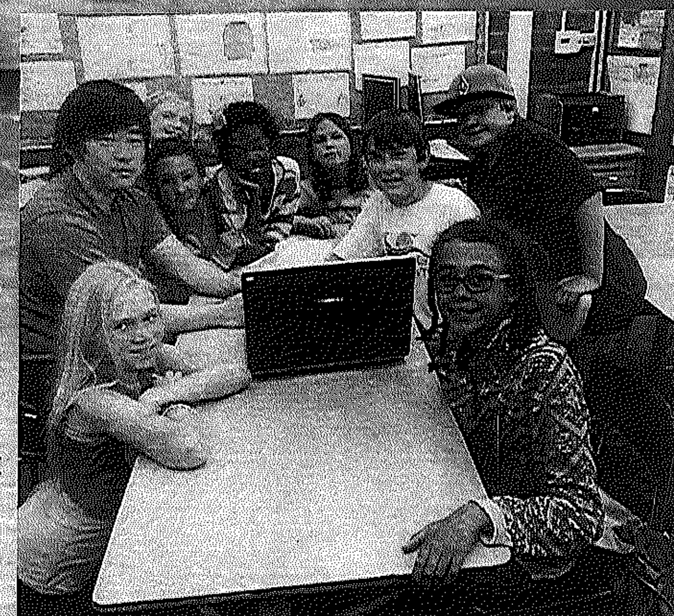
Where Is Pollution at Topanga Beach?

Tent cabins near beach, 1920's

Hypothesis: The data collected from the lagoon will show that it is significantly more polluted than the areas by the beach and the creek.

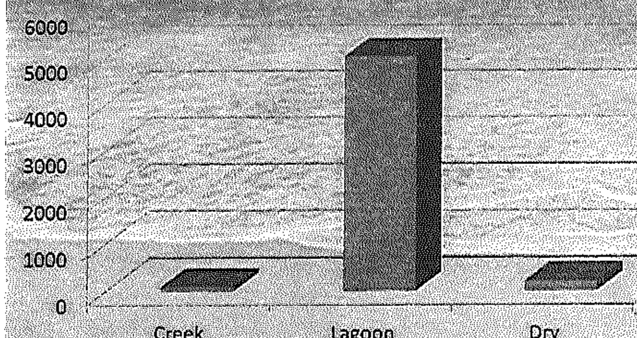
The narrows, 1920's

Analysis: The lagoon's extreme pollution levels may be due to the homeless people living there. In addition, the waters of the lagoon are still whereas by the beach and creek, water is continuously flowing. This flow of water may be washing pollutants down to different areas.



Conclusion: It is obvious that the lagoon needs to be cleaned. Some ways that this might be achieved may be creating volunteer programs and asking the homeless people to relocate. When cleaning the lagoon, the polluted waters of the lagoon must be drained, or any cleaning effort will not be effective.

Pollution Level for Sand



Acknowledgements: We are grateful for financial and/or logistical support from Los Angeles County, Rosi Dagit and everyone at Santa Monica Mountains Resource Conservation District, Jay and Wallace labs at UCLA, UCLA Office of Instructional Development, Topanga Elementary School, Topanga Mountain School

UCLA Day – May 17, 2013

1. Arrival & Student Groups:
Topanga Elementary School and Topanga Mountain School students will arrive at UCLA Ackerman Turnaround at **9:30 AM.** If parking is needed, purchase a daily parking permit ($11) at the kiosk nearby at the intersection of Strathmore and Westwood. Please separate all students into their small groups.

2. Make 3 Groups out of the 10 Small Groups:
UCLA students will meet everyone at the turnaround and find their respective small groups. The 10 small groups will be divided into 3 subgroups, A B and C. **Group A** will consist of TES students that were led by Jae, Jennifer, and Brianna. **Group B** will consist of TES students led by Federica and TMS students led by Raven and Josh. **Group C** will consist of the remaining 4 groups from TMS previously led by Nicole, Uriel, Chris, and Van. Groups A, B, and C will head to their respective demonstration locations and be there by **9:45 AM.** See table to note where each group should be and when.

3. Demonstrations:
The demonstrations will be: (1) solar buggies, (2) cabbage demo, and (3) lab tour. Solar buggies will take place at the bottom of Janss Steps near Wilson Plaza and the intramural field. Cabbage demo will take place at Shapiro Fountain at the top of Janss Steps. The lab tour will be located in 6678 Boelter Hall. Solar ovens, lunch, UCLA panel, and poster session will take place on the patio of Engineering IV, which is located in the building adjacent to Boelter Hall. You can access the patio around the corner from the 2nd floor elevator in Engineering IV. See map for additional location info.

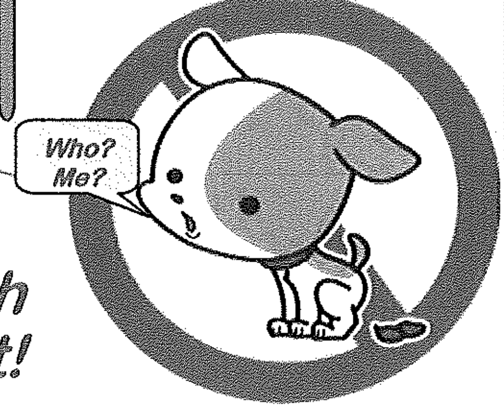
Each demo will be 15 minutes long, with 10 minutes of walking time to the next location. This will take place promptly between **9:45 – 10:50 AM.** After each group has completed the 3 demos, everyone will head to the patio of Engineering IV between 10:40 – 11:00 AM. At **11:00 AM at the engineering patio,** students will set up solar pizza ovens to cook smores. While the smores are cooking, students will have lunch from 11:20 – 11:50 AM. During lunch, we will have the panel of UCLA students for Topanga students to ask questions to regarding college, college life, etc. At noon, the poster session will begin, also on the engineering patio, and go until 1:00 PM.

4. Map:
See attached map of UCLA with highlighted locations for today's events.

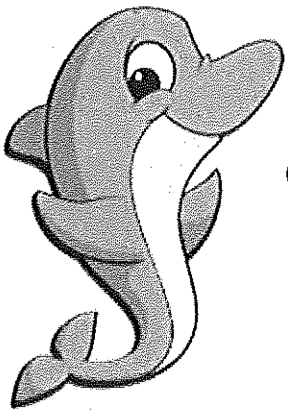
5. Schedule for UCLA Day:

Time	Group A	Group B	Group C
9:30 AM	Arrive at Ackerman Turnaround	Arrive at Ackerman Turnaround	Arrive at Ackerman Turnaround
9:30 – 9:45 AM	Walk to bottom of Janss Steps	Walk to top of Janss Steps	Walk to 6678 Boelter Hall
9:45 – 10:00 AM	Solar Buggies	Cabbage Demo	Lab Tour
10:00 – 10:10 AM	Walk to top of Janss Steps	Walk to 6678 Boelter Hall	Walk to bottom of Janss Step
10:10 – 10:25 AM	Cabbage Demo	Lab Tour	Solar Buggies
10:25 – 10:35 AM	Walk to 6678 Boelter Hall	Walk to bottom of Janss Steps	Walk to top of Janss Steps
10:35 – 10:50 AM	Lab Tour	Solar Buggies	Cabbage Demo
10:50 – 11:00 AM	Walk to Eng IV Patio	Walk to Eng IV Patio	Walk to Eng IV Patio
11:00 – 11:20 AM	Build Solar Ovens	Build Solar Ovens	Build Solar Ovens
11:20 – 11:50 AM	Lunch/UCLA Panel	Lunch/UCLA Panel	Lunch/UCLA Panel
12:00 – 1:00 PM	Poster Session	Poster Session	Poster Session

POSTER CONTEST



Help keep Topanga Beach clean and win a pillow pet!



Did you know that pets are not allowed at Topanga Beach? Many people use this beach for swimming, surfing, and relaxing in the sand. The Topanga Creek *lagoon* is an important resource for birds and fish. Animal feces carry bacteria that can be harmful to humans and wildlife. Help spread the word by submitting your poster today!

Contest Rules:

- **Posters should be 2 ft x 3 ft and explain why it is important to keep our beaches clean!**
- **Posters need to include "no dogs, cats, horses or other animals are allowed on any of the Los Angeles County Beaches (County Code sections 17.12.290 and 17.12.300)."**
- **Posters should be submitted to the RCDSMM (info@rcdsmm.org), or to the Topanga Library by 5pm Tuesday 27 May. Student name, phone # and email should be included on the back.**
- **Reps. from Supervisor Yaroslavsky's office, County Department of Beaches and Harbors, and Topanga Town Council will select the winning posters on 28 May.**
- **Prizes will go to the top 3 posters selected and the top poster will be mounted at Topanga Beach.**

Topanga Town Council

County of Los Angeles Beaches & Harbors

Zev Yaroslavsky
Los Angeles County
Supervisor

County of Los Angeles California

School Programs 2014
Topanga Source Id Study

2014 Program Focus: Keep Topanga Beach and Creek Clean!!!

Background:

Using state of the art tools, Dr. Jenny Jay's lab at UCLA is not only monitoring the typical water quality requirements for fecal indicator bacteria (total coliform bacteria, E. coli, and enterococcus), but are also able to identify the sources of these bacterial indicators, determining if they come from human, gull or dog poop. This program will provide local students to participate in this research effort.

Our focus this year will be on investigating the contributions of these sources at Topanga Beach.

In order to be successful in reducing pollutants entering Topanga Creek, Lagoon and Beach, an on-going education program is needed to complement the research effort focusing on identifying the sources of bacteria that are contaminating Topanga Beach. Outreach to students within the watershed through watershed classes conducted at Topanga Elementary School and Topanga Mountain School is a great way to teach about the connections between what goes into the watershed- trash, pet droppings, fertilizers, washing machine water, pesticides, etc. that can end up polluting the creek and the beach. Getting the students into the creek and ocean to collect and analyze samples is the best way to engage them in making these connections.

Students participating in this program will have a unique opportunity to assist in an on-going research project, learn hands on methods for investigating questions, and share their knowledge with the broader community. This program complies with the CA State Science Standards for Grade 5.

Thanks to funding from the office of Supervisor Yaroslavsky, we are able to offer the students an opportunity to contribute to our understanding of local water quality issues by combining these two programs as follows.

Pre- and post surveys for both the UCLA undergraduates and 5th grad students will assess increases in: 1) interest in science, 2) efficacy of civic engagement, 3) interest in higher education.

POSTER CONTEST:
KEEP OUR BEACHES CLEAN! NO DOGS ON THE BEACH
Students will participate in a community outreach poster contest. Individual or groups of students will be encouraged to design a poster that could be replicated and posted at Topanga Beach and throughout the community. Representatives from Supervisor Yaroslavsky's office, County Department of Beaches and Harbors staff and Topanga Town Council members will select the winning posters at the community meeting on 28 May.

Posters should be 2 ft x 3 ft and explain why it is important to keep our beaches clean!
All posters should be submitted to the RCDSMM, or Topanga Library no later than 5pm Tuesday 27 May. Student name, phone number and email should be on the back.
Prizes will go to the top 3 posters selected and the top poster will be mounted at Topanga Beach.

Topanga Elementary School
22075 Topanga School Road, Topanga, CA 90290
310.455.3711
(2 5th grade classes – 70 students)

28 March (Friday 12:30-1:30 class visit)
RCDSMM biologists and WSP interns will present an introduction to the Topanga Creek Watershed and water quality issues, with a focus on local aquatic species. Introduce the poster contest.

25 April (Friday 12:30-1:30 class visit)
UCLA undergraduates will present an introduction to microbiology and the study framework for the field trip. Students will pour a Petri plate and do a "microbe safari". Students will learn more about coastal water quality issues, focusing on the connection between Topanga Creek and Topanga Beach. Small groups of 5th grade students will work with UCLA undergraduate students to develop their own hypotheses regarding Fecal Indicator Bacteria (FIB) in the ocean compared to the lagoon and creek.

2 May (Friday 9am – 12 pm) Field trip to Topanga beach. Buses will be provided.
Students should come prepared to get wet to the knees. Towels and dry shoes suggested. They should also bring a snack and lunch.
Students and UCLA undergraduates will rotate between stations so that each student has time to 1) use the microscopes to identify plankton and benthic macro-invertebrates and measure crayfish, 2) seine for fish and learn about endangered southern steelhead trout and tidewater gobies, and 3) collect field samples for microbiological testing in the Jay Lab. Samples will be collected by student groups and partially processed in the field. At a brown bag lunch on the beach, students will share what they learned and the hypothesis they are testing!

9 May (Friday 12:30-1:30 class visit)
Students will work with their UCLA mentors to analyze their field samples and examine their results. Students will prepare a power point poster with their UCLA mentors summarizing their project.

16 May UCLA campus visit (9am – 1:30 pm) Buses provided.
Students will visit the UCLA campus, meet with undergraduate student mentors who will present a panel on college life, and then Topanga Students will present their posters at UCLA. Students should bring lunch.

28 May Community Presentation and Poster contest awards
(Wednesday 6-8pm) Topanga Library
The RCDSMM and UCLA research team will be hosting a community meeting to share the results of the on-going water quality study thus far, provide Best Management Practices ideas, and students will be invited to present their posters and discuss what they learned.

Topanga Mountain School
5920 Shoup Ave. Woodland Hills, CA 91367
818.346.8355
(7 6th graders, 11 7th graders, 17 8th graders)

27 March (Thursday 10:45-11:45 class visit)

UCLA students will present an introduction to microbiology and the study framework for the field trip. Students will pour a Petri plate and do a "microbe safari". Students will learn more about coastal water quality issues, focusing on the connection between Topanga Creek and Topanga Beach. Small groups students will work with UCLA undergraduate mentors to develop their own hypotheses regarding sources of Fecal Indicator Bacteria (FIB) in the ocean compared to the lagoon.

28 March (Friday 10:45-11:45 class visit)

RCDSMM biologists and WSP interns will present an introduction to the Topanga Creek Watershed and water quality issues, with a focus on local aquatic species. Introduce the community poster contest.

* We will work with TMS to provide some additional activities/lesson plans to provide students with more in-depth opportunity to think about these issues.

2 May (Friday 9am – 12 pm) Field trip to Topanga beach. Buses will be provided.

Students should come prepared to get wet to the knees. Towels and dry shoes suggested. They should also bring a snack and lunch.

Students and UCLA undergraduates will rotate between stations so that each student has time to 1) use the microscopes to identify plankton and benthic macro-invertebrates and measure crayfish, 2) seine for fish and learn about endangered southern steelhead trout and tidewater gobies, and 3) collect field samples for microbiological testing in the Jay Lab. Samples will be collected by student groups and partially processed in the field. At a brown bag lunch on the beach, students will share what they learned and the hypothesis they are testing!

9 May (Friday 10:45-11:45 class visit)

Students will work with their UCLA mentors to analyze their field samples and examine their results. Students will prepare a power point poster with their UCLA mentors summarizing their project.

16 May UCLA campus visit (9am – 1:30 pm) Buses provided.

Students will visit the UCLA campus, meet with undergraduate student mentors who will present a panel on college life, and then Topanga Students will present their posters at UCLA. Students should bring lunch.

28 May Community Presentation and Poster contest awards

(Wednesday 6-8pm) Topanga Library

The RCDSMM and UCLA research team will be hosting a community meeting to share the results of the on-going water quality study thus far, provide Best Management Practices ideas, and students will be invited to present their posters and discuss what they learned.

Topanga Beach field day and Water Quality Testing
May 2, 2014

Students should come prepared to get wet! Bring a towel and extra clothes.
No flip flops or sandals – please wear old sneakers that can get wet.
Water, snack and lunch needed.
It could be windy, so jackets might also be a good idea.

8:45 am Topanga Buses and TMS vans park at Topanga Ranch Motel lot and walk under PCH to the beach.

9:00 Welcome and organization
Group A1 – TES students (Ms. Tappers class – 14)
Group A2 – TES students (Ms. Tappers class – 14)
Group B1 - TES students (Ms. Saporta's class – 14)
Group B2 - TES students (Ms. Saporta's class – 14)
Group C – TES students (Ms. Batz class 4th/5th – 12)
Group D1 - TMS students (15 students)
Group D2 – TMS students (15 students)

Topanga Elementary School:
9:15-10:30 Group C with UCLA students
9:15 – 9:30
Group A1- Fish station
Group A2 – bird watching
Group B1 – Water quality and plankton,
Group B2 - crayfish
9:30 - 9:45
Group A1- bird watching
Group A2 – water quality and plankton
Group B1 – crayfish
Group B2 – fish station
9:45- 10:15
Group A1- Water quality and plankton
Group A2 - crayfish
Group B1 – fish station
Group B2 – bird watching
10:15 – 10:30
Group A1- bird watching
Group A2 - crayfish
Group B1 – fish station
Group B2 – water quality and plankton

10:30 – 11:45
Group A1, A2 and B1, B2 with UCLA students doing experiments
Group C rotates with TMS students see below

11:45 – 12:30 Lunch on the beach Bus departs at 12:30

Topanga Mountain School:

9:15 – 10:30

Group D1, D2 with UCLA students doing experiment – see details below

10:30 – 10:55

Group C – Fish station
Group D1 - Water quality and plankton, crayfish
Group D2 – bird watching

10:55 - 11:20

Group C – Water quality and plankton, crayfish
Group D1 – bird watching
Group D2 – fish station

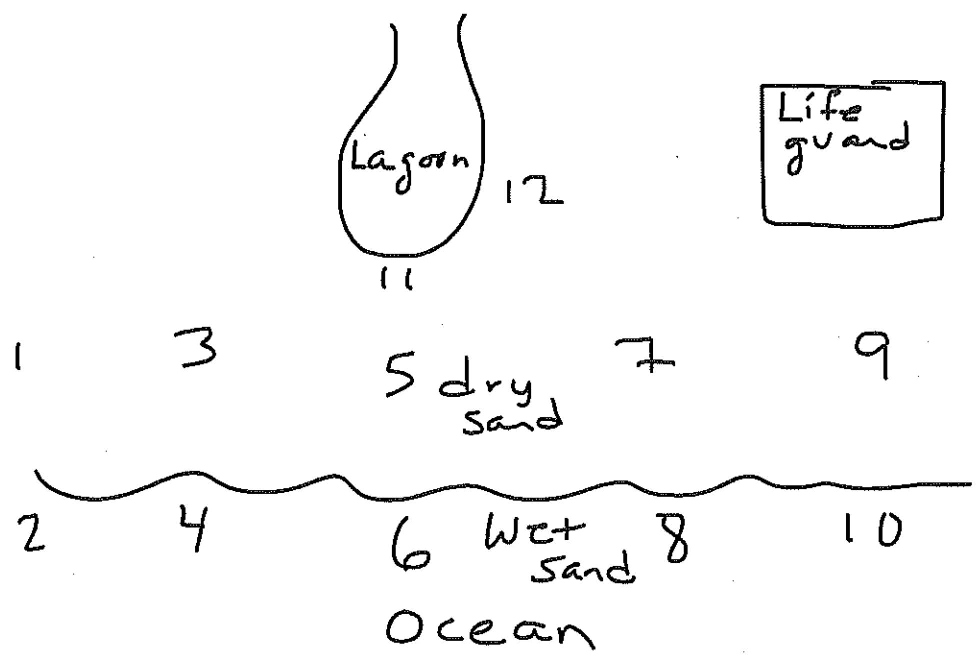
11:20 – 11:45

Group C – bird watching
Group D1 – fish station
Group D2 – Water quality and plankton, crayfish

11:45 – 12:30 Lunch on the beach Vans depart at 12:30

UCLA Experimental Plan- What role does sediment play in supporting bacteria growth?

We will test for traditional fecal indicator bacteria as well as dog-specific DNA as 12 locations at Topanga beach. Students will work with UCLA mentors for this effort.

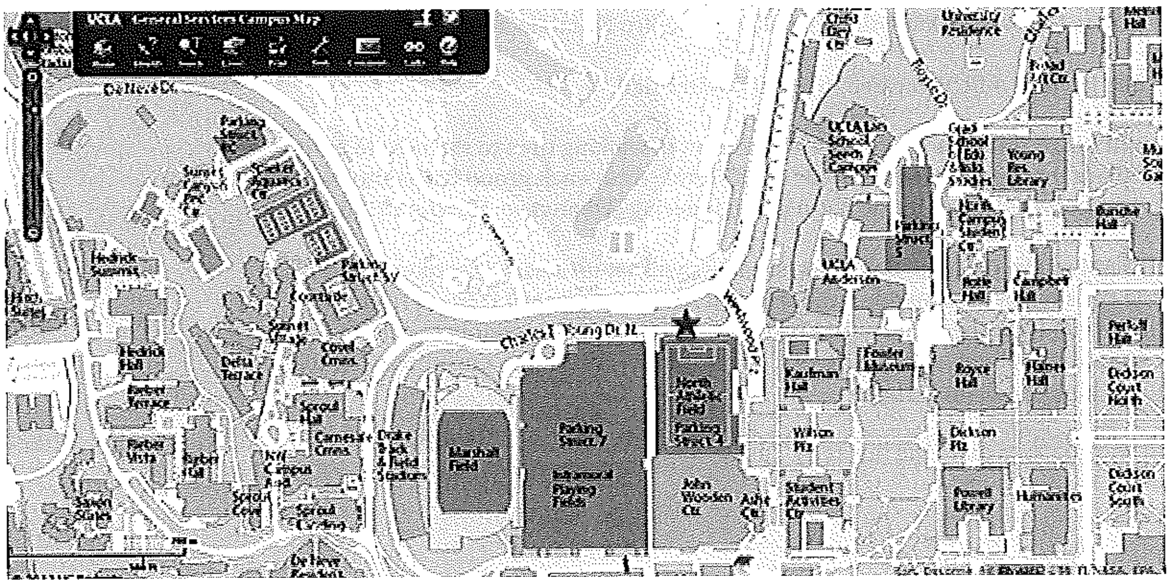


UCLA Day – May 16, 2014

1. 9:30 am Arrival & Student Groups:
Topanga Elementary School and Topanga Mountain School students will arrive at UCLA at **9:30 AM.**

Formatted: Not Highlight

Topanga Elementary Buses
Buses should approach campus from the north side. If coming from the 405 freeway, exit on Sunset Blvd and proceed east. Make a right onto Westwood Plaza and another quick right onto Charles E Young North. The rightmost lane on this street is a designated bus loading zone.



Buses may stay here for the duration of the visit, as long as the bus drivers accompany the buses.

Teams of UCLA mentors and RCD staff will be on hand to meet the students and walk them to the first station.

Topanga Mountain School Vans should park in the visitor parking Lot 8 located near the intersection of Strathmore and Westwood. Be sure to bring a credit card to pay for the parking pass ($12 per car) and put the ticket on the dashboard before you leave the vehicles! Get receipts to Rosi for reimbursement.

Deleted: ¶

Teams of UCLA mentors and RCD staff will be on hand to meet the students at the corner of Westwood and Strathmere, where there is currently construction near where we met last year.
2. Please have the students in the same groups as when we met on Topanga Beach!

Group A will consist of TES students (Ms Tapper Class) that were led by Alex, Usman, Ammad, Alberto, and Daniel.
Group B will consist of TES (Ms. Saporta and Ms. Batz class) students led by Jodutt, Melanie, Marcos, Wayne, Christine, and Katie.
Group C will consist of TMS students led by Paul, Esmeralda, Flora, Niru, and Shalini.
Groups A, B, and C will head to their respective demonstration locations and be there by **9:45 AM**. See table below to note where each group should be and when.

9:45- 10:50 am Demonstrations:
The demonstrations will be:
(1) solar buggies - Solar buggies will take place at the bottom of Janss Steps near Wilson Plaza and the intramural field.
(2) cabbage demo - Cabbage demo will take place at Shapiro Fountain at the top of Janss Steps.
(3) lab tour. The lab tour will be located in 6678 Boelter Hall.

Each demo will be 15 minutes long, with 10 minutes of walking time to the next location. This will take place promptly between **9:45 - 10:50 AM**. After each group has completed the 3 demos, everyone will head to the patio of Engineering IV between 10:40 – 11:00 AM.

11:00 - 11:50 AM at the Court of Sciences, students will set up solar pizza ovens to cook smores. While the smores are cooking, students will have lunch from 11:20 – 11:50 AM. During lunch, we will have the panel of UCLA students for Topanga students to ask questions to regarding college, college life, etc. From 12:00 – 12:30, the poster session will begin in the Penthouse of Boelter Hall.

Students will walk back to meet the buses by 1pm.

5. Schedule for UCLA Day:

Time	Group A Ms. Tapper class	Group B Ms. Saporta/Batz class	Group C TMS students
UCLA Student Mentors	Alex, Usman, Ammad, Alberto, and Daniel	Jodutt, Melanie, Marcos, Wayne, Christine, and Katie	Paul, Esmeralda, Flora, Niru, and Shalini
9:30 AM	Arrive at North Athletic Field	Arrive at North Athletic Field	Arrive at Ackerman Turnaround
9:30 – 9:45 AM	Walk to bottom of Janss Steps	Walk to top of Janss Steps	Walk to 6678 Boelter Hall
9:45 – 10:00 AM	Solar Buggies	Cabbage Demo	Lab Tour
10:00 – 10:10 AM	Walk to top of Janss Steps	Walk to 6678 Boelter Hall	Walk to bottom of Janss Step
10:10 – 10:25 AM	Cabbage Demo	Lab Tour	Solar Buggies
10:25 – 10:35 AM	Walk to 6678 Boelter Hall	Walk to bottom of Janss Steps	Walk to top of Janss Steps
10:35 – 10:50 AM	Lab Tour	Solar Buggies	Cabbage Demo
10:50 – 11:00 AM	Walk to Court of Sciences	Walk to Court of Sciences	Walk to Court of Sciences
11:00 – 11:20 AM	Build Solar Ovens	Build Solar Ovens	Build Solar Ovens
11:20 – 11:50 AM	Lunch/UCLA Panel	Lunch/UCLA Panel	Lunch/UCLA Panel
12:00 – 1:00 PM	Poster Session	Poster Session	Poster Session

TOPANGA CREEK SOURCE ID

STUDENT QUESTIONS
5.7.14

UCLA students will discuss with TES/TMS students to make these questions into hypothesis, plot results and develop conclusions.

1. Do TC levels decrease from upstream to downstream at all times? When does that vary (seasonal pattern? First flush rain event?) and what could be the causes?

2. .Do EC levels decrease from upstream to downstream at all times? When does that vary (seasonal pattern? First flush rain event?) and what could be the causes?

3. .Do ENT levels decrease from upstream to downstream at all times? When does that vary (seasonal pattern? First flush rain event?) and what could be the causes?

4. Is there any relationship between TC levels and EC levels (by site location, at the ocean, at the lagoon, in the creek?) (seasonal pattern? First flush rain event?)

5. Is there any relationship between TC levels and ENT levels (by site location, at the ocean, at the lagoon, in the creek?) (seasonal pattem? First flush rain event?)

6. Is there any relationship between EC levels and ENT levels (by site location, at the ocean, at the lagoon, in the creek?) (seasonal pattem? First flush rain event?)

7. Is there a seasonal pattern of human marker levels at Beach Outlet? Does this change if the beach berm is connected to the ocean or closed?

8. Is there a seasonal pattern of dog marker levels at Beach Outlet? Does this change if the beach berm is connected to the ocean or closed?

9. Is there a seasonal pattern of gull marker levels at Beach Outlet? Does this change if the beach berm is connected to the ocean or closed?

10. Is there a seasonal pattern of human marker levels at Beach Upcoast? Does this change if the beach berm is connected to the ocean or closed?

11. Is there a seasonal pattern of dog marker levels at Beach Upcoast Does this change if the beach berm is connected to the ocean or closed?

12. Is there a seasonal pattern of gull marker levels at Beach Upcoast? Does this change if the beach berm is connected to the ocean or closed?

13. Is there a seasonal pattern of human marker levels at Topanga lagoon? Does this change if the beach berm is connected to the ocean or closed?

14. Is there a seasonal pattern of dog marker levels at Topanga lagoon? Does this change if the beach berm is connected to the ocean or closed?

15. Is there a seasonal pattern of gull marker levels at Topanga lagoon? Does this change if the beach berm is connected to the ocean or closed?

16. Does the nitrate level change seasonally, with first flush, as it moves downstream? (per site) what are possible sources of nitrates? Are there exceedances greater than 1ppm? Why are high nitrates a problem for aquatic creatures?

17. Does the nitrite level change seasonally, with first flush, as it moves downstream? (per site) what are possible sources of nitrates? Are there exceedances greater than 1ppm?
Why are high nitrites a problem for aquatic creatures?

18. Does the ammonia level change seasonally, with first flush, as it moves downstream? (per site) what are possible sources of nitrates? Are there exceedances greater than 1 ppm? Why is high ammonia a problem for aquatic creatures?

19. Does the phosophorus level change seasonally, with first flush, as it moves downstream? (per site) what are possible sources of nitrates? Are there exceedances greater than 1ppm? Why is high phosphate a problem for aquatic creatures?

20. Does the turbidity level change seasonally, with first flush, as it moves downstream? (per site) what are possible sources of turbidity? Why is high turbidity a problem for aquatic creatures?

21. What is the relationship/pattern between water temperature and dissolved oxygen levels in Topanga lagoon? Why is that important for aquatic species?

22. What is the relationship/pattern between water temperature and dissolved oxygen at Topanga Bridge? Why is that important for aquatic species?

23. Is there any relationship between tidal stage and FIB levels at BO or BU?

24. Does pH change between the creek sites, Topanga Lagoon and the Beach Outlet? If so, why? If not, why?

25. Is there any relationship between TC, EC and ENT exceedances and presence of human marker?

26. Is there any relationship between TC, EC and ENT exceedances and presence of gull marker?

27. Is there any relationship between TC, EC and ENT exceedances and presence of dog marker?

28. Does horse marker appear during First Flush events and not otherwise? Why?

29. Is there any spatial patterns between the two ocean sites?

30. Is there any spatial and seasonal patterns between the ocean sites in 2012 and 2013? How might rainfall be involved?

31. Is there a relationship between TC and water temperature at all sites? If so, why?

32. Is there a relationship between Ammonia and Nitrate levels? If so, why?

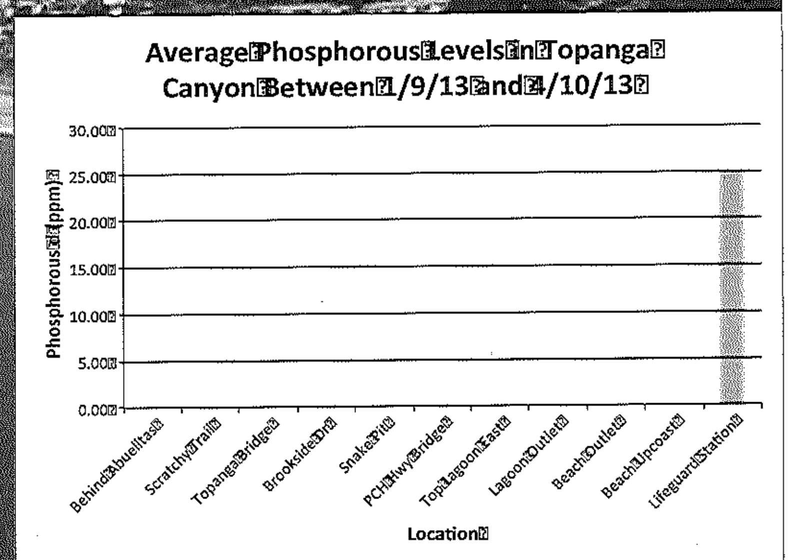
33. Is there a relationship between turbidity and conductivity? If so, why?

Phosphorous Levels at Topanga Beach

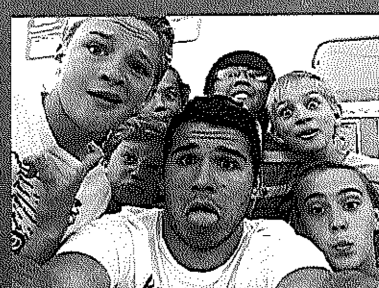
by Paul Cleland (UCLA), Gabbi Beauvais, Forrest Brock, Strider Ellis, Jason Fannon, Tony Mata, and Liam Miller (Topanga Elementary School)

Hypothesis: The amount of phosphorous will increase closer to the ocean because phosphorous levels are typically high in ocean water.

Conclusion: The highest average phosphorous levels detected from January 19 to April 10, 2013 were at the Lifeguard Station. This is because it is near the ocean where phosphorous levels can be high. At Beach Upcoast and Beach Outlet, which are also near the ocean, there was no detectable levels of phosphorous, which is surprising. The average level of phosphorous measured at the Lifeguard Station was 25.3 ppm. This is fortunately not high enough to have negative affects at Topanga Beach.

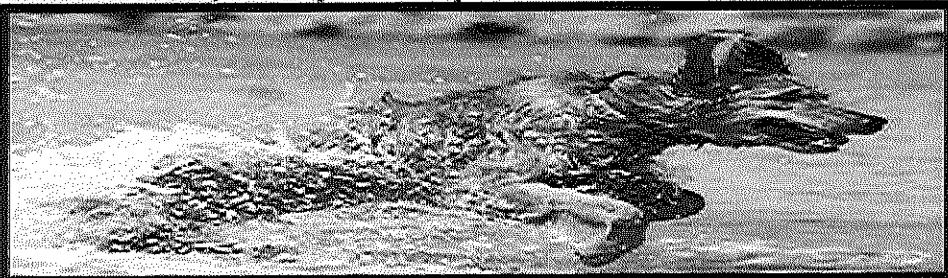


Discussion: Phosphorous can control the amount of small organism growth so certain levels are good, but too much phosphorous is really bad because it can lead to algae blooms which take oxygen from the fish and then they die.

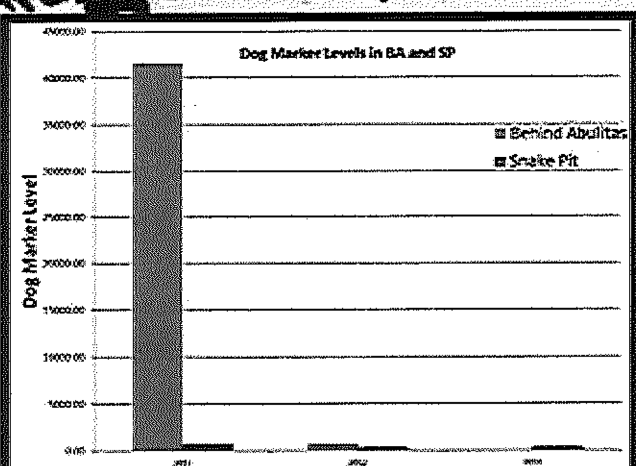


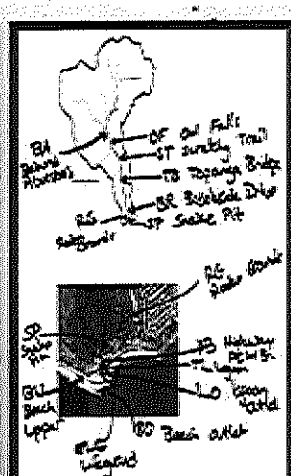
Acknowledgements: We are grateful for funding and assistance from the Resource Conservation District of the Santa Monica Mountains and the County of Los Angeles.

Dog Markers At Topanga State Beach

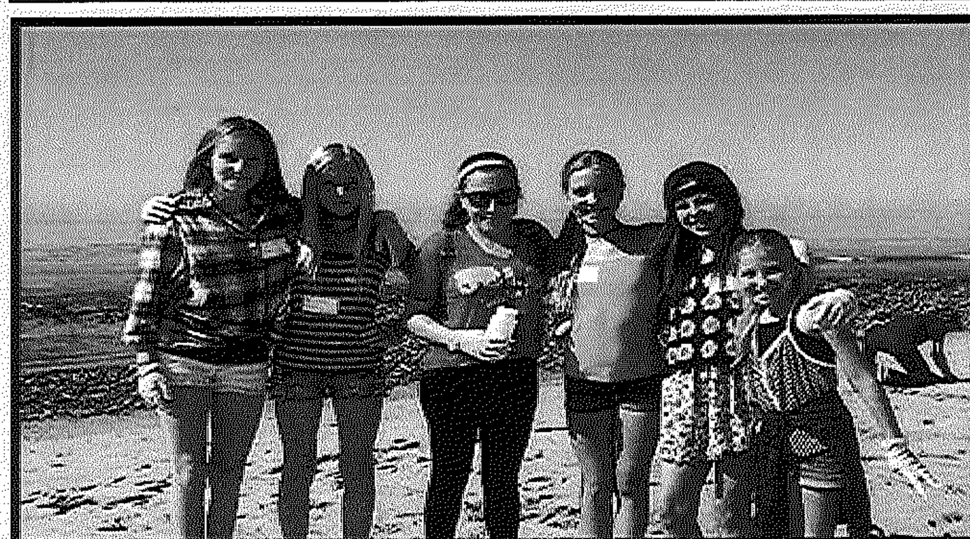


Introduction and group location: Our project looked at bacterial pollution in water and sand at Topanga State Beach. We tested sand at and around the storm drain shown below for Fecal Indicator Bacteria (*E. coli* and Enterococci), which can tell us is there is potential sewage pollution. We washed the bacteria off the sand with water, then tested the water for levels of bacteria.





Hypothesis: There are higher levels of dog markers at the Snake Pit (SP) than at Behind Abuelitas (BA) because we have seen more dogs at SP than at BA.



Authors: Scarllet Meshin, Ava Dingley, Maya Callaway, Cassidy Du Toit and Noa Blonder, Flora Zepeda Torres and Jodutt Basrawi

Conclusion: We found out that (BA) has more than (SP) Our assumption was wrong. Why we think there is more dog markers, is because it is easier to sneak them in. ☹

Acknowledgements: Thank you UCLA, County of LOS Angeles, RCDCSMM and Professor Jay

Odessa Adlon
Jensen Schmitt
Jonathan Goldberg
Angus Bernet

TMS Water Testing

Introduction and Group Location:

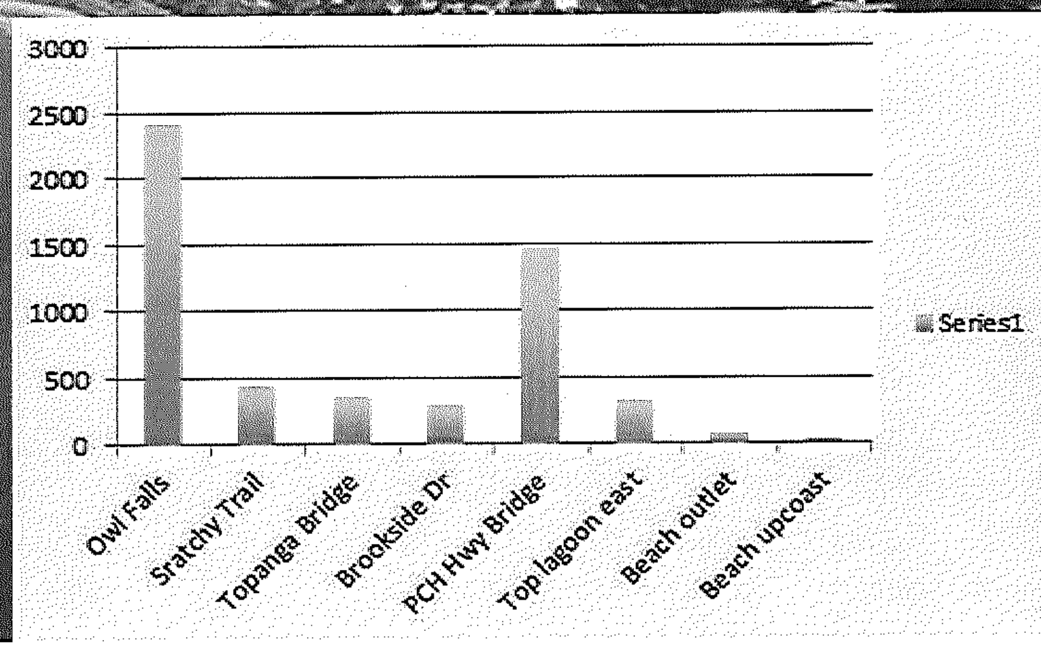
We took samples from the Topanga lagoon and down by the water to check for bacterial markers. We tested wet sand and ocean water.

Conclusion:

PCH did have a spike in bacteria because the water there stays still while the water in the ocean moves around.

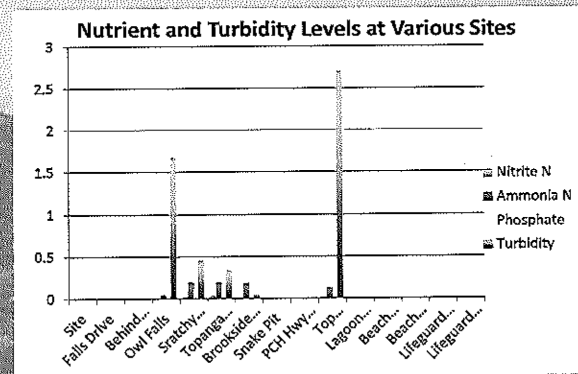
Hypothesis:

There will be more bacteria closer to PCH because everything accumulates closer to the bottom of the stream.



Navigating Nutrients

By: Anna, Phoenix, Ryan, Valentina and Zuzu



Introduction:

Water flows in the Topanga watershed from the mountains to the beach. Samples taken from sites along the creek can show us the nutrient levels and turbidity of the water.

Nutrients are compounds that are needed for organisms to live and be healthy. Examples include ammonia, phosphate, and nitrite.

Turbidity is the cloudiness or murkiness of water caused by total dissolved particles. Soil, run-off, and algae can all increase cloudiness.

Hypothesis: We predict that nutrient levels will increase as water flows towards the coastline.

Results & Discussion:

- Nutrient levels don't have a clear relationship to location, but definitely decrease at the beach.
- The turbidity was high at Owl Falls and Top of the Lagoon. This could be caused by mixing of soil from fast water flow.
- Overall there is a decrease in turbidity as you near the coastline

Conclusion:

Hypothesis was incorrect – nutrient levels decrease and reach 0 at the shoreline. Turbidity doesn't really relate to nutrient levels.

Acknowledgements: We are grateful for funding and assistance from the Resource Conservation District of the Santa Monica Mountains and the County of Los Angeles, as well as for the help from our friends at UCLA, Niru Senthilkumar and Shalini Kannan.

May 2014

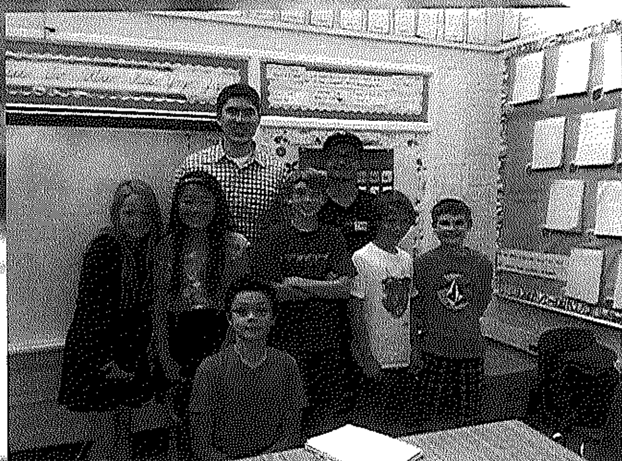
EC Levels in Topanga Beach

By Nikita Mizgunov, Talei Ferra, Stephanie Yoon, Adison Irby, Jasper Baur, and Shane McDermott

Topanga Elementary

Overview

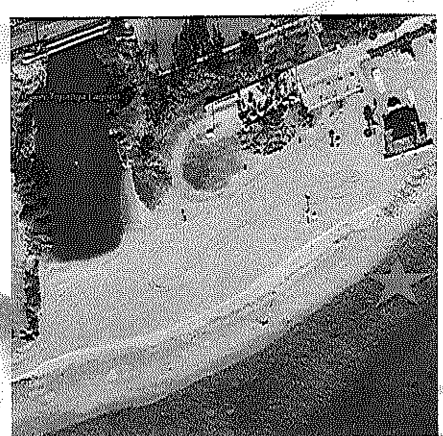
We have been working on testing for bacteria with different varieties of water samples.



The team for sample site 8. 5th graders from Topanga Elementary participated in field work on the beach by the Lagoon.

Hypothesis

When it the bacteria moves down the watershed it will get dirty.



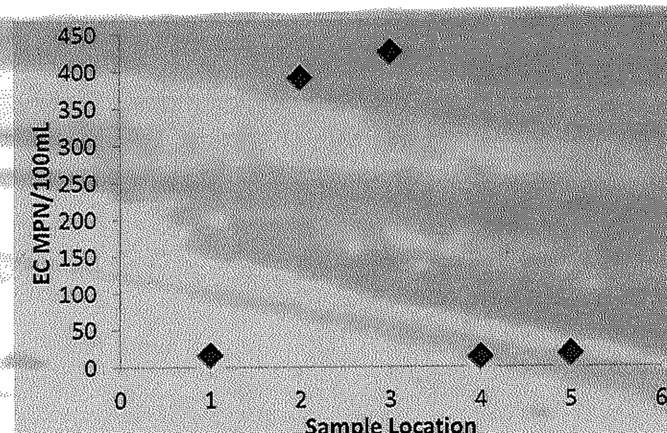
Sample location 8 marked by orange star. Both water and sand samples were collected at that site.

Results

Bacteria cannot survive in heat. As the water flows downstream, it picks up many different types of bacteria and leads to the ocean. It all meets up in the lagoon where it tends to accumulate.

Discussion

We collected sand and water samples. There are many bacteria in our beach and we want to see how they grow and how many they are. After getting all the bacteria in a bottle, we let them grow by feeding them. Then we let them sit in the lab and we can see their colonies under black light.



EC levels were high around the lagoon.. On the horizontal axis, location 1 marks the top of the watershed while location 5 marks the bottom. As we can see, the high concentration levels of TC occur in the middle (location of lagoon).

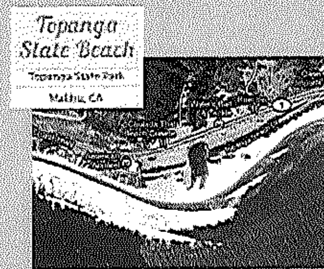
Acknowledgments: We thank Prof. Jenny Jay and her UCLA CEE199 class for their participation in the fieldwork and for processing the samples at UCLA. We also would like to thank our teacher Mrs. Saporta for allowing the 5th grade participation in the experiment. In addition, we are grateful for the funding from Resource Conservation District of Santa Monica Mountains and the County of Los Angeles. Posters were graciously printed by Michelle Myers.

Gull marker levels at Topanga Lagoon

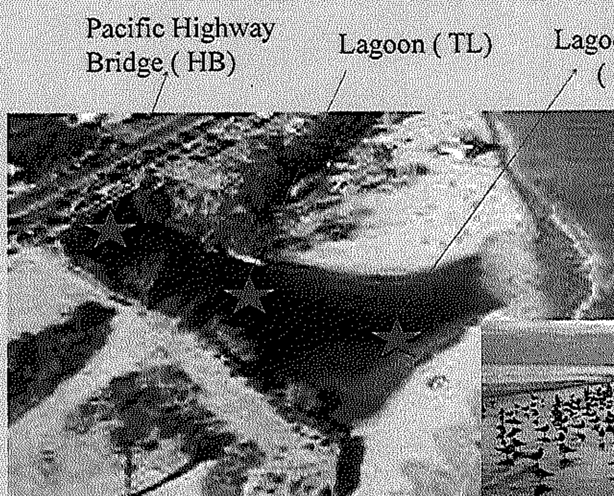
Liam, Keely, Morguinn, Skye – Topanga Elementary School, Katie Rittiphairoj- UCLA

Introduction

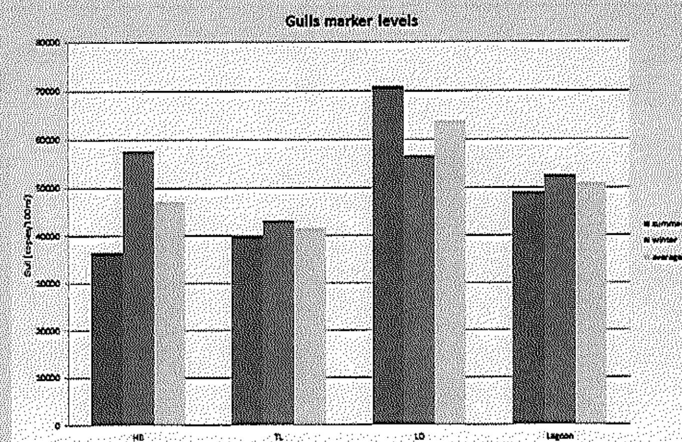
Our group looked at a level of FIB of seagull at Topanga lagoon from three locations : Pacific Highway Bridge, Lagoon and Lagoon Outlet and also looked at the FIB change seasonally.



Hypothesis : We think that the gulls marker levels have a seasonal pattern revolving around their contamination. The highest amount of gull contamination is in the summer.



Results



Discussion :

From our chart, we have discovered that sea gull makers suddenly increase at lagoon outlet (LO), however, total amount of contamination is higher in winter than in summer

Experiment Day

Conclusion :

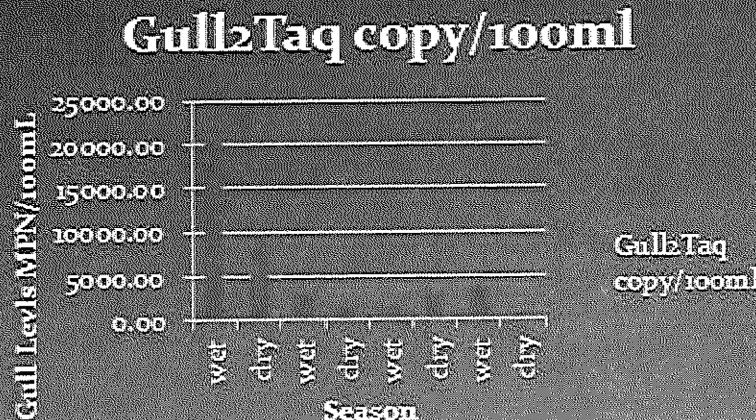
The result matches our hypothesis that the highest FIB of gulls is in summer but for the overall highest FIB is in winter. The reason is because birds may fly to California during the winter.

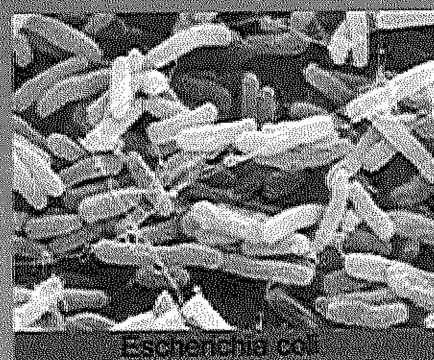
Acknowledgments: We thank Prof. Jenny Jay and her UCLA CEE 199 students for processing the samples at UCLA. We also would like to thank Topanga Elementary School and Ms. Rosi for allowing the 5th grade to participate in this project.

Bacteria Levels at Topanga Beach

Alex, Betsey, Bram, Tristan, Mo, UCLA

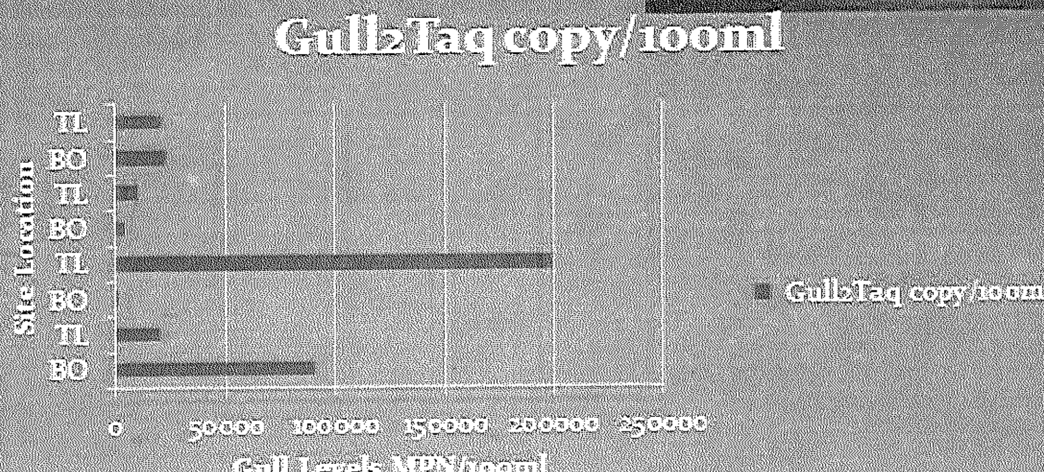
Hypothesis: We hypothesize that gull marker levels follow a seasonal pattern because birds migrate seasonally. We also hypothesize that gull makers would be higher at the lagoon because it is more polluted.





Introduction and site location: Gull marker levels show a great correlation with fecal indicator bacteria (such as E. coli or ENT) and are commonly found around beaches. Our project examined sand water to find traces of fecal indicator bacteria at the beach outlet (BO) and the Topanga lagoon (TL)at the Topanga Beach.

Conclusion: The gull markers were significantly higher in the lagoon than the beach outlet. Gull marker levels were also higher during the wet season because of higher amounts of gulls present.



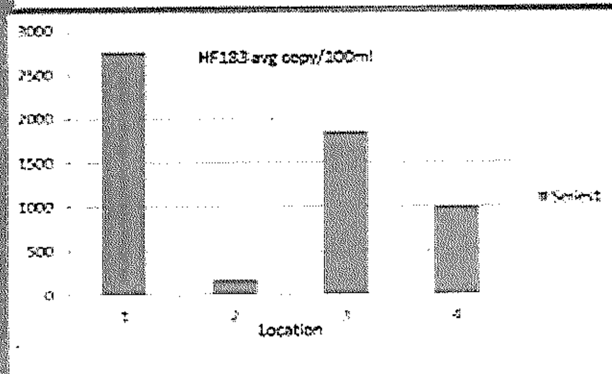
HUMAN MARKER

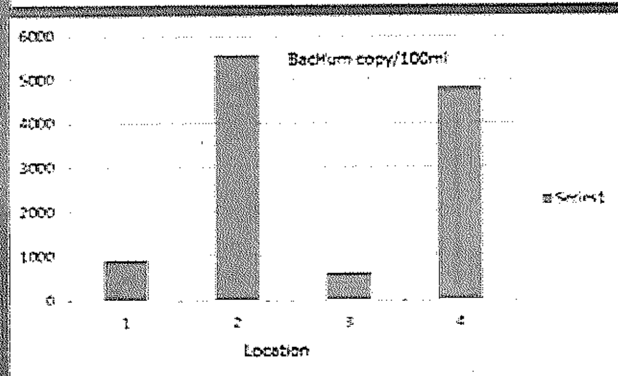
Daniel Valenzuela, Sarah Green, Lee Ivy Voisin, , Rama Kingston Shapiro, Leo Crawford and Zennon Ulyate -Crow

Introduction: Human bacteria contains a certain DNA that is tracable in the bacteria, and harmful to the overall environment.

We, the kids of Topanga Elementary, firmly believe that the following areas are over polluted and destructive to Topanga.

LOC	HF183	BHum
ER	2762	932.13
HR	171.8	5553.8
OF	1847.1	626.84
TB	994.65	4808.7





There is too much human contact near beaches, creeks, rivers, lakes , and the watersheds. Also, some homeless people live on the beach contaminated our water due to lack of restrooms. We even found traces of actual homeless people!

We are grateful for funding and assistance from the Resource Conservation District of the Santa Monica Mountains and the County of Los Angeles

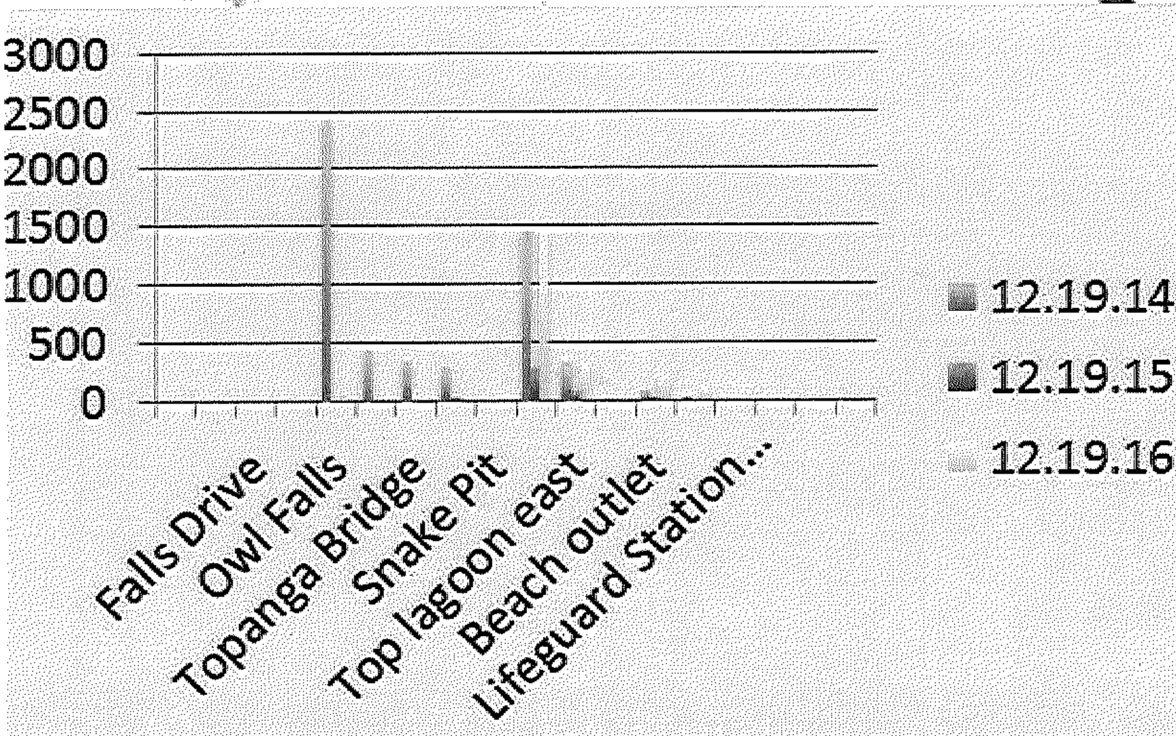
UCLA: Usman Muzaffar

Mira Domberg | Nikki Gelb | Ret Beauregard

Topanga Beach Water Quality

Discussion: Is there any relationship between EC levels and ENT levels at the beach?

Hypothesis: There is a positive correlation between EC and ENT levels at the beach



What is EC and ENT?

Escheirchia coli is a beacteria that doesn't need oxygen to survive and its commonly found in the lower intestine

Enterococci are part of the normal intestinal flora of humans and animals but are also important pathogens responsible for serious infections.

Conclusion: We found that there is no immediate relationship between EC levels and ENT levels. The results show that the relative concentrations of enterococci were almost invariably higher than E coli. Only a few instances where it wasn't. However, instances of EC were also likely to have the presence of ENT.

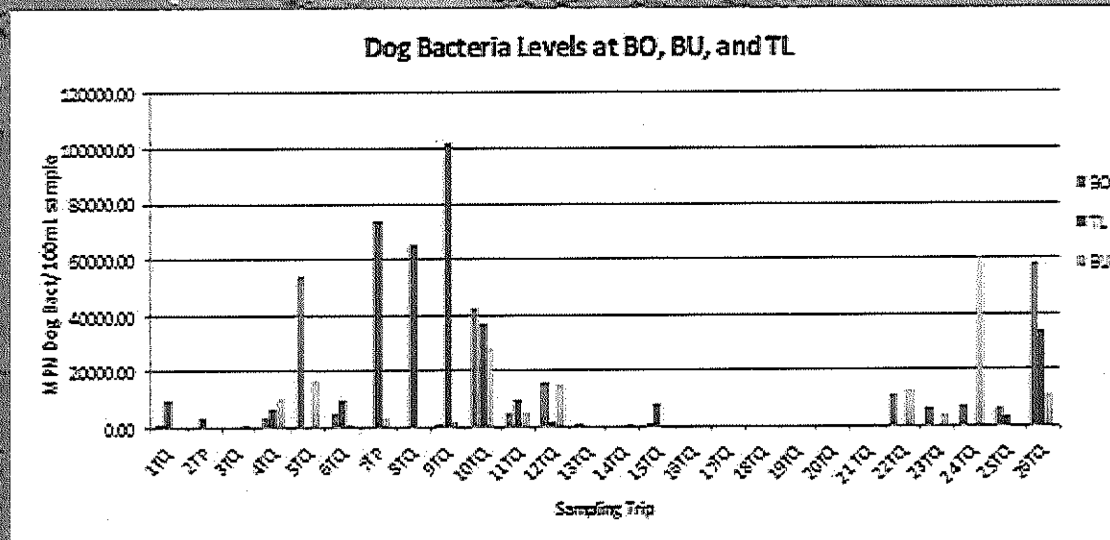
Dog Bacteria Levels at Topanga Beach

by Paul Cleland (UCLA), Dylan Hirschon, John Kahle, Leo Miller, and Atticus Walker (Topanga Mountain School)

Hypothesis: Beach outlet (BO) will have a higher most probable number (MPN) of dog indicator bacteria per 100 mL sample than Topanga Lagoon (TL) and Beach Upper (BU) because dog owners like to walk their dogs close to the shore.

Discussion: Low levels of dog bacteria were measured at all three sites considered for almost all site trips. The three highest measured levels of dog bacteria were at TL. When no data (ND) was measured, it was most likely to happen during the summer months.

Conclusion: Due to the higher average levels of dog bacteria measured at TL it can be concluded that dogs poop more often near the lagoon. BU and BO have similar levels of dog bacteria measured so dogs poop around the same amount at these two sites at Topanga Beach.



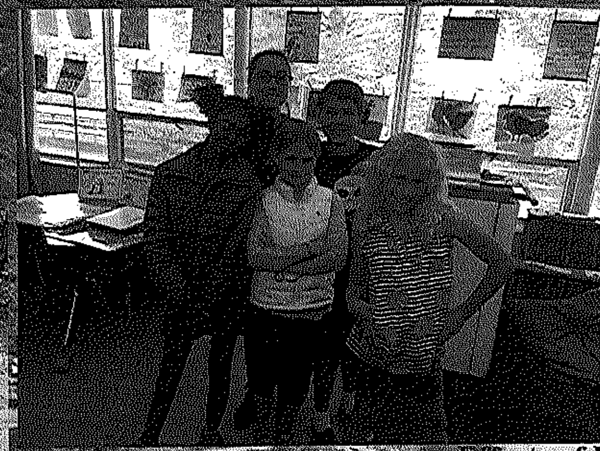
cknowledgements: We are grateful for funding and assistance from the Resource onservation District of the Santa Monica Mountains and the County of Los

Human Marker in Topanga Beach

By: Maya Demontreux, Anouk Wijeratne, Lola Stockard, Slater Antonovfsky

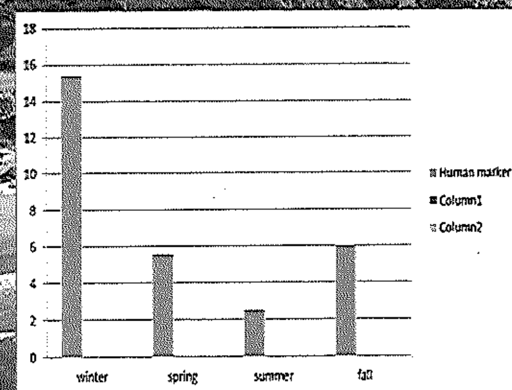
Question:

Is there a seasonal pattern of human marker levels at Topanga lagoon?



Results:

According to our results we can see that there is more human marker in the winter.



Introduction:

Our group conducted an experiment in which we tested bacteria levels in the water and sand at Topanga Beach. Our main focus was to test out the Topanga Lagoon as seen in the picture above, in order to see how much Fecal indicator Bacteria or E.coli there is in the water.

Hypothesis:

Our hypothesis is that there is more fecal marker in the ocean during summer months

Effects of Human markers in the ocean:

- **If human marker is continued to be released into the ocean, we will not be able to swim.**
- **It pollutes the water and hurts the little critters swimming around in there!**
- **It releases dangerous chemicals into the water!**

Conclusion:

We have concluded from the results that there was a lot more Human markers during the winter time, therefore our hypothesis is false.

Acknowledgements: we are grateful for funding and assistance from the Resource Conservation District of Santa Monica Mountains and the Country of Los Angeles.

We are grateful for funding and assistance from the Resource Conservation District of the Santa Monica Mountains and the County of Los Angeles.

TOPANGA BEACH WATER QUALITY

Ammad Bajwa || Macayla Loomis|| Liam Hay|| Akasha Ross ||

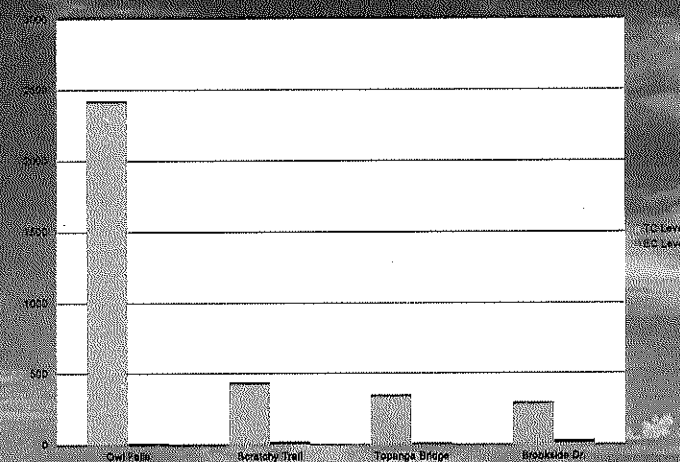
Question

Is there any relationship between TC levels and EC levels (by site location, at the ocean, at the lagoon, in the creek?) (seasonal pattern? First flush rain event?)

Hypothesis

We think that there is a positive correlation with the two bacteria, EC and TC. Since they are both fecal indicators (bad bacteria). TC is also a total coliform therefore we can assume that the bacteria will both increase at the same time.

Results



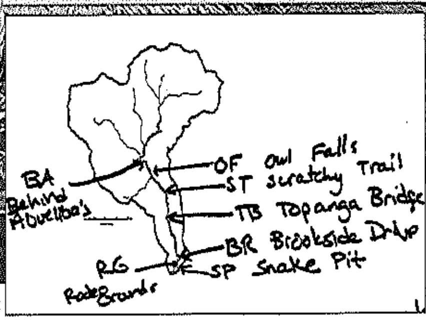
What is EC and TC?

- Escherichia coli is a bacteria that doesn't need oxygen to survive and is commonly found in the lower intestine.
- TC was total coliform. It is all the bacteria including EC.

Field Work

We collected dry sand samples at Topanga Beach. We tested the sand for certain bacteria by feeding it food. The sand samples were then brought to UCLA where it was tested for different bacteria including EC, TC and ENT.

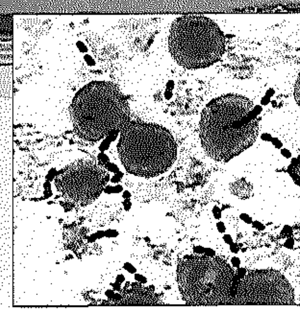
What is the upstream path?

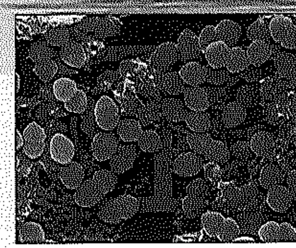


Conclusion

TC has a higher bacteria level then EC although we can not see any direct correlation by comparing the levels on each site. For example, when we tested the bacteria on the Owl Falls site, EC had an average of 10 while TC had an average of 2427 but when we tested the bacteria on Brookside Dr, TC decreased when EC actually increased to 31.

(These numbers are averages based on multiple days of data)

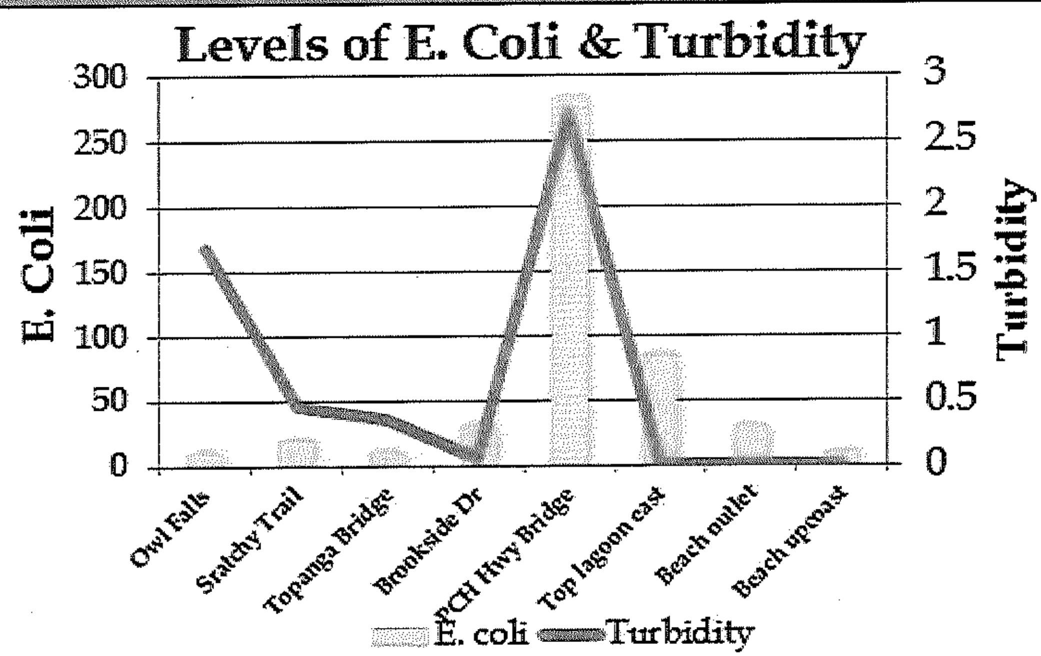


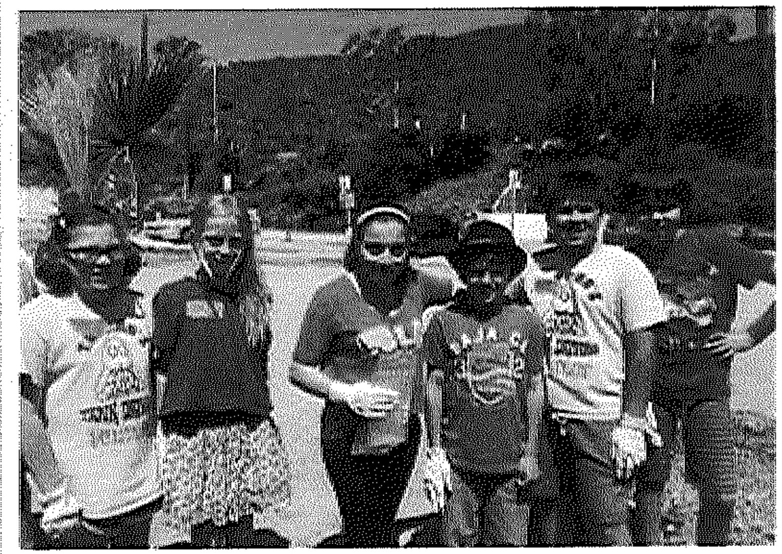


WHERE IS THE MOST E. COLI BASED ON TURBIDITY IN TOPANGA STATE BEACH?

Hypothesis: We hypothesize that the levels of E. coli and Turbidity will increase as we approach the PCH location

Introduction and Group Location: We took samples at Topanga State Beach. We found increasing levels of the bacteria E. Coli the closer we approached the Pacific Coast Highway (PCH) location.





By: Camila, Isis, Luca, Lukas, Matthew, and Flora Zepeda Torres

Conclusion: We found that the highest levels of E. Coli and Turbidity is at the PCH location, while the lowest is at the Beach Upcoast (BU).

Acknowledgements Thank you UCLA, County of Los Angeles RCDCSMM for your support, Professor Jay

Jake Albert | Beckett Cater

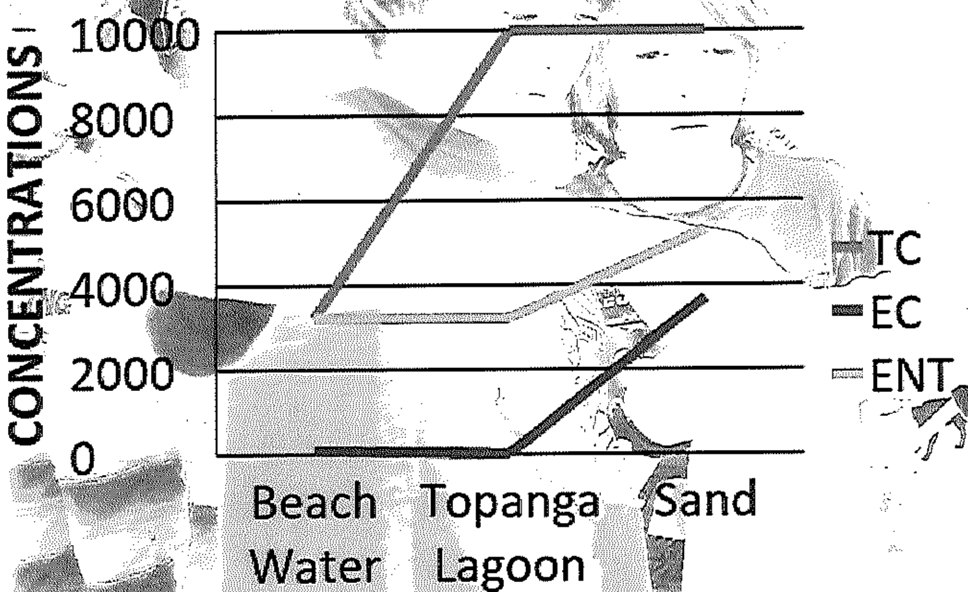
Topanga Beach Water Quality

UCLA | Usman Muzaffar

Is there any relationship between TC, EC and ENT exceedances and presence of dog marker?

<u>Hypothesis:</u> In presences of dog feces, there will be high amounts of TC, EC and ENT

RESULTS



<u>Background:</u>

What is TC, EC and ENT?

Total Coliform includes bacteria that are found in the soil, in water that has been influenced by surface water, and in human or animal waste.

E Coli is a bacterium commonly found in the intestines of humans and other animals, where it usually causes no harm. Some strains cause severe food poisoning.

Entercocci are part of the normal intestinal flora of humans and animals but are also important pathogens responsible for serious infections.

<u>Conclusion:</u> The presence of dog feces was a clear indicator to the high amounts of TC, EC and ENT levels at the beach. The pathogens and bacteria associated with it showed a positive correlation and high concentrations of each on average.

April 2014 TC and EC Levels Across the Topanga Watershed

By Damon, Kristin, Asahna, Emmy, Daniel Valenzuela

Introduction and Background

We took water and sand samples, and later incubated. From there we were able to see the growth of the bacteria and determine within different bacteria markers.

Hypothesis

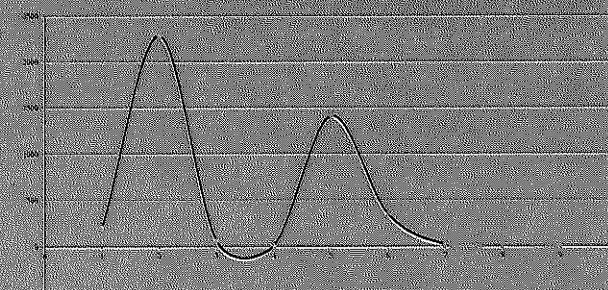
We think that the TC and EC should drop in level after the water reaches the bottom of the water shed.

Discussion

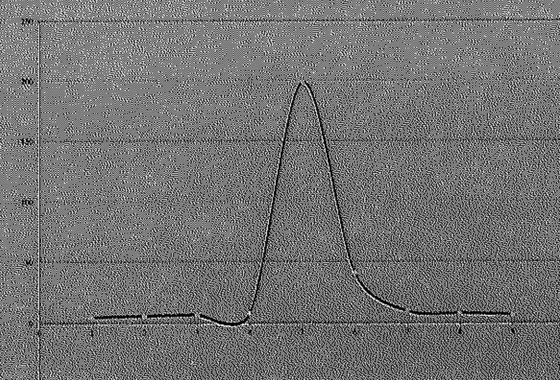
After graphing the results from the month of April, our hypothesis was not correct. The TC level seems to drop as the watershed moves downward. As for the EC level, there is a peak in the middle of the lagoon.

LOC	TC MPN/100 ml	EC MPN/100 ml
OF	201.1	5
ST	2281.8	6
TB	62.6	7
BD	8	8
PCH Brdg	1407.8	198.9

TC Readings MPN/100ml



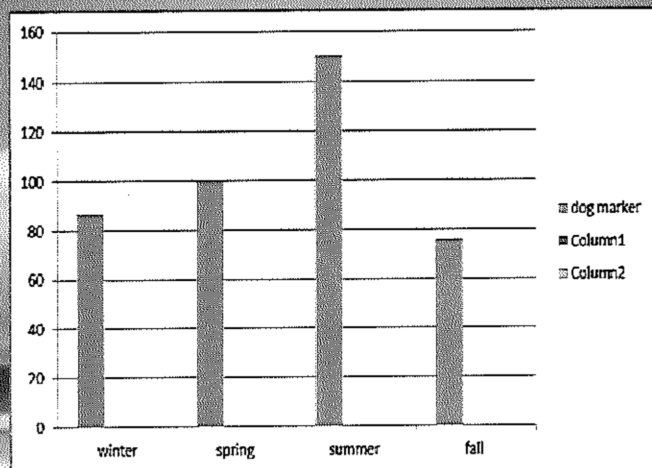
EC Readings MPN /100ml



We are grateful for funding and assistance from the Resource Conservation District of the Santa Monica Mountains and the County of Los Angeles

Topanga Creek Watershed

By: Skyler Caceres, Kestral Bruce: Topanga Middle School



Conclusion: Our results indicated that there are high levels of bacteria in the summer time compared to the levels from the winter time.

Experiment:
What we did was tested water as well as wet sand from the Lagoon in order to see if there was high levels of bacteria.

Question: Is there a seasonal pattern of dog marker level at Topanga Lagoon?

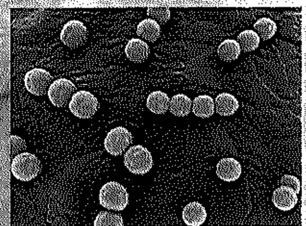
Hypothesis: We believe that there will be more dog markers in the summer time because people walk their dogs in the summer.

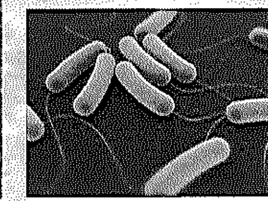
Results: As you can see from the graphs we have results from both the summer and winter and it shows that there is more bacteria from dog markers in the summer time.

Acknowledgements: we are grateful for funding and assistance from the Resource Conservation District of Santa Monica Mountains and the Country of Los Angeles.

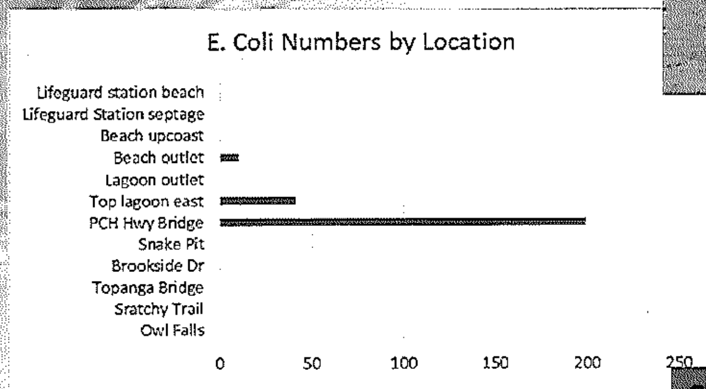
Bacteria in Topanga Lagoon

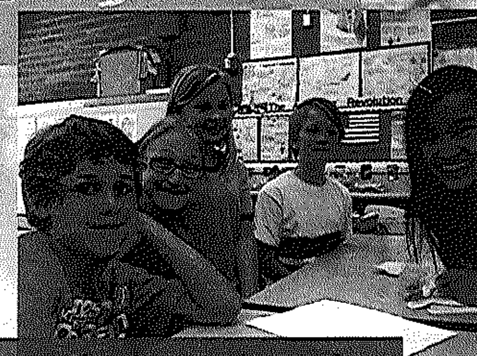
Project by Caleb Clark, Rachel Specland, Sasha Luczy, Henry Miller, and Melanie Tran





Introduction and Procedure: We collected sand, searched for bacteria, and shook sand and water to separate the bacteria. Then we fed the bacteria and put it on trays and sent it to the UCLA lab.





Hypothesis: We think that wherever there are birds, seagulls, dogs, and humans, there will be more E. coli, so places like PCH, and the beach.

Results: The highest number of E. coli was at PCH Hwy Bridge. The second highest number of bacteria was at the top east lagoon. The third highest number of bacteria is at the Beach Outlet.

Conclusion: From the data we know that the most E. coli is in areas where people walk their dogs and where there are more seagulls because of peoples food and because of people in general. These places were PCH and the top of lagoon east and the beach outlet where people swim.

Aiden, Emmett, Victoria, Bella, Liam,
Julian – Topanga Elementary
Jodutt Basrawi - UCLA

INTRODUCTION

We went to the beach to measure gull fecal matter. We want to compere gull fecal matter between seasons and see if an open and closed beach berm affects levels of

l matter.

LOCATION

Topanga State Beach – Lifeguard Station and coastal

HYPOTHESIS

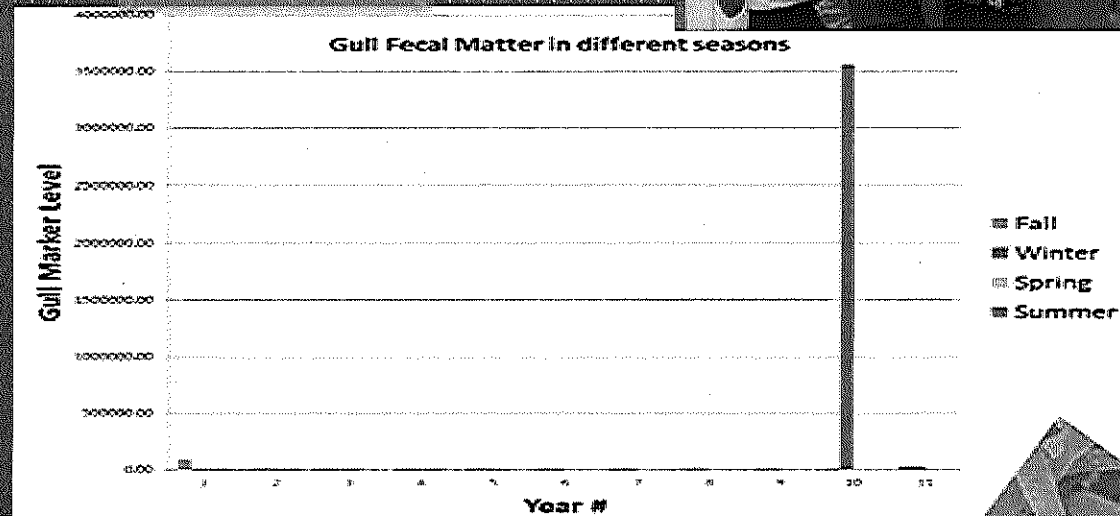
We hypothesize that most gull fecal matter is present during winter because they migrate through Topanga State Beach during the

tay there.

PROCEDURE

We sampled the sand to see how much bacteria there was. We dug at the surface and at the depth of the sand (half an inch).

RESULTS



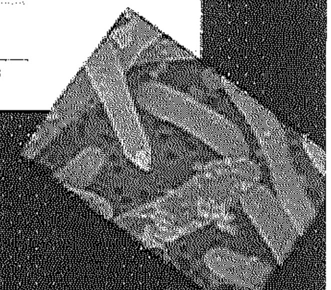
DISCUSSION

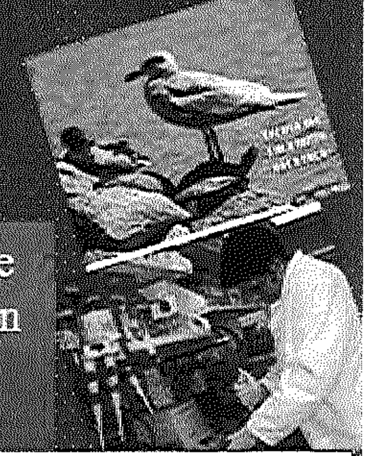
We see that winter has more gull fecal matter then the other seasons. We think closed beach berms have more gull fecal matter because they're

the sand.

CONCLUSION

We conclude that in the winter there is more gull fecal matter because the gull migrates in winter so they leave more fecal matter by staying around the beach.





Acknowledgements: We would like to thank the Resource Conservation District of the Santa Monica Mountains and the County of Los Angeles for their funding and their assistance.

Human Marker In the Topanga Lagoon

Alex Gage, Justin Gilbert, Milo Ruppert; Topanga Elementary School. Christine Kabayan; UCLA

HYPOTHESIS:

In the winter the human marker in the lagoon would be the highest because rain will flush it down the creek.

What were the results?

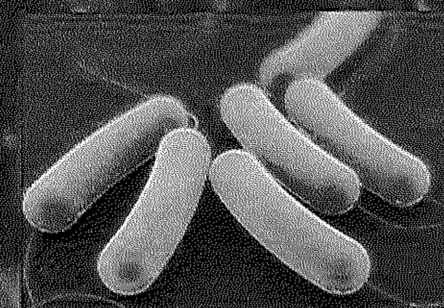
It was not at it's highest, but sort of high. It was highest in July, probably because more people were at the beach.

Conclusion:

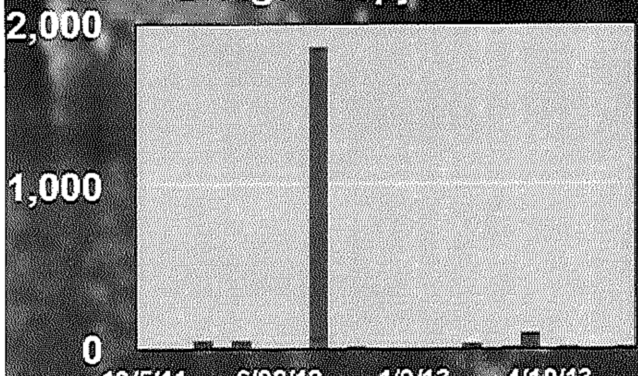
Even though bacteria levels were high after the first rain of the season, there was the most bacteria in the all lagoon locations during the summer.

FIB in Lagoon

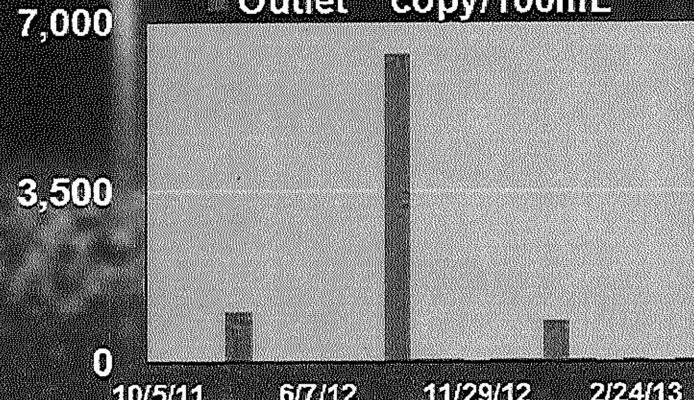
E Coli



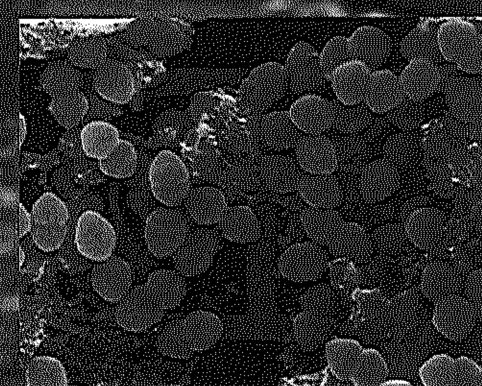
FIB Under Bridge



FIB at Lagoon Outlet



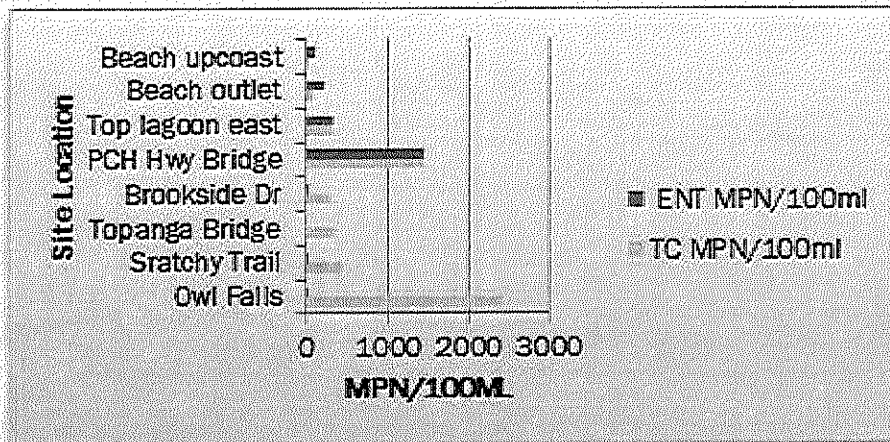
Enterococci



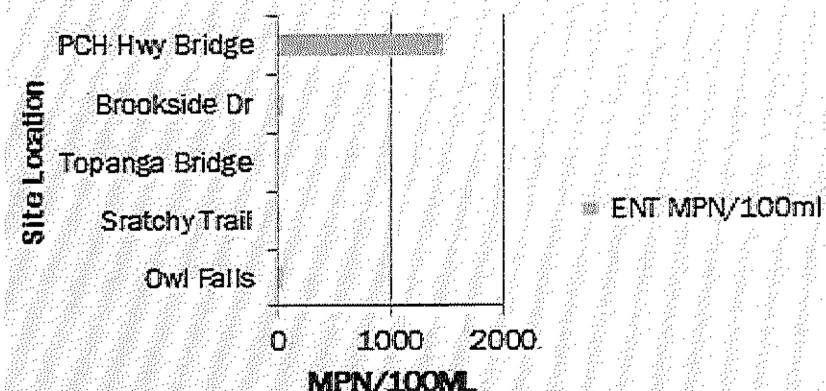
TESTING BACTERIA LEVELS AT TOPANGA BEACH

ALEX, SOUMA, INDIA, JULIEN, LUNA, UCLA

Hypothesis: We hypothesize that ENT levels would increase when going from upstream to downstream because the watershed would accumulate bacteria.

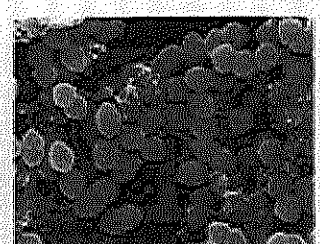


Introduction and Site Location: Enterococci is a fecal indicator bacteria (FIB) used to measure the bacteria levels found near the beach. We gathered sand water from different sites atTopanga Beach to test for ENT levels.



Discussion: ENT levels are highest at Pacific Coast Highway because bacteria accumulates from humans and animals where it is highly populated and polluted.

Conclusion: ENT levels were higher when going from upstream to downstream reaching its peak at Pacific Coast Highway. TC (Total Coliform) levels are significantly higher than ENT levels in almost every case.



We are grateful for funding and assistance from the Resource Conservation District of the Santa Monica Mountains and the County of Los Angeles.

TOPANGA BEACH WATER QUALITY

Ammad Bajwa ||Charlie Mogg || Sidney Brody|| Beau Staun List|| Oona McDermott ||Summer Sholty

Question

Do ENT levels decrease from upstream to downstream at all times? When does that vary (seasonal pattern? First flush rain event?) and what could be the causes?

What is ENT?

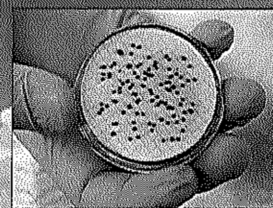
ENT is a type of bacteria that occurs in water. It is called enterococci. ENT is BAD. It shows how much POOP there is in the water.

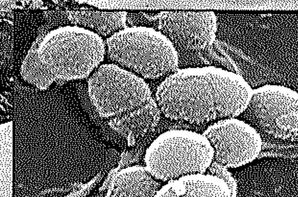
Field Work

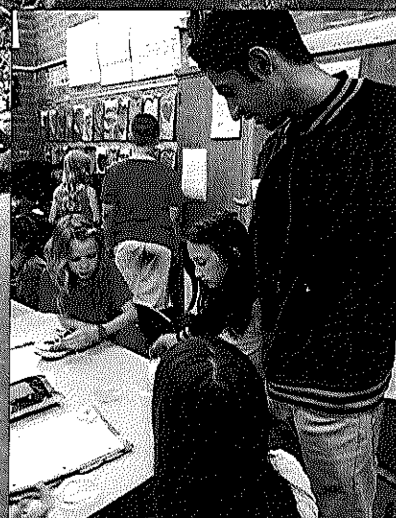
We went to the BEACH and got sand samples and took the BACTERIA from the sand. We fed the bacteria food so it could GROW and we could sample it. We TESTED the samples in the lab and got data.

Hypothesis

We think ENT increases when it goes down stream by CLUMPING together. GRAVITY forces the water to go DOWN hill.



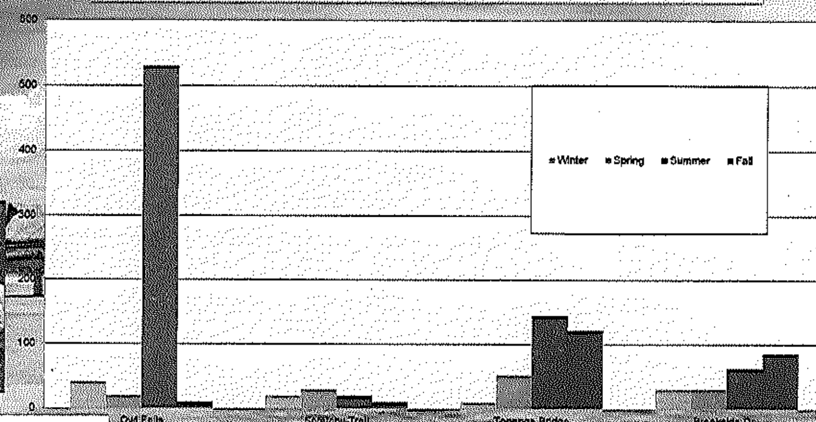




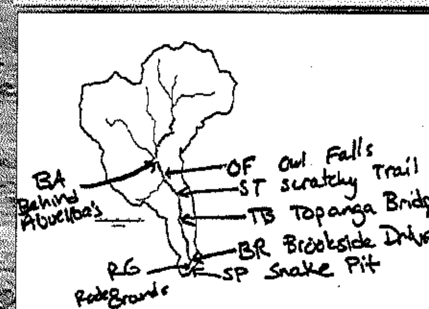
Conclusion

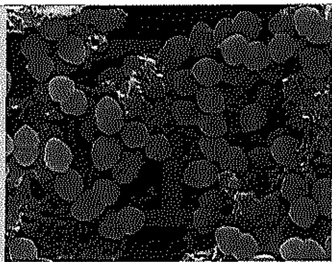
We plotted data from each location (Owl Falls, Scratchy Trail, Topanga Bridge, Brookside Dr.) obtained during each of the 4 different seasons (Winter, Spring, Summer, Fall). Each of the four sub graphs correspond to a location and are ordered as they go downsteam. It seems that, with the exception of a few outliers, ENT levels INCREASE in general as we go downstream. Furthermore, ENT levels seem to be the highest in Summer and Fall. This might be because the beaches are more populated

Results



What is the upstream path?

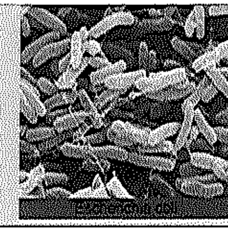




Enterococci

TC Levels in the Topanga Creek

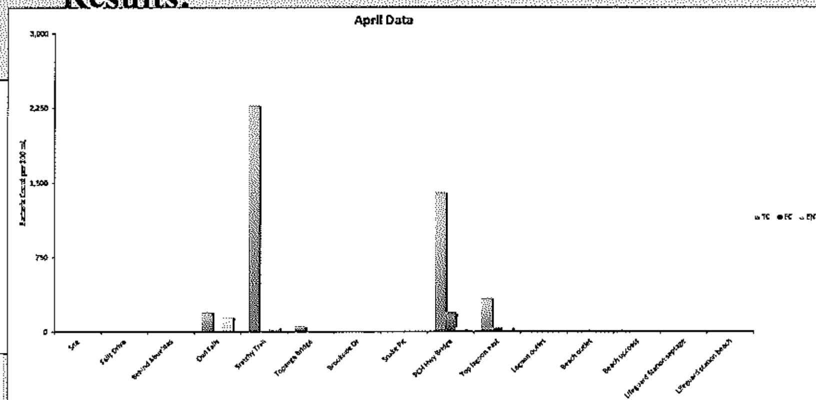
Arianna Faramarzi, Mer Cortez Temple, Jade Cortez Temple, and Bradley Roaché;
Niru Senthilkumar, Shalini Kannan, Katie Rittiphairoj, Christine Kabayan; UCLA

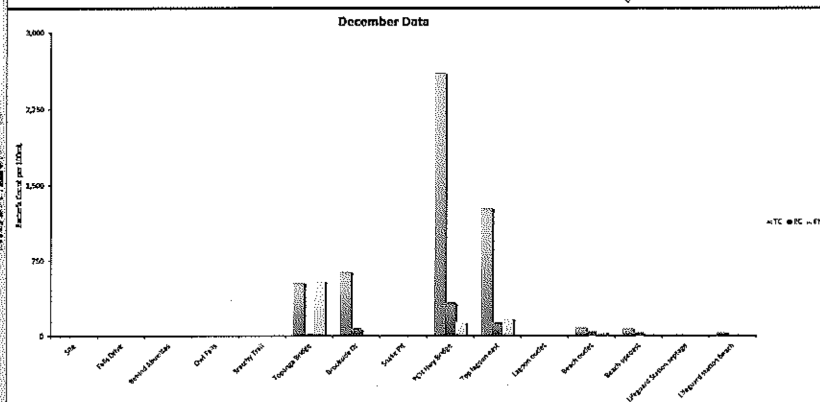


Introduction: Two types of fecal indicator bacteria were tested for in the Topanga Creek, E Coli and Enterococci. The combination of these two types of bacteria is referred to as total Coliform.

Hypothesis: The levels of FIB become higher as we move down the water shed.

Results:





Conclusion: In the winter, presumably after the first rain, TC levels were higher downstream near the PCH bridge. However, TC levels in April were higher upstream, possibly because more people take activities outside. As water travels closer to the ocean, less bacteria is found due to undeveloped land absorbing the pollution.

Discussion: We hypothesized that the TC levels would increase as we look at samples starting at the top of the watershed going down. After we looked at the data, we noticed a seasonal pattern in TC levels. TC levels can be affected by the weather as well as human activity in the area. Graphs of our data showed that levels generally decrease as water flows down the watershed, but then peaks near PCH before decreasing again. This could be due to increased human activity and rainfall runoff near roadways, especially during warm weather.

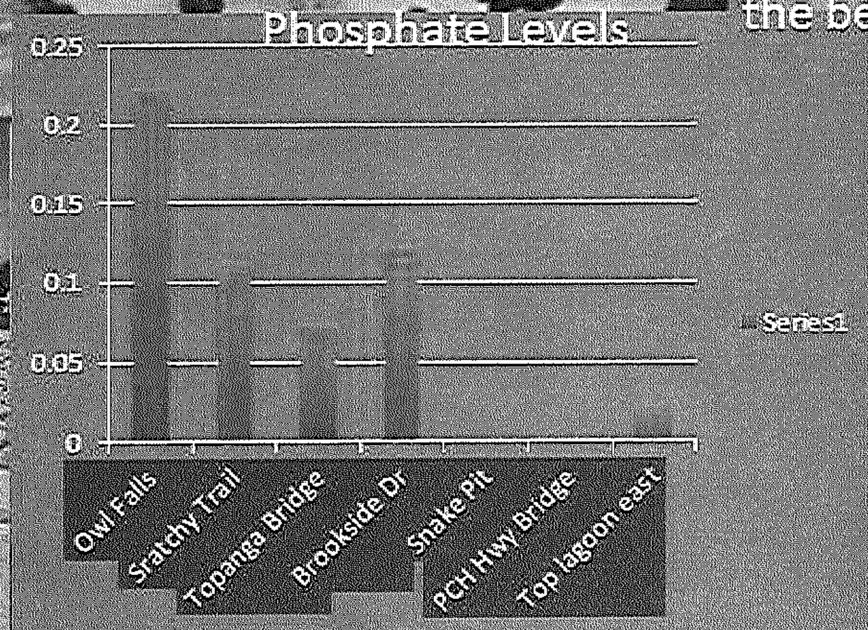
Esme Lee
Mikayla Williams
Charles Nance
Sky Van Starrenburg
Wies Groeneveld

Topanga Beach Water Testing

Introduction and Location: We did water testing in Topanga Beach. Our testing included Ocean water and wet sand.

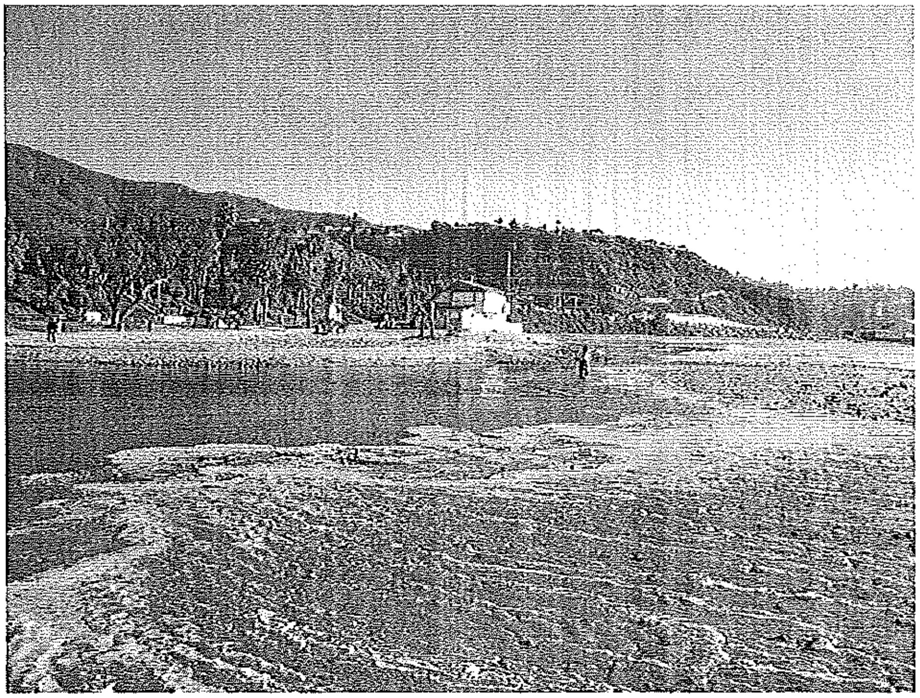
Hypothesis: We think that there would be more Phosphate down by the beach.

Conclusion: We were not correct because there is more phosphate on top near Owl Falls rather than the beach.



TOPANGA BEACH WATER QUALITY UPDATE
What microbes can tell us about water quality

WHAT WE ARE LEARNING AND HOW YOU CAN HELP



Thursday 30 May 2013
6:30-8pm

Topanga Library
122 N. Topanga Canyon Blvd.

6:30 – 7:00 pm What Microbes can tell us about water quality
Poster Presentations by students from Topanga Elementary School and Topanga Mountain School, done with their UCLA Undergraduate Mentors

7:00- 7:15 pm Is it safe to swim at Topanga Beach?
Rosi Dagit, RCD of the Santa Monica Mts.

7:15- 7:30 pm Preliminary results of the Topanga Source Identification Study
Dr. Tim Riedel and Dr. Jenny Jay, UCLA

7:30-7:45 pm WHAT YOU CAN DO TO HELP
Care and Feeding of your septic and graywater system
Richard Sherman, Topanga Underground

7:45-8:00 pm Questions and Brainstorming on reducing inputs at Topanga Beach

Is it safe to swim at Topanga Beach?
Presentation by Rosi Dagit, RCDSMM

30 May 2013 Community meeting
Slide Number

1. We all want to know that swimming at the beach will not make us sick!
2. Topanga Beach has been on the HTB list for Beach Bummers due to water quality problems. The City of LA Environmental Monitoring Division collects water samples in the wave zone on the beach side of the lagoon. It takes 24 hours to get the results of those samples. HTB has a complicated algorithm for calculating a rolling grade, which is graphed on their website. If the sample results exceed the limits set by regulatory standards, then the water quality grade of the beach drops.
3. How do we collect the samples? Very early in the morning! Turns out bacteria are very sensitive to light, so the goal is to collect all the samples before the sun hits the water. Next week we will start at 4am! Always looking for volunteers to help!
4. What are FIB? They are a variety of bacteria typically found in the feces of warm blooded animals, including humans. Many are beneficial, but some have the potential to cause illness, like strains of Enterococcus and E. coli. One of the major questions regarding high bacterial counts is how likely are they to actually cause illness? We need a healthy bacterial community to be the garbage processors. In a healthy ecosystem, bacteria play a really important role in recycling waste and generating resources used by plants and animals alike. Not all bacteria are bad!
5. So, if some bacteria are good and others bad, how do we tell if there really is a potential for illness, or that h igh levels are just an indication of a healthy ecosystem doing its job?
   Goals of this study are to investigate where these bacteria are coming from, and try to figure out what might be done to reduce the levels of the bad guys, while keeping the good guys.
   Funded by District 3, sup. Yaroslavsky in collaboration with Dr Jenny Jay's lab at UCLA. Her lab is one of a few statewide that is trying to set the standards for identifying the source of bacteria.
6. So, where do they come from? Upper watershed sources
7. Sources by the beach
8. What we know so far is that while there definitely are problems in the upper watershed, by the time the water reaches the lagoon, it is pretty clean. Whatever is causing the exceedences at the beach is a fairly local source. So we are looking at the state park and lifeguard septic systems to make sure they are not contributing anything, and collecting samples up and down the beach to better understand how the current flow and tides influence the bacterial levels.
9. How does that happen? Topanga magic refers to the complex, dynamic ecosystem recycling system that is in action between the end of town and the lagoon. As the creek flows through the Narrows, natural cleansing takes place, supporting a healthy ecosystem. Nutrient levels are low, diversity of plants and animals is high, and bacterial levels are low too, except for when park visitors or transients bring dogs and trash into the mix. But how close are we to reaching the limit of natural

cleansing processes? Really hard to know, but once a system is broken, it is really difficult to fix. It would be best if we could make sure that we don't go over the edge!

10. We are not entirely clear on how this magic really works, and that will be the focus of a major investigation by Amy X-F from UCLA. Working with RCD biologists, and others, we will be examining the community of benthic macro-invertebrates to see how that community responds to the water conditions. These are a critical level of the food web, feeding our native frogs, turtles, and fish.
11. So while there are still many questions to be answered, we have learned that dogs are a BIG problem. We all reap the benefits of the beautiful Topanga creek watershed and beach. We need to also take responsibility to do our best to keep it clean – no washing machine direct discharges, pick up feces, dog or otherwise and dispose of properly.

Together we can clean up the beach and make it safe to swim.

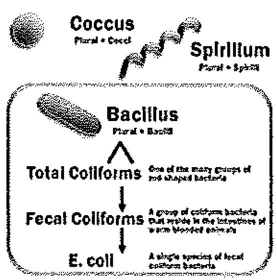
Topanga is a Beach Bummer! Heal the Bay Beach Report Card

Year	Summer Dry (Apr 1- Oct 31)	Winter Dry (Nov 1 – Mar 31)	Winter Wet (w/in 72 hrs of rain)	Total Rain for the year (inches)
2013	C so far	B so far	F	10
2012	B	C	F	16
2011	F	C	F	31
2010	F	F	F	24
2009	C	F	F	15
2008	B	C	F	23

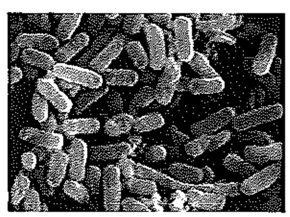
Regulatory Limits	**Freshwater**	**Beach Bathing Standard**	
Total coliform	10,000 MPN	1,000 MPN	Average rain = 25"
E. Coli	104 MPN	Not set	
Enterococcus	104 MPN	35 MPN	

Sample collection

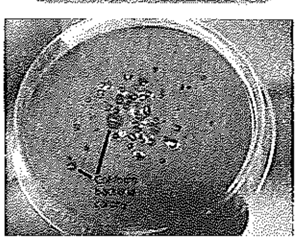
What are FIB?

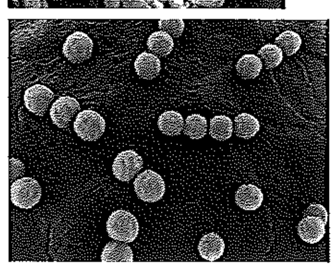


FECAL INDICATOR BACTERIA



Escherichia coli





Enterococcus

WHY is there a problem?

Topanga Source Identification Study
November 2012 – 2014
Funded by District 3, Supervisor Zev Yaroslavsky
Collaboration with Dr. Jenny Jay, UCLA
CA State Water Resources Control Board
Clean Beach Initiative
Source Identification Protocol Project

GOALS:
1. Provide the County with most sophisticated data available to identify sources – human, dog, gull, horse, other

2. Identify Best Management Practices to improve water quality at Topanga Beach

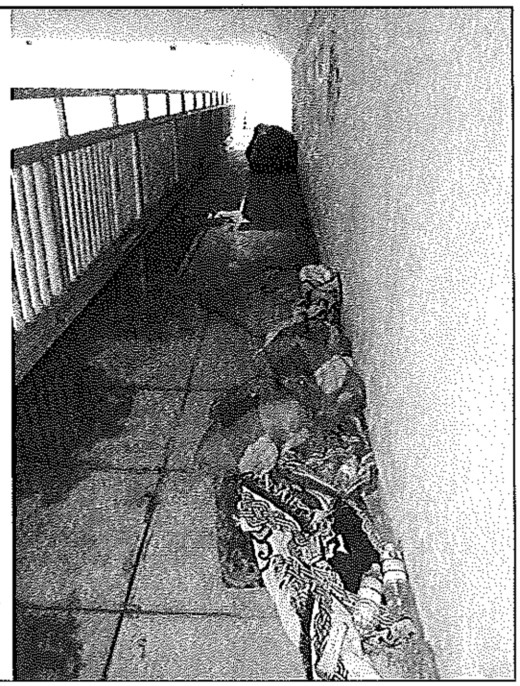
3. Education and Outreach to the community

Possible Upper watershed sources:

- water flowing down the creek from town
- septic systems
- graywater systems
- transient encampments
- domestic animals

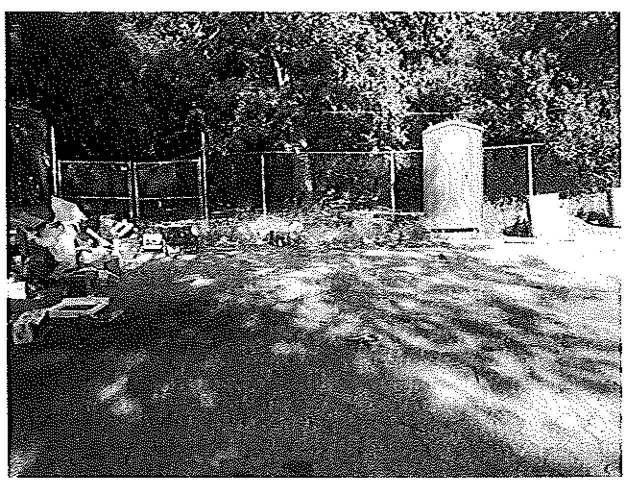
Sources next to the beach

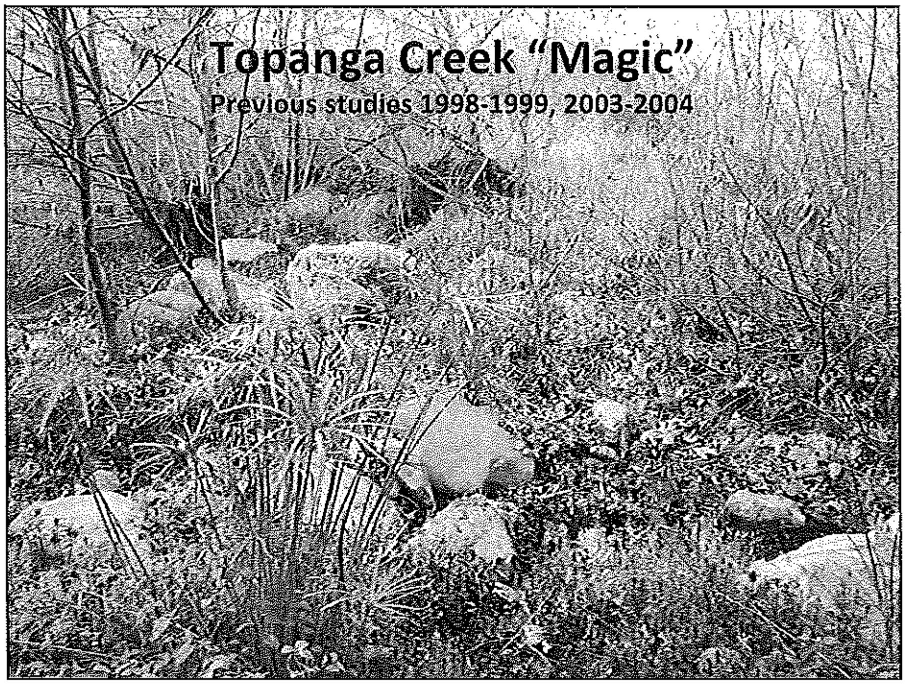
- Lifeguard station restrooms
- Septic systems along PCH
- Wildlife in the lagoon
- Dogs on the beach
- Transients



What we know so far……

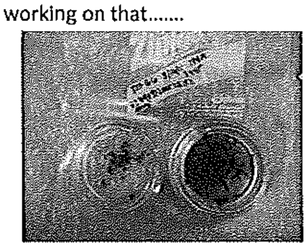
Definitely problems in town that we need to address
Nutrient "Hot spots", Trash, manure

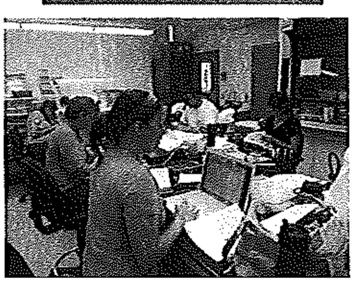


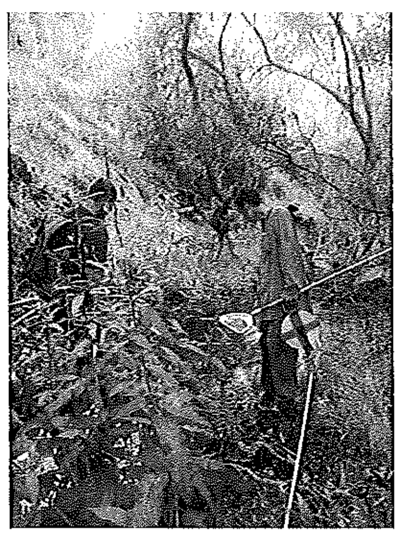


Not sure how the 'magic" works

UCLA graduate student
Amy Zimmer-Faust
working on that.......








Help keep Topanga Beach clean!
NO DOGS
ON BEACH

Public Meeting

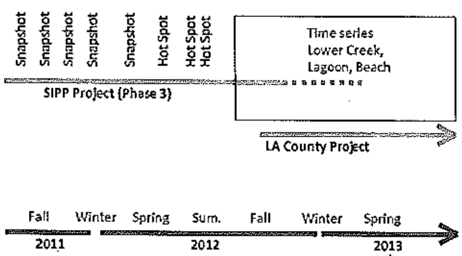
UCLA Data, Presented by Tim Riedel
May 30, 2013

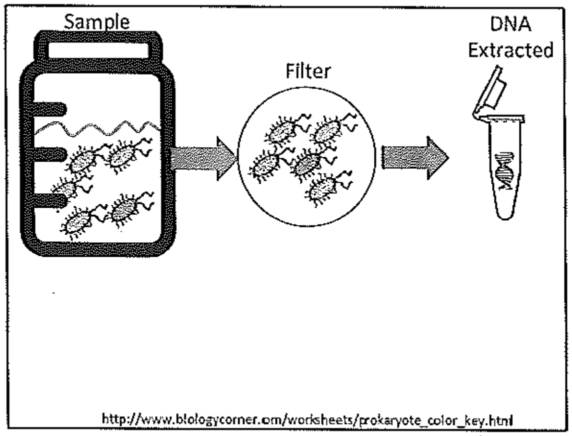
Acknowledgements

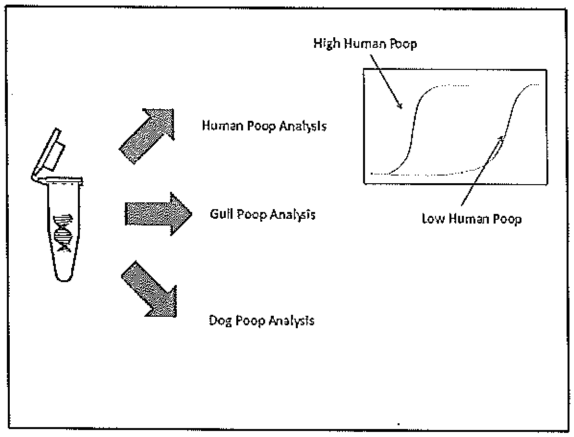
- Big Team Effort!!
  - Sampling
    - RCD folks and their volunteers
  - Processing
  - Analyses

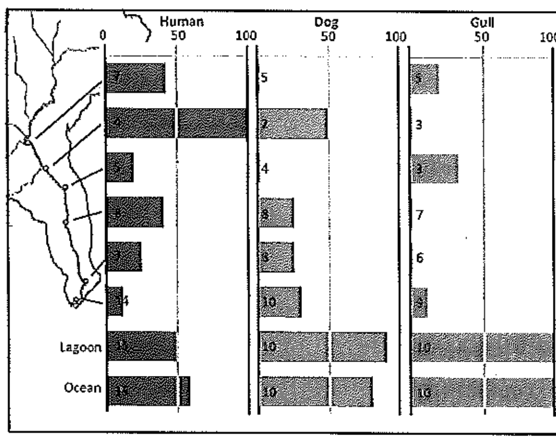
Grad Students = Amy, Vanessa, Saeed
Undergrads = Ben, Uriel, Chris, Robert, Ian
Jay Lab = always willing to jump in and help!
Past Help = Darcy, Kaitlyn, Maria, Julia, Sofi, John, Lynn

UCLA Topanga Timeline



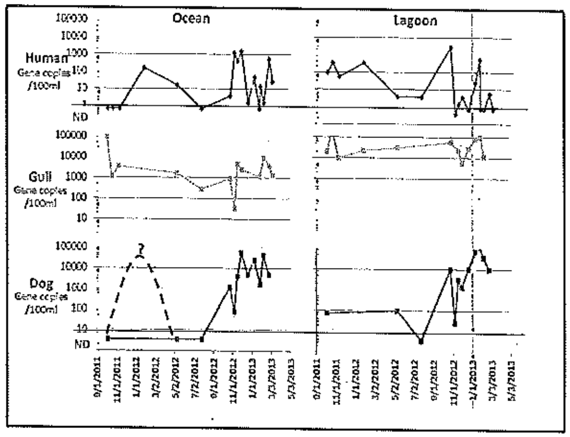


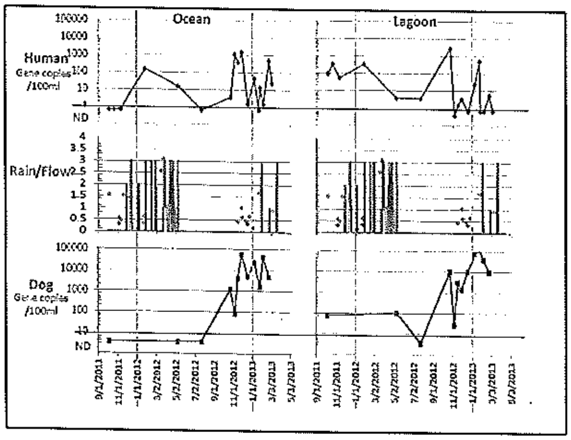




Take Home Points

- Hot Spots in Town -> Clean Narrows -> Impacted Lagoon
- The bridge at MM2.02 shows impact of use
- Creek going into lagoon clean, lagoon impacted.





Beach/Lagoon Conclusions

- **Human** poop has been detected in the lagoon and at beach
- Large presence of **Gull** poop in the lagoon and at beach
  - Fairly consistent throughout year
- **Dog** poop detected at lagoon and beach
  - High levels during winter season

Parting Questions

- How do we lower the human impact on the watershed?
- Is there anything we want to do about the gulls?
- What can we do to improve dog enforcement?

END

DROUGHT, DOGS AND CRAYFISH
Water Quality at Topanga Beach and Creek
Topanga Students to the rescue!

Wednesday 28 May
6:30 – 8pm
Topanga Library
122 N. Topanga Canyon Blvd.

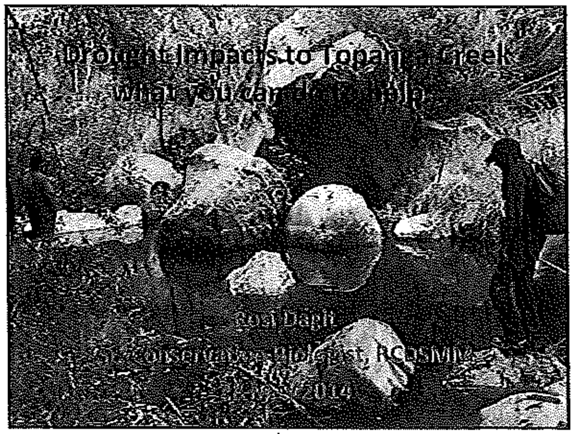
6:00 – 6:30 Keep the Beach Clean Poster Contest
Student Posters will be judged by representatives of Sup. Yaroslavsky, Staff from the Department of Beaches and Harbors and members of the Topanga Town Council.
First Prize winning poster will be used at Topanga Beach
Top 3 posters will win a dolphin pillow pet and dolphin adoption kit from the Ocean Conservation Society.

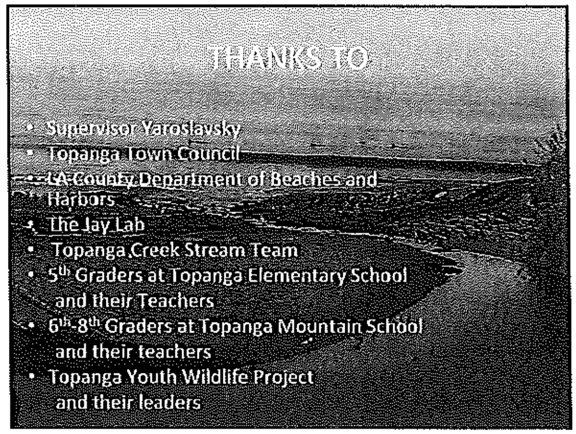
6:30 – 6:45 Topanga Student Research Posters
5th graders from Topanga Elementary School, 6-8th graders from Topanga Mountain School worked with Dr. Jay's UCLA undergraduate students to research water quality in Topanga Creek.
Topanga Homeschool Students have also been investigating the creek.
Posters will highlight their results.

6:45 - 7:00 Drought impacts to Topanga Creek – What you can do to help
Rosi Dagit, RCD of the Santa Monica Mountains

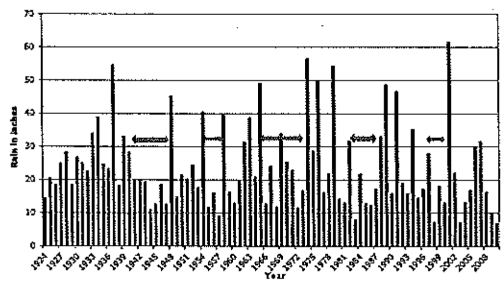
7:00-7:30 Dogs and Gulls: Bacterial sources at Topanga Beach
Dr. Jenny Jay, Vanessa Thulsiraj, UCLA

7:30-8:00 Crayfish impacts to Topanga Creek-
Topanga Homeschool student crayfish removal project
Lizzy Montgomery and Crystal Garcia, Watershed Stewards Program
RCD of the Santa Monica Mountains



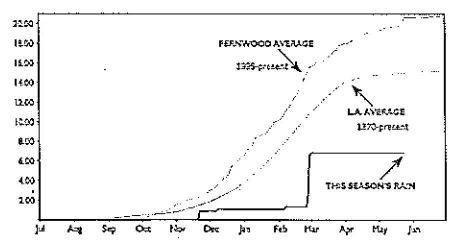


Rainfall patterns and trout numbers



Rainfall by month 2014

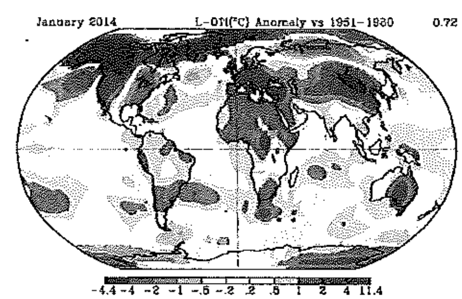
courtesy of Eric Fitzgerald



Present vs. Past Drought impacts

- Less habitat
- More competition for water resources
- More stressors overall
- Fewer individuals to restart a population

El Nino to the rescue?



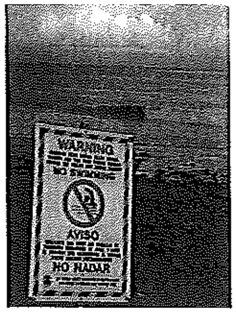
Heal the Bay Beach Report Card

Topanga Beach Beach Bummer Status

19 exceedances 2013-2014 summer dry

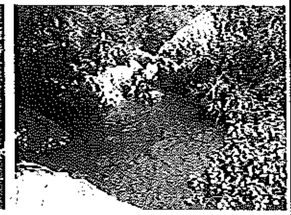
2 exceedances since April 2014

Year	Summer Dry	Wet
2009	A	F
2010	C	F
2011	F	F
2012	B	F
2013	A	F
2014	A	C



Important Refugia Pools

Seep/spring fed
Temperature moderation
Dissolved oxygen available
Instream cover



Fish need water!

24 April 2014

16 May 2014

Crayfish population exploding

What you can do to help.....

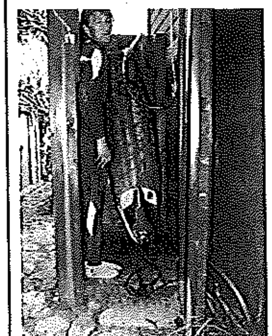
Prevent run-off into the creek

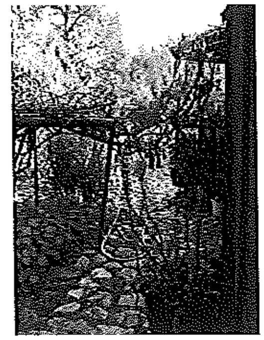
Don't dump pool water into the creek – recycle!

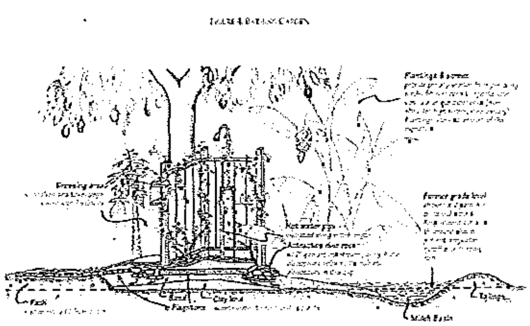
DISH WASHING WATERS PLANTS

Shower to Toilet

Outside showers to irrigate

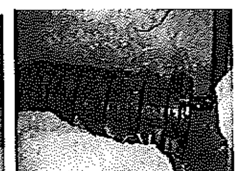




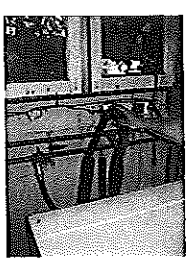


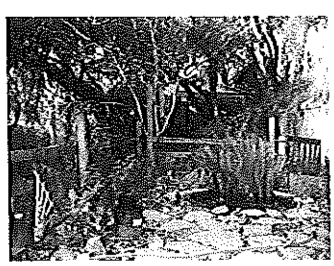
Courtesy of Oasis Designs

Washing Machine Tricks - infiltrators

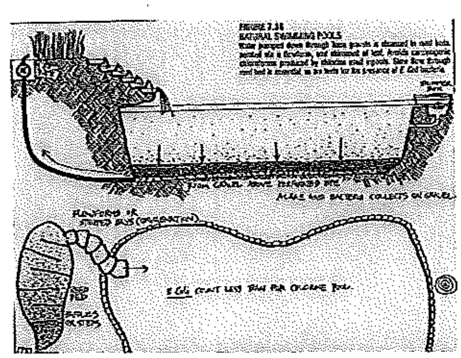


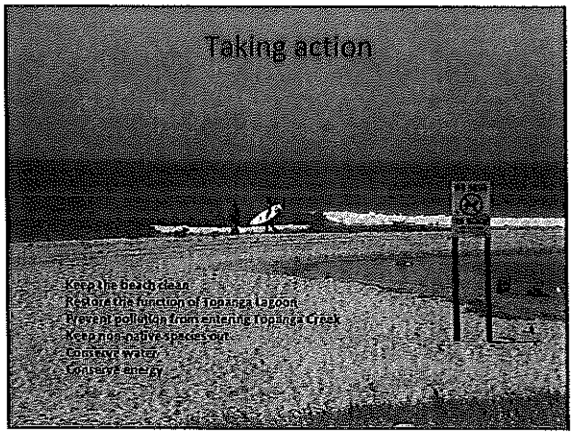
More Washing Machine Tricks

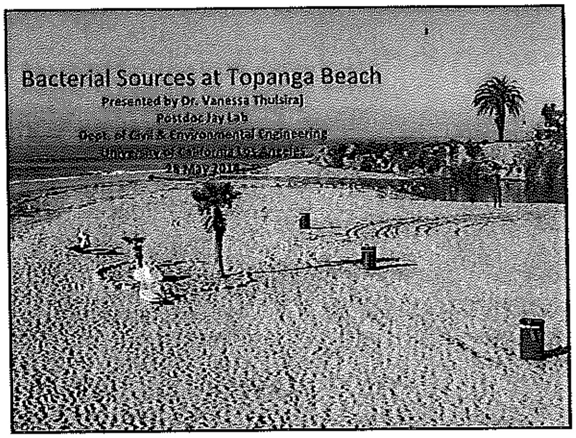




Rainwater capture and re-use




Taking action
Keep the beach clean
Restore the function of Topanga Lagoon
Prevent pollution from entering Topanga Creek
Keep non-native species out
Conserve water
Conserve energy

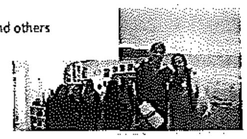


Acknowledgments

Thank you to the many individuals that have contributed to making this project possible.

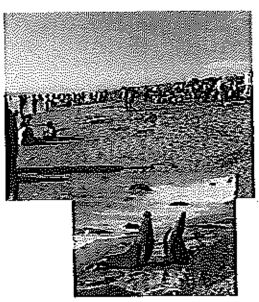
- Professor Jennifer Jay, Dr. Vanessa Thulsiraj, Amy Zimmer-Faust, Dr. Catalina Marambio-Jones, Dr. Tim Riedel
  - UCLA Team: Uriel Cobian, Undergrads and former team members
  - SIPP collaborators
- Rosi Dagit and RCDSMM team
  - Jenna Krug, Krista, Crystal, Uzzy and others
  - Volunteers

Funding: Los Angeles County and SIPP



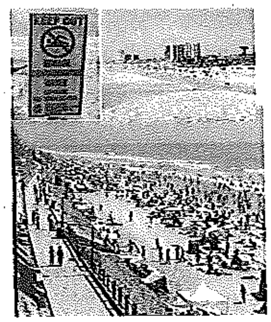
2

Importance of Clean Local Beaches



- Economic benefits
  - 85% US tourist revenues
  - $2 billion in LAC, OC alone
- Ecosystem health
  - fisheries, shellfish
- Human health
  - 630,000-1.5million GI annually (Given et al 2007)
  - $21-51 million health costs

Water Quality and Public Health



Swimming related illness
- Acute Respiratory disease
- Gastrointestinal illness
  - Diarrhea
  - Vomiting
  - Nausea
  - Fever
  - Sore throat
  - Runny nose
  - Ear or Eye infection
  - Skin rash

4

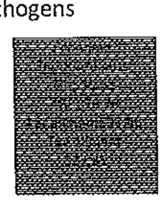
List of Waterborne Pathogens

Bacteria
- *Escherichia coli (pathogenic)*
- *Legionella spp.*
- *Salmonella typhi*
- *Vibrio cholerae*
- *Campylobacter jejuni*

Viruses
- Adenovirus
- Enterovirus
- Norovirus
- Hepatitis A
- Rotavirus

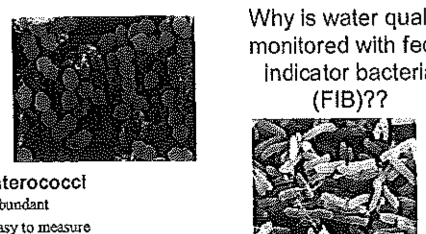
Helminths
- *Schistosoma* spp.

Protozoa
- *Cryptosporidium parvum*
- *Giardia lamblia*



5

Why is water quality monitored with fecal indicator bacteria (FIB)??



Enterococci
- Abundant
- Easy to measure
- Diversity in pathogens
- We have data linking to incidence of illness

Water Quality Standards

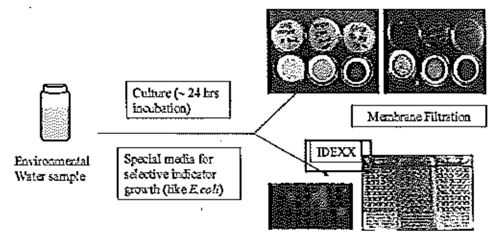
Indicator	Daily threshold (CFU or MPN/100ml)	Monthly threshold (CFU or MPN/100ml)
Total Coliforms	10,000	20% of samples > 1000
Fecal Coliforms	400	200 (GM)
Enterococci	104	35 (GM)

GM = Geometric mean over 30 day period, minimum 5 samples

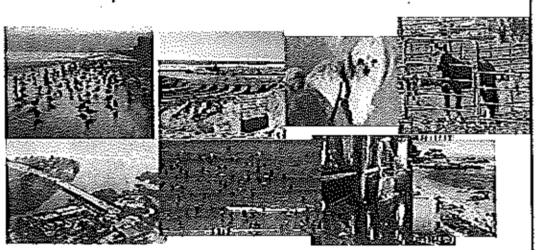
- Beaches posted or closed when FIB is high
- WQ threshold is concentration of FIB at which statistically significant swimming-associated GI illness is observed

Source: US EPA Ambient Water Quality Criteria for Bacteria-1986

Current EPA Standards – Culture-based



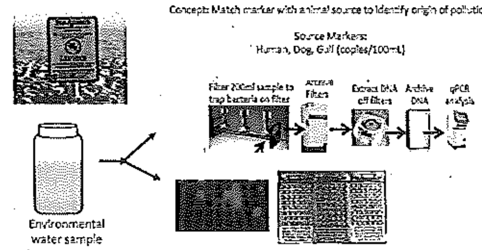
FIB are not specific to sources of fecal contamination



Methodology: Microbial Source Tracking

Concept: Match marker with animal source to identify origin of pollution

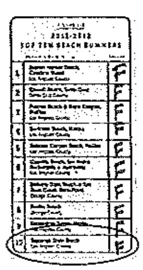
Source Markers:
Human, Dog, Gull (copies/100mL)



FIB: IDEXX

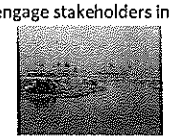
Topanga State Beach

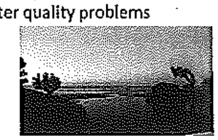
- Beach Bummer List
  - # 9 in 2005/06
  - # 4 in 2010/11
  - # 10 in 2011/12
- Popular beach for recreation
- Home to endangered populations of Southern Steelhead Trout and Tidewater Gobies.



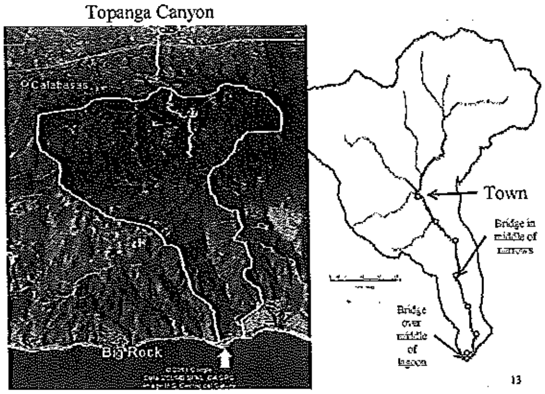
Study Objectives

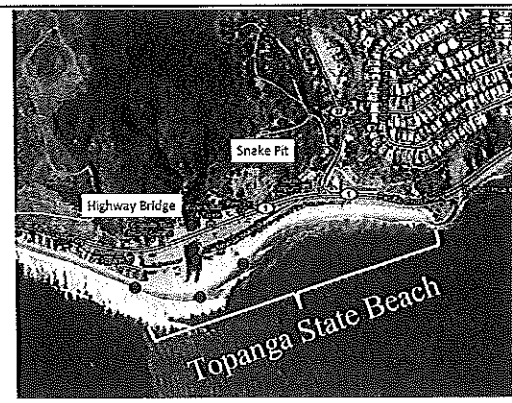
- Identify sources of bacterial contamination at Topanga Beach
- Identify best practices or remedial actions that could reduce or eliminate human or animal bacterial sources
- Implement K-12 and community education and outreach to engage stakeholders in water quality problems



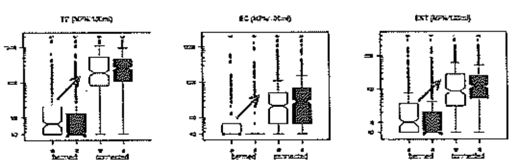


Topanga Canyon





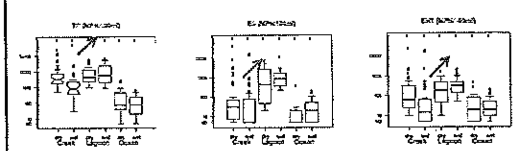
Lagoon and Beach Connection



- Historical analysis of bacteria recorded at Topanga Beach
- FIB values recorded by Los Angeles Department of Public Health (LADPH) between January 2005 – November 2011
- Lagoon is source of bacteria to beach

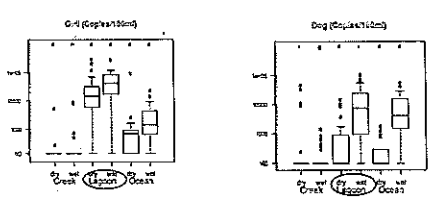
Figure by Dr. Tim Riedel

Summary of FIB Results (Recreational vs Winter)



- Bacteria levels increase at the lagoon
- Different sources of bacteria at creek and lagoon/beach

Summary of Marker Results (Recreational vs Winter)

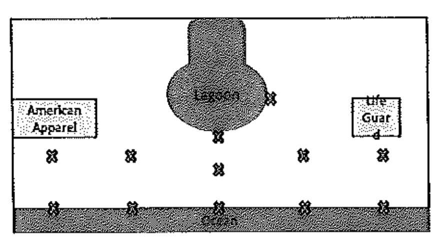


- Gull and dog marker detected in lagoon and beach
- Large seasonal trend for dog marker

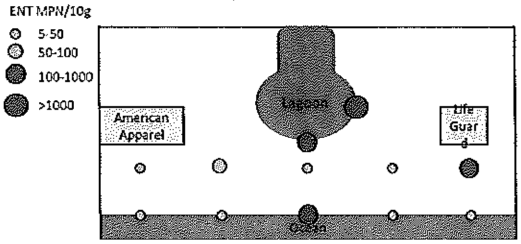
Sediment Survey

Conducted by UCLA and Topanga Students

May 2nd 2014



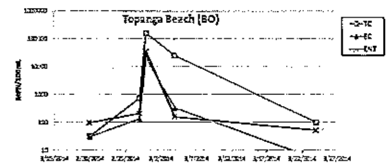
Sediment Survey - Enterococcus
(May 2nd 2014)



19

First Flush (FF) Results

- FF samples collected on 2/27/14
- Three follow-up sampling events
  - Spike in bacteria levels related to rain events
  - *Recommended not to swim at beach after storms*



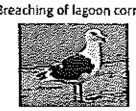
20

Summary of FIB/Marker Results

Dogs are a source of FIB to the lagoon and beach
•Dog marker levels increase during winter months

Gulls are a source of FIB to the lagoon and beach
•Gull marker is consistently detected year round

FIB and marker levels increase during first flush
•Breaching of lagoon corresponds with degraded water quality.

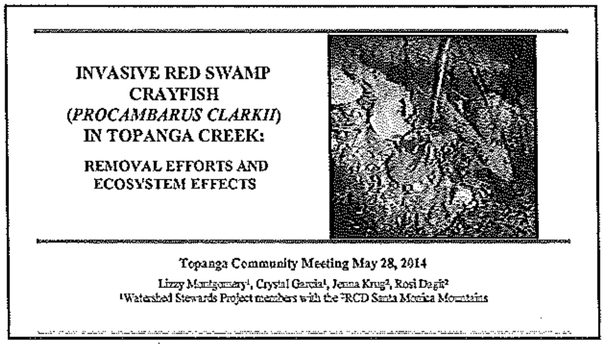


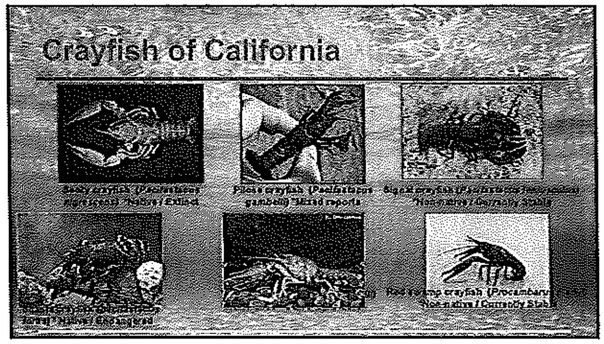
21

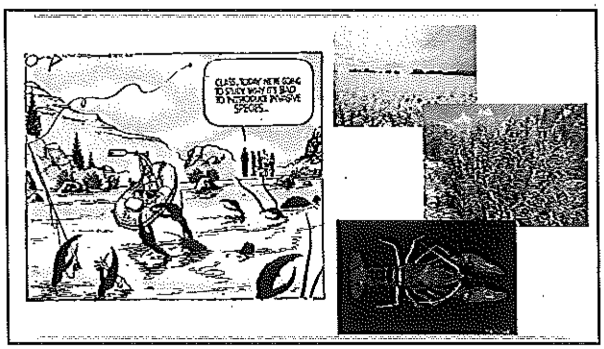
Thank you!
Questions?

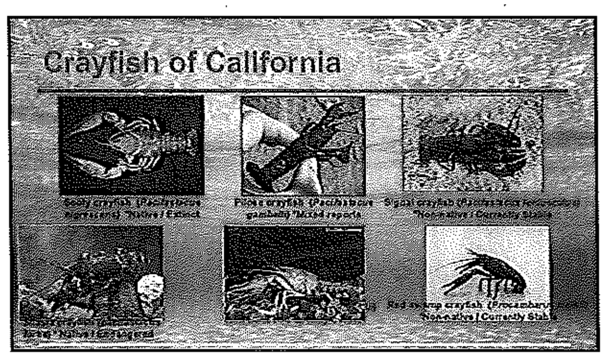
22

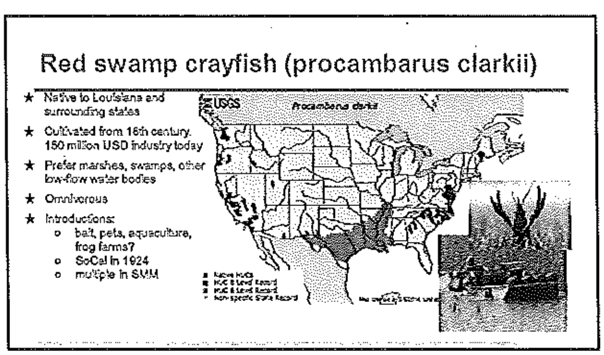
Topanga community to the rescue!

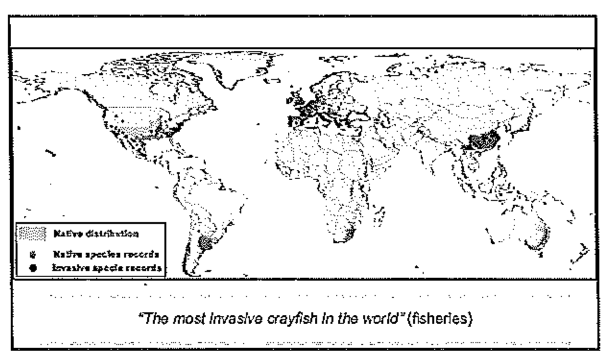

INVASIVE RED SWAMP CRAYFISH (PROCAMBARUS CLARKII) IN TOPANGA CREEK:
REMOVAL EFFORTS AND ECOSYSTEM EFFECTS
Topanga Community Meeting May 28, 2014
Lizzy Montgomery[1], Crystal Garcia[1], Jenna Krug[2], Rosi Dagit[2]
[1]Watershed Stewards Project members with the [2]RCD Santa Monica Mountains


Crayfish of California


CLASS, TODAY WE'RE GOING TO STUDY WHY IT'S BAD TO INTRODUCE INVASIVE SPECIES...

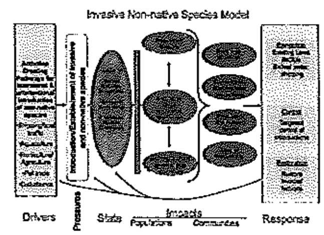

Crayfish of California


Red swamp crayfish (procambarus clarkii)
★ Native to Louisiana and surrounding states
★ Cultivated from 16th century. 150 million USD industry today
★ Prefer marshes, swamps, other low-flow water bodies
★ Omnivorous
★ Introductions:
o bait, pets, aquaculture, frog farms?
o SoCal in 1924
o multiple in SMM
USGS
Procambarus clarkii


Native distribution
Native species records
Invasive specie records
"The most invasive crayfish in the world" (fisheries)

Local and Global Concerns

- Invasive profile
  - rapid reproduction, growth
  - generalist diet
- Native crayfish declines
  - competitive exclusion
  - crayfish plague
- Amphibian loss
  - direct predation on eggs and larva
  - avoidance (CA Newts in SMM)
- Bioturbation/Water Quality?
- Trophic Interference
- Reduced biodiversity



Topanga Creek Project

2001 - The first RCDSMM record of a red swamp crayfish in Topanga Creek.
2012 - The population spikes with lack of large rainfall events.
2013 - Removal study begins to answer the following:

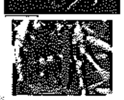
1. What effects have removal efforts had on crayfish demographics?
2. What effect has *P. clarkii* removal had on Topanga Creek water chemistry?
3. What effects have *P. clarkii* had on Topanga Creek macroinvertebrate, amphibian and steelhead trout communities?

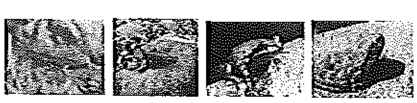
REMOVAL EFFORT
- 200m removal / non-removal study sites
- Citizen science
- 6 Schools
- 200 + students

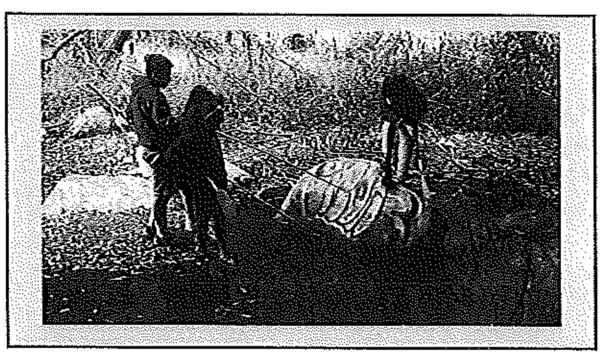
HISTORICAL DATA
- literature search
- snorkel surveys
- amphibian surveys
- steelhead monitoring

Data Collected

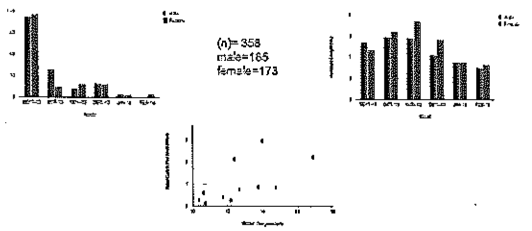
1. Crayfish abundance, sex, length
2. Water chemistry (temperature, salinity, pH, conductivity, dissolved O2, turbidity)
3. Nutrient levels (Ammonia, Nitrite, Nitrate, Phosphorous)
4. Benthic Macroinvertebrate samples (Aquatic bugs and larvae)
5. Amphibian (CA tree frog, Pacific tree frog, CA newt) and trout abundance
6. Trout stomach samples- diet?



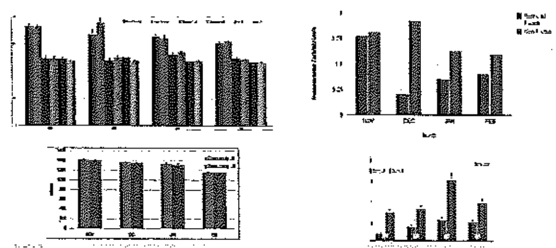




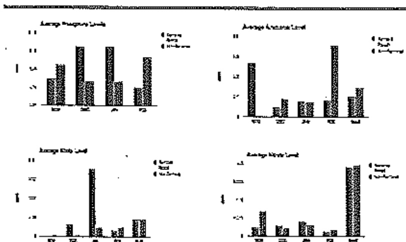
Results: Crayfish abundance



Results: Water Chemistry



Nutrient Levels



No correlations or trends were found between nutrient levels and crayfish presence

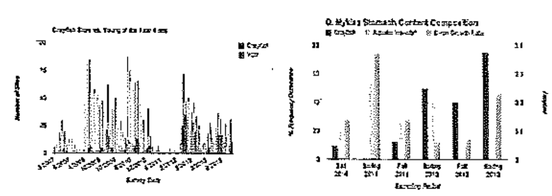
Results:
BMI Index

- Lower diversity in non-removal site (12, 18, 21 fewer species)
- 'EPT Taxa' consistently lower
- Reduced abundance (bugs/1 sq. ft.)
- More non-insect species in non-removal reach
- Sample size?

	Removal	NR	Removal	NR	Removal	NR	
Date	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Total #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Decrease
Taxa Richness	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Decrease
EPT Taxa	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Decrease
% Dominant Taxon	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	N
Bugs/1 sq. ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Decrease
Avg. TV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	N
% Intolerant (0-2)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	N
% Tolerant (8-10)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	N
% CG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Increase
% FC	1%	0	0	0	0	3%	N
% SC	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	Decrease
% P	[illegible]	7%	[illegible]	[illegible]	7%	[illegible]	N
Non-Insect Taxa	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Increase
Coleoptera Taxa	4	1	3	3	3	3	Decrease

Results: Amphibian Abundance

Results: Steelhead trout



Summary

- It would be valuable to continue research potential crayfish effects to:
  - Turbidity
  - Macroinvertebrates
  - CA newts
  - Steelhead trout
  - TROPHIC STRUCTURE / DROUGHT
- How we have shared our research:
  - Poster presentation (SRF 2014, SCAS 2014)
  - Public meetings (Topanga, CNPS)
  - Paper publication… TBA!
- Questions?