

SCCWRP Director's Report



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County first to monitor beach fecal pollution via ddPCR

San Diego County has become the first municipality in the nation to end its reliance on decades-old methods for monitoring fecal contamination in beach water in favor of a rapid, DNA-based method that SCCWRP vetted and optimized for routine use in Southern California.

The droplet digital polymerase chain reaction (ddPCR) method – which the County began using in early May for routine beach water-quality monitoring – will enable public health officials to notify beachgoers about contaminated water on the same day that water samples are collected. The ddPCR method can measure fecal contamination levels in a beach water sample in as little as three hours once samples reach the laboratory.

By contrast, results from traditional, culture-based methods are typically not available for 24 to 72 hours after samples reach the laboratory – a reporting delay that can put beachgoers at elevated risk of exposure to waterborne fecal pathogens.

The ddPCR method, which will be used at more than 50 County and State beach locations, measures the genetic signature of a fecal bacterial indicator known as *Enterococcus*. Although traditional culture-based methods also measure *Enterococcus*, these culture-based methods require an overnight incubation period, where microbes from beach water samples are grown to levels that enable *Enterococcus* to be quantified.

SCCWRP and its member agencies have spent nearly two decades exploring the feasibility of replacing culture-based methods with rapid, DNA-based methods for routine beach water-quality monitoring.

In the early 2000s, SCCWRP led a national effort that examined multiple potential DNA-based methods side by side; researchers developed consensus around a method known as quantitative PCR (qPCR) – a predecessor technology to ddPCR.

Based in part on the results of epidemiology studies conducted by

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Cover photo: A droplet reader instrument is used in a laboratory to quantify fecal contamination in samples collected from beach water. San Diego County has become the first U.S. municipality to replace its traditional beach water-quality monitoring method with ddPCR, a rapid, DNA-based method vetted and optimized by SCCWRP.

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Calendar

- Thursday, May 12**
CTAG quarterly meeting
(Remote participation only)
- Friday, June 3**
Commission meeting
(Remote participation only)

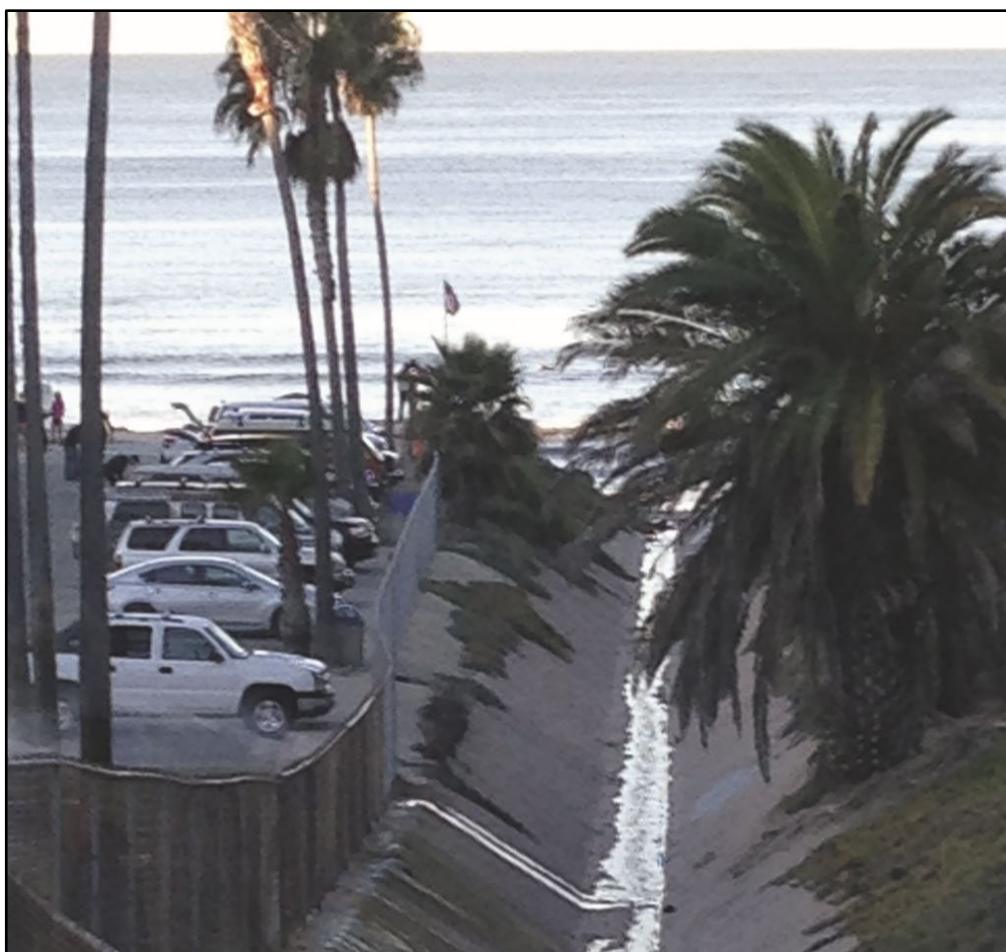
SCCWRP in Southern California, the U.S. Environmental Protection Agency in 2012 approved qPCR as an acceptable DNA-based alternative to culture-based methods.

The EPA's approval of qPCR for beach water-quality monitoring paved the way for more focused, SCCWRP-led studies in Southern California directly comparing the performance of culture-based methods to qPCR – and later, to ddPCR. Researchers also probed reliability and performance issues with the DNA-based methods, and worked to optimize monitoring and analysis protocols.

In 2017, San Diego County began working toward receiving regulatory approvals to replace its culture-based methods with the ddPCR method. These efforts culminated in spring 2021, when a [multi-year study led by the California Department of Public Health and SCCWRP was published](#), demonstrating that the ddPCR method produces results in San Diego County that are equivalent to EPA-approved methods. Subsequently, EPA Region 9 and the California Department of Public Health [granted regulatory approvals](#) to implement the ddPCR method.

Since the May 2021 approval, San Diego County has been preparing to use the ddPCR method for routine beach water-quality monitoring, including being trained in the method at a SCCWRP laboratory and receiving State accreditation in the method.

San Diego County's [official launch date for ddPCR monitoring](#) was May 5, with the County's public health agency transitioning to the ddPCR method at 51 approved beach sites spanning 70 miles of coastline. Water quality at County beaches is monitored at least once a week from April to October.



Tourmaline Surf Park in San Diego, pictured at the receiving end of a storm drain, is one of dozens of beach sites where San Diego County will be using a rapid, DNA-based method instead of a traditional, culture-based method to conduct routine fecal contamination monitoring. The County received regulatory approvals to end reliance on culture-based methods last year, paving the way for the transition to the DNA-based method.

The City of Los Angeles, meanwhile, is following in San Diego County's footsteps, with plans to launch a similar method comparison study as early as next year demonstrating that the two methods can produce equivalent results at City beaches.

Furthermore, the upcoming 2023 cycle of the Southern California Bight Regional Monitoring Program is exploring the

possibility of developing a method comparison study across Southern California that could pave the way for multiple Southern California municipalities to receive regulatory approval to implement ddPCR.

For more information, contact Dr. [Joshua Steele](#).

First regional survey underway to examine health of Southern California eelgrass beds

SCCWRP and its partners have launched a two-year pilot effort to assess the health of Southern California's coastal eelgrass beds using a new, bioassessment-based monitoring approach that focuses on evaluating ecological functioning.

The Regional Eelgrass Survey of Condition and Quality (RESCO), launched in March, represents an important step forward in how Southern California coastal managers track the health of these ecologically important but vulnerable habitats.

Instead of primarily documenting the locations and size of eelgrass beds – as has been historically done – the bioassessment-based monitoring approach will enable researchers to quantitatively assess bed health based upon their ability to provide refugia to fish and other animals, as well as other ecosystem services, including attenuating ocean waves and sequestering carbon.

The pilot monitoring survey marks the first regional assessment of eelgrass beds using a [newly developed scientific framework](#) for assessing submerged aquatic vegetation (SAV) habitats; the framework was [co-developed by SCCWRP in 2020](#).

The framework will enable managers to quantitatively assess the success of eelgrass restoration and mitigation projects, including for compliance with California's eelgrass protection policy.

The framework also can help managers determine if coastal estuaries have achieved beneficial-use designations that are required under stormwater permitting and other regulatory programs.



Researchers have begun assessing the health of eelgrass beds across Southern California, including this one in Newport Bay in Orange County, above, using a new, bioassessment-based monitoring approach that focuses on evaluating ecological functioning, instead of just documenting habitat locations and sizes.

Eventually, the framework could be adopted and incorporated into routine seagrass monitoring programs, including California's estuarine Marine Protected Areas (MPA) program.

Eelgrass beds, which are scattered across shallow, soft-bottom coastal areas of Southern California, are the dominant type of seagrass found in California's coastal embayments. California has invested significant resources into restoring and protecting these fragile ecosystems.

The bioassessment-based monitoring design is the realization of the third of three tiers of the SAV habitat assessment framework. The first and second tiers focus on quantifying the extent and health, respectively, of eelgrass beds relative to what they would be in the absence of human activities. The first tier is currently in development; the second tier, which has not yet been developed, will likely move forward once the third tier is completed.

Researchers will start the bioassessment-based monitoring survey by creating comprehensive maps of all eelgrass beds across Southern California's estuaries and embayments, using both existing maps and field surveys. Then, SCUBA diver teams will collect a suite of monitoring data at these sites, focusing on the eelgrass bed's ability to provide habitat for fish and crustaceans.

Researchers' goal is to build long-term capacity within the State Water Board, Regional Boards and other management agencies for conducting routine, bioassessment-based monitoring of eelgrass beds – initially in Southern California, and eventually statewide.

A management advisory committee is helping to guide the monitoring survey's design and implementation, including development of a web-based interface to provide access to the monitoring data, including via data visualization tools, and the ability to submit future data sets.

For more information, contact Dr. [David Gillett](#).

Special journal issue highlights statewide stream flow management framework

A new scientific framework intended to bring standardization and technical rigor to the process of determining environmental flow needs for California streams is prominently featured in a special issue of a peer-reviewed journal – a key milestone in ongoing efforts by SCCWRP and its partners to promote more widespread management adoption of the framework.

The [special issue of *Frontiers in Environmental Science*](#) – made up of 20 open-access articles being published in phases through this summer – includes seven journal articles that describe the California Environmental Flows Framework (CEFF), a methodical, multi-step process for determining the magnitude, duration and frequency of stream flows needed to protect ecological integrity, recreational opportunities and other beneficial uses.

The CEFF-focused articles include an overview of the CEFF development process, as well as the findings of two

SCCWRP-facilitated Southern California case studies that used the framework to build a technical foundation for updating flow management practices in the [Los Angeles River](#) and [southern Orange County streams](#), respectively.

The special journal issue, titled “Environmental Flows in an Uncertain Future” and co-edited by SCCWRP, represents the successful culmination of the scientific peer review process for CEFF.

The development of the framework follows more than a decade of scientific research, deliberation and debate about how to appropriately update flow management practices across drought-prone California.

Historically, the scientific basis for flow management has consisted of non-standardized analyses aimed at protecting the hydrologic flow needs of a single species or a single beneficial use. Managers also have tended to focus on restoring flow patterns to their natural

historical state, without necessarily considering if or how these natural flows translate into improved ecosystem functioning.

CEFF takes advances of recent advances in flow-ecology science to comprehensively redesign California’s approach to flow management. Instead of focusing narrowly on a single species or a single beneficial use, CEFF calls on managers to consider the flows needed to support stream ecosystems and processes, in addition to multiple beneficial uses. The framework also refocuses managers’ attention on protecting specific, ecologically important “functional” attributes of a stream’s flow patterns over the course of a year – as opposed to focusing on flow patterns during a specific time of the year or a single species at a specific life stage, or trying to automatically restore flows to natural, historical conditions.

In addition to journal peer review, the California Environmental Flows Framework also has undergone multiple rounds of technical and stakeholder review.

The State Water Board is planning to use the framework as the basis for deciding whether to approve a pair of Los Angeles River diversion proposals [submitted last year](#) by two City of Los Angeles divisions – the Bureau of Sanitation and the Department of Water and Power. The agencies are seeking to recycle more wastewater effluent and stormwater discharges, respectively, instead of releasing their discharges into the L.A. River.

Meanwhile, the State Water Board’s Division of Water Rights intends to use the framework as the basis for deciding how to award water rights to cannabis growers, which are requesting to divert water from California streams to support cannabis cultivation.

The 14 non-CEFF-related articles in the special issue of *Frontiers in Environmental Science* chronicle advances in



A SCCWRP-led study in the Los Angeles River, pictured above where the L.A.-Glendale Water Reclamation Plant discharges treated effluent into the river, is one of the focal points of a special issue of the journal *Frontiers in Environmental Science* that chronicles the development of a scientific framework for determining environmental flow needs for California streams. The L.A. River served as a case study during the framework’s development.

environmental flow management in other parts of the world, including the U.K. and Australia.

Significantly, all of these advances, including CEFF, share a common scientific foundation: They are all based on a holistic scientific approach to flow management

known as the Ecological Limits of Hydrologic Alteration (ELOHA) that was developed by the U.S. Environmental Protection Agency in 2010.

Once all 20 articles have been published, the journal will package all of the articles together as an e-book; all seven CEFF-

focused articles already have been published and can be [read for free online](#).

For more information, contact Dr. [Kris Taniguchi-Quan](#).

Draft science product released to support development of statewide stream policy

SCCWRP and its partners have released for public comment a draft science product that is expected to serve as the technical foundation for the State Water Board in developing a policy intended to protect the biological integrity of wadeable streams from the impacts of eutrophication and other stressors.

The draft product, released in April and [available to download online](#), consists of a statistical modeling tool and supporting analyses that will help State Water Board staff set scientifically defensible numeric thresholds for eutrophication indicators, including nutrient concentrations and algal biomass levels.

A key feature of the modeling tool is that it gives State Water Board staff options for setting numeric thresholds, based on how much confidence managers want in the likelihood that the thresholds will be sufficient to protect stream biointegrity.

The draft science product is the culmination of nearly six years of research and review by the State Water Board, project stakeholders, and international experts in stream ecology and biogeochemistry.

State Water Board staff will consider use of the science product in the coming years to [develop an amendment](#) to the existing Inland Waters and Estuaries policy to protect aquatic life and other stream beneficial uses from the biostimulatory impacts of eutrophication and other stressors.

The science product can be useful to California's Regional Water Quality Control Boards should they decide to

develop region-specific biostimulatory policies and management programs.

A stakeholder advisory group meeting has been scheduled for June 29, 2022 to solicit stakeholder feedback on the draft product and to provide an overview of the State Water Board's intended uses for the science product.

The SCCWRP-developed statistical modeling tool evaluates the response of three stream bioassessment scoring tools to a range of nitrogen, phosphorus, and

algal abundance levels at more than 1,250 sites across California. The three bioassessment tools, which were co-developed by SCCWRP to stream biointegrity, consist of the invertebrate-based [California Stream Condition Index](#) and two [Algal Stream Condition Indices](#) based on diatoms and a hybrid of diatoms and soft-bodied algae, respectively.

Researchers also completed additional lines of analysis – including an evaluation of eutrophication indicators at stream reference sites – to help managers avoid



SCCWRP has developed a statistical modeling tool and supporting analyses to help State Water Board staff set scientifically defensible numeric thresholds for eutrophication indicators in streams, including nutrient concentrations and algal biomass levels. Above, a SCCWRP field crew wades into the Santa Margarita River, a river spanning Riverside and San Diego Counties that is prone to ecologically disruptive algal bloom events.

selecting biostimulatory thresholds that are lower than natural background levels.

Finally, to demonstrate how the modeling tool could be applied by managers to inform choice of nutrient or algal biomass level as a water-quality goal, researchers also estimated what portion of California stream sites have total nitrogen levels that are in excess of a hypothetical threshold

that would provide 80% probability of protecting stream biointegrity.

Under this scenario, 37% of California stream sites would exceed the threshold, with exceedances disproportionately concentrated in the agriculture-dominated Central Valley (76%) and highly urbanized coastal Southern California (68%).

The June 29, 2022 stakeholder informational meeting will be held via webinar; to participate, contact [Joseph Westhouse](#) with the State Water Board.

For more information on the science product, contact Dr. [Raphael Mazor](#) or Dr. [Martha Sutula](#).

Updates by Thematic Area

SCCWRP Research Themes **BIOASSESSMENT** • **ECOHYDROLOGY** • **EUTROPHICATION** • **CLIMATE CHANGE** • **CONTAMINANTS OF EMERGING CONCERN** • **MICROBIAL WATER QUALITY** • **STORMWATER BMPs** • **REGIONAL MONITORING**

BIOASSESSMENT

Tool developed to help watershed managers prioritize among multiple stream restoration, protection projects

SCCWRP and its partners have developed a set of tools to help California watershed managers identify watershed restoration and protection projects that are most likely to achieve the greatest improvements to stream health and optimally benefit communities disproportionately affected by stream degradation.

The set of statewide tools, released in April and described in a [SCCWRP technical report](#), provides a systematic way for watershed managers to take advantage of existing data – including stream bioassessment data from statewide databases, and maps of areas subject to a variety of landscape stressors – to prioritize among multiple potential restoration and protection projects across a watershed.

The tool set is designed to particularly useful for conducting screening-level prioritization exercises for watersheds that lack a critical mass of detailed, site-specific investigations.

As part of the tool's development, researchers demonstrated how to apply

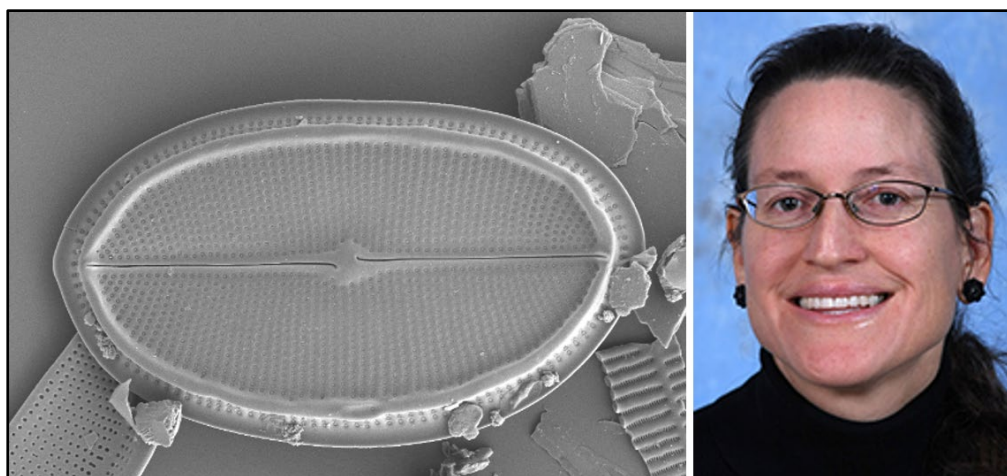
the tools in six pilot watersheds in central and southern California, including the Ventura River, San Juan Creek and San Diego River watersheds.

Newly discovered algae species named after former SCCWRP scientist

A newly discovered species of algae has been named after former SCCWRP Senior Scientist Dr. A. Elizabeth "Betty" Fetscher in recognition of her decades of contributions to the field of algae taxonomy.

Algae researcher Dr. Rosalina Stancheva of California State University, San Marcos, who discovered the new species, named it *Cocconeis fetscheriana* and explained that it is characterized by a "closed and uninterrupted" ring that connects the organism's frustule valves – "a symbol of Betty's devotion to SWAMP and scientific eternity," Stancheva said in announcing the species' name at an annual algal taxonomy seminar hosted by SCCWRP.

Fetscher, who worked at SCCWRP from 2003 to 2015, was a key champion in statewide efforts to begin using algae as a bioassessment tool for monitoring water body health. She spearheaded



A newly discovered species of algae has been named *Cocconeis fetscheriana* in honor of former SCCWRP Senior Scientist Dr. Betty Fetscher, who was a champion of statewide efforts to use algae as a bioassessment tool for monitoring water body health. Fetscher worked at SCCWRP from 2003 to 2015, then for the San Diego Regional Water Quality Control Board until her retirement in 2019. She passed away in 2021.

development of stream algae sampling protocols and Southern California's first algae-based stream scoring tool in 2014, as well as conducted a 2015 statewide survey of toxin-producing cyanobacteria in streams.

After leaving SCCWRP, Fetscher worked as the San Diego Region 9 Coordinator for California's Surface Water Ambient Monitoring Program (SWAMP), where she continued to support SCCWRP's efforts to develop the statewide Algal Stream Condition Index and DNA-based approaches to algal bioassessment. Fetscher retired in 2019 and passed away March 17, 2021.

ECOHYDROLOGY

Technical foundation being developed for cannabis growers to request stream flow diversions

SCCWRP and its partners have begun working to develop a scientific foundation for cannabis growers in California to demonstrate that the water they are requesting to divert from nearby streams to support cannabis cultivation does not adversely affect the streams' ecological health.

The study, initiated earlier this year, involves developing in-stream flow criteria using the recently developed California Environmental Flows Framework, as well as a suite of technical tools to assess potential ecological risks from diverting stream flows to support cannabis cultivation. Recreational marijuana was legalized in California in 2016.

The products of this work will help cannabis growers demonstrate that the individual and cumulative effects of their proposed stream flow diversions will not adversely affect the flow regimes necessary to support aquatic life and ecosystem functioning.

Researchers are initially focusing on evaluating the environmental flow needs of streams in the North Coast region of California. Eventually, the State Water Resources Control Board's Division of Water Rights intends to complete similar



Researchers are working to develop a statewide system for classifying modified channels like Morrison Creek in the Central Valley, above, based on their bed and bank material – a foundational step that will help stream managers decide if and how to apply bioassessment tools to this ubiquitous class of streams.

analyses for each of 14 regions in California.

Classification system under development to distinguish among different types of modified channels

SCCWRP and its partners have begun working to build a classification system for distinguishing among different types of modified channels in California – a foundational step toward helping stream managers decide if and how to apply bioassessment tools to this ubiquitous class of streams.

The work, launched last year, involves analyzing bioassessment scores statewide – with a focus on the Central Valley – to understand how different types of channel modifications affect the health of the streams' biological communities. Researchers also will evaluate how biostimulatory stress from eutrophication factors affects biological integrity.

From these analyses, researchers will develop a statewide system for classifying modified channels based on their bed and bank material.

The classification system is intended to provide more practical insights for managers working through the challenges associated with implementing bioassessment-based monitoring programs for modified channels.

EUTROPHICATION

Study sheds light on causes of toxin-producing cyanobacterial blooms in California lake

SCCWRP and its partners have completed a two-year study that has identified genetic and environmental factors that appear to be triggering and exacerbating toxin-producing cyanobacterial blooms in California's largest freshwater lake.

The study, completed in March, found that wind events at Clear Lake in Northern California can increase levels of nutrients and dissolved oxygen in the lake's surface layers, potentially causing toxin-producing cyanobacteria to proliferate suddenly and rapidly. The study also found that genetic markers can be used to track how the ratio of toxin-producing cyanobacteria to non-

toxin-producing cyanobacteria changes throughout a bloom event.

The insights from the Clear Lake study are expected to help managers statewide develop better-informed strategies for mitigating and preventing bloom events.

Already, researchers are planning to launch a follow-up study seeking to identify the environmental conditions that are triggering cyanobacteria to turn on and off their toxin-producing genes.

CLIMATE CHANGE

Framework evaluates how to appropriately protect streams, wetlands vulnerable to climate change

SCCWRP and its partners have developed a management framework intended to bring technical rigor and consistency to the process of evaluating when it is appropriate to allow conversion of a stream or wetland to a different type of aquatic resource to improve its long-term resiliency to climate change and other stressors.

The Aquatic Resource Type Conversion Framework, [published in March](#) as Version 2.0, reflects a growing recognition among environmental managers that aquatic resources may not be sustainable under future climate conditions, including changes in precipitation patterns that will alter the hydrologic regimes of streams and wetlands.

Thus, the framework is intended to help managers evaluate whether converting a water body to a different type of aquatic resource could result in a greater long-term environmental benefit.

The framework is expected to be particularly useful for managers responsible for implementing stream and wetland restoration projects under regulatory permitting programs, including achieving compliance with compensatory mitigation requirements.

CONTAMINANTS OF EMERGING CONCERN

Bight '18 study shows how bioanalytical screening can be used to monitor sediment contamination

SCCWRP and its partners have completed a three-year effort to demonstrate how bioanalytical screening technology can be incorporated into the Southern California Bight 2018 Regional Monitoring Program to help track the ecological impacts of CECs in coastal sediment.

The study, described in the [Bight '18 Sediment Quality Executive Synthesis](#) report published in March, involved screening Bight '18 sediment samples using a trio of bioanalytical cell assays that SCCWRP has been working to adapt for routine environmental monitoring.

Researchers found that bioanalytical screening serves as a valuable additional line of evidence to assess chemical exposure and to detect chemicals not being routinely monitored.

Moreover, bioanalytical screening can be used to help explain why sediment toxicology analyses and targeted chemistry analyses sometimes conflict. Specifically, when toxicity analyses conclude that sediment is ecologically impacted by contamination but targeted chemistry analyses reach the opposite conclusion, the discrepancy has the potential to be explained by the bioanalytical screening results, as bioanalytical screening can detect additional contaminants not measured during traditional sediment chemistry analyses.

During the study, researchers subsequently used non-targeted chemical analysis to confirm the presence of other chemicals not being measured via targeted chemistry analysis, and to identify potential toxicants.



SCCWRP's Dr. Alvina Mehinto transfers cells into assay wells for a bioanalytical screening test. Researchers have demonstrated how bioanalytical screening technology can be incorporated into a regional monitoring program to help track the ecological impacts of CECs in coastal sediment.

STORMWATER BMPs

SMC develops workplan for regional BMP performance monitoring network

The Southern California Stormwater Monitoring Coalition (SMC) has developed a detailed workplan for how it will build a new regional monitoring network to investigate the performance of a wide variety of structural stormwater BMPs (best management practices).

The SCCWRP-authored study workplan for the SMC Regional BMP Monitoring Network – expected to be finalized and published in the coming weeks – will enable the SMC to investigate a prioritized set of research questions intended to shed light on the effectiveness of structural BMPs in treating and managing contamination in runoff.

During the pilot phase, which kicked off this winter, SMC member agencies are investigating two key aspects of BMP performance: (1) what levels and types of pollutants are being removed by flow-through bioretention/biofiltration BMPs, and (2) the rates at which sediment loading into multiple types of BMPs decreases the infiltration rates of runoff.

Results from the pilot monitoring are expected to be available in summer 2023.

Performance effectiveness of two non-structural BMPs to be quantified through SMC study

The Southern California Stormwater Monitoring Coalition (SMC) has decided to quantify the performance effectiveness of two types of non-structural stormwater BMPs (best management practices) – part of a renewed focus on understanding how these ubiquitous stormwater control measures contribute to improving runoff water quality.

During a SCCWRP-facilitated workshop in March, the SMC agreed to focus initially on studying street sweeping and catch basin cleaning.



A field crew constructs a bioretention planter in Riverside County to study its mechanistic inner workings. The Southern California Stormwater Monitoring Coalition (SMC) has finalized the design of a new regional monitoring network that's being built to investigate the performance of a range of structural stormwater BMPs (best management practices), including bioretention planters.

Like other nonstructural BMPs, these two stormwater control measures have been widely incorporated into stormwater management plans across the region, despite a lack of Southern California-specific research quantifying their performance effectiveness.

SCCWRP will develop a study workplan in the coming months for the SMC's approval. In the next fiscal year, the SMC is expected to issue an RFP (request for proposals) to implement the workplan.

Data collection underway to quantify benefits of replacing turf with drought-tolerant landscaping

SCCWRP and the County of San Diego have begun the data collection phase for a study seeking to measure how much irrigation-induced runoff is eliminated when residential turf grass is replaced with drought-tolerant landscaping and a drip irrigation system.

The study, which began in 2021, represents a first-of-its-kind effort to quantify the value of turf replacements, which are a type of stormwater BMP (best management practice) designed to reduce use of irrigation water and eliminate irrigation-derived runoff.

Data collection efforts started in March in a residential community in Spring Valley. The first year of the study was spent configuring and installing a custom array of soil moisture sensors, as well as measuring the baseline infiltration capacity of the soil.

Water districts commonly offer property owners rebates and incentives for turf replacements. By assessing the potential of turf replacements to contribute to runoff water-quality goals, researchers hope to demonstrate if stormwater management agencies also should make bigger investments in these turf replacement programs.

REGIONAL MONITORING

Bight '18 publishes synthesis report summarizing Sediment Quality studies

The Southern California Bight 2018 Regional Monitoring Program (Bight '18) has published its final assessment report summarizing how sediment contamination in Southern California has impacted the overall health of coastal marine ecosystems.

The Bight '18 Sediment Quality Executive Synthesis report, which synthesizes five lines of evidence and was [published in March](#), found that sediment contamination levels remain so low across the vast majority of the coastal seafloor – 98.6% – that these areas are considered ecologically unimpacted by sediment contamination.

However, coastal embayments, particularly estuaries, remain disproportionately impacted by sediment contamination, with 67% of the assessed area of Southern California's brackish estuary seafloors and 56% of marine estuary seafloors possibly or likely impacted.

New to Bight '18 sediment quality synthesis report are brief summaries of studies examining the persistence of harmful algal toxins and the spread of trash across the coastal seafloor; both studies are closely linked to sediment quality.

SMC completes intercalibration for stream monitoring program after 2-year hiatus

The Southern California Stormwater Monitoring Coalition (SMC) has completed an in-person field intercalibration exercise for its Regional Watershed Monitoring Program that demonstrated that program participants have been able to maintain a high degree of comparability and standardization despite a two-year intercalibration hiatus.

The day-long SMC intercalibration exercise, held in March and facilitated by SCCWRP, was the first opportunity since 2019 for field crews to come together to ensure that they are generating

comparable, high-quality data sets for the SMC's regional stream monitoring program.

The annual intercalibration was canceled in 2020 and 2021 as a result of the COVID-19 pandemic, although monitoring program participants continued to collect field data on their own and SCCWRP continued to audit the performance of field crews individually.

The SMC Regional Watershed Monitoring Program [initiated its third five-year monitoring cycle](#) last year. Among the priorities for this monitoring cycle is a stream causal assessment investigation that will examine specifically why some SMC stream sites with degraded water quality score low using bioassessment-based stream scoring tools.



A field crew for the SMC's Regional Watershed Monitoring Program participates in a March 2022 intercalibration exercise in San Juan Capistrano in Orange County to ensure a high degree of comparability and standardization for the data being collected by program participants. Despite canceling the annual intercalibration exercise for the past two years due to the COVID-19 pandemic, SMC program participants continued to demonstrate proficiency in the field sampling methods.

New SCCWRP Publications

Journal Articles

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The Southern California Bight 2018 Regional Monitoring Program has published its final assessment report summarizing how sediment contamination in Southern California has impacted the overall health of coastal marine ecosystems.

Quarter in Review

Conference Presentations

Greenstein, D., A. Parks, K. McLaughlin, K. Schiff. Sediment toxicity assessment in the Southern California Bight. Society of Environmental Toxicology and Chemistry Southern California Chapter Annual Meeting. April 25-26, 2022. Ventura, CA.

Schiff, K. Making the Most of Expensive Monitoring: Informing Adaptive Watershed Management Decisions. National Stormwater Conference. April 26-29, 2022. St Petersburg, FL.

Schiff, K. Session facilitator. Flood Risk and Resilience. National Stormwater Conference. April 26-29, 2022. St Petersburg, FL.

Taniguchi-Quan, K. Workshop co-organizer. California Environmental Flows

Framework. 39th Annual Salmonid Restoration Federation Conference. April 20, 2022. Santa Cruz, CA.

Taniguchi-Quan, K. California Environmental Flows Framework (CEFF) case study in south Orange County. 39th Annual Salmonid Restoration Federation Conference. April 20, 2022. Santa Cruz, CA.

Taniguchi-Quan, K. Tool demonstration on the Functional Flows calculator R package for the California Environmental Flows Framework (CEFF). 39th Annual Salmonid Restoration Federation Conference. April 20, 2022. Santa Cruz, CA.

Thornton Hampton, L.M., H. Lowman, S. Coffin, E. Darin, H. De Frond, L. Hermabessiere, E. Miller, V.N. de Ruijter, A. Faltynkova, S. Kotar, L. Monclús, S.

Siddiqui, J. Völker, S. Brander, A.A. Koelmans, C.M. Rochman, M. Wagner, A.C. Mehinto. ToMEx: Toxicity of Microplastics Explorer. Society of Toxicology and Environmental Chemistry Southern California Chapter Annual Meeting. April 25-26, 2022. Ventura, CA.

Wong, C.S. International interlaboratory intercalibration study for microplastics in environmental media. Society of Environmental Toxicology and Chemistry Southern California Chapter Annual Meeting. April 25-26, 2022. Ventura, CA.

Conference Posters

Gouin, T., R. Ellis-Hutchings, L.M. Thornton Hampton, C.L. Lemieux, S.L. Wright. Screening and prioritization of nano- and microplastic particle toxicity

studies for evaluating human health risks—development and application of a toxicity assessment tool. Society of Toxicology Annual Meeting. March 27-31, 2022. San Diego, CA.

Mehinto, A., B. Du, E. Wenger, Z. Tian, E. Kolodziej, D. Apeti, K. Maruya. Using Cell-Bioassay and Effects Directed Analyses to Assess Sediment Quality in the Bight Region. Society of Environmental Toxicology and Chemistry Southern California Chapter Annual Meeting. April 25-26, 2022. Ventura, CA.

Other Presentations

Gillett, D. Science for Setting Sediment Organic Matter Targets for Estuaries and Embayments in California. SWAMP Bioassessment Workgroup. March 23, 2022. Via webinar.

Gillett, D. Science for Setting Sediment Organic Matter Targets for Estuaries and Embayments in California. State TMDL Roundtable. April 27, 2022. Via webinar.

Mazor, R. Biointegrity-biostimulatory response models. SWAMP Roundtable. April 12, 2022. Via webinar.

Mazor, R. Biointegrity-biostimulatory response models. SWAMP Bioassessment Workgroup. March 22, 2022. Via webinar.

Mazor, R. Modified channels presentation and training. Central Valley Regional

Water Quality Control Board. April 4, 2022. Sacramento, CA.

Mehinto, A.C. Proposed management strategies to assess chemical contaminants and microplastics in California aquatic habitats. Oregon state University, Winter Seminar Series of the Department of Fisheries, Wildlife and Conservation Sciences. March 9, 2022. Via webinar.

Schiff, K. Southern California Regional Monitoring. California State University, Fullerton. February 9, 2022. Via webinar.

Schiff, K., and M. Sutula. Research advances at SCCWRP. San Diego Regional Water Quality Control Board Meeting. March 9, 2022. Mission Viejo, CA

Stein, E. Recently completed guidance document "Framework for Evaluating Wetland and Stream Compensatory Mitigation Programs." Water Boards Water Quality Certification Roundtable Meeting. April 26, 2022. Via webinar.

Stein, E. Recently published statewide watershed prioritization tool and data set. Water Boards Water Quality Certification Roundtable Meeting. April 26, 2022. Via webinar.

Taniguchi-Quan, K. California Environmental Flows Framework case study in south Orange County. California

Environmental Flows Workgroup Meeting. February 8, 2022. Via webinar.

Taniguchi-Quan, K., E. Stein. Developing recommendations for watershed-scale flow management in south Orange County California. Water Quality Monitoring Council Meeting. February 24, 2022. Via webinar.

Taniguchi-Quan, K., S. Yarnell. California Environmental Flows Framework (CEFF): Importance of groundwater and nexus between CEFF and SGMA. North Coast Stream Flow Coalition Meeting. March 14, 2022. Via webinar.

Taniguchi-Quan, K. Managing hydrology and erosion to protect stream health. Chapman University. March 3, 2022. Via webinar.

Theroux, S. Advances in the statewide algal bioassessment program. SWAMP Bioassessment Workgroup. March 23, 2022. Via webinar.

Theroux, S. California bioassessment. California State University, San Marcos. January 31, 2022. Via webinar.

Thornton Hampton, L.M. Microplastic research to inform management strategies in California. University of Akron Williams Honors College Colloquium Webinar Series: Polymers and the Environment. March 31, 2022. Via webinar.

SCCWRP Personnel Notes

Commission and CTAG



Keith Lilley, Deputy Director of Water Resources for the Los Angeles County of Public Works, was named a Commissioner in February, replacing Daniel Lafferty, who retired. Lafferty served on the Commission for three years.



Chris Crompton, Alternate Commissioner and CTAG Representative for OC Public Works, departed the County in March. Crompton served on the Commission for 14

years and on CTAG for 17 years. His replacement has not yet been named.

Staff



Dr. **Zachary Gold**, who just completed his postdoctoral studies at the Northwest Fisheries Science Center and the University of Washington, started in early May in a

joint Scientist position with SCCWRP's Biology Department and the Scripps Institution of Oceanography. He will investigate the fate and persistence of environmental DNA in marine waters and work on strengthening collaborations between SCCWRP and the California Cooperative Oceanic Fisheries Investigations (CalCOFI) program.

Scientific Leadership

Dr. **David Gillett** has been appointed a member of the Washington Department of Ecology's Marine Benthic Index and Causal Assessment technical advisory committee.

Dr. **Alvina Mehinto** has been appointed to the Genome Canada Research Oversight Committee for the iTrackDNA: Non-Destructive Precision Genomics for Environmental Impact Tracking Project.

Dr. **Alvina Mehinto** has been appointed to the Santa Monica Bay Restoration Commission's Technical Advisory Committee.

Dr. **Kris Taniguchi-Quan** has been elected the California Environmental Flows Workgroup Ambassador for the Justice, Equity, Diversity, and Inclusion Workgroup of the California Water Quality Monitoring Council.

Dr. **Stephen Weisberg** has been appointed to the Executive Committee of the U.S. Environmental Protection Agency's Board of Scientific Counselors.



Adam Babcock, who has been working as a part-time Laboratory Assistant in the Microbiology Department since October, was promoted in March to a full-time

Research Technician. Babcock recently earned a B.S. in microbiology from California State University, Long Beach.

Syd Kotar, who worked at SCCWRP for nearly four years, starting as a Laboratory Assistant and then as a full-time Research Technician in the Chemistry Department, left SCCWRP in February to become a Research Fellow at SciTech DiploHub in Spain.



Sydney Dial, who has been working as a part-time Laboratory Assistant in the Chemistry Department since May 2021, was promoted in February to a full-time

Research Technician. Dial recently earned a B.S. in marine biology from California State University, Long Beach.

SCCWRP COMMISSIONER SPOTLIGHT

Stormwater manager gets homecoming of sorts

Until Crystal Benham was named head of San Diego County's Watershed Protection Program in February, she'd technically never worked for the program.



Crystal Benham

But for Benham, the new job feels like more of a homecoming than an unfamiliar new role. That's because Benham worked closely with Watershed Protection Program staff while employed for six years at a private consulting firm. In fact, one of her job responsibilities was managing the County's Integrated Regional Water Management (IRWM) planning initiative, which focuses on developing integrated, multi-benefit, State-funded water management projects.

"IRWM is how I got to meet so many members of my team, and how I got to learn so much about the County's municipal stormwater discharge permit and the challenges of compliance," said Benham, Program Manager for the San Diego County Watershed Protection Program. "That background knowledge really set me up for success in my current role."

In late January, Benham moved to the Watershed Protection Program from her previous County role as Group Program Manager for the Department of Parks and Recreation; she spent nearly four years there helping to lead planning efforts for various County parks projects. She also worked extensively on projects to improve water quality in the Tijuana River Valley, which allowed her to collaborate with the County's Watershed Protection Program team.

Benham replaces Todd Snyder, who left the County last fall to take a job in private consulting. Snyder served on the SCCWRP Commission for seven years and was Commission Chair at the time of his departure; Benham will serve out the rest of the Chair term.

"SCCWRP does such a good job of letting the data and science drive management outcomes," Benham said. "I'm looking forward to



Crystal Benham, right, enjoys a hike with wife Brooke in Red Rock State Park during a 2020 trip to Sedona, Arizona.

Crystal Benham

Job: Program Manager, San Diego County Watershed Protection Program (started January 2022)

SCCWRP role: Commission Chair

Prior jobs: Group Program Manager, San Diego County Department of Parks and Recreation (2018-2022); Land Use/Environmental Planner III, San Diego County Planning and Development Services (2017-2018); Planner, RMC Water and Environment consulting (2010-2016); Sustainability Planner, Cleveland National Forest Foundation (2009-2010)

Education: Master of Environmental Science and Management, University of California, Santa Barbara (2008); B.S. ecology, behavior and evolution, University of California, San Diego (2006)

Residence: San Diego

Family: Wife Brooke, a senior office assistant for the San Diego County Health and Human Services Agency; two dogs, Gus and Scout, both terrier mixes

Hometown: Santa Barbara

Hobbies: Hiking; bike riding; spending time with nieces and nephews; cooking gluten-free foods; reading books in Spanish

being part of this great effort, making sure I help move things along smoothly and allowing everyone to have a voice."

Benham discovered that her calling was in County service while she worked at as a Planner for a local consulting firm in San Diego. Although she loved the job, she realized that she was mostly being assigned projects that were already fully conceptualized and funded. Benham decided she wanted to work at the earlier stages of project development.

"I wasn't at the forefront of strategic planning," Benham said. "That's what got me thinking about moving to the County – I didn't just want to be involved in projects at the implementation end."

Benham, who grew up in an environmentally conscious family, knew from a young age she wanted to work in environmental management. She studied ecology in college, then earned her master's in environmental science and management.

When she's not working, Benham loves bike-riding; she and her wife, Brooke, also a County employee, ride to work together most days. Their favorite local biking spot is the 24-mile Bayshore Bikeway that wraps around San Diego Bay.

CTAG SPOTLIGHT

Manager helps shape stormwater over 37 years

Chris Crompton began his career in Orange County stormwater management nearly four decades ago – before the first municipal stormwater discharge permits had been developed, before groups like the California Stormwater Quality Association (CASQA) existed, before stormwater compliance was a requirement for OC Public Works.



Chris Crompton

In this time span, he's had tremendous opportunity to help shape and fashion the field. He helped negotiate the County's first stormwater discharge permits in the 1990s, as well as every subsequent one. In early 2000s, he played a leading role conceptualizing and building the regional stormwater R&D collaboration that became the Southern California Stormwater Monitoring Coalition (SMC), as well as the professional membership organization that became CASQA.

Crompton also took the lead in making OC Public Works among the earliest stormwater agency participants in the SCCWRP-facilitated Southern California Bight Regional Monitoring Program in 1998. Later, in the mid 2000s, he helped convince his colleagues at three other Southern California stormwater agencies to join SCCWRP as member agencies.

"You get hooked on stormwater – it's complex and challenging and nothing is cookie cutter," said Crompton, who departed OC Public Works in March after 37 years of County service. "But at the end of the day, it's meaningful work. You can look back and say: 'I didn't build a widget; I helped improve the environment.'"

Crompton served for 14 years as a SCCWRP Alternate Commissioner and as his agency's first and only CTAG



Chris Crompton celebrates at the finish line of the New York City Marathon, which he ran in 2019.

Chris Crompton

Job: Former Manager for OC Public Works' North Orange County Watershed Management Area (departed in March)

SCCWRP role: CTAG Representative for 17 years (2005-2022); Alternate Commissioner for 14 years (2007-2022)

Prior jobs: 37 years with OC Public Works (1985-2022), starting with monitoring and pollution response before becoming a manager, a position he held for over 30 years, the last being Manager of the North OC Watershed Management Area

Education: B.S. biological science and post-graduate education, University of Nottingham

Residence: Orange

Family: Wife Sue, a retired information systems manager; son Jordan, owner of a film marketing company; daughter-in-law and two grandchildren, 1 and 3; two playful cats

Hometown: Braunton, a village in southwestern England

Hobbies: Beach and trail running; running in marathons and half-marathons; photography; garden improvement projects; traveling

Representative, a role he held for 17 years. His replacement at the County has not yet been named.

Crompton has been enamored with Orange County since he applied for a temporary U.S. work visa while in college in the U.K. Crompton, who hails from a small village in southwestern England, ended up coming with friends to Santa Ana, where he spent a summer driving an ice cream truck.

"I missed everything about the life and culture in Orange County when I went back to England – I was determined to come back," Crompton said.

After graduating college, Crompton obtained another temporary work visa and took a job with a startup pollutant treatment firm in Santa Fe Springs. He was subsequently approved for permanent U.S. residency and joined the County in 1985.

Looking to the future, Crompton intends to stay engaged in stormwater management in different capacities, including through CASQA. He's also spending more time training for marathons and half-marathons – either at the beach or on a trail near his home in Orange. He's already competed in marathons as far away as the original marathon in Athens, Greece. Meanwhile, he and his wife, Sue, are planning a long-delayed trip to England to visit family, a cruise in Norway and a trip to Hawaii.

SCCWRP PARTNER SPOTLIGHT

Engineer building, studying pilot seaweed farm

Javier Infante was already an established aquaculture engineer in his home country of Chile when he was contacted by a Southern California research team in 2018: Could he help them build a large-scale, pilot seaweed farm in Southern California coastal waters?



Javier Infante

Infante was intrigued and immediately started interacting with the Southern California researchers to learn more. Two years later, Infante was named Principal Investigator for a three-year, federally funded project to design, build and study a 16-acre pilot seaweed farm about 4 miles off the coast of Santa Barbara.

"If someone is willing to try aquaculture farming in California, I'm there," said Infante, founder of the Chile-based Patagonia Seaweeds

aquaculture consulting firm. "California is the toughest area in the world to make aquaculture work from a regulatory and stakeholder point of view, so if we can make it work in California, we can make it work anywhere."

Among his research collaborators for the pilot seaweed farm project is SCCWRP and the University of California, Irvine, which are working together to examine the potential of offshore seaweed farms to remove nutrients from surrounding seawater and/or reduce the effects of intensifying coastal ocean acidification and hypoxia.

"There's a lot of debate about carbon capture, and maybe it won't be enough, but I love the idea of recognizing that seaweed has the potential for bioremediation," Infante said.

Infante's farm is in the middle of its second year of growing and then harvesting giant seaweed plants tethered to ropes that have



Javier Infante retrieves a type of seaweed known as sugar kelp that has been growing on ropes suspended underwater off the Faroe Islands in the North Atlantic Ocean in 2018.

Javier Infante

Job: Founder, Patagonia Seaweeds aquaculture company in Puerto Varas, Chile (2015-present); Principal Investigator, Ocean Rainforest pilot seaweed farm in Southern California (2020-present)

SCCWRP role: Research partner on cultivation of seaweed aquaculture to potentially offset Southern California ocean acidification and hypoxia

Prior jobs: CEO and Operations Manager, Consorcio Bal Biofuels in Puerto Montt, Chile (2010-2014); Independent environmental consultant (2006-2010); Associate Researcher, Pontificia Universidad Católica de Chile (2004-2006); Associate Researcher, Universidad de Antofagasta (2002-2004)

Education: M.B.A., Universidad San Sebastián in Chile (2016); bachelor's degree in aquaculture engineering, Universidad de Antofagasta in Chile (2001)

Residence: Puerto Varas, Chile

Hometown: Santiago, Chile

Family: Wife Carolina, a University of Los Lagos researcher; children Ignacia, 12, and Francisca, 10; two dogs and one cat

Hobbies: Swimming; diving; surfing; sailing; hiking

been suspended underwater. The project, which is overseen by the global Ocean Rainforest aquaculture company, has been temporarily using a smaller, rented mussel farm about a half mile from shore due to delays getting permits for its own farming site. Infante hopes they'll be able to move to the larger site this fall.

Although Infante was originally planning to relocate to Santa Barbara with his family for the duration of the project, the COVID-19 pandemic disrupted those plans; instead, he's been traveling to Santa Barbara about once a month.

Infante has been working in seaweed aquaculture for more than two decades. He initially enrolled in a field technician program for aquaculture at the Universidad de Antofagasta in Chile, then went on to earn an aquaculture engineering degree there in 2001. Before forming his own aquaculture consulting firm in 2015, Infante served as Operations Manager and later CEO for a Chilean biofuels company for five years.

A self-described lifelong mariner, Infante says he's never wavered in his career path: He was born by the ocean and, throughout his life, has spent most of his free time swimming, diving, surfing and sailing. When he visits Southern California, he makes time for surfing and hiking in Santa Barbara.

SCCWRP STAFF SPOTLIGHT

Marine biologist pivots to microplastics research

Sydney Dial graduated from Cal State Long Beach as a marine biology major, but throughout her studies, found herself more drawn to environmental contamination issues than marine organisms themselves.



Sydney Dial

After a campus laboratory that studies microplastics was unable to find a spot for her, Dial took a job working as a husbandry technician for a commercial aquarium fish breeder – a job that affirmed her desire to focus on contamination issues over aquarium work.

"I quickly found out working as an aquarist wasn't for me," Dial said of her four-month stint taking care of aquarium animals and packaging them for shipping. "I realized I

wanted to do research on contaminants – something that I felt would have more of an impact."

About a year ago, Dial was hired as a part-time Laboratory Assistant in SCCWRP's Chemistry Department, where she's been supporting a SCCWRP-facilitated effort to develop reliable, standardized methods for measuring microplastics contamination in aquatic systems. Dial's responsibilities include helping to validate, optimize and transition the new methods for routine use by environmental and drinking water management agencies across California and beyond. In April, Dial was promoted to a full-time Research Technician.

"I have learned so much over the past year – things I never thought I'd be learning," said Dial, who's become proficient in both FTIR



Sydney Dial walks with her dog, Charlie, through Colorado Lagoon in Long Beach in 2019.

Sydney Dial

Job: Research Technician, SCCWRP Chemistry Department

Prior jobs: Laboratory Assistant, SCCWRP Chemistry Department (2021-2022); Husbandry Technician, Quality Marine (2020-2021); Barista, Shift Lead, Assistant Manager, Origins Trainer, Peets Coffee & Tea (2012-2019)

Education: B.S. marine biology, California State University, Long Beach (2021)

Residence and hometown: Long Beach

Family: Boyfriend Zach, a film and television editor; dog Charlie, a basset hound mix

Hobbies: Walking with her dog along the beach; paddleboarding and kayaking; snorkeling; biking

(Fourier-transform infrared spectroscopy) and Raman spectroscopy.

In April, Dial served as an instructor for a three-day, SCCWRP-led workshop to train laboratory accreditation bodies in California's draft microplastics monitoring methods – an experience that helped her critically re-examine how the methods are constructed.

"The questions the participants were asking made us reflect on why we do and don't do certain things, and allowed us to make adjustments to the SOPs we developed," Dial said.

Dial intends to work at SCCWRP for a few years, then go back to school to earn a master's or Ph.D., possibly in data science.

Dial has had a lifelong passion for the coastal marine environment. Raised in Long Beach, she has been kayaking, biking, and taking walks along the beach since childhood. One of her fondest childhood memories is taking the ferry to Catalina Island for snorkeling.

After graduating from high school, Dial enrolled in community college to complete her prerequisites. Then, she took a few years off school to work at a coffee shop before deciding to study marine biology at Cal State Long Beach.

In college, Dial became involved in volunteer-led efforts to help restore an 18-acre tidal wetland area in Long Beach known as Colorado Lagoon. She's helped with both cleanup and planting of native plants.

"It was really motivating," she said. "From the time I started at Cal State Long Beach to when I graduated, a lot of progress was made cleaning up the lagoon and bringing it back to its former glory."

SCCWRP SCENES

Building capacity to monitor microplastics

SCCWRP hosted a three-day workshop in April to introduce laboratory accreditation agencies to California's newly developed draft methods for measuring microplastics in drinking water, including how to evaluate laboratories for basic competency in the methods. The workshop marked the first opportunity for the laboratory accreditation community to gain hands-on experience in the microplastics measurement methods, which were standardized via an [international SCCWRP-facilitated study](#). Workshop participants included assessors from the California Environmental Laboratory Accreditation Program (ELAP), as well as third-party assessor organizations from across the nation. The workshop was held in response to the release last fall of a State Water Resources Control Board [draft policy requiring drinking water agencies](#) in California to monitor microplastics for four years; California is expected to become the first entity in the world to enact a routine microplastics monitoring requirement for drinking water.

Clockwise from right: SCCWRP's Sydney Dial, left, demonstrates how to prepare drinking water samples to measure microplastics contamination during a three-day microplastics training workshop organized by SCCWRP; SCCWRP's Dr. Wayne Lao, in a pink lab coat, discusses Raman spectroscopy – one of two microplastics measurement methods that SCCWRP organized an international study to standardize; and laboratory accreditors visit the Moore Institute for Plastic Pollution Research in Long Beach for a mock inspection on the final day of the workshop.

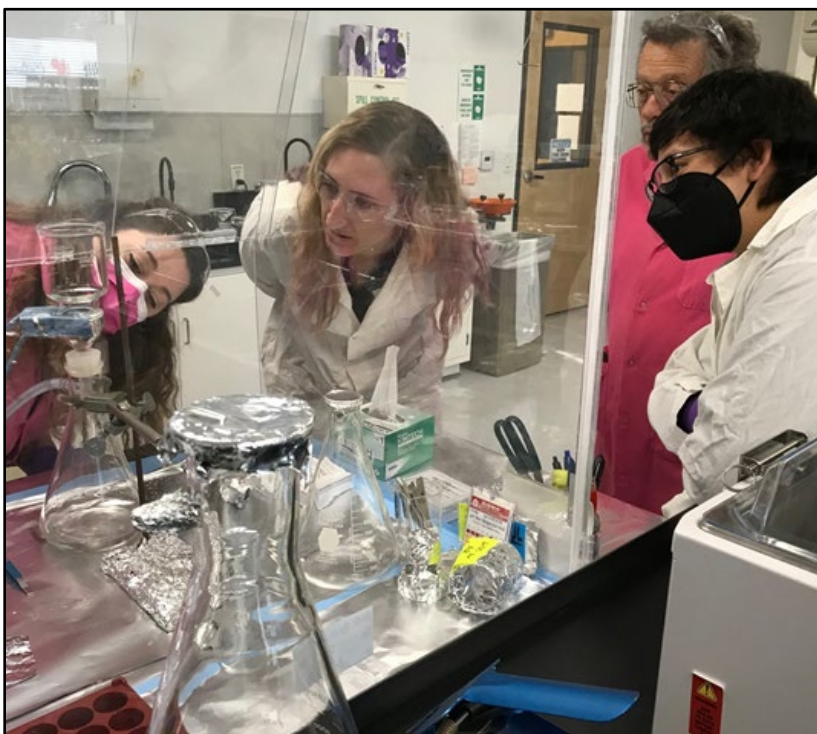


Photo courtesy of Moore Institute for Plastic Pollution Research