

FEATURE ARTICLE

## Bight '18 Keeps Focus on Key Issues of Management Concern

By Karen McLaughlin and Scott Martindale, Southern California Coastal Water Research Project

A collaboration involving more than 80 environmental organizations – including public wastewater, utility, and scientific government agencies, academia, regulatory agencies, industry, and private consultants – will examine how human activities have affected the ecological health of Southern California's coastal waters during the sixth cycle of the Southern California Bight Regional Monitoring Program, which initiated field sampling in July.

The program's 2018 cycle, known as Bight '18, features five distinct study elements – Sediment Quality, Ocean Acidification, Harmful Algal Blooms, Trash and Microbiology – that together help paint a regional picture of ecosystem condition.

A majority of Bight '18 studies are new or have new components, ensuring the 24-year-old program remains responsive to pressing issues of management concern in coastal Southern California. Meanwhile, the study elements carried over from previous program cycles will enable Bight '18 to track trends in ecosystem health across time and space.

The Southern California Bight Regional Monitoring Program, which has been facilitated by the Southern California Coastal Water Research Project

(SCCWRP) since its inception in 1994, is a regional marine monitoring initiative that examines the health of about 1,500 square miles of Southern California's coastal waters in five-year cycles.

The program mobilizes Southern California environmental management agencies to collect data from across a much greater expanse than just their local discharge zones. Both regulated and regulatory agencies, as well as non-governmental and academic organizations, come together to collaboratively design the study and interpret findings.

Southern California's environmental management communities rely on the Bight Program to better direct resources and to maintain focus on the areas and issues that pose the greatest threats to ecosystem integrity.



*Sediment grab sample collection in Mission Bay for the San Diego Regional Harbor Monitoring Program during Bight '18.*

### President's Corner



*Keith Maruya, SCCWRP*

As I approach the end of my stint as Chapter President, I reflect back on the past year. On the local scene, I have had a blast working with the Board, interacting with the membership, and seeing our community grow and evolve. First and foremost, I want to thank you all, particularly those of you who have come out to our recent dinner and annual meetings. It is easy to see why our community is among the best – if not the best – regional Chapter around. To those we have not seen in a while, I urge every one of you to get more active in Chapter business. Your engagement is the key to making our community even better. I look forward to working with you in the coming year. More on how to get involved later.

*Cont. on page 3*

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## FEATURE ARTICLE (continued)

Bight '18 participants have worked collaboratively over the past year to finalize study designs, as well as to coordinate quality-assurance activities, including laboratory intercalibration exercises.

The design of each of the five Bight '18 study elements has been influenced by a number of emerging issues in environmental management:

» **Sediment Quality:** For the first time, Bight '18 will incorporate use of bioanalytical cell screening assays to screen for bioactive chemical contaminants in seafloor sediment and fish tissues. The addition of this screening step, which will be done alongside traditional sediment quality assessment methods, reflects the Bight program's commitment to using emerging technologies to glean additional insights about sediment contamination's ecosystem impacts. In April 2018, the State Water Resources Control Board released a draft policy that would require bioanalytical assays to be incorporated into routine monitoring of emerging contaminants in recycled water statewide, underscoring the growing importance of this prototype tool for contaminant monitoring. In addition, the Sediment Quality element will track chemical contaminants that have bioaccumulated in sport fish, and measure an expanded list of emerging contaminants, including PBDEs, pyrethroids, fipronils and neonicotinoids.

» **Ocean Acidification:** In addition to tracking changes to Bight seawater chemistry resulting from ocean acidification and hypoxia, Bight '18 will for the first time seek to document the relationship between the chemical changes and effects on vulnerable,

shell-forming organisms. Understanding the relationship between chemistry and biology is key to interpreting a growing body of data on ocean acidification's impacts in the Bight, especially the outputs of a computer model being developed by a consortium of researchers that quantifies changes to seawater chemistry along the North American West Coast.

» **Harmful Algal Blooms:** This new Bight '18 study element will focus on understanding the long-term impacts of marine and freshwater blooms that are becoming more severe, frequent and longer-lasting. While water-quality managers have traditionally focused on managing the immediate impacts of these ecologically disruptive events, Bight '18 will examine how toxins produced by some types of blooms can be transported through waterways and linger in seafloor sediment, potentially impacting the health of marine organisms for months, including shellfish consumed by humans.

» **Trash:** New to the Bight '18 trash monitoring element will be test-driving a series of standardized methods for quantifying the levels and types of trash found in urbanized streams; this work will be done in partnership with the Southern California Stormwater Monitoring Coalition. Development of reliable trash-surveying capabilities is crucial as California and its municipalities seek to document the effectiveness of aggressive new trash reduction and control programs being rolled out statewide.

» **Microbiology:** This Bight '18 study element will examine the relevance and reliability of using coliphage viruses to track microbial water quality at Southern California beaches. With the

U.S. Environmental Protection Agency slated to issue guidance in the coming months on how water-quality managers can begin using coliphage to track microbial contamination, Southern California water-quality managers will need to understand how traditional *Enterococcus* bacteria-based methods for detecting microbial contamination compare to the new coliphage-based approach.

The planning documents for Bight '18, as well as final assessment reports for prior cycles of the Bight program, are available online at

[www.sccwrp.org/Documents/BightDocuments](http://www.sccwrp.org/Documents/BightDocuments). For more information about Bight '18, contact Karen McLaughlin at [karenm@sccwrp.org](mailto:karenm@sccwrp.org).



*Giant Pacific seahorse, left, found in Mission Bay for the first time this summer. Below, the sampling crew aboard the Seaventures R/V Early Bird II.*



**PRESIDENT'S CORNER (continued)**

Second, a huge shout out to our Chapter sponsors who give us the flexibility to plan the best events possible. Stalwarts such as wood. (the old Amec), Aquatic Bioassay and Consulting Laboratories, Aquatic Biosystems, Anchor QEA, LimnoTech, Nautilus, Pacific EcoRisk, Physis, Pi Environmental and Vista Labs continue to support us. New to us in 2018, we want to welcome Weck Labs and Geosyntec to our community. We hope you all find the investment well worth your while.

A special thanks to the officers and members rotating off the Board – Rachel Adams, Kimbrie Gobbie, Denise Li, Alvina Mehinto, Eilleen Salas and Dan Schlenk; and a warm welcome to member-elects – Nick Hayman, Nicol Parker, Karin Wisenbaker, Mary Woo and Jun Zhu. A second round of kudos to Erika Holland for accepting the VP nomination, and to Alvina and Denise for re-enlisting in their new roles as co-Secretary and Outreach Coordinator, respectively. My sincere appreciation goes to all Board member candidates, and especially to those whom I encouraged to run.

At the national level, I can only express outrage over the attempts to reverse our political course of action, e.g. the disregard of scientific information and progress over the past few decades. On a more personal level, the affronts to building and reaping the social benefits of a diverse community is more than troubling. You all probably know someone deeply affected by our Administration's recent actions on immigration – I know I do. One of the great ironies of 2018 was the Fed's renouncement of the internment of residents of Japanese-American heritage (1942-1945), some 73 years later, while on the very same day having the Supreme Court upholding the action to

exclude all people of Muslim faith from selected nations. Respectfully, this is not my America.

Is there light at the end of the tunnel? I can only hope, with the recent resignation of EPA's head honcho. According to the LA Times (still my go-to source), the ex-Administrator enjoyed a luxurious existence – rubbing elbows with fast food execs on behalf of a family member, while attempting to dismantle decades of hard work from dedicated staffers. With such slash-and-burn stances, I am not surprised at the publicized requests for heightened personal security, including the infamous \$43,000 "cone-of-silence". Certainly, Max and his buds at Control would be appalled.

In stark contrast to the political shenanigans of the past year, soccer's World Cup was as engaging, collegial and inspirational as can be. How about host nation Russia pulling off a gem of a tourney on and off the field? Who would have thought that Croatia, a nation with a population less than LA County, would show such heart and compete for the title? And we can all learn from the manners demonstrated by the Japanese squad, a huge underdog who took star-studded Belgium to the limit before losing at the buzzer, and who then proceeded to leave its locker facility spotless with a thank you note to the host nation. And oui, I will say it, allez Les Bleus. Bravo to the Champions.

Over the next few months, we will be planning our 2019 Chapter Annual Meeting. I encourage all of you to weigh in and provide suggestions for focused topics, invited speakers, and especially venues. As a SoCal native, I love our unique geography and coastal lifestyle. Along with our new Board, I will be working to provide an experience which celebrates all that you contribute, so c'mon aboard!

Until next time,

Keith



**SAVE THE DATE**

**SOCAL SETAC FALL DINNER  
MEETING**

**OCTOBER 10<sup>th</sup>, 2018**

Presentation by Dr. Andrew Gray of UC  
Riverside.

Old Spaghetti Factory in Fullerton

Stay tuned for more details soon.

## MEET THE BOARD

# Rachel Adams

**Loyola Marymount University  
Professor of Civil Engineering &  
Environmental Science and  
Environmental Science Program  
Director**

Since my last Meet the Board article in 2011, I've been fortunate to continue my involvement with SoCal SETAC, serving on the Board of Directors, as Vice President, as President, and most recently as Past President – and most importantly, working with an amazing group of SoCal environmental scientists and engineers. As the Past President, I was responsible for organizing the Annual Meeting back in April and want to take this opportunity to thank all of the SoCal SETAC officers and members who were all so instrumental in making it happen. It was a team effort and I am thankful to everyone for all of their hard work. Our President Keith Maruya (transitioning to Past President) did a great job of thanking all of the officers, board members, and members for all of their contributions, so I want to extend a big thank you to Keith for his significant contributions to the annual meeting program, keeping it all on track, and his leadership this past year as SoCal SETAC President.

Originally from Alaska, Michigan, a small rural community south of Grand Rapids, I have always had a love for the environment. My parents both grew up on farms and taught me a deep appreciation for nature. My dad is an engineer who tackled all of the repairs in our home himself and enlisted me to help with them, giving me an opportunity to learn from him. As a female engineering & science professor, I think about the importance of making these fields inclusive and appealing for both genders, and I am very thankful that my dad did not follow stereotypes and encouraged me to get my hands dirty. Because of my parents and my love for math and science, I earned a B.S. in chemical engineering from the University of Michigan, taking environmental engineering electives wherever possible. I was fortunate to be advised by Nikolaos Katopodes, who suggested that I pursue graduate studies—an idea that I had not yet considered until he suggested it.

After working as an environmental engineer at Radian International for 2 years, I moved to Boston to pursue a PhD in environmental engineering at the Massachusetts Institute of Technology with my advisor Phil Gschwend. I focused on the fate of organic contaminants and studied polyethylene passive samplers, using them to measure legacy contaminants [polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs)] in Boston Harbor and the Hudson River. I was very fortunate to work with a lot of amazing people at MIT and learned so much from Phil, members of the Gschwend lab and the Parsons Lab (home of environmental engineering at MIT).

After graduating from MIT, I served as a Knauss Sea Grant Marine Policy Fellow at the U.S. Environmental Protection Agency (EPA) and then joined the faculty at Loyola Marymount University. I've been at LMU for the past 14 years and really enjoy teaching and working with terrific students and faculty in an effort to mentor and inspire the next generation of environmental engineers and scientists. I am continuing to use passive samplers to measure both legacy and emerging contaminants of concern in collaboration with many amazing colleagues.



*Hannah (8 yrs) poses with her mom before Rachel competes in the La Jolla Swim Club Pier-to-Cove Swim*

**MEET THE BOARD - Rachel Adams (continued)**

This past year, I was fortunate to work as an Office of Naval Research Sabbatical and Summer Fellow collaborating with the Space and Naval Warfare Systems Center Pacific (SSC Pacific) in San Diego on both the *in situ* and *ex situ* evaluation of multiple contaminated sediment treatment amendments, including clean sand and various dredged materials to evaluate capping amendments in Pearl Harbor, HI. Later this month, in collaboration with the EPA, SSC Pacific, and Coastal Monitoring, I'll be travelling to Tern Island (about 500 miles northwest of Hawaii), where I'll be using passive samplers to measure legacy contaminants on this island home for many endangered species including monk seals and green sea turtles.

When I'm not working, I enjoy spending time with my husband Steve and our 8-year old daughter Hannah. This last year, I was able to do a lot of ocean swimming in La Jolla Cove and have gained an even greater appreciation for the ocean environment.

I am looking forward to see you all at the next SoCal SETAC event.

**WELCOME NEW SETAC BOARD MEMBERS****Amro Hamdoun, UCSD SIO****Nicholas Hayman, SPAWAR****Nicol Parker, UCSB****Karin Wisenbaker, Aquatic Bioassay and Consulting Laboratories****Mary Woo, CSUCI****Jun Zhu, LARWQCB****SoCal SETAC Student Grant Announcement**

**SoCal SETAC provides annual grants to support graduate and undergraduate student research. Up to \$2,000 will be awarded for a graduate student project and \$1,000 for an undergraduate student project.**

**Grant applications and instructions are located on our website at:**

**<https://www.socal-setac.org/student-grants>**

**The deadline is 8/31/2018 at 11:59PM**

## STUDENT CORNER

## Samantha Geier, LMU

*Interviewed by Scott Coffin, SoCal SETAC Board Member – Student Representative*



*Samantha Geier won the Best Undergraduate Student Presentation award at the 2018 conference at LMU. We caught up with Samantha to learn more about her research interests and future plans.*

**1. Please describe your research and how you became interested in it.**

A little bit of background on my research: Fecal Indicator Bacteria (FIB) are natural inhabitants in the gastrointestinal tracts of warm-blooded animals and serve as effective indicators of water quality and the presence of pathogens. The density and antibiotic resistance of these bacteria have been shown to be reduced through wetland processes in local tidal salt marsh and lagoon systems. Unfortunately, little is known about how the *diversity* of FIB fluctuates as wetland processes occur. My research determined how the diversity and density of FIB changed during tidal water exchanges in an urbanized salt marsh (more specifically the Ballona Wetlands Ecological Reserve, which is the last major coastal wetland in Los Angeles County). The wetlands have been largely degraded over the past century and a half due to local development efforts and have long been planned for restoration. Three types of water samples were collected: urban runoff (collected just before the runoff entered Ballona Creek), flood (collected in the morning as water entered the wetlands), and ebb (collected as water exited the wetlands). We measured the most probable number of bacteria, identified approximately 62 different

species of bacteria, calculated biodiversity, and assessed pathogenicity for each sample type.

In short, we answered the following question: does the BWER act as a sink or source for FIB and what is the composition of those communities?

With Environmental Science being such a broad field, it took me a while to find what I was most passionate about. I have worked in the Ballona Wetlands on a few different research projects since my freshman year at LMU, so when my academic advisor, Dr. John Dorsey, recommended this project for my thesis, I was enthusiastic to work at the field site again. Dr. Dorsey's previous research provided some context for this project. In addition, as a swimmer and SoCal native, I have always had a vested interest in the health of our oceans and coastlines. This project gave me the opportunity to combine my fascination with microbiology with my passion for coastal restoration. Because of this study, I now want to pursue a master's degree in the field.

**2. What are some anticipated impacts of your research?**

This research aims to initiate long-term monitoring of the bacterial composition of the Ballona Wetlands to contribute to our understanding of its overall health and resilience. The results of this study may inform decisions made about local restoration projects in the future and provide important data for evaluating human health risk in the Santa Monica Bay. This study also provides additional evidence that wetlands improve water quality and are efficient natural filtration systems, but that more research is needed to pinpoint the source of pathogens found in the water entering and exiting the ecosystem. So far, our data has resulted in three primary conclusions:

- The Ballona Wetlands acts as a sink for *E. coli* and enterococci bacteria (differing by up to three orders of magnitude over a tidal period).
- The runoff entering and exiting the Ballona Wetlands have almost identical levels of biodiversity (high biodiversity); however, they have differing compositions likely due to the suspension of sediment and organic matter during strong tidal ebb flows, irrigation from the Playa Vista community, UV light exposure, bird activity, and predation by bacteriophage.
- Most of the identified isolates represented potentially pathogenic/toxic bacteria. The presence of these pathogens

in the marsh presents little concern to humans. However, the water that exits the wetlands into Santa Monica Bay holds a larger health risk due to recreational exposure or seafood consumption and requires further research.

### 3. What are your plans for your future?

I was able to walk with my graduating class this past spring, but will be taking a few classes in the fall in order to complete my bachelor's degree in Environmental Science by December. Following graduation, I will be taking a gap year, during which I hope to serve in an international post-graduate service program for environmental education. Following a year of post-grad service, I will begin the process of applying to graduate school, likely in environmental microbiology or coastal marine resource management. I absolutely love conducting research and hope that my career path allows me to continue to contribute to coastal restoration projects. I am also very passionate about education and could see myself becoming a professor or high school teacher down the road.

### 4. What were some of your most memorable moments at the conference?

My favorite part about the conference was receiving feedback from so many different professionals in their respective fields. Everyone's varying backgrounds and areas of interest provided me with new lenses through which to view my own research. When you spend a significant amount of time on a project, it is easy to overlook new, innovative ways to improve or expand upon your study. The conversations I had with professors, professionals, and peers have largely shaped the future direction of this project and have given me insight into practical applications for the results.

It was also exciting to learn about such a vast array of contemporary environmental issues from students all over southern California. When we create a dialogue with those who have different areas of expertise, we diversify our own interests and become better scientists, which is what I believe conferences like this one are all about.

I also enjoyed the opportunity to present alongside my peers, especially my fellow seniors at LMU whose research I've watched grow from merely an idea to a publishable final product. It was a wonderful conclusion to my time at LMU and a very successful event.



*Samantha clearly has no fear of heights!*



## STUDENT CORNER

## Kara Wiggin, CSULB

*Interviewed by Scott Coffin, SoCal SETAC Board Member – Student Representative*

*Kara Wiggin won the Best Student Poster award at the 2017 SoCal SETAC conference in Dana Point, and the Best Student Presentation award at the 2018 conference at LMU. We caught up with Kara to discuss her research and gain some insight into the rapidly developing and buzz-worthy field of microplastics.*

As a master's student at California State University Long Beach working in the Toxicology Laboratory with Dr. Erika Holland, my research focuses on the presence and impacts of microplastic pollution in the urban waterways surrounding Long Beach, California. Long Beach is a highly urbanized area, leading to an increased potential for plastic pollution due to littering and mismanaged waste. The aim of my research is to determine the concentration of microplastics that exists in the Los Angeles River, the San Gabriel River, and the Long Beach Harbor. I will then be assessing the impacts of environmentally relevant levels of microplastics on a local copepod species, *Acartia tonsa*, vital to the bottom of the food chain in southern California. In the future, I plan to pursue a PhD addressing the effects of microplastics on aquatic organisms and attempt to bridge the gap between scientific research, public education, and public policy.

Microplastic pollution is a relatively new area of research and, as such, the best methods for sampling, extraction, and identification of microplastics of various sizes are still in development. However, we do know that microplastics are ubiquitous. They are found at both poles, in the deepest ocean

trenches, and in almost all of the world's lakes and rivers that have been tested. There are two main concerns associated with exposure to microplastics: ingestion and the uptake of toxic chemicals. Microplastics are unable to be digested, and can cause blockages, internal injuries, and a reduced intake of food, which can lead to reduced fitness and reproduction. Plastics often contain chemicals such as additives, dyes, and plasticizers, and due to their hydrophobic properties, can sorb various environmental pollutants. These chemical mixtures can cause wide-ranging effects, such as reductions in reproduction and survival, and allow for an increased chance for these chemicals to bioaccumulate up the food chain.



An exciting aspect of studying plastic pollution in 2018 is the increase in interest both from the scientific community as well as from corporations, non-profits, and citizens. Due to the increase in research documenting the presence of plastic pollution in every corner of the globe, and the negative effects of plastic pollution on wildlife, there has been an influx of legislation aimed at preventing plastic pollution from reaching aquatic environments. In the first few weeks of July alone, Starbucks announced its decision to ban disposable straws, American Airlines has joined Alaska Airlines in its commitment to eliminate straws, and Seattle has banned straws city-wide. For the last decade, plastic bag taxes and bans have been implemented all over the world and have resulted in influential reductions in the use and improper disposal of plastic bags. Additionally, many cities around the world are considering bans of polystyrene take-away containers and plastic utensils. I am hopeful that this surge of scientific and public interest in the issue of plastic pollution will continue to encourage future research and legislative action to stem the tide of plastic into our environment.



## CALENDAR OF EVENTS

### *August*

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*August 5-10*

[Ecological Society of America 2018 Annual Meeting](#) | *New Orleans, LA*

*August 6-10*

[National Environmental Monitoring Conference 2018](#) | *New Orleans, LA*

*August 12-16*

[StormCon: The Surface Water Quality Conference & Expo](#) | *Denver, CO*

### *September*

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*September 9-12*

[33rd Annual Water Reuse Symposium](#) | *Austin, TX*

*September 16-19*

[SETAC Asia-Pacific 2018 Annual Meeting](#) | *Daegu, KR*

### *October*

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*October 10*

*SoCal SETAC Fall Dinner Meeting* | *Fullerton, CA*

*October 15-17*

[California Stormwater Quality Association Annual Conference](#) | *Riverside, CA*

### *November*

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*November 4-8*

[SETAC North America 39th Annual Meeting](#) | *Sacramento, CA*

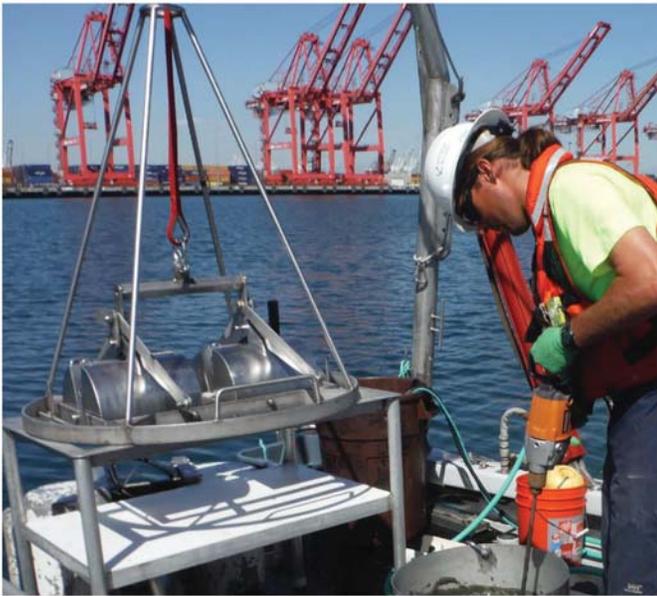
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### SoCal SETAC 2018–2020 Board Members

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<b>Board Member (2017–2019)</b> <b>Student</b>	<b>Scott Coffin</b> University of California, Riverside <a href="mailto:scoff003@ucr.edu">scoff003@ucr.edu</a>
<b>Board Member (2018–2020)</b> <b>Public</b>	<b>Jun Zhu</b> Los Angeles Regional Water Board <a href="mailto:jun.zhu@waterboards.ca.gov">jun.zhu@waterboards.ca.gov</a>
<b>Board Member (2018–2020)</b> <b>Academic</b>	<b>Amro Hamdoun</b> University of California, San Diego - Scripps Institution of Oceanography <a href="mailto:ahamdoun@ucsd.edu">ahamdoun@ucsd.edu</a>
<b>Board Member (2018–2020)</b> <b>Private</b>	<b>Karin Wisenbaker</b> Aquatic Bioassay and Consulting Laboratories Inc. <a href="mailto:karin@aquaticbioassay.com">karin@aquaticbioassay.com</a>
<b>Board Member (2018–2020)</b> <b>Student</b>	<b>Nicol Parker</b> University of California Santa Barbara <a href="mailto:nparker@bren.ucsb.edu">nparker@bren.ucsb.edu</a>
<b>Board Member (2018–2020)</b> <b>Public</b>	<b>Nicholas Hayman</b> SPAWAR Systems Center Pacific (SSC Pacific) <a href="mailto:nicholas.hayman@spawar.navy.mil">nicholas.hayman@spawar.navy.mil</a>
<b>Board Member (2018–2020)</b> <b>Academic</b>	<b>Mary Woo</b> California State University Channel Islands <a href="mailto:mary.woo@csuci.edu">mary.woo@csuci.edu</a>



## Design, Implementation, and Evaluation of Water and Sediment Quality-related Studies

- Site-specific criteria
- Toxicity identification evaluation
- Sediment quality objectives
- Total Maximum Daily Loads (TMDLs)
- Ultra-low detection limit
- Source tracking
- Stormwater monitoring
- Bioaccumulation modeling
- Chemical fate and transport

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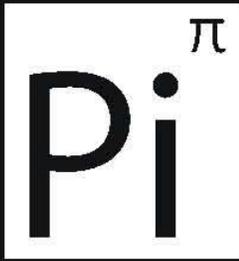
Anaheim, California

Municipal Regional Coastal Global

Regulatory Research Consulting Cooperative Communities

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[info@physislabs.com](mailto:info@physislabs.com)



# Pi Environmental

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## AN ENVIRONMENTAL CONSTANT

### WATER QUALITY

- ▶ Dredge water quality monitoring
- ▶ Hydrographic modeling support
- ▶ Real-time receiving water studies
- ▶ Planning and technical studies
- ▶ Water quality monitoring for fireworks displays

### SEDIMENT

- ▶ Dredged material characterization
- ▶ SQO Part I sampling and analysis
- ▶ Confirmation sediment sampling
- ▶ NPDES monitoring
- ▶ TMDL special study support

### GRAPHICS AND GIS

- ▶ Data visualization
- ▶ Custom illustration
- ▶ Scientific process diagrams
- ▶ Formatting of large documents
- ▶ Illustrated maps

PI ENVIRONMENTAL, LLC

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small business

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Total Coliform	Organochlorine Pesticides	Unregulated Contaminants
Fecal Coliform	Organonitrogen Pesticides	Pharmaceuticals/Hormones
Enterococcus	Organophosphorus Pesticides	Emergent Chemicals
Streptococcus	Triazine Pesticides	Nitrosamines
Heterotrophic Plate Count	Pyrethroid Pesticides	Cyanotoxins
Minerals	Neonicotinoid Pesticides	Flame Retardants
Nutrients	Carbamate Pesticides	Alkylphenols
Trace & Ultra-Trace Metals	Organochlorine Herbicides	PFAS/PFOS/PFOA
Hexavalent Chromium	1,2,3-Trichloropropane	Organotins
Radioactivity	1,4-Dioxane	Alcohols, Glycols & Aldehydes
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Semivolatile Organics	Geosmin & MIB	Hydrazines (+ UDMH & MMH)



## Weck Laboratories, Inc.

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